

KEEPING THE BUSH IN THE CITY

# BUSH FOREVER

Volume 2  
Directory of Bush Forever Sites



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# Volume 2



The Bush Forever report is the culmination of the Perth's Bushplan Project – a long-running initiative to identify and protect areas of regionally significant bushland and associated wetlands on the Swan Coastal Plain in the Perth Metropolitan Region. It was released in draft form for public comment in 1998 as *Perth's Bushplan* (Government of Western Australia 1998).

Bush Forever is in two separately bound volumes:

## **Volume 1: Policies, Principles and Processes**

This volume includes:

- implementation options, approaches and processes providing a decision-making framework for landowners, the community, local governments and State Government agencies
- a map showing the location of all Bush Forever Sites and detailed maps showing individual Bush Forever Sites and their associated site implementation recommendations
- a summary table of Bush Forever Site implementation guidelines outlining options and approaches for site implementation
- Bush Forever Site implementation recommendations assigning an implementation recommendation for each site describing zoning attributes, and site opportunities and constraints.

## **Volume 2: Directory of Bush Forever Sites**

This volume includes:

- Guide to Bush Forever Sites: an outline of the scope of the Perth's Bush Forever Project, background to its preparation, area selection, and delineation of Bush Forever Sites, and a guide to the Bush Forever Site descriptions. The guide outlines each of the categories of information used to describe the Bush Forever Sites.
- Bush Forever Site Descriptions: descriptions of each of the Bush Forever Sites arranged in six sections that reflect the major landform elements of the Swan Coastal Plain.
- References: all known sources are referenced, including geographic information systems, databases and unpublished reports.
- Appendices 1–4: the appendices contain the terms and acronyms commonly used in Volumes 1 and 2, an introductory guide to the Bush Forever Site descriptions, a table cross-referencing the Bush Forever Sites to the System 6 recommendations, and an index to all Bush Forever Site descriptions and the Bush Forever Site maps.





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# Volume 2

## CONTENTS



### PART A : GUIDE TO BUSH FOREVER SITES

<b>1. INTRODUCTION</b>	1
<b>1.1 Background</b>	1
<b>1.2 Scope and Content</b>	1
<b>1.3 Assessment of Regional Significance</b>	4
<b>1.4 Selection of Regionally Significant Bushland Areas</b>	5
Rarity	6
Planning Constraints	6
Opportunities Outside the Metropolitan Region	6
Size and Shape	6
Condition	7
Relationship to Other Areas	7
Conservation Category Wetlands	7
Ownership or Reservation Status	7
Regional Infrastructure Requirements	8
Basic Raw Materials and Titanium Minerals	8
<b>1.5 Review of Regionally Significant Bushland Areas in Response to Submissions</b>	8
<b>2. BUSH FOREVER SITES</b>	8
<b>2.1 Introduction</b>	8
<b>2.2 Bush Forever Site Boundaries</b>	8
<b>2.3 Bush Forever Site Maps</b>	11
<b>3. GUIDE TO BUSH FOREVER SITE DESCRIPTIONS</b>	11
<b>3.1 Introduction</b>	11
<b>3.2 Name and Boundary Definition</b>	14
Background	14
Information Source	15
Directory Descriptors	15
<b>3.3 SECTION 1: LOCATION INFORMATION</b>	16
Background	16
<i>Bush Forever Site Number</i>	16
<i>Area of the Bush Forever Site</i>	16
<i>Bush Forever Site Maps</i>	16
<i>Bush Forever Site Map References</i>	16
<i>Other Names</i>	16
<i>CALM Managed Lands</i>	16
<i>Local Government Area</i>	16
<i>Relationship of the Current Bush Forever Site to the Area Recognised in the System 6 Report</i>	16
Information Source	17
Directory Descriptors	17



**3.4 SECTION 2: REGIONAL INFORMATION** ..... 18

**3.4.1 Landforms and Soils** ..... 18

    Background ..... 18

    Information Source ..... 24

    Directory Descriptors ..... 24

**3.4.2 Vegetation and Flora** ..... 24

**Vegetation Complexes** ..... 24

        Background ..... 24

        Information Source ..... 26

        Directory Descriptors ..... 27

**Floristic Community Types** ..... 27

        Background..... 27

        Information Source..... 31

        Directory Descriptors..... 32

**3.4.3 Wetlands** ..... 32

**Introduction** ..... 32

**Wetland Types**..... 33

        Background..... 33

        Information Source..... 33

        Directory Descriptors..... 33

**Natural Wetland Groups (Consanguineous Suites)**..... 33

        Background..... 33

        Information Source..... 33

        Directory Descriptors..... 33

**Wetland Management Objectives**..... 38

        Background..... 38

        Information Source..... 39

        Directory Descriptors..... 39

**Environmental Protection (Swan Coastal Plain Lakes) Policy 1992**..... 39

        Background..... 39

        Information Source..... 39

        Directory Descriptors..... 39

**3.4.4 Threatened Ecological Communities** ..... 40

    Background..... 40

    Information Source..... 42

    Directory Descriptors..... 42



# Volume 2



<b>3.5 SECTION 3: SPECIFIC SITE DETAIL</b> .....	42
<b>3.5.1 Introduction</b> .....	42
<b>3.5.2 Landscape Features</b> .....	42
Directory Descriptors.....	42
<b>3.5.3 Vegetation and Flora</b> .....	42
Background .....	42
Information Source .....	43
Directory Descriptors .....	43
<b>Structural Units</b> .....	43
Background .....	43
Information Source .....	45
Directory Descriptors .....	45
<b>Scattered Native Plants</b> .....	46
<b>Vegetation Condition</b> .....	46
Background.....	46
Information Source.....	49
Directory Descriptors.....	49
<b>Total Flora</b> .....	49
Background .....	49
Information Source .....	50
Directory Descriptors .....	50
<b>Significant Flora</b> .....	51
Background .....	51
<i>Declared Rare and Priority Taxa</i> .....	56
<i>Endemic Taxa</i> .....	56
<i>Geographic Variation</i> .....	57
Information Source .....	57
Directory Descriptors .....	57
<b>3.5.4 Fauna</b> .....	58
Background .....	58
Significant Fauna .....	58
Faunal Groups .....	60
<i>Birds</i> .....	60
<i>Mammals</i> .....	64
<i>Reptiles</i> .....	69
<i>Amphibians</i> .....	69
<i>Invertebrates</i> .....	69
Information Source .....	70
Directory Descriptors .....	70





3.5.5	<b>Linkage</b> .....	71
	Background .....	71
	Information Source .....	73
	Directory Descriptors .....	73
3.5.6	<b>Other Special Attributes</b> .....	73
	Background .....	73
	Information Source .....	74
	Directory Descriptors .....	74
3.6	<b>SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE</b> .....	74
3.6.1	<b>Introduction</b> .....	74
3.6.2	<b>Wetlands of International Importance (Ramsar Wetlands)</b> .....	74
	Background .....	74
	Information Source .....	75
	Directory Descriptors .....	75
3.6.3	<b>Directory of Important Wetlands in Australia</b> .....	76
	Background .....	76
	Information Source .....	76
	Directory Descriptors .....	76
3.6.4	<b>Register of the National Estate</b> .....	77
	Background .....	77
	Information Source .....	78
	Directory Descriptors .....	78
3.6.5	<b>Migratory Bird Agreements (JAMBA and CAMBA)</b> .....	79
	Background .....	79
	Information Source .....	79
	Directory Descriptors .....	79
3.6.6	<b>Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i></b> .....	79
	Background .....	79
	Information Source .....	80
	Directory Descriptors .....	80



# Volume 2



<b>3.7 SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS</b> .....	80
<b>3.7.1 Criteria</b> .....	80
Background .....	80
Representation of Ecological Communities .....	81
Diversity .....	82
Rarity .....	83
Maintaining Ecological Processes or Natural Systems .....	83
Scientific or Evolutionary Importance .....	84
General Criteria for Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation .....	85
Criteria Not Relevant to Determination of Regional Significance, but which may be Applied When Evaluating Areas Having Similar Values .....	86
Information Source .....	86
Directory Descriptors.....	86
<b>3.7.2 Implementation Considerations</b> .....	86
Background.....	86
<b>3.7.3 Specific Site Recommendations</b> .....	91
Background.....	91
Information Source.....	91
Directory Descriptors.....	91

## MAPS

<b>Map 1:</b> The Boundaries of the Various Study Areas referred to in Volume 2 .....	3
<b>Map 2:</b> An Example of a Bush Forever Site Map .....	12
<b>Map 3:</b> Western Australian Museum specimen records showing the distribution and abundance of the Honey Possum ( <i>Tarsipes rostratus</i> ) over time .....	65
<b>Map 4:</b> Western Australian Museum specimen records showing the distribution and abundance of the Wambenger ( <i>Phascogale tapuatafa</i> ) over time .....	66
<b>Map 5:</b> Western Australian Museum specimen records showing the distribution and abundance of the Ash Grey Mouse ( <i>Pseudomys albocinereus</i> ) over time .....	67
<b>Map 6:</b> Sightings of Quenda ( <i>Isoodon obesulus</i> ) reported by the public during CALM's Bandicoot Survey 1991–1996 .....	68
<b>Map 7:</b> Existing and Potential Bushland/Wetland Linkages in the Perth Metropolitan Region .....	72

## FIGURES

<b>Figure 1:</b> Perth's Bushplan Project – Summary of Background and Content .....	2
<b>Figure 2:</b> Selection of Regionally Significant Bushland Areas .....	5
<b>Figure 3:</b> A cross-section of the Perth Metropolitan Region showing major landform elements .....	19
<b>Figure 4:</b> Distribution of the four major floristic groups (Supergroups) across the Swan Coastal Plain .....	28
<b>Figure 5:</b> Categories of vegetation information used to describe vegetation structure .....	44



## TABLES

<b>Table 1:</b> Relationship between geological and geomorphological systems identified on the Swan Coastal Plain in the Perth Metropolitan Region .....	20
<b>Table 2:</b> Relationship between geological units identified in the Environmental Geology Maps and soils described on these maps on the Swan Coastal Plain in the Perth Metropolitan Region .....	21
<b>Table 3:</b> Landform and soils Directory Descriptors with examples of the soil units associated with these .....	22
<b>Table 4:</b> Key to Environmental Geology Series Symbols .....	23
<b>Table 5:</b> Vegetation Complexes in the Perth Metropolitan Region .....	25
<b>Table 6:</b> Floristic Community Types .....	29
<b>Table 7:</b> Wetland and Estuary Definitions .....	32
<b>Table 8:</b> Natural Wetland Groups (Consanguineous Suites) .....	34
<b>Table 9:</b> Definitions of the status of the threat to ecological communities .....	40
<b>Table 10:</b> Threatened Ecological Communities on the Swan Coastal Plain in the Perth Metropolitan Region .....	41
<b>Table 11:</b> Vegetation Structural Classes .....	46
<b>Table 12:</b> Vegetation Condition Scales commonly used in the Perth Metropolitan Region .....	48
<b>Table 13:</b> Significant Flora of the Perth Metropolitan Region .....	51
<b>Table 14:</b> Threatened Fauna in the Swan Coastal Plain Portion of the Perth Metropolitan Region (Excluding Birds) .....	59
<b>Table 15:</b> Significant Birds of the Swan Coastal Plain Portion of the Perth Metropolitan Region .....	61
<b>Table 16:</b> Criteria for Identifying Wetlands of International Importance .....	75
<b>Table 17:</b> Criteria for the Register of the National Estate .....	77



# Volume 2



## **PART B: BUSH FOREVER SITE DESCRIPTIONS**

<b>1. INTRODUCTION</b> .....	93
<b>2. BUSH FOREVER SITES</b> .....	95
<b>2.1 Dandaragan Plateau</b> .....	95
2.1.1 Introduction .....	95
2.1.2 Descriptions .....	99
<b>2.2 Foothills and Pinjarra Plain (Eastern Side of the Swan Coastal Plain)</b> .....	105
2.2.1 Introduction .....	105
2.2.2 Descriptions.....	119
<b>2.3 Bassendean Dunes</b> .....	193
2.3.1 Introduction .....	193
2.3.2 Descriptions.....	203
<b>2.4 Spearwood Dunes</b> .....	291
2.4.1 Introduction .....	291
2.4.2 Descriptions.....	299
<b>2.5 Quindalup Dunes</b> .....	369
2.5.1 Introduction .....	369
2.5.2 Descriptions.....	377
<b>2.6 Estuaries, Rivers and Creeks</b> .....	405
2.6.1 Introduction .....	405
2.6.2 Descriptions.....	409
<b>REFERENCES</b> .....	445
<b>APPENDICES</b> .....	473
<b>APPENDIX 1: TERMS, ACRONYMS AND FREQUENTLY USED ABBREVIATIONS</b> .....	473
<b>APPENDIX 2: INTRODUCTORY GUIDE TO THE BUSH FOREVER SITE DESCRIPTIONS AND MAPS</b> .....	477
<b>APPENDIX 3: IMPLEMENTATION STATUS OF SYSTEM 6 RECOMMENDATION AREAS WITHIN BUSH FOREVER AND MAP OF SYSTEM 6 AREAS</b> .....	501
<b>APPENDIX 4: BUSH FOREVER SITE INDICES</b> .....	511
Site Number Index .....	513
Site Name Index .....	523





Bush Forever



# Part A

## GUIDE TO BUSH FOREVER SITES

## 1. INTRODUCTION

### 1.1 Background

Bush Forever is the culmination of the Perth's Bushplan Project (hereafter referred to as the Project). It was released for public comment in draft form in 1998 as *Perth's Bushplan* (Government of Western Australia 1998). The Project is part of a process which began in the 1970s with System 6, continued in 1993 with the establishment of the Perth Environment Project, and in 1995 with the release of the *Urban Bushland Strategy* (Government of Western Australia 1995). A key aim of these measures was to develop a strategic plan for the conservation of representative bushland and associated wetland areas on the Perth metropolitan Coastal Plain.

The general objective of the *Urban Bushland Strategy* was 'to ensure that bushland, an important aspect of the urban environment, is given proper recognition and consideration in the development of Western Australia's cities, particularly Perth'.

Central to the *Strategy* was the establishment of the Urban Bushland Advisory Group (UBAG), with representation from the Western Australian Planning Commission (WAPC), the Urban Bushland Council, local government, the Ministry of Sport and Recreation, and the Urban Development Institute of Australia, and an independent scientist. The functions of UBAG were to provide advice to WAPC on planning proposals involving urban bushland, and on the development of a strategic plan identifying areas of bushland of regional significance within the Perth Metropolitan Region (PMR). UBAG accordingly focused principally on the refinement of the bushland assessment criteria outlined in the *Urban Bushland Strategy*, and on the use of those criteria to identify regionally significant bushland.

#### Terminology

The text contains many technical terms and uses a number of common words in special ways. Words in these categories are defined in Appendix 1 and are further explained in Sections 2 and 3.

Bush Forever, as foreshadowed in the *Urban Bushland Strategy*, combines the work of several government agencies: the Department of Conservation and Land Management (CALM), the Department of Environmental Protection (DEP), the Water and Rivers Commission (WRC) and the Ministry for Planning (MfP). The contributions of agencies represented on the steering committee and broadly based technical working group established initially for the System 6 Part System 1 Update Program in developing the draft *Perth's Bushplan* are also acknowledged. The work of the Western Australian Museum is specially acknowledged. Work of the wider scientific community, local government, conservation groups, environmental consultants and community members was used when known and accessible. Section 3 in this volume details these contributions.

The continuing research and consultative programs of the principal contributing agencies are regional or state-wide in scope, but subsets of information relevant to the Perth Metropolitan Region have been selected and combined. Figure 1 shows schematically the history of the major studies of Perth's natural environment, and how the contributory programs have developed, merged and will continue. The details of these and other studies that have contributed to the identification of regionally significant bushland and associated wetland areas in the Project are found in Section 3.

### 1.2 Scope and Content

Bush Forever is concerned with the protection of regionally significant bushland and associated wetlands. It does not include areas which may be of local significance. (See Volume 1, Section 2.5.6 for undertakings with regard to locally significant areas.)

The area covered by Bush Forever is the Swan Coastal Plain portion of the Perth Metropolitan Region (Map 1), with the addition of the Wilbinga-Caraban area, immediately north of the Perth Metropolitan Region boundary. This area is included in Bush Forever as a previously



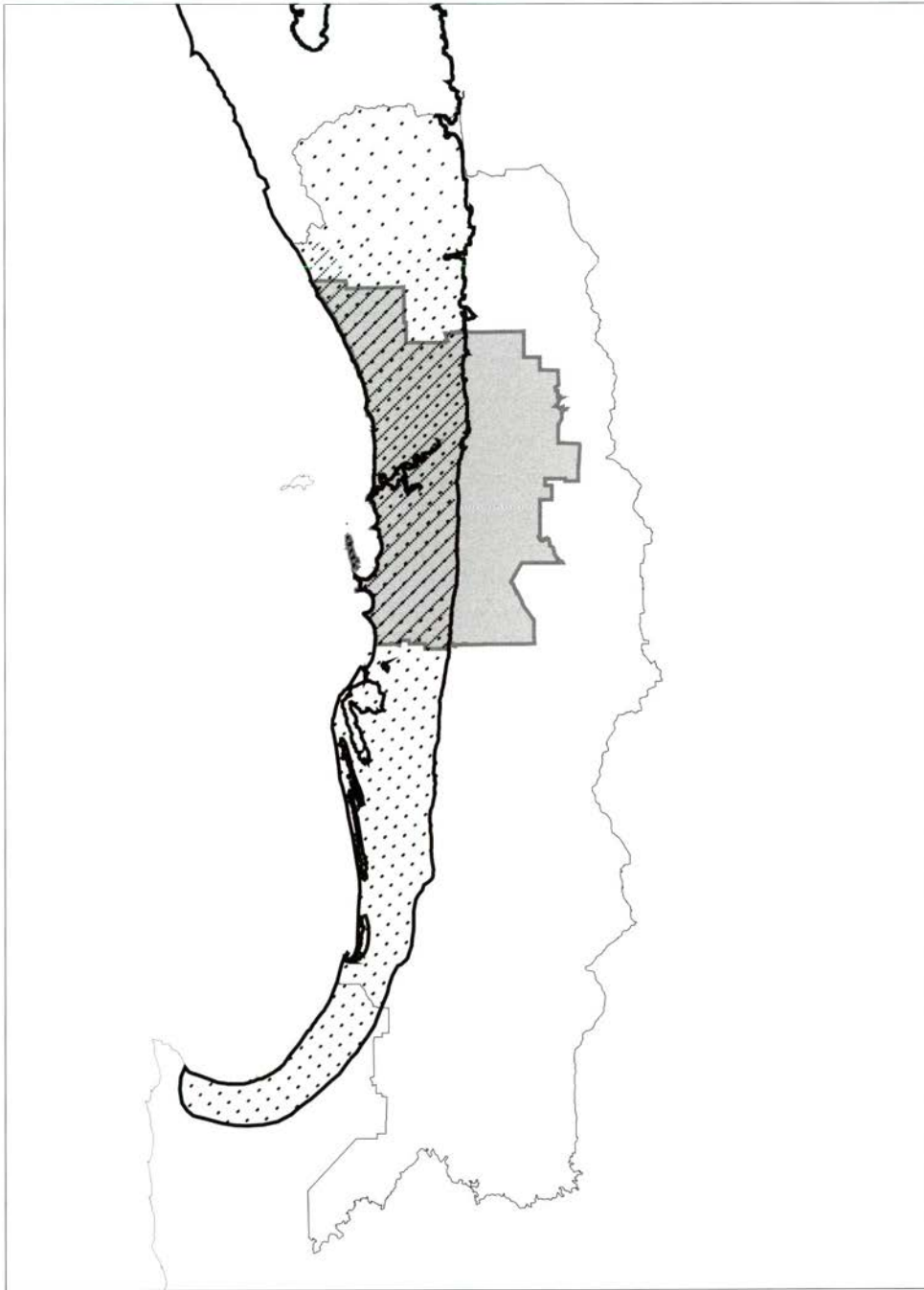








	WAPC/MfP (and precursors)	WRC (and precursors)	EPA/DEP (and precursors)	NPNCA/CALM (and precursors)
1955	Stephenson Hepburn Report			
1962	Metropolitan Region Scheme inaugurated			
1963			Australian Academy of Science Committee on National Parks	
1972			EPA established Conservation through Reserves Committee (CTRC) to review conservation reserves throughout Western Australia  CTRC reported on 11 of the 12 Systems (Red Books)	Biological Survey Program (1972 ongoing)
1980			Vegetation complex mapping (Heddle <i>et al.</i> 1980)	
1981			System 6 Green Book	
1982				Rare Flora surveys (1982 ongoing)
1983			System 6 Red Book (DCE 1983)	
1985		Wetland mapping classification and evaluation (1985-96)		
1990	METROPLAN (DPUD 1990)			
1991			Ecoplan strategy (1991 ongoing)	Floristic Survey of the Swan Coastal Plain (1991-94) (Gibson <i>et al.</i> 1994)
1993	Perth Environment Project (1993-97)		Red Book Status Report Review of status of all Systems recommendations	Threatened Ecological Communities Project (1993 ongoing) (English & Blyth 1997, 1999)
1994			System 6 and part System 1 Update initiated (including additional surveys, 1994 ongoing)	
1995	Urban Bushland Strategy (Government of WA 1997)	Water Resource Protection Strategies	System 6 and part System 1 Update Program - public submissions (DEP 1996, 1998)	
1996		Wetland mapping, classification and evaluation report. (Hill <i>et al.</i> 1996)		
1997	AGWEST vegetation mapping Greenways (Tingay 1998a)	Verification and conservation category wetlands (Semeniuk 1997)	System 6 and part System 1 Update: PMR/SCP	Gnangara Park (Bailey 1997)
<b>1998 DRAFT PERTH'S BUSHPLAN</b>				
1999	Submissions received Consideration of submissions (MfP coordination agency)			
2000	Bushplan Reference Group Report (Ministerial Committee) Submissions Report (MfP coordination agency)			
<b>BUSH FOREVER</b>				
2001	Implementation of Bush Forever (MfP lead agency)	Implementation of Bush Forever	Implementation of Bush Forever  System 6 and Part System 1 Update: other than PMR/SCP	Implementation of Bush Forever  Ongoing identification and acquisition of areas of significance.

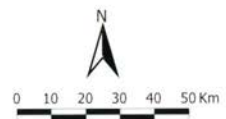
**Figure 1: Perth's Bushplan Project – Summary of major contributory programs**



# Part A



-  Bush Forever Study Area
-  Perth Metropolitan Region (MFP 1997b)
-  System 6 Region boundary\* and boundary of the vegetation complex mapping (Hedde *et al.* 1980) (\*except where north-western boundary follows the Moore River on the Swan Coastal Plain)
-  Swan Coastal Plain boundary (CALM & ANCA 1996)
-  Area of floristic survey - Gibson *et al.* 1994, System 6 Update Program (DEP 1996)
-  Additional area of floristic survey - System 6 Update Program (DEP 1996)



This map has been produced using various data from other agencies. No responsibility is accepted for any error or omission.

**Map 1: The boundaries of the various study areas referred to in Volume 2**



agreed exchange for System 6 Recommendation M1 (Two Rocks Open Space) and its protection as a Class A conservation reserve has been confirmed by the Government. That part of the Perth Metropolitan Region east of the Darling Scarp will be covered by a further study and report which will update the remainder of the Swan Coastal Plain and the System 6 region, excluding the forested and non-forested land, which was dealt with through the Regional Forest Agreement process.

Assessment of the areas considered is comprehensive and at a level of detail as precise as could be achieved within the limits imposed by the scale and date of the data capture.

Bush Forever has identified 287 Bush Forever Sites containing natural areas of regional conservation value (see Section 2). The attributes of these Sites are outlined in 236 Bush Forever Site descriptions, at times several Sites being grouped in a single description (see Section 3).

### 1.3 Assessment of Regional Significance

Taking the information from the sources summarised in Figure 1 (detailed in Section 3), an assessment was made of each area to determine whether it was, in the words of the *Urban Bushland Strategy*, 'of particular regional significance within the Perth Metropolitan Region' (Government of Western

Australia 1995a, page v). Under the Strategy, compliance with at least one of the following criteria was considered essential for bushland to be regarded as regionally significant:

- An example of regional vegetation type which is threatened or poorly reserved or a site with special value for flora and fauna conservation;
- Having considerable biological diversity or supports a population of Declared Rare Flora, Priority Flora, or Threatened Fauna;
- Vegetation in good condition or better (Connell 1995), but threatened vegetation types may be regionally significant even if in poor condition;
- Usually greater than 20ha but may be smaller in the case of threatened or poorly reserved vegetation types, or areas with special significance for other purposes.

Other matters that were taken into consideration included usefulness for passive recreation, value for educational or scientific study, cultural heritage value and linkage value.

In refining the criteria the Urban Bushland Advisory Group based its assessment of the adequacy of representation of regional vegetation types on the survival of vegetation complexes.

#### Criteria for the Selection of Regionally Significant Bushland Areas

**Representation of ecological communities:** A number of areas selected to represent the range of ecological communities and the places in which these communities merge.

**Diversity:** Areas with a high diversity of flora and/or fauna species or communities in close association.

**Rarity:** Areas containing rare or threatened communities or species, or species of restricted distribution.

**Maintaining ecological processes or natural systems:** Maintenance of ecological processes or natural systems at a regional or national scale.

**Scientific or evolutionary importance:** Areas containing evidence of evolutionary processes either as fossilised material or as relict species and areas containing unusual or important geomorphological or geological sites; Areas of recognised scientific and educational interest as reference sites or as examples of the important environmental processes at work.

**General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation:** Conservation Category Wetland areas including fringing vegetation and associated upland vegetation. Coastal vegetation within the accepted coastal management zone.

**Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values:** Attributes which taken alone do not establish regional significance, but which can add to the value of bushland and enhance its contribution to Bush Forever.

*(The criteria are fully stated and details of their application are given in this volume in Section 3.7.1.)*



# Part A



Target measures, based on the *Urban Bushland Strategy*, were set for the protection of at least 10 per cent, in accordance with guidelines set by the International Union for the Conservation of Nature (IUCN 1991), or 400ha, whichever was the larger, of each complex in at least five separate areas. Having regard for these measures, criteria developed initially for the System 6 Update were applied to refine the assessment of regional significance.

## 1.4 Selection of Regionally Significant Bushland Areas

The criteria, along with additional opportunities and constraints identified in the process outlined later in this section, were applied in selecting areas to be recommended for protection under Bush Forever. The first step in selecting areas of regional

significance (Figure 2) was to establish the total number of bushland areas likely to have conservation value or to contain bushland remnants with basic vegetation structure intact or able to be regenerated.

Initially the 'at least 10 per cent' criterion for representation of each vegetation complex (after Heddle *et al.* 1980) was applied to enable an estimate to be made of the extent to which adequate representation of each complex was possible.

Since the objective of the Project was not only to identify areas of regional significance but to provide for their protection, a further selection was made based on publicly owned or reserved land which included a conservation purpose, where the best

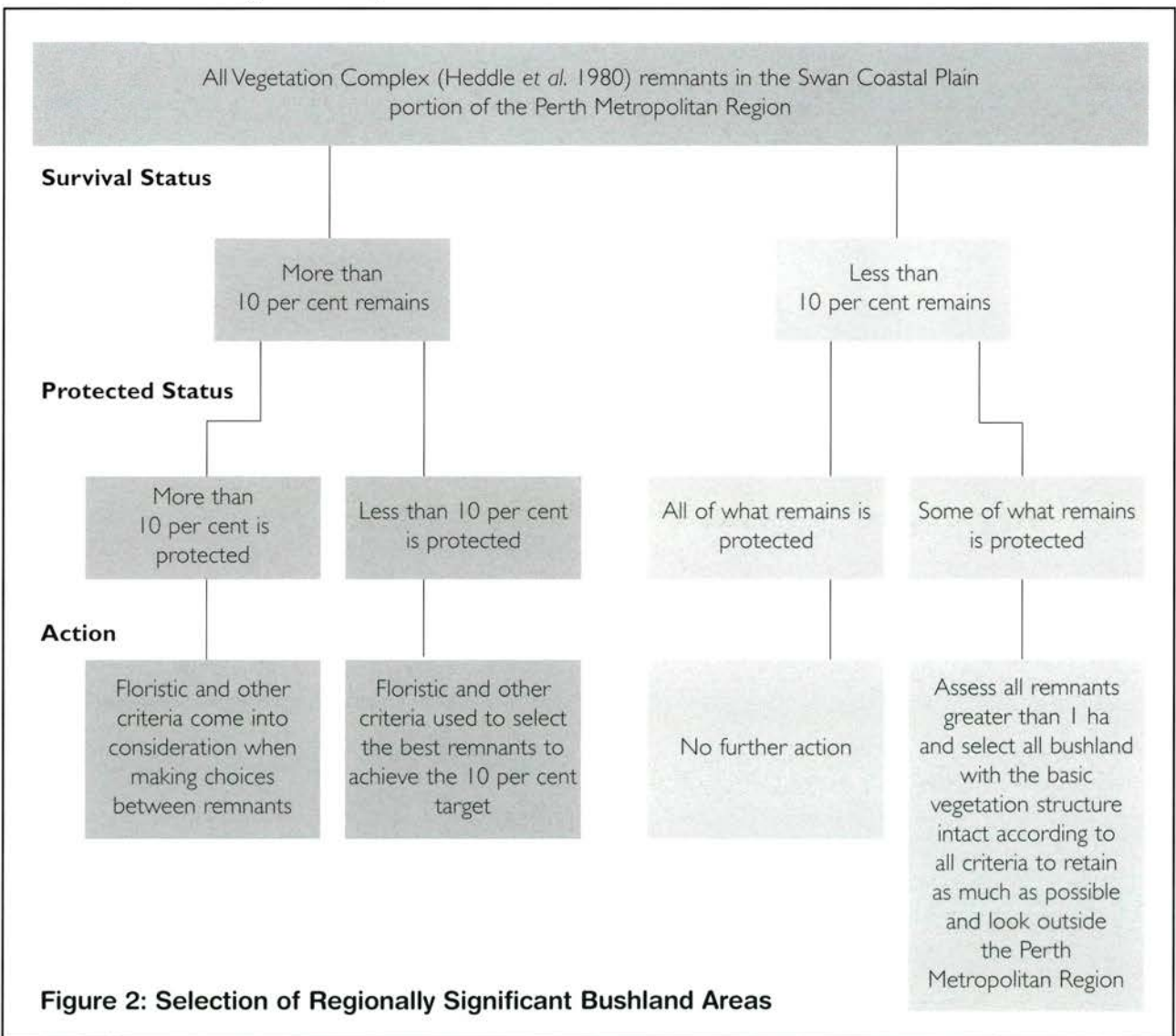


Figure 2: Selection of Regionally Significant Bushland Areas





opportunities existed for Government to institute management regimes to protect the values of the area.

Where more than 10 per cent of a complex fell into the publicly owned or reserved category and provided effective representation of the range of floristic communities and geographic distribution of the complexes, the areas identified were provisionally considered protected. The selection process then concentrated on complexes for which less than 10 per cent of the remnant area had some degree of protection.

Further refinement of the choice of areas to be recommended was based on the assessment criteria (Sections 1.3 and 3.7.1). In some cases areas were identified over the 10 per cent minimum target where a site contained regional attributes not well represented in other areas, or where conservation was compatible with an area's productive use, such as groundwater protection.

Final choices were moderated by considerations which included the following:

### **Rarity**

For those vegetation complexes where less than 10 per cent of bushland remained, all areas were considered. Most complexes in this category were on the eastern side of the Coastal Plain (Map 2, Volume 1), where the bushland is highly fragmented and the remnants too numerous to be individually assessed at the strategic level of the Project. Many of these remnants were likely, under the Rarity criterion, to be regionally significant. While they are not the subject of individual recommendations in Volume 2, they are covered by a specific policy statement (Volume 1, Policy Statement) that there be a presumption against clearing bushland containing threatened ecological communities or representing vegetation complexes of which less than 10 per cent currently remains in the metropolitan area.

### **Planning Constraints**

An important objective of the Project was to recognise and take into account the values of natural areas in the planning process, but the selection process had also to recognise existing land use proposals. Hence, for example, publicly owned areas were preferred to those in private ownership; and, if privately owned, land zoned Rural was preferred to that zoned Urban, where opportunities to use complementary mechanisms were more restricted. No categories of land were automatically excluded from consideration, but where lands were significantly constrained by existing zonings or development approvals, alternative selections were made where possible.

### **Opportunities Outside the Perth Metropolitan Region**

The Project focuses on the metropolitan portion of the Swan Coastal Plain; however, this is essentially an administrative boundary, representing only a portion of the Swan Coastal Plain Biogeographical Region, which extends from Jurien to Dunsborough. The possibilities for protecting additional areas, or to identify substitute areas outside the Perth Metropolitan Region to secure the desired minimum 10 per cent representation of complexes, were taken into consideration in the selection of areas and will be investigated as Bush Forever is implemented, particularly through the Peel and Bunbury regional planning processes and the ongoing System 6 and Part System 1 Update Program. As well as being necessary to achieve the 10 per cent target in some cases, looking beyond the Perth Metropolitan Region can also allow some flexibility in allocating limited financial resources to achieve the best conservation value for the community's investment. However, since the characteristics of a particular complex will vary along its extent and with specific soil and moisture characteristics, replacement is not simply a matter of area-for-area exchange.

### **Size and Shape**

Size is of key importance in determining the viability of natural areas for conservation purposes. In general, the capacity of an area to support the full



# Part A



species range of a given vegetation type will diminish with decreasing size. Shape determines the ratio of perimeter to area, the ratio being greater in more elongate patches. Elongate remnants may have value as connecting links, but the more extended they are and the longer their interfaces with non-conservative areas, the greater will be their susceptibility to weed invasion and disturbance.

Area selection was guided by the following general principles:

- a large remnant is preferable to a small one;
- a compact shape is preferable to an irregular or an elongate shape;
- several replicates across the range of a community type or complex are preferable to a single area, 5 – 10 being optimal; and
- areas close to others or linked by corridors are preferable to isolated ones.

The lower size limit of 20ha given in the *Urban Bushland Strategy* was accepted as a general guide, but smaller areas were considered in cases where a vegetation complex or community was seriously threatened or poorly reserved (less than 10 per cent protected). Account was also taken of evidence from recent observations through comprehensive regional survey programs which indicates that very small areas on certain soil types are resistant to weed invasion, the appropriate management practice being simply to fence and avoid disturbing influences.

## Condition

Remnants in largely undisturbed condition were preferred; remnants with basic vegetation structure intact were selected as the next best alternative. However, in cases where no other choices were available, remnants in lesser condition but able to be regenerated were included.

## Relationship to Other Areas

The importance of looking at the region's bushland as an integrated system was recognised, and the maintenance or establishment of linkage corridors was given a high priority.

## Conservation Category Wetlands

The focus of wetland protection within this project has been on Conservation Category Wetlands (CCWs), the continued presence, condition and boundaries of which have been verified through reviews in 1997 (Semeniuk, V&C Research Group 1997) and 2000 (ATA Environmental 2000, *ecologia* 2000). Wetlands in this management category were included within a Bush Forever Site where they contained regionally significant bushland and/or formed an integral part of a Site. There are many other Conservation Category Wetlands which are outside the areas selected in Bush Forever (see Volume 1, Map 5 and Site maps 1– 83).

The Government is committed to the improved conservation of metropolitan Perth's wetlands through a separate wetland protection statement (Government of Western Australia 1997). Particularly important is the current review and revision of the *Environmental Protection (Swan Coastal Lakes) Policy* (Government of Western Australia 1992c). The *Environmental Protection (Swan-Canning Rivers) Policy* (Government of Western Australia 1998b) also contains provisions relating to the protection of native fringing vegetation and its associated functions and values as does the Statement of Planning Policy No. 6 - *Jandakot Groundwater Protection Policy* (Government of Western Australia 1998). These policies give effect to the overall *Wetlands Conservation Policy for Western Australia* (Government of Western Australia 1997) as far as the Perth Metropolitan Region is concerned.

## Ownership or Reservation Status

Recommended areas fell into a range of categories: land reserved for conservation purposes or purposes potentially compatible with conservation; Crown land reserved for other purposes; local government reserves; Government (including Commonwealth) freehold lands; and privately owned land under various zonings. Specific ownership details for each Bush Forever Site have been identified in Volume 1.





## Regional Infrastructure Requirements

Account was also taken of regional infrastructure requirements such as roads, railways and main public utility services. A number of Bush Forever Sites include land that has been identified for regional road requirements. Conservation of these areas, shown on Map 1 (Volume 1) is constrained to varying degrees depending on the stage to which the planning and implementation of the road has proceeded.

## Basic Raw Materials and Titanium Minerals

As previously mentioned, no vegetated area was automatically excluded from consideration; however, Bush Forever recognises the importance of the extractive and mining industries in the context of broader community considerations. A limited number of Bush Forever Sites fall within some of the strategic resource policy areas in the Draft Statement of Planning Policy No. 10 Basic Raw Materials (WAPC 1999).

### 1.5 Review of Regionally Significant Bushland Areas in Response to Submissions

Two thousand and four submissions were received commenting on the draft *Perth's Bushplan* (MfP 2000). These included requests for the deletion from and addition to the area of regionally significant bushland and associated wetlands recognised for protection in the draft *Perth's Bushplan*. Within the constraints of the time-frame for the release of Bush Forever these were considered through individual botanical survey. The nature of this survey was dependent on the type of the submission and the level of survey done for the draft *Perth's Bushplan*. As a consequence this part Site survey had one or a combination of the following aims:

- General liaison with land owners to outline and discuss values of the regionally significant bushland and associated wetlands in the area of the Site on their land;
- Boundary verification when the area and/or individual property had not been subject to individual survey (part of a Site where the boundaries were based on the native vegetation

mapping (AGWEST 1998 GIS) sometimes supported by edge inspection). In each case the location and boundaries of regionally significant bushland were confirmed or modified in response to the survey;

- Vegetation unit verification to identify vegetation units in the area and/or individual property in terms of the Site description. When vegetation units were not identified in the Site description (draft *Perth's Bushplan* Volume 2B) any additional units were described.

When an area of native vegetation was proposed for addition or removal, the bushland was described and considered against the Selection Criteria (Section 3.7.1). Bushland areas which met the necessary criteria for recognition as regionally significant bushland were then subject to the additional factors outlined above (Section 1.4).

## 2. BUSH FOREVER SITES

### 2.1 Introduction

Bush Forever identifies a series of Bush Forever Sites on the Swan Coastal Plain (SCP) portion of the Perth Metropolitan Region that contain natural areas of regional conservation value (Map 1). These Sites were identified on their bushland and wetland conservation values as outlined in Sections 1.4 and 1.5 (this volume). This directory gives details of the location, boundaries and natural attributes of each of the Sites. All of the Sites are mapped in Map 1 and Site maps 1–83 of Volume 1.

### 2.2 Bush Forever Site Boundaries

The Bush Forever Site boundaries circumscribe areas of regionally significant bushland and associated wetlands. Bushland is defined as: 'land on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation, and provides the necessary habitat for fauna' (after Keighery, BJ, and Gray 1993, and Connell 1995, adapted from the Government of New South Wales State Environmental Planning Policy No. 19 — Bushland in Urban Areas).



# Part A

Areas of native vegetation where the structure and the floristics have been altered to the extent that the vegetation cannot practically be restored to be 'representative of the structure and floristics of the natural vegetation' are not considered bushland (see Section 3.5.3 Vegetation Condition). While these areas have conservation value, as they provide habitat for some fauna, they are not generally considered the prime conservation areas.

The initial bushland mapping by MfP was done as part of the Perth Environment Project (PEP) and was based on the interpretation of 1989 – 1993 1:20 000 aerial photography (Dixon *et al.* 1994). The approximate extent of the bushland remnants was drawn on 1:10 000 base maps and entered into a computer-based geographic information system (GIS). Combined SPOT (from 22 January 1993) and LANDSAT (from 6 April 1993) satellite images were classified to assist interpretation. The 1:10 000 computer maps were checked in the field and updated between September and December 1994. The field check involved checking the accuracy of the bushland mapping and collecting mapping information on vegetation condition (see Section 3.5.3 Vegetation Condition). A further review of the data was made from January 1996 1:20 000 aerial photography (MfP GIS 1996).

Since 1995 two local government studies, City of Gosnells (Trudgen and Keighery 1995) and City of Wanneroo (Trudgen 1996), have used the MfP remnant bushland mapping of the Perth Metropolitan Region as the base for documentation of the bushland within the local government area. These studies have involved further, more recent, aerial photography interpretation and extensive (Gosnells) to limited (Wanneroo) ground-truthing. As would be expected, these studies found some discrepancies between the local government and Perth Metropolitan Region mapping related to misinterpretation, clearing and changed land use (leading to condition changes). MfP found similar discrepancies between the 1995 MfP remnant bushland map and the 1996 review.

A final review of the base mapping was done by Agriculture Western Australia (AGWEST 1998 GIS) from the first digital colour orthophotography of the

Perth Metropolitan Region produced by the Department of Land Administration (DOLA). This digital colour orthophotography allows for a more accurate location of vegetation, as the boundaries can be interpreted at a resolution of +/- 1 metre. This improves on the +/- 30 metres resolution of the base SPOT/LANDSAT image used in 1995 and updated in 1996 and allows for more accurate location of bushland areas.

AGWEST Spatial Resource Information Group has mapped vegetation throughout the south-west of Western Australia. Three basic vegetation classes (Beeston *et al.* 1995) were mapped from visual interpretation of aerial photographs. These three classes are:

#### Remnant vegetation

- most closely resembles the natural state of vegetation for a given area
- most similar to identifiable remnant areas of similar vegetation types
- understorey intact
- of the greatest structural diversity/complexity in comparison to disturbed vegetation in the region
- minimal disturbance by agents of human activity;

#### Modified vegetation

- degraded understorey
- obvious human disturbance
- saline incursions
- high perimeter-to-area ratio
- narrow corridors of vegetation along roads, railway lines;

#### Scattered trees

- cleared parkland
- no canopy continuity
- no significant opportunity for regeneration.

These classes can be further divided into more descriptive units. Fifteen units were used by Van Gool (1994) in the mapping of the Peel-Harvey Catchment Area.





AGWEST mapping for the Project is based on the visual interpretation of the 1997–1998 digital colour orthophotos (DOLA 1998 GIS, provided by the Land Information Branch at MfP) or black and white orthophotos for the same period where colour images were not available. The vegetation was digitised directly from 3.8 × 3.5 digital orthophoto images with 1-metre resolution using Intergraph™ IRASC software.

Vegetation was mapped where its condition was considered to fall into either the 'remnant' or 'modified' vegetation classes. For the purposes of the Project, vegetation in this context is termed 'native vegetation' (see Volume 1, Map 1 and Bush Forever Site maps 1–83). Vegetation in the 'scattered trees' class has not been mapped. It is intended that sub-categories similar to those mapped by Van Gool (1994) will be mapped at a later stage.

Of the 4,565 individual bushland areas (polygons) mapped by AGWEST, 1,880 (i.e. 41 per cent) represent vegetation remnants not mapped previously. These discrepancies between the AGWEST vegetation mapping and the MfP bushland mapping are related to a series of factors such as resolution of the photography, differences in the mapping units (native vegetation versus bushland), misinterpretation and condition changes (for example, regrowth after partial clearing and/or fire).

The AGWEST vegetation mapping is shown as the base vegetation mapping used in Volume 1, Map 1 and Site maps 1–83). However, the selection of regionally significant bushland areas, was based on the 1995 MfP ground-truthed remnant bushland mapping, as updated in 1996 (MfP 1996 GIS). As a consequence the Bush Forever Site boundaries shown in Volume 1, Map 1 and Site maps 1–83 were determined by comparing:

- AGWEST vegetation mapping
- 1995 MfP ground-truthed remnant bushland mapping, as updated in 1996 (MfP 1996 GIS)
- 1997 Metropolitan Street Directory aerial photography and 1997 Perth Metropolitan Region digital colour orthophotography
- DEP survey records (DEP 1996, 1998, 1999, 2000)

- the boundaries of Conservation Category Wetlands (Hill *et al.* 1996b) and verified Conservation Category Wetlands (after Semeniuk, V&C Research Group 1997, ATA Environmental 2000, *ecologia* 2000; see Section 3.4.3 for a description of these two categories).

At times there were discrepancies between the mapped vegetation (AGWEST 1998 GIS) and survey records of bushland areas in the Bush Forever Site (for example Site 74). In these cases Site boundaries were drawn to reflect the survey records. As time permits the AGWEST mapping will be amended to account for this.

While boundaries of the Bush Forever Sites are as accurate as possible and the mapped vegetation for the Perth Metropolitan Region (Volume 1, Map 1 and Site maps 1–83) is a good guide, a detailed determination of the bushland boundaries depends on individual ground-truthing of each bushland boundary. Individual ground-truthing of some bushland boundaries has occurred since the release of the draft *Perth's Bushplan* in response to individual submissions.

The final determination of boundaries of the area to be identified and managed for conservation will involve consideration of:

- individual area ground-truthing of bushland boundaries
- management design criteria such as
  - reduction of the bushland edge-to-area ratio
  - establishment of a foreshore reserve or management buffer area
  - connectivity with other Sites and natural areas
- cadastral boundaries
- existing planning constraints.



# Part A

## 2.3 Bush Forever Site Maps

A series of 83 coloured maps has been produced to show the Bush Forever Sites. These maps can be found at the end of Volume 1 (see Volume 1, Bush Forever Site maps 1–83). Map 2 (and legend) of this volume is an example. The Bush Forever Site Index (Appendix 4 of this volume) cross-references the Site number to the pages on which the relevant Site description (Part B of this volume) and map (in Volume 1) may be found.

The map legend lists each category of mapped information (see Map 2 legend). Further information on each of these categories can be obtained by reference to the relevant sections of Bush Forever, Volumes 1 and 2.

For efficiency of space a non-standard map grid at a scale of 1:35 000 is used. This can be related to the Streetsmart 2001 Street Directory maps by using the overlay of the Bush Forever site map grid on the Street Directory map grid shown in the legend. These overlaid grids and the map sheet series reference number(s) listed for each Site in the descriptions allow for cross-referencing to the standard map sheet series used in the Australian 1:25 000 Topographic Survey.

Layers of mapped information have been overlaid on the Bush Forever Site maps to define each Site and individual lots within each Site, namely: Bush Forever Site boundaries, Site number (the arbitrary number assigned to each Site for identification in Bush Forever), mapped vegetation (AGWEST 1998 GIS), cadastre (DOLA 1998 GIS), implementation category (after Volume 1, Section 2) and mapped Conservation Category Wetlands (WRC 2000 GIS).

When mapped information sets (data sets) are overlaid in this way there can be some discrepancy between boundaries, the magnitude of this discrepancy being related to the resolution of each data set. The original SPOT/LANDSAT image used for the base of the MfP bushland mapping can be interpreted at resolutions of +/- 30 metres compared with the +/- 1 metre resolution of the base digital colour orthophotography of the AGWEST native vegetation mapping. Using the AGWEST native vegetation mapping as the base vegetation data set facilitates a more accurate identification of other mapped data sets with the

individual regionally significant bushland areas. For the Project mapped data sets have been used to source information on cadastre (lot numbers, reserve status, street name), zoning, landform and soil, vegetation complex, floristic community type, wetland type, natural wetland group, wetland management objective, lakes subject to the *Environmental Protection (Swan Coastal Plain Lakes) 1992 Policy*, threatened ecological communities and Declared Rare Flora and Priority Flora. Details of each of these categories of information are given in Section 3 (natural attribute information) or Volume 1 (planning and implementation information).

## 3. GUIDE TO BUSH FOREVER SITE DESCRIPTIONS

### 3.1 Introduction

Bush Forever Sites are described according to the regional and individual attributes of the bushland and wetlands identified within the Site boundaries.

A standard format was developed to provide comparable descriptions of each Bush Forever Site, the descriptions being ordered in the following broad categories:

#### Name

All the Bush Forever Sites have been named.

#### Boundary Definition

Identified boundary category/categories used to define the Bush Forever Site boundary are listed.

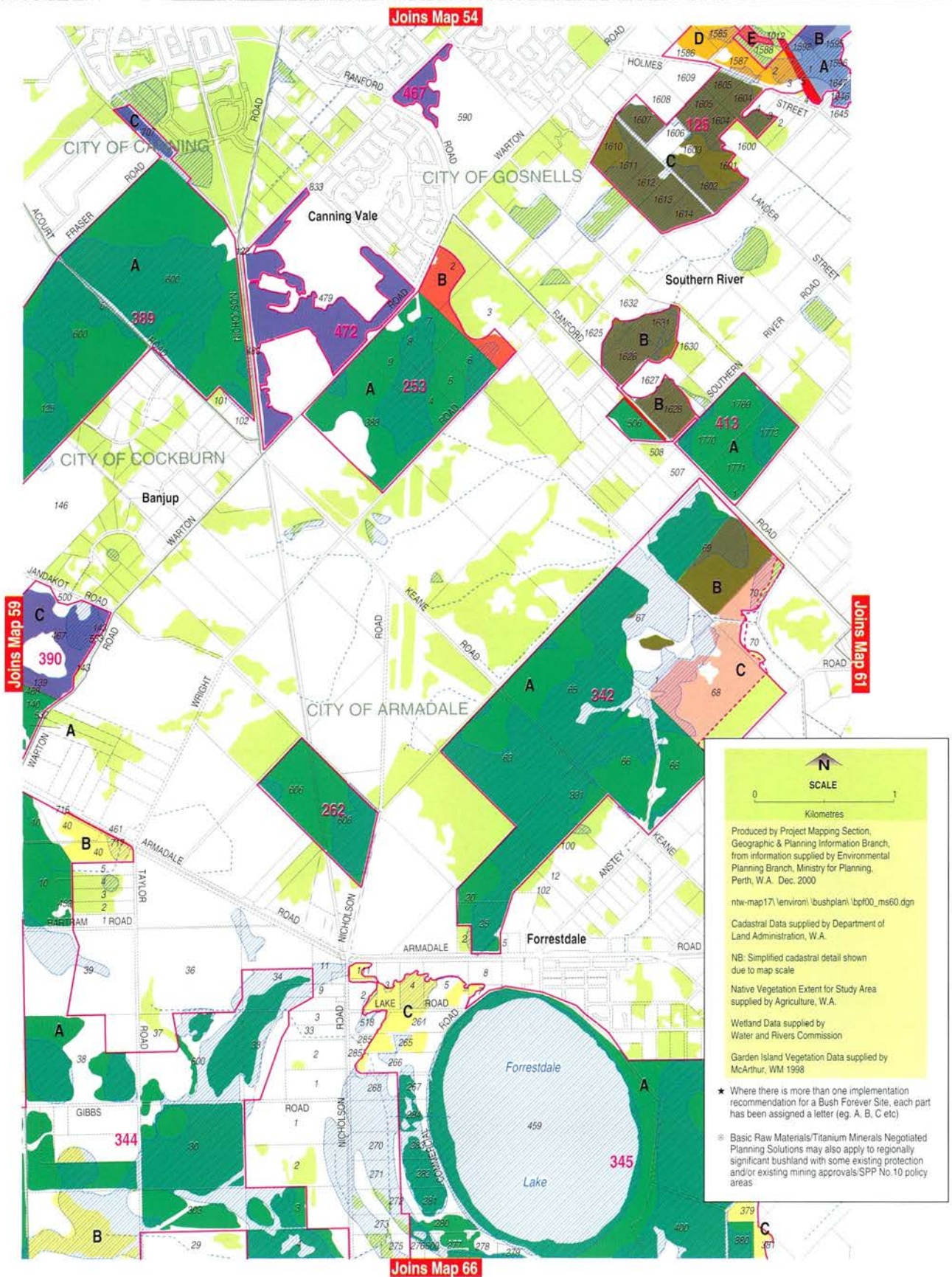
### **SECTION 1: LOCATION INFORMATION**

Location, size and ownership detail.

### **SECTION 2: REGIONAL INFORMATION**

The primary selection of the regionally significant areas encompassed in the Bush Forever Sites was based on information collected and compared from across the Swan Coastal Plain (see Figure 1). These comparative regional data sets consider landforms and soils, vegetation, wetlands and threatened ecological communities.





**Map 2: An Example of a Bush Forever Site Map**



# Part A

## BUSH FOREVER MAP SHEET INDEX (Non - Standard Map Sheet Grid)

38 Bush Forever Map Sheet

Streetsmart 2001 Perth Street Directory Page

### LEGEND

275 Bush Forever Sites (or part thereof) <sup>A</sup>

#### Regionally Significant Bushland

- Some Existing Protection
- Proposed Parks and Recreation
- Rural Complementary
- Urban, Urban Deferred, Industrial Negotiated Planning Solutions (Agreed)
- Urban, Urban Deferred, Industrial Negotiated Planning Solutions (Agreement Proposed or To Be Determined)
- Strategic - Negotiated Planning Solutions
- Basic Raw Materials/ Titanium Mineralisation Negotiated Planning Solutions \*
- Cemeteries
- Other Government Land (including existing and proposed public utilities)
- Local Town Planning Scheme Reserves (including existing and proposed public utilities)
- Major Road/Railway Reserves
- Regional Creekline (with Mapped Vegetation)

#### Boundary Interpretations:

##### Agreed

Area to be Protected for Conservation

##### Agreement Proposed

Proposed Bush Forever Boundary

Areas Proposed to be Protected for Conservation

Other Native Vegetation

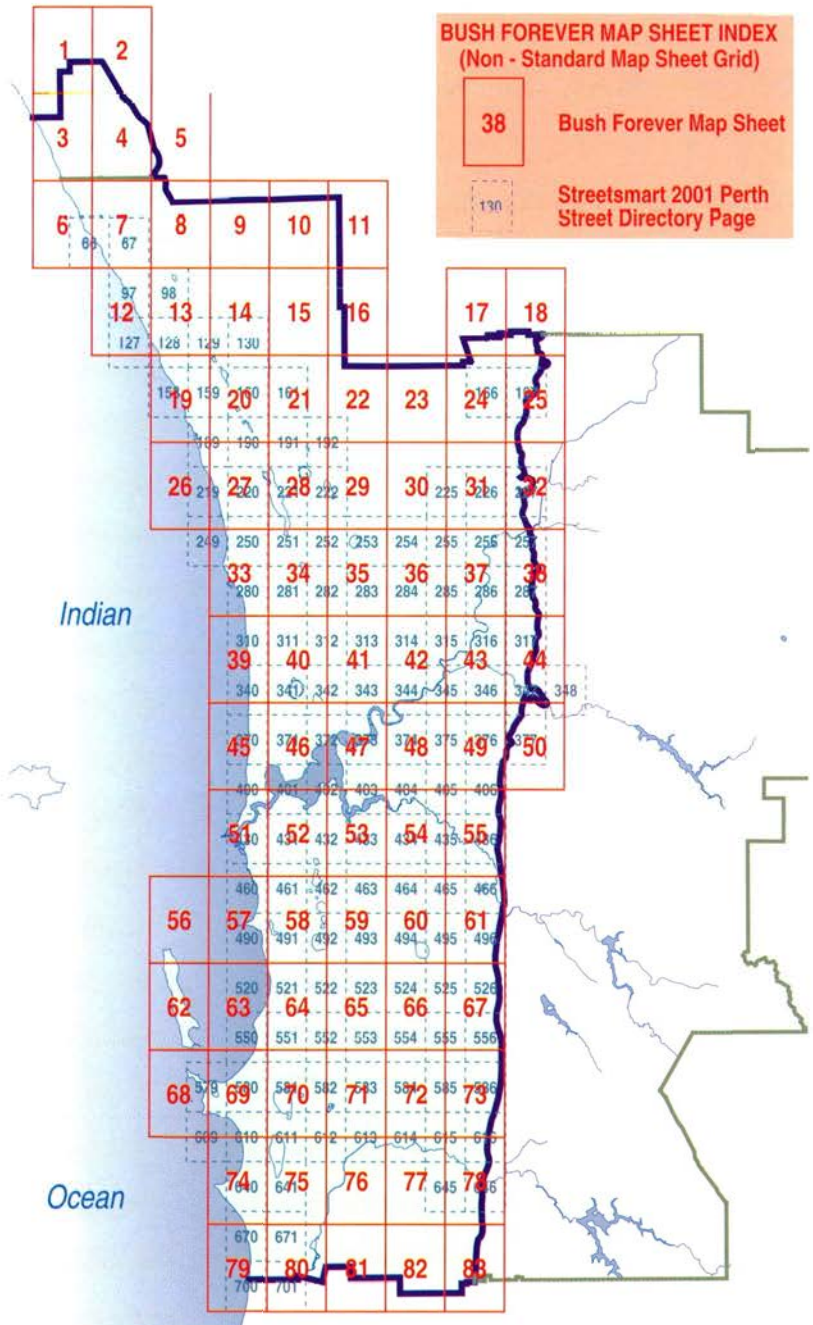
Conservation Category Wetlands (both within and outside Bush Forever Sites)

Channel Wetlands

Local Government Boundary

Perth Metropolitan Region Boundary

Bush Forever Study Area Boundary







### **SECTION 3: SPECIFIC SITE DETAIL**

An individual description is given of the Bush Forever Site's vegetation, flora, fauna, connectivity and other particular attributes not described elsewhere.

### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

A listing is given of the Bush Forever Site's national and international significance.

### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

The selection criteria met by the Bush Forever Site are listed together with recommendations for each Site.

**Information listed in SECTIONS 2 to 5 of the Bush Forever Site descriptions only applies to the bushland within the circumscribed boundaries.**

This format is considered the 'minimal data set' for describing each Site. In many cases additional information can be gained from the references listed or from the relevant government department or local authority. In addition, there are many ongoing studies which will continue to add to this knowledge.

In general each category of information is detailed in three sections:

- **Background:** This section gives a brief description of the category of information, i.e. what information is recorded, and in some cases provides discussion of the background studies which have given rise to the information used. A more detailed account can be obtained from the original studies referred to in this section. Copies of most studies are held at the DEP.
- **Information Source:** This section gives a brief summary of the particular information source, the form of the information and area of the Swan Coastal Plain to which the information relates. The information ranges from comprehensive regional studies to individual studies of varying detail and quality. As many of these sources of information as possible (within the time and resource constraints of this study) have been accessed and collated. Survey work was undertaken specifically for the Project by both the MfP and the DEP to complement existing information on the area. The information

may be in the form of maps, published and unpublished written accounts and/or survey data sheets. The source of the information is referenced in each case. Information contained in these sources may also be on databases or a geographic information system (GIS). Database references are annotated with a 'D' and geographic information system references with 'GIS' and are listed at the beginning of the References.

- **Directory Descriptors:** This section provides an explanation of how the information is used and presented in the Bush Forever Site account together with a listing of the descriptive phrases used in describing the information. In some cases the category of information is self-explanatory and this detail is not given.

A condensed version of Section 3 is contained in Appendix 2: 'Introductory Guide to the Bush Forever Site Descriptions'. This appendix omits the Background section outlined above. Appendix 2 shows all Directory Descriptors available in shaded boxes. Throughout the following text reference is made to the page of the Appendix on which the Directory Descriptors are listed.

## **3.2 Name and Boundary Definition**

### **Background**

All the Bush Forever Sites have been named. At times several numbered Sites have been grouped in a single description and the group bears an individual name.

Each Site name is in keeping with well-used names of the area. Where an existing name is not known one has been adopted from a boundary road for the purposes of the Project. Other known names are listed in SECTION 1 of the Site description. The suburb(s) in which it is found follows the name.

The rationale for the development of the Bush Forever Site boundaries is outlined in Section 2 and will not be further detailed here.



# Part A

## Information Source

Source	Form	Custodian	Coverage
1997 native vegetation maps (AGWEST 1998; McArthur 1998) (see Volume 1, Bush Forever Site maps 1 – 83)	GIS	AGWEST	Swan Coastal Plain portion of the Perth Metropolitan Region
1996 remnant bushland maps (MfP 1996)	GIS	MfP	Perth Metropolitan Region
1998 PanAorama (aerial photography) (DOLA 1998d)	CD ROM	DOLA	South-West Western Australia
1998 Perth Metropolitan Region digital colour orthophotography (DOLA 1998e)	GIS	DOLA	part of the Perth Metropolitan Region
1997 black and white orthophotography (DOLA 1997)	GIS	DOLA	Perth Metropolitan Region
Conservation category wetlands (Hill et al. 1996b; WRC 1996)	GIS	WRC	Perth Metropolitan Region
Verified conservation category wetlands (Semeniuk, V&C Research Group 1997a; ATA Environmental 2000; <i>ecologia</i> 2000)	GIS	WRC	Perth Metropolitan Region

### Directory Descriptors (Appendix 2, page 477)

The Bush Forever Site boundaries are at various stages of refinement according to the history of the Site's recognition and its complexity.

Boundaries of Sites are allocated to seven categories:

- protected area boundary: boundary matches current MRS Parks & Recreation, and lands managed by CALM or Crown Reserves with a conservation purpose
- management boundary: boundary selected for ease or viability of management
- management/bushland boundary: combination of management boundary and mapped bushland boundary
- bushland boundary: boundary fully encompasses mapped bushland areas
- bushland group boundary: boundary encompasses several mapped bushland areas
- conservation wetland boundary: boundary matches verified conservation category wetland boundary or boundary adjusted to include all of a conservation category wetland (WRC 1997 GIS)
- vegetation complex boundary: boundary follows boundary of the area of a single complex.

Where there are discrepancies between:

- a dataset and a cadastral or zoning boundary – the boundary has been matched to the later datasets
- the mapped vegetation (AGWEST 1998 GIS) and survey records of bushland in the Bush Forever Site – the 'boundary category' has been annotated with the following statement: 'Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.'
- the draft *Perth's Bushplan* boundary and the boundary depicted in Bush Forever – the 'boundary category' has been annotated with the following statement: 'Boundary adjusted after vegetation survey and/or negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan*.'

In general, the areas recognised initially in the draft *Perth's Bushplan* have preliminary boundaries related to the mapped bushland. However, changes are expected to be limited.





### **3.3 SECTION 1: LOCATION INFORMATION**

#### **Background**

SECTION 1 in the Site description contains a miscellany of information on the Bush Forever Sites.

#### **Bush Forever Site Number**

The arbitrarily assigned Site number from 1 – 500.

#### **Area of the Bush Forever Site**

The area of mapped native vegetation contained within the Site is what Bush Forever identifies as regionally significant bushland. If open water (not vegetated) is known to occur in the Site this is indicated. Areas of open water are not given, but generally the area of the Environmental Protection (Swan Coastal Plain Lakes) Policy (Government of Western Australia 1992b) lakes can be considered to be the area of open water.

#### **Bush Forever Site Maps**

The relevant map number from Volume 1 (Bush Forever Site maps 1– 83).

#### **Bush Forever Site Map References**

The map sheet series reference number(s) after the Australian 1: 25 000 Topographic Survey Map Sheet Series from which the map pages are derived. This allows the Site maps to be compared with other mapped datasets such as those in Hill *et al.* (1996b).

#### **Other Names**

Contains all known names and reference codes. Such 'names' can be a guide to information on the area. Reference is also made to whether whole or part of the Site was the subject of a public submission to the System 6 and part System 1 Update Program during 1994.

#### **Local Government Area**

The local authority (government) and suburb(s) in which the Bush Forever Site is located.

#### **CALM Managed Lands**

Any CALM managed lands located within the Site are listed with reference to the Reserve number(s) and purpose.

#### **Relationship of the Current Bush Forever Site to the Area Recognised in the System 6 Report**

Over twenty years ago the EPA initiated the first systematic study to identify areas of bushland, landscape and open space of regional significance in the area surrounding and including Perth. The study, commonly referred as the System 6 Report (DCE 1983), was a part of a series of studies identifying areas of conservation significance in the 12 regions (systems) in Western Australia.

The map in Appendix 3 shows the System 6 area and that portion of it covered by Bush Forever. The System 6 Report made recommendations for 108 areas in the Perth Metropolitan Region based on the knowledge available at the time.

Seventeen years on, the System 6 Report can be seen as a landmark document. The majority of its recommendations have been implemented (Appendix 3) through national parks, nature reserves, regional parks and regional open space systems of the Metropolitan Region Scheme. It has had a lasting influence on the retention and management of most of the areas it covers. In 1994 the EPA initiated the System 6 Update Program for System 6 and the Swan Coastal Plain portion of System 1. The objective of the program was to review the conservation recommendations for this region to take account of the more recent and much improved information on the flora and fauna of the southern Swan Coastal Plain. Bush Forever Sites will replace those of the System 6 Report (DCE 1983) within the Swan Coastal Plain portion of the Perth Metropolitan Region.

Appendix 3 shows the relationship between Sites and the System 6 recommended areas in Bush Forever. It is indicated whether the Site coincides with all or part of a System 6 area. Appendix 3 gives a summary of all System 6 areas and their status within Bush Forever.



# Part A

Information Source			
Source	Form	Custodian	Coverage
Bush Forever Site Boundaries	GIS	MfP/DEP	Swan Coastal Plain portion of the Perth Metropolitan Region
1997 native vegetation maps (AGWEST 1998)	GIS	AGWEST	Swan Coastal Plain portion of the Perth Metropolitan Region
DOLA Local Government Authorities and suburbs (DOLA 1998b&c)	GIS	DOLA	WA
DOLA Sept 1998 cadastre (DOLA 1998a)	GIS	DOLA	WA
System 6 areas (DCE 1983, DEP 1995b)	GIS	DEP	System 6 Region

## Directory Descriptors (Appendix 2, page 478)

For each Bush Forever Site the following information is listed:

**Bush Forever Site number:** The arbitrary number assigned to each Site, for example, Kings Park is Bush Forever Site 317. Some descriptions refer to a series of Site numbers.

**Area (hectares):** The area of bushland (native vegetation mapped) defined by the Site boundary, and the presence of open water.

**Map number:** The number of the Bush Forever Site map in Volume 1 on which the Site is located.

**Map sheet series reference number:** The Australian 1: 25 000 Topographic Survey Map Sheet Series from which the map pages are derived, for example 2034 IV SW.

**Other Names:** Any other known names or reference codes.

**Local Authorities (Suburb):** For example, City of Nedlands (Shenton Park).

**Includes CALM Managed Lands:** Reserve numbers (with the Reserve purpose in brackets).

**System 6 (1983):** The System 6 reference number, then the portion of the System 6 area included within the Bush Forever Site (see Appendix 3).





## 3.4 SECTION 2: REGIONAL INFORMATION

### 3.4.1 LANDFORMS AND SOILS

#### Background

The patterning of plant and animal distributions on the Swan Coastal Plain is closely related to the geology, geomorphology and soils of the Plain. Some understanding of these physical features is essential.

From east to west the Perth Metropolitan Region is conspicuously divided into two distinct landscape units (Figure 1). To the east is the Darling Plateau, an ancient plateau of Archaean origin, and to the west are the more recent sedimentary deposits of the Perth Basin expressed as the Swan Coastal Plain.

The Darling Scarp, being the western margin of the Darling Plateau, forms the eastern boundary of the Swan Coastal Plain south to near Dardanup (Figure 3, Map 1). The Darling Fault is just to the west of the Scarp, the fault line having been eroded since its formation. Compared with the Plateau, the Swan Coastal Plain is of very recent origin, the soils of the Plain having been laid down in the Pleistocene and Holocene periods (the last three million years). The Darling Scarp forms the eastern boundary of the study area for the Project.

Studies of the geomorphology and geology of the Plain (McArthur and Bettenay 1960 and Playford *et al.* 1976, see Tables 1 and 2, and Figure 3 this volume and Map 2, Volume 1) have divided the Plain into a sequence of alluvial (water-borne) and/or colluvial (erosional) deposits in the east and aeolian (wind-borne) sands in the west. The six major landform elements identified lie more or less parallel to the coast. These, from east to west (Figure 1), are:

(i) Dandaragan Plateau (north of the transect shown in Figure 1) – Lying to the west of the Darling Scarp, the Dandaragan Plateau is geologically part of the Swan Coastal Plain and is separated from the five units described below by the Gingin Scarp. The Dandaragan Plateau is

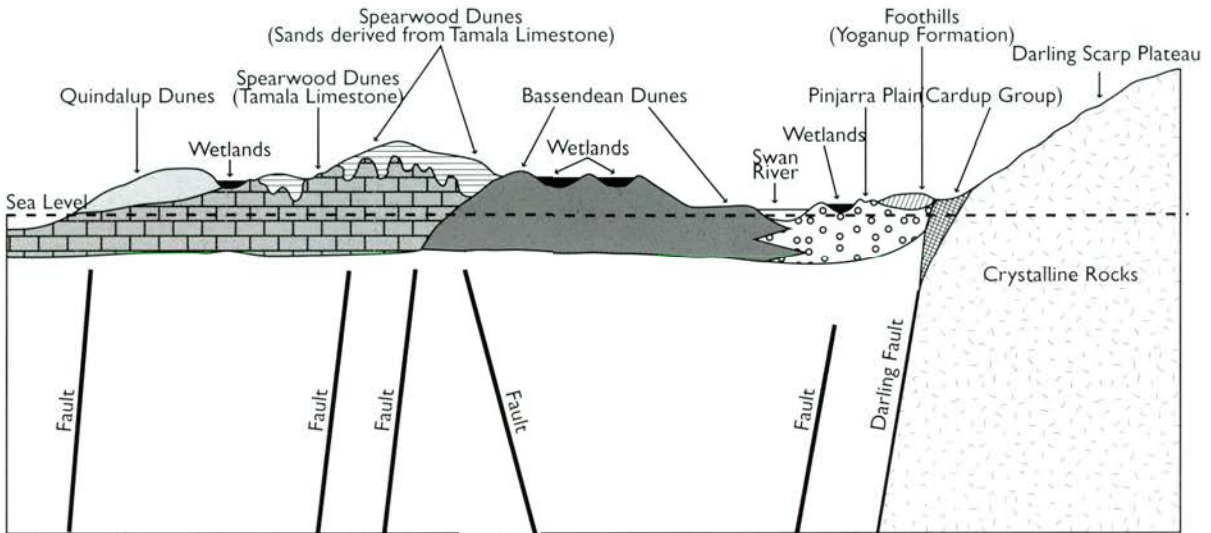
composed of Jurassic and Cretaceous sandstones with bands of siltstones and shale. The Plateau has been subject to laterite formation and erosion and the soils are laterites and colluvial sands.

- (ii) Foothills (Pleistocene foothills of the Darling Plateau and a similar series of foothills which occurs at the base of the Dandaragan Plateau) – A narrow band of colluvial and alluvial deposits and old beach sands occurring at the base of the plateaus.
- (iii) Pinjarra Plain – An alluvial plain of Pleistocene to Holocene age, originating from the river systems flowing down from the plateaus.
- (iv) Bassendean Dunes – Pleistocene aeolian heavily leached sands falling from 40–80 metres relief in the north of the Plain to almost sea level in the south.
- (v) Spearwood Dunes – Pleistocene aeolian sands overlying Tamala Limestone. These sands have a less leached profile than the sands of the Bassendean Dunes but generally a similar relief except where the Tamala Limestones are exposed. The exposed ridges of Tamala Limestone are the most prominent landforms on the Swan Coastal Plain.
- (vi) Quindalup Dunes – These calcareous coastal Holocene sands on the western margin of the Plain are the most recent aeolian dunes. At times these overlie Tamala Limestone.

Each of the six major landform elements has a characteristic suite of soils, generally bearing similar names. These soils are mapped at various scales in a series of maps. The Urban Geology and Environmental Geology Series (Gozzard 1982a&b, 1983a&b, 1986; Jordan 1986a&b; Smurthwaite 1986a&b) give the most complete coverage of the Swan Coastal Plain and use consistent mapping units (Tables 2, 3 and 4). These maps were commissioned in 1981 by the then Metropolitan Region Planning



# Part A



A 'typical' transect of the major geomorphological systems of the Swan Coastal Plain after McArthur and Bettenay (1960) followed by major geological systems after Playford *et al.* 1976

**Foothills (Ridge Hill Shelf)**

-  Yoganup Formation
-  Cardup Group



**Bassendean Dunes**

-  Bassendean Sand

**Pinjarra Plain**

-  Guildford Formation

**Spearwood Dunes**

-  Tamala Limestones
-  Sands Derived from Tamala Limestones

**Quindalup Dunes**

-  Safety Bay Sands

Adapted with permission from Fact Sheet 15. The Geology of Perth.  
Department of Minerals and Energy, Western Australia.

**Figure 3: A cross-section of the Perth Metropolitan Region showing major landform elements**





**Table 1: Relationship between geological and geomorphological systems identified on the Swan Coastal Plain in the Perth Metropolitan Region.** The general terms used in Bush Forever for describing the major landform elements are in bold italics. Column 1 may be used to cross-reference to groups shown in Table 2.

Major Geological Systems (after Playford <i>et al.</i> 1976)	Major Geomorphological Systems (after McArthur and Bettenay 1960)	Detailed Geomorphological Units (after Churchward and McArthur 1980)
Plateaus Darling Plateau (not covered in Bush Forever) Dandaragan Plateau	Darling Plateau (not covered in Bush Forever) <b><i>Dandaragan Plateau</i></b>	not applicable Mogumber
Scarps Darling Scarp Gingin Scarp	Darling Scarp Gingin Scarp	Darling Scarp (Darling Plateau) Reagan (Gingin Scarp)
Foothills	Ridge Hill Shelf, the <b><i>Foothills</i></b> of the Darling and Dandaragan Plateau	Forrestfield (on foothills of the Darling Plateau) Coonambidgee (foothills Dandaragan Plateau)
Guildford Formation	<b><i>Pinjarra Plain</i></b>	Guildford Beermullah Yanga Serpentine Swan Dardanup
Bassendean Sand	<b><i>Bassendean Dunes</i></b>	Bassendean
Bassendean Sand/Guildford Formation and other combinations	Not applicable	Southern River Cannington
<b><i>Tamala Limestone</i></b> and <b><i>Sands derived from Tamala Limestone</i></b>	<b><i>Spearwood Dunes</i></b>	Cottesloe Karrakatta
Safety Bay Sands	<b><i>Quindalup Dunes</i></b>	Quindalup
Wetlands (within the Guildford Formation, Bassendean Sand, Tamala Limestone)	Not applicable	Herdsmen
Lagoonal and Estuarine Deposits (within the Guildford Formation, Bassendean Sand, Tamala Limestone)	Not applicable	Vasse Yoongarillup



# Part A



**Table 2: Relationship between geological units identified in the Environmental Geology Maps and soils described on these maps on the Swan Coastal Plain in the Perth Metropolitan Region.** Column 1 may be used to cross-reference to groups shown in Table 1.

Major Geological Systems (after Playford <i>et al.</i> 1976; *major geomorphological systems, after McArthur and Bettenay 1960)	Major Units in the Environmental Geology Maps (after various authors)	Soils associated with each unit (after units described in the Environmental Geology Maps)
Dandaragan Plateau *Dandaragan Plateau	Colluvial sand Laterites Leederville Formation Osborne Formation	light grey or pale brown quartz sands with some felspar; ferruginous gravel in a clay-sand matrix overlying cemented laterite up to 4m thick; brown laterised granite pebbles in a clay-silt matrix and pale brown quartz and felspar sands in a siltstone matrix
Gingin Scarp *Gingin Scarp	Gingin Scarp	not distinguished, as above
Foothills *Ridge Hill Shelf Colluvial deposits	Colluvial sand Yoganup Formation Ridge Hill Sandstone Armadale Shales	quartz sands with differing amounts of silt, gravel and clay; light grey quartz sands and white quartz sands
Guildford Formation *Pinjarra Plain	Guildford Formation Alluvial/colluvial deposit Alluvial/colluvial deposit (Pinjarra Plain over Ridge Hill) Muchea Limestones	clays with silts, sands and peat; also areas of ironstone at depth or surface associated with red/brown silts and Limestones associated with clays and orange sands
Bassendean Sand *Bassendean Dunes	Bassendean sands	light grey quartz sands
Bassendean Sand/Guildford Formation *Bassendean Dunes /Pinjarra Plain	Bassendean sands over Guildford Formation	light grey quartz sands over silty sands
Tamala Limestone *Spearwood Dunes	Sands derived from Tamala Limestone Tamala Limestone	white to pale yellow sands  Limestone and associated light yellowish brown sands
Safety Bay Sands *Quindalup Dunes	Safety Bay Sands	white calcareous sands, sometimes Limestone deposits
Wetlands - within the Guildford Formation, Bassendean Sand, Tamala Limestone	Holocene swamp deposits	peats associated with clays, sands and silts in various proportions
Lagoonal and Estuarine Deposits - within the Guildford Formation, Bassendean Sand, Tamala Limestone	Lagoonal and Estuarine Deposits	silts, sands and calcareous deposits in various associations





**Table 3: Landform and Soils Directory Descriptors with examples of the soil units associated with these.** A key to the symbols is given in Table 4.

**Dandaragan Plateau/Gingin Scarp**

Colluvial Sand (Qs: S6)

Laterite (Ql: G2, LA1)

Leederville Formation (Klb: ST1)

Osborne Formation (Ko: ST2)

**Darling Plateau (Darling Range)/Darling Scarp**

Laterite (Ql: G2, LA1)

Darling Scarp – gravels and laterite (Czl: for example G2, LA1)

Even-grained Granite (Ae, Aes: M3, GR) (Am: GN)

**Foothills**

Colluvial deposits (Qc: for example Msg, Csg, Ms3, Smg, S5)

Colluvial sand (Qs: for example S6)

Yoganup Formation (Qpr: for example S12)

Ridge Hill Sandstone (Qph: S5)

Armadale Shale (Pa: SH)

**Pinjarra Plain**

Guildford Formation (Qpa: for example FS, Ms2, Mgs1, Cs, Sc) (Qha: for example Cp, S14, Msc1)

Alluvial/colluvial deposit (Qha/Qc: for example G1)

Alluvial/colluvial deposit (Pinjarra Plain / Ridge Hill) (Qha/Qc: for example FS3)

Muchea Limestone (Qpm: for example LS5)

**Bassendean Dunes**

Bassendean sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean sands over Guildford Formation (Qpb/Qpa: S10)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: for example LS1, LS2)

**Quindalup Dunes (Holocene dunes)**

Safety Bay Sands (Qhs: for example S1, S2, S13, LS4)

**Wetlands (within the Quindalup, Spearwood, Bassendean Dunes or Pinjarra Plain)**

Holocene swamp deposits (Qhw: for example Cps, Scp, Spc, Spm, Ms5) (Qrw: for example Sp1, Sp2)

**Lagoonal and Estuarine Deposits (within the Quindalup, Spearwood, Bassendean Dunes or Pinjarra Plain)**

Lagoonal and Estuarine Deposits (Vasse) (Qhg: for example M5, Sm2)

Lagoonal deposits in Bassendean Dunes (Qpw: for example S9)



# Part A



**Table 4: Key to Environmental Geology Series Symbols**

## Geology Units

Ae and Aes	Even-grained granite
Am	Migmatite
Czl	Laterite
Klb	Leederville Formation
Ko	Osborne Formation
Pa	Armada Shale
Qc	Colluvium
Qha	Alluvium – Holocene
Qhg	Lagoonal and Estuarine Deposits
Qhs	Safety Bay Sands
Qpa	Alluvium – Pleistocene
Qpb	Bassendean Sand
Qph	Ridge Hill Sandstone
Qpm	Muchea Limestone
Qpr	Yoganup Formation
Qpw	Lagoonal deposits in Bassendean Sand
Qrw	Swamp deposits
Qtl	Tamala Limestone
Qs	Colluvial Sand
Qts	Sands derived from Tamala Limestone

## Soil Units

### • Letters

The main 'soil fraction' is given first in capitals, followed by fractions in decreasing importance in lower case

- **Numbers** indicate mappable units of a similar character

C	clay
M	silt
G	gravel
P	organic material
S	sand
ST	siltstone
SH	shale

## Rocks

Double capitals

DO	dolerite
FS	ironstone
GN	gneiss
GR	granite
LA	laterite
LS	Limestone





Authority (MRPA) and the Geological Survey Division of the then Department of Mines to produce a series of environmental and urban geology maps for the entire Perth Metropolitan Region. The principal objective of these maps was to assist the MRPA in urban planning and to promote the development of extractive industry planning by local government.

The mapping units used in the Urban Geology and Environmental Geology map series can be directly compared with the major geomorphological systems (McArthur and Bettenay 1960) and, to a lesser

extent, to the units identified by Churchward and McArthur (1980) (Table 1). The units identified by Churchward and McArthur were used as the basis for the mapping of the vegetation complexes (Heddle *et al.* 1980; see 3.4.2 Vegetation Complexes). The first column in Tables 1 and 2 (after Playford *et al.* 1976) can be used as a basis for comparing the various units.

The majority of the regional data on the Plain has been broadly grouped with reference to the six major landform elements, the interleaving of these elements and the wetlands.

Information Source			
Source	Form	Custodian	Coverage
Urban and Environmental Geology Series (Gozzard 1982a&b, 1983a&b, 1986; Jordan 1986a&b; Smurthwaite 1986a&b; Geological Survey of WA 1989)	printed maps part GIS	DOME MfP	majority of Swan Coastal Plain selected maps

#### Directory Descriptors (Appendix 2, page 479)

Urban and Environmental Geology Series sub-units are grouped according to the major landform units, namely: the Darling Plateau (Darling Range)/Darling Scarp; the Dandaragan Plateau/Gingin Scarp; the Pinjarra Plain; the Foothills; the Bassendean Dunes; the Bassendean Dunes/Pinjarra Plain; the Spearwood Dunes; the Quindalup Dunes; Wetlands; and Lagoonal and Estuarine Deposits (Table 3). Each sub-unit heading is followed by the symbol which denotes the geological unit and, in most cases, the broad soil characteristics as described in Table 4.

### 3.4.2 VEGETATION AND FLORA

#### Vegetation Complexes

##### Background

The vegetation complexes (Heddle *et al.* 1980) were defined in relation to the landform–soil units determined by Churchward and McArthur (1980, see Table 1). The vegetation complexes were delineated on the basis of data on vegetation and some floristic information collected from information current at the time, ground surveys (both plots and transects on small scale areas), road traverses, aerial photographs and from previous interpretations of the vegetation.

The delineation of vegetation complexes is based on the concept of a series of plant communities

forming regularly repeating complexes associated with a particular soil unit as identified by Churchward and McArthur (1980, see Table 1). In this mapping the plant communities may occur in more than one complex but the relative proportions of communities in the complex are different. A total of 38 vegetation complexes are described on the Plain (including the Dandaragan Plateau, Heddle *et al.* 1980), 26 of these occurring in the Perth Metropolitan Region (Table 5). Nine of the 38 complexes are confined to the Dandaragan Plateau, Gingin Scarp and foothills of the Dandaragan Plateau, only three of these occurring on the Swan Coastal Plain in the Perth Metropolitan Region.



# Part A



**Table 5: Vegetation Complexes in the Perth Metropolitan Region** (after Heddle et al. 1980, arranged in major geomorphic units (see Landforms and Soils))

## **Dandaragan Plateau**

**MOGUMBER COMPLEX – SOUTH:** Open woodland of *Eucalyptus calophylla*, with some admixture of *E. marginata* and a second storey of *E. todtiana* - *Banksia attenuata* - *B. menziesii* - *B. ilicifolia*.

## **Gingin Scarp**

**REAGAN COMPLEX:** Vegetation ranges from low open woodland of *Banksia* species *E. todtiana* to closed heath depending on the depth of soil.

## **Foothills (Ridge Hill Shelf)**

**COONAMBIDGEE COMPLEX:** Vegetation ranges from a low open forest and low woodland of *E. todtiana* - *B. attenuata* - *B. menziesii* - *B. ilicifolia* with localised admixtures of *B. prionotes* to an open woodland of *E. calophylla* - *Banksia* species

**FORRESTFIELD COMPLEX:** Vegetation ranges from open forest of *E. calophylla* - *E. wandoo* - *E. marginata* to open forest of *E. marginata* - *E. calophylla* - *C. fraseriana* - *Banksia* species. Fringing woodland of *E. rudis* in the gullies that dissect this landform.

## **Pinjarra Plain**

**GUILDFORD COMPLEX:** A mixture of open forest to tall open forest of *E. calophylla* - *E. wandoo* - *E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei*). Minor components include *E. rudis* - *M. raphiophylla*.

**SWAN COMPLEX:** Fringing woodland of *E. rudis* - *M. raphiophylla* with localised occurrence of low open forest of *Casuarina obesa* and *M. cuticularis*.

**DARDANUP COMPLEX:** Mosaic of vegetation types characteristic of adjacent vegetation complexes such as Serpentine River, Southern River and Guildford.

**SERPENTINE RIVER COMPLEX:** Closed scrub of *Melaleuca* species and fringing woodland of *E. rudis* - *M. raphiophylla* along streams.

**BEERMULLAH COMPLEX:** Mixture of low open forest of *C. obesa* and open woodland of *E. calophylla* - *E. wandoo* - *E. marginata*. Minor components include closed scrub of *Melaleuca* species and occurrence of *Actinostrobus pyramidalis*.

**YANGA COMPLEX:** Predominantly a closed scrub of *Melaleuca* species and low open forest of *C. obesa* on the flats subject to inundation. On drier sites the vegetation reflects the adjacent vegetation complexes of Bassendean and Coonambidgee.

## **Bassendean Complex**

**BASSENDEAN COMPLEX – NORTH:** Vegetation ranges from a low open forest and low open woodland of *Banksia* species *E. todtiana* to low woodland of *Melaleuca* species and sedgelands which occupy the moister sites.

**BASSENDEAN COMPLEX – CENTRAL AND SOUTH:** Vegetation ranges from woodland of *E. marginata* - *C. fraseriana* - *Banksia* spp. to low woodland of *Melaleuca* species, and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth.

**BASSENDEAN COMPLEX – NORTH – TRANSITION VEGETATION COMPLEX:** A transition complex of low open forest and low woodland of *Banksia* species - *E. todtiana* on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean-North and Karrakatta-North vegetation complexes.

**BASSENDEAN COMPLEX – CENTRAL AND SOUTH – TRANSITION VEGETATION COMPLEX:** Woodland of *E. marginata* - *E. calophylla* with well defined second storey of *Allocasuarina fraseriana* and *B. grandis* on the deeper soils and a closed scrub on the moister sites. The understorey species reflect similarities with the adjacent vegetation complexes.

## **Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes**

**SOUTHERN RIVER COMPLEX:** Open woodland of *E. calophylla* - *E. marginata* - *Banksia* species with fringing woodland of *E. rudis* - *M. raphiophylla* along creek beds.

**CANNINGTON COMPLEX:** Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.





**Table 5 (continued): Vegetation Complexes in the Perth Metropolitan Region**  
(after Heddle *et al.* 1980, arranged in major geomorphic units (see Landforms and Soils))

**Spearwood Dunes**

**KARRAKATTA COMPLEX – NORTH:** Predominantly low open forest and low woodland of *Banksia* spp. *E. E. tottiana*, less consistently open forest of *E. gomphocephala* - *E. tottiana* - *Banksia* species.

**KARRAKATTA COMPLEX – NORTH – TRANSITION VEGETATION COMPLEX:** A transition complex of low open forest and low woodland of *Banksia* species - *E. tottiana* on the transition zone of a series of high sand dunes between Bassendean-North and Karrakatta-North.

**KARRAKATTA COMPLEX – CENTRAL AND SOUTH:** Predominantly open forest of *E. gomphocephala* - *E. marginata* - *E. calophylla* and woodland of *E. marginata* - *Banksia* species.

**COTTESLOE COMPLEX – NORTH:** Predominantly low open forest and low woodland of *B. attenuata* - *B. menziesii* - *E. tottiana*; closed heath on the Limestone outcrops.

**COTTESLOE COMPLEX – CENTRAL AND SOUTH:** Mosaic of woodland of *E. gomphocephala* and open forest of *E. gomphocephala* - *E. marginata* - *E. calophylla*; closed heath on the Limestone outcrops.

**Quindalup Dunes**

**QUINDALUP COMPLEX:** Coastal dune complex consisting mainly of two alliances – the strand and fore-dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *M. lanceolata* - *Callitris preissii* and the closed scrub of *Acacia rostellifera*.

**Wetlands**

**HERDSMAN COMPLEX:** Sedgeland and fringing woodland of *E. rudis* - *Melaleuca* species.

**PINJAR COMPLEX:** Vegetation ranges from woodland of *E. marginata* - *Banksia* species to a fringing woodland of *E. rudis* - *M. preissiana* and sedgeland.

**Marine (Lagoonal and Estuarine) Deposits**

**YOONGARILLUP COMPLEX:** Woodland to tall woodland of *E. gomphocephala* with *Agonis flexuosa* in the second storey. Less consistently an open forest of *E. gomphocephala* - *E. marginata* - *E. calophylla*.

**VASSE COMPLEX:** Mixture of the closed scrub of *Melaleuca* species fringing woodland of *E. rudis* - *Melaleuca* species and open forest of *E. gomphocephala* - *E. marginata* - *E. calophylla*.

Maps of the vegetation complexes at a scale of 1:250 000 digitised by CALM were refined for use by the Perth Environment Project (PEP). By intersecting the two map sets — remnant bushland (MfP 1996 GIS) and vegetation complexes — the present occurrence of bushland in the various vegetation complexes has been determined. The scale of this mapping needs to be taken into

consideration when the vegetation complexes in an individual bushland area are determined, especially when the area is near the boundary between complexes. Trudgen (1996) considered this issue when looking at mapped bushland areas in the City of Wanneroo and documents more accurate boundaries between the complexes in the Wanneroo area.

**Information Source**

Source	Form	Custodian	Coverage
vegetation complex maps (Heddle <i>et al.</i> 1980, DCE 1990 GIS)	GIS	DEP	System 6 area plus area from most northern point Moore River west to coast (see Map 1)



# Part A

## Directory Descriptors (Appendix 2, page 482)

Mapped units (Table 5) occurring in each Site are listed. Units are grouped according to major landform elements, namely: Plateaus, Scarps, Foothills, Pinjarra Plain, Bassendean Dunes, Combinations of the Bassendean Dunes/Pinjarra Plain/Spearwood Dunes, Spearwood Dunes, Quindalup Dunes, Wetlands, and Marine (Lagoonal and Estuarine) Deposits.

## Floristic Community Types

### Background

The most recent and detailed analysis of the patterning of plant communities on the Swan Coastal Plain south of the Gingin Brook was initiated by a three-year detailed floristic survey by CALM and the Conservation Council, funded by the Australian Heritage Commission (Gibson *et al.* 1994). This study is the most recent regional floristic work on public lands over the entire Swan Coastal Plain and was used in the Project as the basis for the regional comparison of bushland areas. This study considered the patterning of plant distribution on the Plain and relates to the total flora of the Plain. The presence or absence of individual species in standard areas (plots, sites or quadrats) is used to define floristic groupings based on shared species with the aid of various multivariate analysis techniques. The vegetation complex mapping (Heddl *et al.* 1980, see above) was based in part on earlier plot-based studies undertaken by Havel (1968).

Gibson *et al.* (1994) located 509 100-square-metre plots across the Swan Coastal Plain (Map 1). Plots were confined to public lands and located so as to sample the geomorphological/soil units and plant community patterning identified by previous studies. Plots were placed in bushland areas to sample vegetation in the best available condition. Within each plot all vascular plants were recorded and information collected on various physical parameters, vegetation structure and vegetation condition. Most plots (more than 95 per cent) were visited on at least two occasions.

Not all the geographical or geomorphological variation was sampled by Gibson *et al.* (1994). The Foothills, Pinjarra Plain and Quindalup Dunes were

under-sampled and the Dandaragan Plateau was not sampled at all. The Foothills and the Pinjarra Plain have been largely cleared (and hence the chance to study them on crown lands was limited) while few reserves occur on the Quindalup Dunes. It was not possible to cover fully the estuarine and riverine vegetation in the time available for the study. These restricted habitat types have been documented elsewhere (Pen 1983, 1993; Siemon *et al.* 1993).

Analysis of the 509 plots distinguished four 'super' groups, three related to the major landform elements and a wetland group found across all the major landform elements (Figures 3 and 4). More detailed classification established 30 floristic community types, with a further 13 subdivisions evident, making 43 types (Table 6):

- Supergroup 1: Foothills/Pinjarra Plain — six floristic community types — 1 (a & b), 2 and 3 (a, b & c)
- Supergroup 2: Seasonal Wetlands — 17 floristic community types — 4, 5, 6, 7, 8, 9, 10 (a & b), 11, 12, 13, 14, 15, 16, 17, 18 and 19
- Supergroup 3: Uplands centred on Bassendean Dunes — nine floristic community types — 20 (a, b & c), 21 (a, b & c), 22 and 23 (a & b)
- Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes — 11 floristic community types — 24, 25, 26 (a & b), 27, 28, 29 (a & b), 30 (a, b & c).

The seasonal wetland group (Supergroup 2) is the most heterogeneous of the groups, containing the largest number of floristic community types and the lowest average number of plots per community type. As a consequence seasonal wetlands were under-sampled in the study.

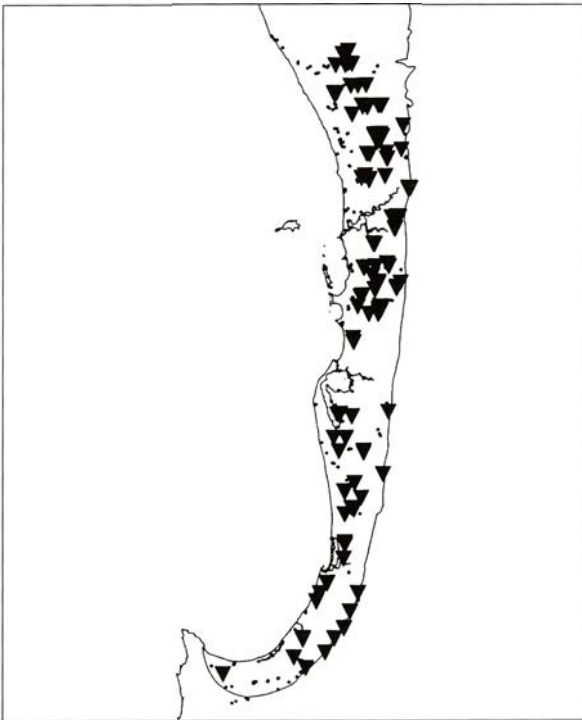




Supergroup 1 – Foothills/Pinjarra Plain



Supergroup 2 – Seasonal Wetlands



Supergroup 3 – Uplands centred on Bassendean Dunes



Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes

**Figure 4: Distribution of the four major floristic groups (Supergroups) across the Swan Coastal Plain (Gibson *et al.* 1994a)**



# Part A



**Table 6: Floristic Community Types** (identified in Gibson *et al.* 1994, and in the System 6 and Part I Update, DEP 1996)

## Key

### Column 1: Floristic Community Type Codes

The numbers of the types additional to Gibson *et al.* (1994) are italicised if they are subsets of an existing group (in types 19, 20, 23 and 30) and italicised and preceded by an S if they are supplementary groups.

### Column 2: General Description of Floristic Community Types

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgeland and herblands after Gibson *et al.* (1994).

### Column 3: Distribution in Relation to the Perth Metropolitan Region

PMR	confined to PMR		
PMR+	predominantly in PMR	N	Northernmost location in the PMR
(PMR)	rare in PMR	S	Southernmost location in the PMR
blank	outside PMR	C	PMR central to distribution
>PMR	distribution goes well beyond the PMR		
	* except for isolated occurrence outside normal range		

### Column 4: Average Species Richness per Floristic Community Type

Average species richness per 10m x 10m plot, less those species only occurring in a single plot (single records). Some community types can have a high proportion of single records and these estimates of average species richness are underestimates in some cases.

### SUPERGROUP 1 – FOOTHILLS/PINJARRA PLAIN

1a	<i>Eucalyptus haematoxylon</i> - <i>E. marginata</i> woodlands on Whicher foothills	(PMR)/N	66.2
1b	Southern <i>Eucalyptus calophylla</i> woodlands on heavy soils		65.0
2	Southern wet shrublands	(PMR)/N	50.3
3a	<i>Eucalyptus calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils	PMR+	58.2
3b	<i>Eucalyptus calophylla</i> - <i>Eucalyptus marginata</i> woodlands on sandy clay soils	>PMR/N	57.3
3c	<i>Eucalyptus calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands	>PMR/N	47.7
S8	<i>Eucalyptus wandoo</i> woodlands (Scarp)	PMR+/N	44.0

### SUPERGROUP 2 – SEASONAL WETLANDS

4	<i>Melaleuca preissiana</i> damplands	>PMR/C	33.2
5	Mixed shrub damplands	PMR+	38.1
6	Weed dominated wetlands on heavy soils	>PMR	28.3
7	Herb rich saline shrublands in clay pans	>PMR/C	44.8
8	Herb rich shrublands in clay pans	>PMR/C	50.8
9	Dense shrublands on clay flats	PMR+/N	34.8
10a	Shrublands on dry clay flats	>PMR/N	45.9
10b	Shrublands on southern ironstones		53.3
11	Wet forests and woodlands	>PMR/C	28.0
12	<i>Melaleuca teretifolia</i> and/or <i>Astartea</i> aff. <i>fascicularis</i> shrublands	>PMR/N	27.3
13	Deeper wetlands on heavy soils	>PMR/C	16.9
14	Deeper wetlands on sandy soils	PMR+	16.5
15	Forests and woodlands of deep seasonal wetlands	>PMR/C	16.8
16	Highly saline seasonal wetlands	PMR	11.2
17	<i>Melaleuca raphiophylla</i> - <i>Gahnia trifida</i> seasonal wetlands	>PMR/N*	13.4
18	Shrublands on calcareous silts	PMR+/C	36.6
19a	Sedgeland in Holocene dune swales	PMR	25.0
19b	Woodlands over sedgeland in Holocene dune swales	PMR	26.3
S1	<i>Astartea</i> aff. <i>fascicularis</i> / <i>Melaleuca</i> species dense shrublands	>PMR/N	22.4
S2	Northern <i>Pericalymma ellipticum</i> dense low shrublands	PMR+	17.7
S3	Wet sedgeland on sandy clays	PMR+	10.6
S4	<i>Regelia ciliata</i> Dandaragan Plateau wetlands		22.0





S5	<i>Acacia saligna</i> wetlands	(PMR)	23.3
S6	Northern dense low shrublands	(PMR)	35.4
S7	Northern woodlands to forests over tall sedgeland alongside permanent wetlands	PMR+	17.7
S17	<i>Eucalyptus rudis</i> / <i>Agonis linearifolia</i> wetlands in Bassendean Dunes	(PMR)	15.2
S19	Dense tall shrublands		11.5
S20	Northern shrublands on sandy clays		12.42

### **SUPERGROUP 3 – UPLANDS CENTRED ON BASSENDEAN DUNES AND DANDARAGAN PLATEAU**

20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	PMR+/S	64.5
20b	Eastern <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands	PMR+/N	59.7
20c	Eastern shrublands and woodlands	PMR	60.4
20d	Dandaragan Plateau shrublands and woodlands		67.6
21a	Central <i>Banksia attenuata</i> - <i>Eucalyptus marginata</i> woodlands	PMR/N	52.0
21b	Southern <i>Banksia attenuata</i> woodlands		57.5
21c	Low lying <i>Banksia attenuata</i> woodlands or shrublands	PMR+	38.5
22	<i>Banksia ilicifolia</i> woodlands	>PMR/C	30.0
23a	Central <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands	PMR	59.0
23b	Northern <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands	>PMR/S	47.0
23c	North-eastern <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands	(PMR)	53.0
S9	<i>Banksia attenuata</i> woodlands over dense low shrublands	(PMR)/S	38.9
S10	<i>Calothamnus sanguineus</i> dense low shrublands on sandy laterites	(PMR)/S	44.2
S16	Mixed dense shrublands on yellow brown sands		38.8
S18	<i>Eucalyptus marginata</i> / <i>Eucalyptus calophylla</i> woodlands on laterites	(PMR)/S	35.7

### **SUPERGROUP 4 – UPLANDS CENTRED ON SPEARWOOD AND QUINDALUP DUNES**

#### **Spearwood Dunes**

24	Northern Spearwood shrublands and woodlands	PMR*	38.9
25	Southern <i>Eucalyptus gomphocephala</i> – <i>Agonis flexuosa</i> woodlands	>PMR/S	48.1
26a	<i>Melaleuca huegelii</i> - <i>Melaleuca acerosa</i> shrublands on Limestone ridges	PMR+	49.6
26b	Woodlands and mallees on Limestone	PMR+	49.8
27	Species poor mallees and shrublands on Limestone	>PMR	37.3
28	Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> - <i>Eucalyptus</i> woodlands	>PMR/S	55.1

#### **Quindalup Dunes**

29a	Coastal shrublands on shallow sands	>PMR/C	33.7
29b	<i>Acacia</i> shrublands on taller dunes	>PMR/N*	34.2
30a2	<i>Callitris preissii</i> and/or <i>Melaleuca lanceolata</i> forests and woodlands	PMR	17.5
30c2	Woodlands and shrublands on Holocene dunes (re-allocated from 30c)	PMR	23.9
30b	Quindalup <i>Eucalyptus gomphocephala</i> and/or <i>Agonis flexuosa</i> woodlands	(PMR)	35.0
S11	Northern <i>Acacia rostellifera</i> - <i>Melaleuca acerosa</i> shrublands	PMR	21.0
S12	Rottneest Island <i>Melaleuca lanceolata</i> and/or <i>Callitris preissii</i> forests and woodlands		16.0
S13	Northern <i>Olearia axillaris</i> - <i>Scaevola crassifolia</i> shrublands	>PMR/S	18.8
S14	<i>Spinifex longifolius</i> grassland and low shrublands	PMR	8.6

S15	Weed group Not allied with any supergroup	n/a	n/a
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As evident in the supergroups, the major environmental correlates with the classification were seasonal moisture regime and geomorphology. Within the seasonal wetland group some geomorphic patterning was also evident.

Using this classification as a basis, a further 613 100-square-metre plots were analysed for the System 6 and Part System 1 Update Program. These additional plots came from several additional sources: 291 plots from the System 6 and Part System 1 Update Program (DEP 1996, including

13 from Trudgen and Keighery 1995); 32 plots established by GJ Keighery (1996 D) for a study of Tuart (*Eucalyptus gomphocephala*) woodlands on the Plain; and 290 plots or releves (approximately located areas) from Griffin (1994) on floristic variation on the sandplains to the north of Perth. These additional plots were located on private lands, Quindalup Dunes, Dandaragan Plateau and some System areas (Map 1). Information for these plots was directly comparable with that collected in the Gibson *et al.* (1994) study.



# Part A



Classification of these plots against the Gibson *et al.* (1994) data identified a further 23 floristic community types. Greater sampling density lead to a reclassification of floristic groups 19, 20, 23 and 30 (new subgroups being distinguished in three of these groups). Fifteen supplementary groups were identified, namely:

- Supergroup 1: Foothills/Pinjarra Plain — a single group, floristic community type S8, associated with the Darling Scarp.
- Supergroup 2: Seasonal Wetlands — 11 groups, floristic community types S1 to 7, S17, S19 and S20, and 19a and 19b from the reclassification of 19.
- Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau — six groups, floristic community types 20d, 23c, S9, S10, S16, S18 (all centred on the Dandaragan Plateau).
- Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes — four groups, floristic community types S11 to 14, centred on the Quindalup Dunes. Floristic community type 30 was further sampled and reclassified to identify 30a2 and 30c2.

Group S15 could not be allocated to any supergroup.

In total, 66 floristic community types are now recognised (Table 6). The additional floristic community types were to be expected, being centred on major landform elements either not sampled (Dandaragan Plateau) or under-sampled (wetlands, Quindalup Dunes) in the base study (Gibson *et al.* 1994). The 1996 extension of the 1994 study also:

- located further occurrences of some community types;
- extended the geographic range of some types;
- located vegetated areas of Muchea Limestone (presumed extinct in Gibson *et al.* 1994) and identified the floristic community types associated with these limestones (Keighery, GJ, and Keighery 1995); and
- identified the floristic community types associated with the Perth to Gingin Ironstone Association.

Of the 66 types currently identified, five floristic community types are apparently confined to the Perth Metropolitan Region (Table 6) and eight are absent from the Perth Metropolitan Region.

## Information Source

Source	Form	Custodian	Coverage
CALM flora survey 1991–1993 (Gibson <i>et al.</i> 1994)	Database, GIS*	CALM	Swan Coastal Plain (see Map 1)
DEP flora survey, 1994 and 1995 (DEP 1996)	Database, GIS*	DEP	Swan Coastal Plain
flora survey (Griffin 1994)	Database, GIS*	AGWEST	Swan Coastal Plain north of Perth
flora survey (Keighery, GJ 1996)	Database, GIS*	CALM	Tuart ( <i>Eucalyptus gomphocephala</i> ) woodlands on the Swan Coastal Plain
flora survey, published and unpublished reports	text, lists	N/A	bushland areas on the Swan Coastal Plain

\* plot location only





### Directory Descriptors (Appendix 2, pages 485–486)

Floristic community types were identified in Bush Forever Sites in two ways:

- (i) plots were located in the area of the Bush Forever Site and the floristic community type was determined by analysis
- (ii) the floristic community types were inferred from information on the floristics of the area and the area's geographic location. An asterisk indicates an inferred floristic community type.

Floristic community types could not be determined when the remaining vegetation was too disturbed to sample or not enough was known about the vegetation.

Units are grouped as: Supergroup 1 – Foothills/Pinjarra Plain; Supergroup 2 – Seasonal Wetlands; Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau; Supergroup 4 – Uplands centred on Spearwood Dunes and Quindalup Dunes.

### 3.4.3 WETLANDS

#### Introduction

The low relief and varied stratigraphy of the Swan Coastal Plain together with the rainfall and runoff from the Darling Plateau, and recharge and discharge of the underlying high ground water, has variably resulted in a complex mosaic of seasonal waterlogging and inundation which characterises Perth's wetlands (Semeniuk, CA 1987). Western Australia's wetlands have been defined as 'areas of seasonally, intermittently or permanently waterlogged soils or inundated land whether natural or otherwise, fresh or saline, e.g. waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries' (Wetland Advisory Committee 1977). This definition is directly comparable with the definition of wetlands used in the State *Wetland Conservation Policy* (Government of Western Australia 1997; see Section 3.6.2) i.e. 'areas of marsh, fen, peatland or water, whether natural or artificial,

permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed more than six metres'.

Over a quarter of the Swan Coastal Plain land area from Wedge Island to Dunsborough is wetland. Wetlands are biologically some of the most productive and diverse of all areas on the Coastal Plain. They play a critical part in supporting and protecting the values of the estuarine and groundwater systems and the life cycles and ecology of the Swan Coastal Plain fauna and flora. Approximately 17 per cent of the wetlands, 15 per cent of the rivers and 42 per cent of the creeks in the Wedge Island to Mandurah area remain fully vegetated, with a substantial area of the resource partly vegetated. This complex and nationally unique wetland system has only recently been described in extent (Hill *et al.* 1996a&b) and is in its early days of being understood scientifically (Balla 1994).

**Table 7: Wetland and Estuary Definitions**

7a: Wetland types (after Semeniuk 1987, and Semeniuk and Semeniuk 1996a&b)

WATER LONGEVITY	LANDFORM				
	BASIN	CHANNEL*	FLAT	SLOPE	HIGHLAND
Permanent inundation	lake*	river	-	-	-
Seasonal inundation	sumpland	creek	floodplain	-	-
Intermittent inundation	playa#	wadi#	barlkarra#	-	-
Seasonal waterlogging	dampland	trough#	palusplain	paluslope	palusmont#

# Not used on Swan Coastal Plain in the Perth Metropolitan Region

\* Artificial Channels and Artificial Lakes are man-made channels and lakes

7b: Estuaries (after Hill pers. comm.)

ESTUARY (waterbody)	that part of an estuary which is permanently or seasonally inundated
ESTUARY (peripheral)	that part of an estuary subject to seasonal waterlogging



# Part A



## Wetland Types

### Background

To better describe wetland types in the Darling System, CA Semeniuk (1987) proposed a geomorphic approach to habitat classification based on basin shape and the nature or period of inundation. Twelve wetland types are now recognised from the application of this system: lake, sumpland, dampland, artificial lake, floodplain, palusplain, paluslope, river, creek, artificial channel,

estuary waterbody and estuary periphery (Table 7). A detailed description of these wetland types across the Swan Coastal Plain from Wedge Island to Dunsborough has been published on maps and most recently in a comprehensive wetland atlas for the region (Hill *et al.* 1996b). The data is also retained in a database that can be updated to incorporate changes in wetland characteristics over time. This database is held by the Water and Rivers Commission (WRC 2000).

### Information Source

Source	Form	Custodian	Coverage
basin and channel wetland (WRC 1996a)	GIS	WRC	Swan Coastal Plain
flora survey, published and unpublished reports	text, lists	N/A	bushland areas on the Swan Coastal Plain

### Directory Descriptors (Appendix 2, page 487)

All wetland types as mapped by the Water and Rivers Commission that occur within the boundaries of the Bush Forever Site are listed.

## Natural Wetland Groups (Consanguineous Suites)

### Background

Forty-two natural wetland groups or consanguineous suites were described in the Perth to Bunbury region (northern boundary being the Moore River) after considering wetland similarity in response to factors of geomorphic setting, origin and water maintenance (Semenuk 1987, 1996). These groupings provide a regional perspective on wetlands, assist in understanding the hydrologic maintenance requirements of the different wetland

systems and provide assistance to assessments of the conservation value of wetlands (Hill *et al.* 1996a&b). This work has been used in the Water and Rivers Commission's regional assessment to ensure representation of wetland suite and type is adequately considered in the description of management categories. A systematic description of all wetlands by wetland suites and types has been published (Hill *et al.* 1996a&b).

The 21 consanguineous suites that occur within the Perth Metropolitan Region are listed alongside their characteristics in Table 8.

### Information Source

Source	Form	Custodian	Coverage
mapped consanguineous suites (WRC 1996b)	GIS	WRC	Swan Coastal Plain north of Bunbury

### Directory Descriptors (Appendix 2, page 488)

All wetland suites as mapped on the Water and Rivers Commission GIS (2000 GIS) which intersect with bushland within the boundaries of the Bush Forever Site are listed.

Suites are grouped according to landform elements, that is, the Darling Plateau, the Dandaragan Plateau–Darling Plateau interface, the Dandaragan Plateau, the Pinjarra Plain, the Bassendean–Pinjarra transition or Bassendean with fluvial features, the Bassendean Dunes, the Spearwood–Bassendean interface, the Spearwood Dunes, the Quindalup Dunes, Swan Coastal Plain Rivers, and Estuaries.





**Table 8: Natural Wetland Groups (Consanguineous Suites) (after Semeniuk 1996; map codes are in brackets)**

Name & location	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Dandaragan Plateau</b>				
<b>Red Gully suite (DP1)</b> 9 km south of Moore River in Dandaragan Plateau	Dandaragan Plateau of gently undulating to flat surface with occasional broad gently sloping valleys alternating with incised creeks	Creeks & floodplains grading into sumplands	Quartz sand	Fluvial incision; surface runoff & depressions receiving groundwater discharge from slopes
<b>Pinjarra Plain</b>				
<b>Keysbrook suite (P1)</b> Alluvial fans along the foothills of the Darling Scarp occurring south of Forrestfield Lake & continuing as far south as Brunswick Junction	Alluvial fans & creeks of the Pinjarra Plain – gently undulating plain dissected by channels	Palusplains, floodplains & creeks	Clay overlying lateritic clay & sand	Sediment discharge to develop alluvial fans; groundwater seepage, & surface runoff from the plateau & ponding of precipitation
<b>Ellen Brook suite (R3)</b> Ellen Brook area	Pinjarra Plain	Creek, floodplain river	Clays & sandy clays overlying laterite & sandstones	Fluvial incision; sedimentation; surface runoff
<b>Bassendean – Pinjarra transition OR Bassendean with fluvial features</b>				
<b>Mungala suite (B/P2)</b> Perth Airport surrounds including Wright Lake	Transition between Bassendean Dunes & Pinjarra Plain. Underlying stratigraphy is a complex of sands, clays, calcrete & laterite. Wetlands lie along depressions at the distributary ends of the creeks or adjacent to intermittent disconnected drainage channels	Lakes, sumplands, floodplains & creeks	Variable: clays to clay overlying quartz; sand to quartz sand overlying laterite or calcrete	Alluvial fan distributaries of creeks terminate in wetlands already present in Bassendean sandplain, bringing water & sediment
<b>Muchea suite (B/P3)</b> 1. Western margin of Whitfield Brook e.g. Six Mile Swamp 2. Western margin of Ellen Brook	Complex transition between Bassendean Dunes & Pinjarra Plain. Wetlands lie along the depressions at the base of Bassendean Dunes & at the headwaters of the tributaries of creeks	Sumplands & floodplains	Complex & variable pattern of quartz sand, clays, laterite & calcrete	Discharge of groundwater into basins, flats & creeks; Ponding of rainwater & groundwater occurs over impermeable sediments



# Part A



**Table 8 (continued): Natural Wetland Groups (Consanguineous Suites) (after Semeniuk 1996; map codes are in brackets)**

Name & location	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Bennett Brook suite (B/P4)</b>				
1. Ballajura: In Bennett Brook area west of West Swan	Bassendean Dune – with microscale creeks	Sumplands creeks palusplains floodplains	Quartz sands, or clay overlying quartz sand	Depressions which intersect the water table; Precipitation is ponded by clay lenses in the sub-surface; Palusplains are situated between tributaries
2. Balannup: In Southern River area north of Forrestdale Lake				
3. Yangedi: In Serpentine River area west of Serpentine township				
<b>Bassendean Dunes</b>				
<b>Lake Pinjar suite (B1)</b> Lake Pinjar area	Bassendean Dunes with higher undulating dunes on the western margin of the wetland	Sumpland	Quartz sand sheet overlying clay sheet on Bassendean Sand	Coalesced Bassendean Dune wetlands; meteoric water & discharge water from Gngara Mound ponded by clay bed
<b>Gngara suite (B2)</b> East of Wanneroo includes Lake Gngara & Lake Jandabup	Bassendean Dunes with slightly higher undulating dunes on western margin of this area; Wetlands enclosed by saddles or ridges	Lakes & sumplands & occasional damplands	Diatom. mud peaty sand & clay overlying quartz sand; Hardpans (ferricreted quartz sand) at level of water table	Groundwater wetlands; Large lakes appear as coalesced smaller basins; Drainage is impeded by thin clay, diatom. mud or ferricrete layers superimposed on, or within, the quartzose Bassendean sand
<b>Jandakot suite (B3)</b> 1. Nine Mile Swamp area 2. Spade Lake to Caladenia lake area 3. Bindar area 4. Gngara Pine Forest area 5. Jandakot area	Bassendean Dunes comprised of low dunes & depressions	Damplands & sumplands	Peat or peaty sand or humic sand overlying quartz sand	Groundwater surfacing or near surface in depressions to develop water table basins
<b>Riverdale suite (B4)</b> 1. West of Gingin, north & south of Gingin Brook 2. East Pinjar Lake area 3. Harvey River Flats area	Bassendean Dunes comprised of low, regularly undulating dunes	Sumplands	Clay, peat or peaty sand overlying quartz sand	Wetlands occur in regularly spaced depressions as parallel microscale interdunal swales to form linear, parallel chains; recharge by precipitation & groundwater rise, often maintained by ponding on a clay or peat bed





**Table 8 (continued): Natural Wetland Groups (Consanguineous Suites) (after Semeniuk 1996; map codes are in brackets)**

Name & location	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Spearwood Dunes</b>				
<b>Yanchep suite (S1)</b> Between Yanchep to the north & Kingsley to the south in a linear belt about 5 km inland from the coast	Spearwood Dunes Unit – area of parallel, coastal dune ridges, up to 40-60 m above mean sea level, & associated segmented depressions	Lakes & sumplands	Thin layer of peat overlying grey to yellow sand	Wetlands occur in depressions between Limestone ridges fed by discharge from Limestone & groundwater table rise; basins are young karst features
<b>Balcatta suite (S2)</b> In a 5 x 10 km area north of the Swan River estuary about 3 km inland from the coast	Spearwood Dunes Unit/area of hills & depressions within the Limestone dune ridges	Sumplands & lakes subsequent to clearing of vegetation e.g. Carine Swamp	Variable: peat overlying yellow sand, to peat & clay overlying thick yellow sand	Wetlands occur in depressions between hills; possibly old (mature) karst features
<b>Coogee suite (S3)</b> In a linear belt 1-2 km inland from the coast, east of Woodman Point	Spearwood Dunes Unit – inter dune ridge depression overlying Limestone	Lakes & sumplands	Carbonate mud overlying Limestone	Carbonate mud filled depressions now acting to pond meteoric water
<b>Stakehill suite (S4)</b> Linear belt extending from Wattleup to Mandurah	Spearwood Dunes Unit – ranging from ridges of Limestone outcropping to ridges of yellow sand overlying Limestone	Lakes & sumplands	Carbonate mud & peat overlying yellow sand	Carbonate mud & peat filled depressions; probably originally karst depressions superimposed on palaeotopographic features
<b>Spearwood - Bassendean Dunes Interface</b>				
<b>Bibra suite (SB1)</b> 1. Linear belt extending south from Bidaminna to Caladenia Cave 2. Linear belt extending from Murdoch to Wellard, in a N/S orientation approximately 5-7 km east of the coast	Spearwood Dunes & Bassendean Dunes contact depression. Continuous high dune ridges to the west & a series of discontinuous hollows & hills with lower relief to the east	Lakes & sumplands in a north-south oriented chain	Mud, peat, or peaty sand overlying Bassendean Sand	Contact depressions with groundwater impounded against Spearwood Dune ridge



# Part A



**Table 8 (continued): Natural Wetland Groups (Consanguineous Suites) (after Semeniuk 1996; map codes are in brackets)**

Name & location	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Quindalup Dunes</b>				
<b>Cooloongup suite (Q1)</b> Rockingham area Shoalwater Bay & Baldivis	Quindalup Dunes/Spearwood Unit beachridge plain	Lakes	Carbonate mud overlying Becher sand or for Lake Richmond unfilled with sediment	Wetlands originated as barred oceanic basins as part of the prograding shoreline; now freshwater recharged
<b>Becher suite (Q2)</b> Between Safety Bay & Peelhurst, in the coastal dune area; locally at Preston	Quindalup Dunes – specifically the small scale plain of parallel beachridges	Sumplands & damplands	Humic sand or peat & thin carbonate mud overlying Safety Bay sand	Wetlands are a series of primary inter-ridge depressions which intersect or lie close to the water table in a prograding coastal beachridge plain
<b>Peelhurst suite (Q3)</b> Narrow strip, 3 km long along the coast south of Becher Point; locally along the west short of Lake Walyungup & in isolated areas such as Whitfords cusp	Quindalup Dunes – specifically area of semi-mobile dunes & blowout depressions	Sumplands & damplands	Safety Bay Sand overlain by (carbonate) muddy sand	Wetlands are basins deflated to the level of the water table by prevailing onshore winds
<b>Estuaries</b>				
<b>Swan River Estuary suite (E2)</b> Swan River area between Fremantle & Guildford	Traversing 3 dune units: Quindalup, Spearwood & Bassendean; Flooded basins extend north & south of Swan River channel along depressions between Spearwood Dune ridges & Bassendean Dunes	Estuary	Mud & sand overlying quartz sand & Limestone	Marine-inundated river valley which was receiving basin for Canning, Helen & Swan rivers
<b>Swan Coastal Plain Rivers</b>				
<b>Swan River suite (R2)</b> Swan River; Helena River; Canning River; Serpentine River	Traversing the Swan Coastal Plain; incised channel alternates with braided shallow channel, terraces & large point bar deposits	River; floodplain	Alluvium of quartz sand & clay	Fluvial incision; sedimentation; surface runoff
<b>Goegrup suite (R4)</b> Serpentine River section north of Peel Inlet to Karnup	Contact depression between Spearwood Dunes Unit & Bassendean Dunes Unit – along which Serpentine River meanders	River; floodplains, palusplains & creeks	Quartz sand with iron indurated hardpans	Fluvial incision; sedimentation; river has been impounded & water flow reduced





## Wetland Management Objectives

### Background

An assessment by the Water and Rivers Commission of the appropriate preliminary management category for 4,700 basin and flat wetlands in the Wedge Island to Mandurah area has been published in maps and reports (Hill and Del Marco 1996, Hill *et al.* 1996b). It is based on the existing recognition of wetland values at the international, national or regional level, the application of DEP's wetland evaluation method (EPA 1990) and the Commission's review of categories using 1993 assessments of wetland vegetation status/naturalness (Hill and Del Marco 1996, Hill *et al.* 1996b). Since the publication of the mapping in Hill *et al.* (1996b) further verification work has been undertaken in some locations. As a result some wetland mapping has changed since the reports and maps were published. Any changes are progressively incorporated into the Water and Rivers Commission database. All recent updates are incorporated into the mapping and the Bush Forever Site descriptions.

The management categories described by the Water and Rivers Commission are outlined below:

- Conservation wetlands: 'Wetlands recognised at the international, national or regional level, "High Conservation" and "Conservation" wetlands identified using Bulletin 374 (EPA 1990) [or Bulletin 686 (EPA 1993)] assessment; wetlands 95–100% vegetated, sections of extensive wetlands' (Hill and Del Marco 1996 p. 102). Conservation Category Wetlands are wetlands for which the appropriate management regime has the objective of preserving their natural attributes and functions;
- Resource Enhancement: 'Wetlands 10–94% vegetated and Bulletin 374 (EPA 1990) [or Bulletin 686 (EPA 1993)] "Resource enhancement" and "Open Space" wetlands not identified above' (Hill and Del Marco 1996 p. 102). Resource Enhancement Category Wetlands are wetlands for which the appropriate management objective should be restoration through maintenance and enhancement of natural attributes and functions;
- Multiple Use: 'Wetlands 0–9% vegetated, Bulletin 374 "Multiple Use" (EPA 1990) [or Bulletin 686 (EPA 1993)] wetlands not identified above' (Hill and Del Marco 1996 p. 102). Multiple Use Category Wetlands are wetlands most appropriately managed for their use and development in the context of water, town and environmental planning.

In the context of these definitions 'vegetated' refers to uncleared native vegetation which may be in any of the vegetation condition categories described in the section on Vegetation Condition (Section 3.5.3). For the purposes of the Project channel wetlands that are 75–100 per cent vegetated are given Conservation Category Wetland status (Hill and Del Marco 1996 p. 96).

Some of the most vulnerable Conservation Category Wetlands in the Perth Metropolitan Region were subject to boundary verification and field visits in January 1997 (Semenuk, V & C Research Group 1997a) to assist in selection of areas to be included in Bush Forever. These verified Conservation Category Wetlands may still include some wetland areas which are relatively degraded. However, from the analysis, these include some of the best remaining examples of particular wetland suites and types (Semenuk, V & C Research Group 1997), or on some single criterion (Hill and Del Marco 1996) are considered worthy of protection and rehabilitation in conservation reserves and through other complementary mechanisms. Some further verification work has also been undertaken since the release of the draft *Perth's Bushplan* in 1998 and has been incorporated into Bush Forever (Tingay, Alan and Associates 1999, ATA Environmental 2000, *ecologia* 2000).

While many channel wetlands have not been identified in Sites, channels in the following categories are recognised as wetlands warranting protection, conservation and restoration (see Volume 1, Map 5). These categories are:

- rivers and creeks with existing specified regional significance
- principal channels for multiple-use corridors (or regional greenways)
- creeks that remain fully or partly vegetated.



# Part A



These channel wetlands warrant protection and enhancement under existing and future State

foreshore, catchment and environmental protection policies.

## Information Source

Source	Form	Custodian	Coverage
basin and channel wetlands (WRC 1996a)	GIS	WRC	Perth Metropolitan Region
verified conservation category wetlands (Semeniuk, V&C Research Group 1997a, WRC 2000, ATA Environmental 2000, <i>ecologia</i> 2000)	reports, GIS	WRC	Perth Metropolitan Region
flora survey, published and unpublished reports	text, lists, vegetation maps	N/A	bushland areas on the Swan Coastal Plain

### Directory Descriptors (Appendix 2, page 489)

All wetlands, are placed in management categories as described by Hill and Del Marco (1996). The area or length of each conservation category wetland is given.

Categories are: Conservation, Resource Enhancement and Multiple Use.

## Environmental Protection (Swan Coastal Plain Lakes) Policy 1992

### Background

The *Environmental Protection (Swan Coastal Plain Lakes) 1992 Policy* (referred to as the Swan Coastal Plain Lakes EPP) was gazetted in December 1992 (Government of Western Australia 1992c) to protect 'Swan Coastal Plain Lakes', a selection of permanently and seasonally inundated wetlands on the Swan Coastal Plain. Under the terms of this policy a 'lake' is 'a Swan Coastal Plain wetland with surface water of at least 1,000 square metres at the 1st December 1991 (the first day of summer)' (an EPP lake).

All such EPP lakes are mapped on DOLA Miscellaneous Plan No. 1815. Wetlands identified under the Policy are protected from unauthorised filling, mining, effluent disposal and drainage.

The Swan Coastal Plain Lakes EPP has been reviewed. The reviewed policy (EPA 1999) and the associated documents (EPA 2000a&b) propose:

- continued protection of the EPP lakes with additional protection from clearing; and
- inclusion of additional wetlands with significant attributes and values. See Section 3.

## Information Source

Source	Form	Custodian	Coverage
DOLA Miscellaneous Plan No. 1815 (DEP 1992b)	GIS	DEP	Swan Coastal Plain

### Directory Descriptors (Appendix 2, page 489)

The following two categories were used in describing EPP lakes:

- Xha + Yha etc. = Zha (total) – the area of each lake and the total area of lake as defined by the EPP within the Site
- none identified – no area of EPP lake identified in the Site.





### 3.4.4 THREATENED ECOLOGICAL COMMUNITIES

#### Background

Over recent years CALM's Western Australian Threatened Species and Communities Unit (WATSCU), with financial help from Environment Australia, has developed a procedure for identifying 'threatened ecological communities' (English and Blyth 1997, 1999). Ecological communities are defined as 'naturally occurring biological assemblages that occur in a particular type of habitat'.

Information on the geographic extent of each ecological community and the threatening processes that may be operating on the community is used to

determine if an ecological community is 'threatened'. 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' or 'Vulnerable' (Table 9). Three further categories — 'Data Deficient', 'Lower Risk' and 'Not Assessed' — are also distinguished. Ecological communities identified as 'data deficient' are usually communities with poorly known distributions which are suspected of belonging to one of the threatened categories. The 'lower risk' category describes communities that are well enough known and surveyed and not considered to be under threat.

**Table 9: Definitions of the status of the threat to ecological communities**  
(English and Blyth, 1999)

#### Category 1

##### Presumed Totally Destroyed

An ecological community which has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

#### Category 2

##### Critically Endangered

An ecological community which has been adequately surveyed and found to have been subject to a major contraction in area and/or which was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

#### Category 3

##### Endangered

An ecological community which has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

#### Category 4

##### Vulnerable

An ecological community which has been adequately surveyed and found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not been assured and/or a community which is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

#### Category 5

##### Data Deficient

An ecological community for which there is inadequate data to assign it to one of the above categories and/or which is not yet evaluated with respect to status of threat.

(Usually an ecological community with poorly known distribution or biology that is suspected to belong to any of the above categories. These ecological communities have a high priority for survey and/or research.)

#### Category 6

##### Lower Risk

A community which has been adequately surveyed and evaluated and available information suggests that it does not qualify



# Part A

CALM is working with government agencies and private land holders on whose lands these communities have been identified to protect and manage these threatened ecological communities.

Due to insufficient time the remaining ecological communities (floristic community types) identified by Gibson *et al.* (1994) have not been assessed. Also some of the additional floristic community types identified in the System 6 and Part System 1 Update Program (DEP 1996, Table 6) may be classified as 'threatened' once they are assessed. For example, floristic community type S5 is known only from two bushland areas, one in the Perth Metropolitan Region and another in Bunbury.

On the Swan Coastal Plain a number of floristic studies (Gibson *et al.* 1994, Keighery, GJ, and Keighery 1995, DEP 1996) and freshwater organism studies (Ahmat 1993, Moore 1993, Jasinska and Knott 1994, 1995, Jasinska 1997) have delineated ecological communities in a form adequate for assessment. Twenty-five ecological communities defined by these studies have been assessed. One was considered 'data deficient' (floristic community type 14, Gibson *et al.* 1994) and 24 'threatened'. Twenty of these communities (English and Blyth 1997 and Blyth pers. comm.) occur within the Perth Metropolitan Region (Table 10).

**Table 10: Threatened Ecological Communities on the Swan Coastal Plain in the Perth Metropolitan Region (after English and Blyth 1997, Blyth pers. comm. 2000)**

KEY	CR	Critically Endangered
	EN	Endangered
	VU	Vulnerable
	+	Listed as 'endangered' under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (see Section 3.6.6)

## A. Floristic Community Types (as identified in Gibson *et al.* 1994)

### Supergroup 1 – Foothills/Pinjarra Plain

2	Southern wet shrublands	EN
3a	<i>Eucalyptus calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils	CR+
3b	<i>Eucalyptus calophylla</i> - <i>Eucalyptus marginata</i> woodlands on sandy clay soils	VU
3c	<i>Eucalyptus calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands	CR+

### Supergroup 2 – Seasonal Wetlands

7	Herb rich saline shrublands in clay pans	VU
8	Herb rich shrublands in clay pans	VU
9	Dense shrublands on clay flats	VU
10a	Shrublands on dry clay flats	EN
15	Forests and woodlands of deep seasonal wetlands	VU
18	Shrublands on calcareous silts	VU
19	Sedgeland in Holocene dune swales	CR+

### Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau

20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	EN
20b	Eastern <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands	EN
20c	Eastern shrublands and woodlands	CR+

### Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes

#### Spearwood Dunes

26a	<i>Melaleuca huegelii</i> – <i>Melaleuca acerosa</i> shrublands on Limestone ridges	EN
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#### Quindalup Dunes

30a	<i>Callitris preissii</i> and/or <i>Melaleuca lanceolata</i> forests and woodlands	VU
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## B: Restricted floristic community type mosaics

Shrublands and woodlands on Muchea Limestones (Keighery, GJ, and Keighery 1995)	EN+
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## C: Freshwater communities

Communities of Tumulus Springs (Jasinska and Knott 1994, Ahmat 1993)	CR+
Stromatolite-like microbialite community of coastal freshwater lakes (Lake Richmond, Moore 1993)	CR+
Aquatic root mat community of caves of the Swan Coastal Plain (Jasinska 1997, Jasinska and Knott 1995)	CR+





### Information Source

Source	Form	Custodian	Coverage
English and Blyth (1997) and Blyth (pers. comm.); MfP & CALM (1996) (with additional locations from DEP 1996)	listed areas, point locations on GIS	MfP & CALM	N/A, determined in response to the identification of ecological communities by expert study

#### Directory Descriptors (Appendix 2, page 490)

The following categories are used in describing 'threatened' ecological communities:

- Not determined — applies to communities not referred to in English and Blyth (1997)
- Not assessed — applies to communities referred to in English and Blyth (1997) but yet to be assessed (generally considered not at risk)
- Critically Endangered, Endangered, Vulnerable — status of threat determined by English and Blyth (1997) and Blyth (pers. comm.).

## 3.5 SECTION 3: SPECIFIC SITE DETAIL

### 3.5.1 INTRODUCTION

The information presented in SECTION 3 essentially describes the area on the ground, that is, what it looks like. Specific information on the areas comes from survey data collected in the floristic surveys (databases used for/in Gibson *et al.* 1994, DEP 1996

and Griffin 1994), DEP survey records (DEP 1998), MfP survey (including Connell 1995, Mattiske Consulting Pty Ltd 1997), Western Australian Museum surveys, CALM's Bandicoot survey (Friend 1996 D) and published and unpublished reports. The level of detail varies, being dependent on the detail of survey on the particular area. Standard descriptions are used to indicate this level of detail.

### 3.5.2 LANDSCAPE FEATURES

#### Directory Descriptors (Appendix 2, page 492)

General landscape features as observed during survey are broadly described to give the general physical characteristics of the area. In general each term is self explanatory. The terms are:

- river — limestone cliff (Tamala Limestone)
- ocean — limestone cliff (Tamala Limestone)
- limestone ridge (Tamala Limestone)
- Muchea Limestone (limestone found on the eastern side of the Swan Coastal plain)
- ironstone (locally formed ironstones found in the Pinjarra Plain)
- tall dune
- open water
- vegetated wetland (seasonally inundated or waterlogged)
- creek or streamline
- river
- estuary
- island
- vegetated uplands.

### 3.5.3 VEGETATION AND FLORA

#### Background

Information on the vegetation and flora of the bushland in each Bush Forever Site has been

grouped under a series of headings: Structural Units, Remnant Vegetation, Vegetation Condition, Total Flora and Significant Flora. This information has been collated from the surveys outlined in Section 3.4.2 above and published and unpublished reports.



# Part A

## Information Source

See under Structural Units, Scattered Native Plants, Vegetation Condition, Total Flora and Significant Flora below.

### Directory Descriptors (Appendix 2, page 492)

Vegetation and flora information has been collated from CALM, DEP and MfP surveys and published and unpublished studies. For ease of reference these are listed at the beginning of 'Vegetation and Flora' and repeated as necessary under each of the other headings. The surveys and published and unpublished studies are categorised under the following headings.

- not known — area not visited, studies not known
- limited survey — area visited on a limited basis (generally once or twice); principal vegetation units described. (The majority of the survey work to locate floristic study plots falls into this category; all plots are listed by code and study source, see Section 3.4.2 Floristic Community Types.)
- detailed survey — multiple visits, the entire area traversed, vegetation generally mapped, flora list prepared
- not field-surveyed (aerial photography interpretation only) — area not visited within the time of the project.

## Structural Units

### Background

The basic patterning of the plant communities on the Plain is related to a series of broad vegetation formations (plant associations, assemblages or communities) described according to dominant species and the structure and density of these dominants. Structural units are used at the regional and local level to map vegetation. For example Beard (1979a&b) maps vegetation on the Swan Coastal Plain (region) and Keighery, GJ, and Keighery (1993) maps individual areas (local) on the Plain. These broad units and associated dominant species are described below:

### Open Forests and Woodlands

These communities are dominated by a wide variety of trees, either individually or in various combinations. The major tree species are:

- Eucalypts — *Eucalyptus calophylla*, *E. wandoo*, *E. marginata*, *E. totiana*, *E. rudis*, *E. decipiens*, *E. lanepolei*, *E. haematoxylon* and *E. gomphocephala*
- Sheoaks — *Allocasuarina fraseriana* and *Casuarina obesa*
- Banksias — *Banksia attenuata*, *B. menziesii*, *B. prionotes*, *B. ilicifolia*, *B. grandis* and *B. littoralis*
- Melaleucas — *Melaleuca preissiana*, *M. raphiophylla* and *M. lanceolata*
- Rottnest Island Cypress — *Callitris preissii*.

### Shrublands

The dominant shrub species of these communities are too numerous to attempt to list, probably numbering close to 200. Examples are from the following genera: *Jacksonia*, *Viminaria*, *Daviesia*, *Leucopogon*, *Regelia*, *Banksia*, *Dryandra*, *Grevillea*, *Hakea*, *Petrophile*, *Stirlingia*, *Gompholobium*, *Calytrix*, *Verticordia*, *Pericalymma*, *Melaleuca*, *Hibbertia*, *Halosarcia*, *Sarcocornia*, *Xanthorrhoea*, *Kingia* and *Acacia*.

### Herblands

Again the dominant herb species are too numerous to list. Examples are from the following genera: *Borya*, *Phlebocarya*, *Lomandra*, *Anigozanthos*, *Conostylis*, *Paterosonia*, *Drosera* and *Stylidium*.

### Sedgeland

Similarly the dominant sedge and rush species are too numerous to list. Examples are from the following genera: *Baumea*, *Gahnia*, *Evandra*, *Schoenus*, *Mesomelaena*, *Alexgeorgea*, *Cyathochaeta*, *Desmodcladus*, *Chaetanthes*, *Meeboldinia*, *Dielsia* and *Juncus*.

### Grasslands

Grasslands are not a very significant component of the flora of the Plain. Their greatest area of representation is on the Quindalup Dunes. Important genera are *Spinifex*, *Austrostipa*, *Austrodanthonia* and *Poa*.

The various combinations of these broad vegetation formations and the patterning of the hundreds of individual taxa found on the Perth Metropolitan Region portion of the Plain have resulted in the





complex series of communities on the Plain. This structural diversity is significant as vegetation structure is an important aspect of landscape and has particular significance for fauna habitat. Mature plants of individual species, especially trees and tall shrubs, have significant biological and landscape values.

The diversity of vegetation structural units varies between the major landform elements. Structural diversity is greatest within the Spearwood Dunes and lowest within the *Banksia* Woodlands. This

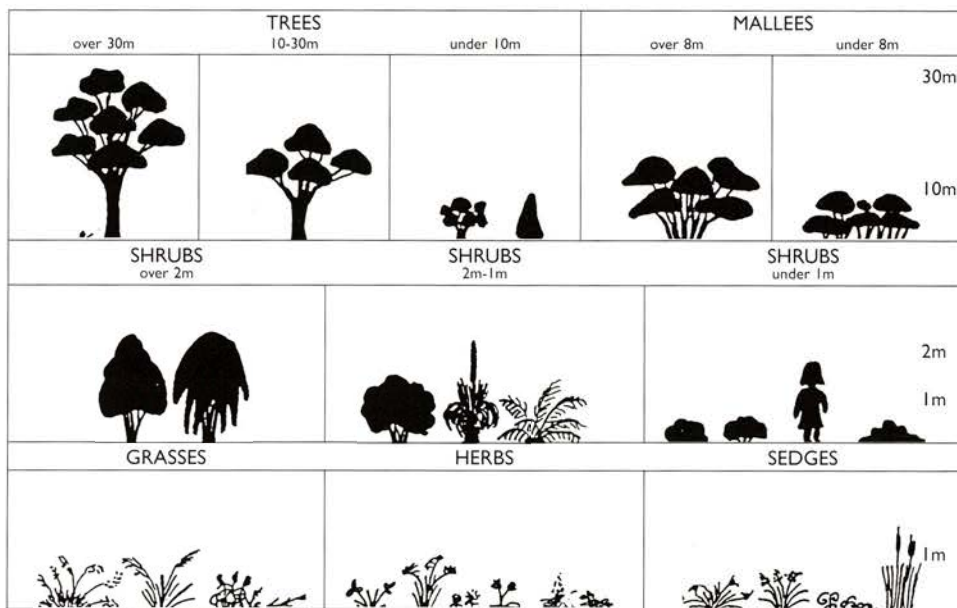
structural diversity is accentuated in the Spearwood Dunes as it combines with the greatest landscape diversity on the Plain.

In an individual bushland area the structural units are generally described in a number of categories related to the height class of each life form, the cover of each layer and the dominant species (Figure 5). The scale (regional or local) at which the vegetation is described and the subjective nature of cover determination can lead to some inconsistencies in descriptions of the same area.

Each layer of vegetation in a plant community is described according to life form, height, cover and dominant species.

- **Life Form/Height**

Each layer in the community is described according to the divisions shown below.



- **Cover**

A measure of the plant cover in each layer is recorded. Plant cover (or crown cover) is the total area under an imaginary line bounding the extremities of all the plants in each layer described. To simplify the estimation of cover, cover 'classes' are used:

Cover Classes	2-10%	10-30%	30-70%	over 70%
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Not all layers will be present in a site. Table 11 is used to name the vegetation structural classes from the information on the life form, height and cover:

- **Dominant Species**

The principal species in each layer are included in the description of the structural layers.

**Figure 5: Categories of vegetation information used to describe vegetation structure (Keighery, BJ 1994a)**



# Part A



Information Source			
Source	Form	Custodian	Coverage
CALM flora survey, 1991–1993 (Gibson <i>et al.</i> 1994)	database, GIS	CALM	individual bushland areas on the Swan Coastal Plain
DEP flora survey, 1994–1995 (DEP 1996)	database, GIS	DEP	individual bushland areas on the Swan Coastal Plain
DEP flora survey, 1994–1998 (DEP 1996, DEP 1998)	survey sheets	DEP	individual bushland areas on the Swan Coastal Plain
flora survey (Griffin 1994)	database, GIS	AGWEST	individual bushland areas on the Swan Coastal Plain
flora survey (Keighery, GJ 1996, 1999)	database, GIS	CALM	individual bushland areas on the Swan Coastal Plain
flora survey (Mattiske Consulting Pty Ltd 1997)	text, lists	MfP	individual bushland areas on the Swan Coastal Plain
flora survey, published and unpublished reports	text, lists, vegetation maps	N/A	individual bushland areas on the Swan Coastal Plain
submissions to the System 6 and Part System 1 Update Program, various dates	text, lists	DEP	individual bushland areas on the Swan Coastal Plain

## Directory Descriptors (Appendix 2, page 492)

Vegetation structural information has been collated from CALM, DEP and MfP surveys and published and unpublished studies. These are referenced at the beginning of the vegetation and flora section. Studies that include vegetation maps are indicated and referenced.

For uniformity a single vegetation structural code has been used (Table 11). When necessary, vegetation descriptions have been modified to conform with this code and/or several sources of structural information on the same area have been combined. The original descriptions can be found in the references quoted. In general, vegetation structural descriptions only refer to the dominant layer with the dominant species in this layer listed.





**Table 11: Vegetation Structural Classes** (Keighery, BJ, 1994 (adapted from Muir 1977 and Aplin 1979))

Life Form/ Height Class	Canopy Cover (percentage)			
	100 – 70%	70 – 30%	30 – 10%	10 – 2%
Trees over 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland
Trees 10 – 30m	Closed Forest	Open Forest	Woodland	Open Woodland
Trees under 10m	Low Closed Forest	Low Open Forest	Low Woodland	Low Open Woodland
Tree Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs over 2m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1 – 2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs under 1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

## Scattered Native Plants

For Bush Forever Sites in which there are areas of native vegetation that do not meet the definition of bushland (completely degraded, see Vegetation Condition below), an estimate of the area with some natural vegetation is made, if possible. When trees are present the type of woodland or forest is given. When insufficient detail of the Site is available this category is 'not assessed'.

## Vegetation Condition

### Background

Change is a feature of bushland. Individual plants grow, flower and shed seed. Plants age and die, to be replaced by others, either from seed or by vegetative growth. Changes in a plant community may be cyclic or directional. Broadly speaking, natural cycles in the plant community may be maintained by recurring events such as fire or flood. After these, species already in the habitat, perhaps as soil-stored seed, are recruited and the vegetation gradually regains its former structure. Depending on the

sequence of events and weather conditions, slightly different combinations of species may be favoured, but the plant community is essentially self-maintaining. Directional change may be induced by habitat disturbance which alters soil and water properties, and allows recruitment of species not native to the habitat, in particular, exotic weeds. Such changes generally lead to bushland deterioration.' (Benson and Howell 1990).

Activities that adversely affect the self-maintenance of bushlands are commonly called disturbance factors. Such factors include partial clearing, fragmentation, selective removal of species (for example, timber cutting, wildflower picking, mowing), dieback, fire regime, 'enrichment plantings' (that is, plantings of species not found in that plant community), weed invasion, animal impact (horses, foxes, rabbits, cats, dogs), soil movement (both removal and dumping), changes in water regimes (flooding, drainage and watering), rubbish dumping, mining (particularly mining for roadworks), grazing (stock, overgrazing by native mammals), proliferation of tracks (fire-breaks and walk trails), off-road vehicle



# Part A



use, use as service corridors (for electricity, gas, roads and water), fertiliser drift and pesticide or nutrient influx along waterways.

Not all of these factors have the same level of impact but generally they are interrelated, the presence of one type of disturbance leading to further disturbance. The observed disturbance is most often the cumulative result of a series of compounding disturbance factors.

An assessment of disturbance, in relation to the ability of the bushland to self-maintain, has been used as the basis of defining condition ratings for plant communities. The three most widely used scales are given in Table 12 and the relationship between these scales indicated. Condition scales in the Perth Metropolitan Region used in Bush Forever follow Keighery, BJ (1994); (also see Table 12, left-hand column). Two of these condition ratings were developed from Trudgen (1991). Such detailed condition ratings were designed to describe the condition of 100-square-metre plots (accurately located areas) or levees (approximately located areas). In each case the condition rating is related to the vegetation structure, that is, the impact of disturbance on each of the layers and consequently on the ability of the community to regenerate.

In the actual assessment of vegetation condition in the field it is important to understand the basis of the condition ratings and the particular features of the individual plant communities being assessed. For example, woodlands of the Quindalup and Spearwood Dunes in pristine to excellent condition typically have areas of bare sand and Quindalup Dunes shrublands typically have a native grass layer. If either of these two features is absent or replaced by weeds the vegetation is degraded. Much of the confusion between condition ratings determined by different studies is related to inexperience with the variation in plant communities on the Plain and the subjective aspects of condition determination.

Of particular interest when considering vegetation condition are the communities of the eastern side of the Plain. Heavy soils on the eastern side of the Swan Coastal Plain and other soils with a high percentage of clay are well known for their ability to maintain vegetation condition and biodiversity when reduced to small remnants (Keighery, BJ, and Trudgen 1992, Keighery, BJ 1996, Keighery, BJ et al. 1997, Matiske Consulting Pty Ltd 1997). Examples of such remnants include that at the junction of Mundijong and Duckpond Roads (part Bush Forever Site 360, approximately three hectares), private land on Page Road (Site 78, approximately one hectare), Lambert Lane Bushland (Site 264, approximately four hectares), Lambkin Reserve (part Site 375, approximately one hectare) and the smaller remnants in Hartfield Park (Site 320). This ability to maintain condition is also apparent in the linear remnants along Mundijong Road (Site 360). The ability of such remnants to resist weed invasion appears to be related to a combination of all or some of the following factors: the density of the cover of the plant communities, seasonal inundation and the dry impenetrable nature of clay-based soils in summer.

In most vegetation condition mapping, ranges (Trudgen 1991, Keighery, BJ, and Trudgen 1992) or broader units (Kaesehagen 1994, Keighery, BJ 1996c) are generally used, as most bushland areas are a mosaic of conditions and broader units are more applicable.





**Table 12: Vegetation Condition Scales commonly used in the Perth Metropolitan Region**

Condition scale used in BUSH FOREVER, VOL. 2, from Keighery B J (1994)	Condition scale used to derive Keighery B J (1994) and Connell (1995) after Trudgen (1991)	Condition scale used in PEP MAPPING after Connell (1995)
<b>Pristine (1)</b> Pristine or nearly so, no obvious signs of disturbance	<b>Excellent (E)</b> Pristine or nearly so, no obvious signs of damage caused by the activities of European man.	No equivalent unit
<b>Excellent (2)</b> Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.	<b>Very Good (VG)</b> Some relatively slight signs of damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fires and the presence of some relatively non-aggressive weeds such as <i>Ursinia anthemoides</i> or <i>Briza</i> species, or occasional vehicle tracks.	<b>Very Good (vg)</b> Evidence of localised low level damage to otherwise healthy bush. Seedling recruitment and generally healthy population size (age/stage) structure apparent. Weed and grazing damage is confined (<20% of area). Some modification to vegetation structure due to changes in fire regimes may be apparent. Evidence of logging or fire wood collection may be found. High likelihood that vegetation structure and species richness can be maintained.
<b>Very Good (3)</b> Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	<b>Good (G)</b> More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones.	<b>Good (g)</b> Evidence of localised high level damage to otherwise low level damaged bush. Recruitment is localised and the populations of some species may be senescent. Weed and grazing damage is apparent in 20–50% of the area. Modification to vegetation structure due to changes in fire regimes may be apparent. Localised gall and parasitic plant damage may be apparent. Evidence of logging or firewood collection. Moderate likelihood that vegetation structure and species richness can be maintained.
<b>Good (4)</b> Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing	<b>Poor (P)</b> Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man such as grazing or partial clearing (chaining) or very frequent fires. Weeds as above, probably plus some more aggressive ones such as <i>Ehrharta</i> species.	<b>Poor (p)</b> Widespread high level damage. Recruitment is disrupted and most woody species appear senescent. Weed and grazing damage may be apparent throughout >50% of the area. Modification to vegetation structure due to changes in fire regimes may be apparent. Locally some vertical strata are absent. Gall and mistletoe damage apparent. Evidence of logging or firewood collection. Low likelihood that vegetation structure and species richness can be maintained or re-established.
<b>Degraded (5)</b> Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	<b>Very Poor (VP)</b> Severely impacted by grazing, fire, clearing, or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species including aggressive species.	<b>Very Poor (vp)</b> Widespread high level damage. Recruitment is disrupted and most species appear senescent. Weed and grazing damage apparent throughout the area. Modification to vegetation structure due to changes in fire regimes apparent. Widespread loss of vertical strata. Gall and mistletoe damage apparent. Evidence of logging or firewood collection. Little to no likelihood that vegetation structure and species richness can be re-established.
<b>Completely Degraded (6)</b> The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.	<b>Completely Degraded (D)</b> Areas that are completely or almost completely without native species in the structure of their vegetation i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.	Not used – does not apply to bushland.



# Part A



## Information Source

Source	Form	Custodian	Coverage
CALM flora survey 1991–1993, (Gibson <i>et al.</i> 1994)	database, GIS	CALM	individual bushland areas on the Swan Coastal Plain
DEP flora survey 1994–1995, (DEP 1996)	database, GIS	DEP	individual bushland areas on the Swan Coastal Plain
DEP flora survey, 1994–1998 (DEP 1996, DEP 1998)	survey sheets	DEP	individual bushland areas on the Swan Coastal Plain
flora survey (Griffin 1994)	database, GIS	AGWEST	individual bushland areas on the Swan Coastal Plain
Connell (1995) as digitised by MfP (1996)	GIS	MfP	individual bushland areas on the Swan Coastal Plain
flora survey (Mattiske Consulting Pty Ltd 1997)	text, lists	MfP	individual bushland areas on the Swan Coastal Plain
flora survey, published and unpublished reports	text, lists, vegetation condition maps	N/A	individual bushland areas on the Swan Coastal Plain
submissions to the System 6 and Part System 1 Update Program, various dates	text, lists	DEP	individual bushland areas on the Swan Coastal Plain

### Directory Descriptors (Appendix 2, page 493)

Condition scales follow Keighery, BJ (1994a) as defined in Table 12, left-hand column. Wherever possible vegetation condition is given as an estimate of the percentage of the bushland area in a range of conditions (Table 12) selected from two categories, for example: '>75% Excellent to Very Good with <25% Good to Degraded'. In many bushland areas there are pockets of completely degraded vegetation and these are referred to as 'areas of severe localised disturbance'.

At times there was not sufficient information available from which to determine a range and a single condition is given.

## Total Flora

### Background

There has been a series of studies of the flora of the Swan Coastal Plain. *Flora of the Perth Region* (Marchant *et al.* 1987) which covers much of the Swan Coastal Plain (and some of the Darling Plateau) identified approximately 1,500 vascular plant taxa (species, subspecies and varieties) on the Plain. A total of 1,485 vascular plant taxa were identified by Gibson *et al.* (1994) in the 509 plots and in adjacent areas. Around nine per cent of these taxa were undescribed and were additional to those described in *Flora of the Perth Region*. The System 6 and Part System 1 Update Program identified

around 200 taxa additional to those in Gibson *et al.* (1994) in the update area (DEP 1996). In 1999 GJ Keighery listed a total of 2,546 vascular plant taxa for the southern Swan Coastal Plain – an equivalent area to that studied by Gibson *et al.* (1994); see Map 1 – which included 1,749 native vascular plant taxa and 797 weeds (Keighery, GJ 1999).

Within the Swan Coastal Plain portion of the Perth Metropolitan Region over 1,200 native taxa have been identified from the floristic study plots and bushland area records and WA Herbarium records (DEP 1996). The DEP is currently working collaboratively with CALM to produce an annotated list of the flora of the Swan Coastal Plain south of the Moore River.





Species diversity on the Plain is generally high. Detailed vegetation studies have established that the diversity of flora on the Plain is considerably higher than originally estimated. Fox *et al.* (1980) recorded approximately 250 taxa for Yalgorup National Park, yet recent survey recorded in excess of 600 taxa for the Park (Keighery, GJ 1996). Other areas have demonstrated exceptional levels of species diversity, 19 hectares of the nationally significant Brixton Street Wetlands having over 300 taxa (Keighery, BJ, and Keighery 1995) and the larger area of the Wetlands (Site 387) containing in excess of 550 taxa (Keighery, GJ, and Keighery 2000).

There are now a considerable number of studies detailing the flora of individual bushland areas (see references for each Site). In addition, a study surveying and collating flora lists for national parks and nature reserves on the Plain by GJ Keighery (1996) considers the conservation status of species

on the Plain, from the widespread and common species to the rare and restricted.

Direct comparisons of species diversity between bushland areas are not meaningful as species diversity in a given area on the Plain relates to habitat diversity which in turn is related to geomorphology, inundation and floristics. As a consequence a comparison of the average species diversity per plot (less those taxa found in only plot) with each floristic community type can give an indication of the patterning of species diversity on the Plain (Table 6). With the single-plot taxa excluded, diversity ranges from 66.2 taxa to 8.6 taxa per 10-metre x 10-metre plot. The highest diversity is found in the woodlands of the Bassendean Dunes and the eastern side of the Plain (Foothills and Pinjarra Plain). Within the seasonal wetland communities the highest diversity is associated with the wetlands of the eastern side of the Plain.

### Information Source

Source	Form	Custodian	Coverage
CALM flora survey, 1991–1993 (Gibson <i>et al.</i> 1994)	database, GIS	CALM	individual bushland areas on the Swan Coastal Plain
DEP flora survey, 1994–1995 (DEP 1996)	database, GIS	DEP	individual bushland areas on the Swan Coastal Plain
DEP flora survey, 1994–1998 (DEP 1996, DEP 1998)	survey sheets	DEP	individual bushland areas on the Swan Coastal Plain
flora survey (Griffin 1994)	database	AGWEST	individual bushland areas on the Swan Coastal Plain
flora survey (Keighery, GJ 1996, 1999)	database	CALM	individual bushland areas on the Swan Coastal Plain
flora survey, published and unpublished reports	text, lists	N/A	individual bushland areas on the Swan Coastal Plain
submissions to the System 6 and Part System 1 Update Program, various dates	text, lists	DEP	individual bushland areas on the Swan Coastal Plain

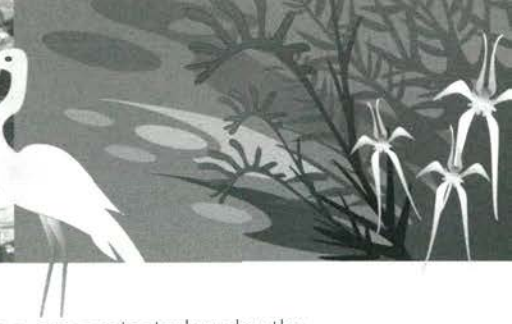
### Directory Descriptors (Appendix 2, page 494)

A measure of the native vascular plant flora has been collated from survey work undertaken specifically for the Project by the DEP and from published and unpublished studies. Survey information additional to the regional surveys are referenced in each case. The sources are categorised according to the level of detail of survey to give an indication of the percentage of the flora the survey recorded. Categories were:

- not known — area not visited, studies not known to exist
- plot-generated list only — a list extracted from amalgamated floristic study plots
- estimate % — quoted as percentage of the expected flora. The following ranges were used in most cases: >50%, >75% and >90% expected flora.
- estimate — estimate of expected total flora based on knowledge of plant communities in the Site



# Part A



## Significant Flora

### Background

One hundred and seventy eight vascular plant taxa (species, subspecies or varieties) recorded on the Swan Coastal Plain are of particular interest as they are rare, poorly known, restricted in distribution or have some other distinctive feature (Table 13).

A series of these taxa are protected under the Commonwealth *Environment Protection and Biodiversity Act 1999* (see Section 3.6.6). Table 13 is annotated to indicate the taxa protected by the Act. The categories of significance considered relevant in assessing bushland areas for regional conservation value are detailed below.

**Table 13: Significant Flora of the Perth Metropolitan Region**

### Key

#### Column 1: Taxon

Names follow Gibson *et al.* (1994) and Atkins (1999) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. An 'ms' after the name indicates that this is a manuscript name which is yet to be published.

#### Column 2: Conservation Status (Atkins 1999)

- R = Declared Rare Flora
- 1 = Priority 1: Poorly Known Taxa
- 2 = Priority 2: Poorly Known Taxa
- 3 = Priority 3: Poorly Known Taxa
- 4 = Priority 4: Rare Taxa

#### Column 3:

##### Geographical Variation

- r = populations at the northern or southern limit of their known geographic range
- d = populations disjunct from their known geographic range
- p = considered to be poorly reserved (applies to all Declared Rare Flora and Priority taxa)
- s = significant populations (applies to all Declared Rare Flora and Priority taxa)
- X = considered lost in the Perth Metropolitan Region

##### Regional Ecological Preferences

- e = taxa endemic to the Swan Coastal Plain
- E = taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region

#### Column 4: Species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (see Section 3.6.6)

- EN = Species that are endangered
- VU = Species that are vulnerable
- TD = Species that are extinct

Taxon	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Acacia anomala</i>	R	p, s	VU
<i>Acacia alata</i> var. <i>tetrantha</i>		s	
<i>Acacia benthamii</i>	2	p, s, E	
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> (long peduncle variant) (GJ Keighery 5026)	1	p, s, e	
<i>Acacia littorea</i>		s, d	
<i>Actinodium cunninghamii</i>		X	
<i>Actinostrobilus acuminatus</i>		p, d	
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	3	p, s	
<i>Agonis flexuosa</i>		r, s	
<i>Allocasuarina lehmanniana</i>		s	
<i>Alyogyne huegelii</i> var. <i>glabrata</i>		s	





**Table 13 (continued): Significant Flora of the Perth Metropolitan Region**

Taxon	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Amperea protensa</i>	2	p, s	
<i>Amyema melaleucaea</i>		s, d	
<i>Andersonia gracilis</i>	R	p, s, d	EN
<i>Angianthus micropodioides</i>	3	p, s, d	
<i>Anthotium junciforme</i>	4	p, s	
<i>Aotus cordifolia</i>	3	p, s	
<i>Aponogeton hexatepalus</i>	4	p, s, e	
<i>Aristida ramosa</i>	1	p, s, d	
<i>Astroloma macrocalyx</i>		s, p	
<i>Astroloma microcalyx</i>		s	
<i>Atriplex suberecta</i>		s, d	
<i>Banksia micrantha</i>	3	p, s, d	
<i>Baeckea</i> sp. Darling Range (= sp. Chittering) (R. Cranfield 1673)	1	p, s	
<i>Baeckea tenuifolia</i>	3	p, s, d	
<i>Blancoa canescens</i>		d, p	
<i>Boronia alata</i>		s, d	
<i>Boronia crenulata</i> subsp. <i>viminea</i> (= var. <i>gracilis</i> )		s	
<i>Boronia purdieana</i>		r, s	
<i>Burchardia bairdiae</i>		r, s	
<i>Beyeria cygnorum</i>	2	p, s	
<i>Byblis lindleyana</i> (= <i>gigantea</i> )	2	d, p, r, E	
<i>Caesia micrantha</i> (Large swamp form) (BJ Keighery & N Gibson 094)		e	
<i>Caladenia huegelii</i>	R	p, s, e	EN
<i>Calandrinia</i> sp. Kenwick (= aff. <i>composita</i> ) (GJ Keighery 10905)	1	p, s, E	
<i>Callitris preissii</i>		s, E	
<i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>	4	p, s	
<i>Carpobrotus modestus</i>		s	
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	R	p, s, E	EN
<i>Centrolepis caespitosa</i>	R	p, s	EN
<i>Chamaescilla gibsonii</i> ms (= sp. Ellen Brook and aff. <i>spiralis</i> ) (GJ Keighery 12501)	3	s, e	
<i>Chamelaucium uncinatum</i>		r, s	
<i>Chorizema varium</i>	R	X	EN
<i>Comesperma rhadinocarpum</i>	2	p, s, d	
<i>Conospermum huegelii</i>		s	
<i>Conospermum incurvum</i>		r, s	
<i>Conospermum triplinervium</i>		s, p	
<i>Conospermum undulatum</i>	R	p, s, E	VU
<i>Conostephium minus</i>	4	p, s, e	
<i>Conostylis bracteata</i>	3	r, p, s, E	
<i>Conostylis aculeata</i> subsp. <i>cygnorum</i> ,		e	
<i>Conostylis pauciflora</i> subsp. <i>pauciflora</i>	4	p, s, e	
<i>Conostylis pauciflora</i> subsp. <i>euryrhipis</i>	3	p, s	
<i>Craspedia arenicola</i> ms (GJ Keighery 14449)		s	
<i>Crassula colorata</i> subsp. <i>miriamiae</i>	2	?X	
<i>Cyathochaeta teretifolia</i>	3	p, s	
<i>Cyathochaeta equitans</i> (= <i>clandestina</i> )		r, s	
<i>Cyclosorus interruptus</i>		s, d	
<i>Cynoglossum australe</i>		s, d	
<i>Darwinia</i> sp. 'Mucea' (BJ Keighery 2006)		s, p	
<i>Dasyopogon obliquifolius</i>		s, d	
<i>Dielsia stenostachyus</i> (= <i>Restio stenostachyus</i> )		e	
<i>Dillwynia dillwynioides</i>	3	p, s, e	
<i>Diplolaena dampieri</i>		r, s	



# Part A



**Table 13 (continued): Significant Flora of the Perth Metropolitan Region**

Taxon	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Diplolaena angustifolium</i>		p	
<i>Diuris drummondii</i>	R	p, s	VU
<i>Diuris micrantha</i> ms	R	p, s	EN
<i>Diuris purdiei</i>	R	p, s, e	
<i>Dodonaea hackettiana</i>	4	p, s, e	
<i>Drakaea elastica</i>	R	p, s	
<i>Drakaea micrantha</i> ms	R	p, s	
<i>Drosera bulbigena</i>		e	
<i>Drosera gigantea</i> subsp. <i>geniculata</i>		s	
<i>Drosera macrantha</i> (Swan coastal plain form) (BJ Keighery & N Gibson 228)		?e	
<i>Drosera occidentalis</i> subsp. <i>occidentalis</i>	4	p, s, e	
<i>Dryandra kippistiana</i>		d, r	
<i>Dryandra mimica</i>	R	p, s, e	VU
<i>Dysphania glomulifera</i> subsp. <i>glomulifera</i>		r, s	
<i>Epaltes australis</i>		s, d	
<i>Eleocharis keigheryi</i> (= sp. Kenwick, GJ Keighery 5180)	R	p, s	VU
<i>Epiblema grandiflorum</i> var. <i>cyanea</i> ms	R	p, s	EN
<i>Eremaea asterocarpa</i> subsp. <i>brachyclada</i>	1	p, s, e	
<i>Eremaea fimbriata</i>		r, s	
<i>Eremaea purpurea</i>		d, p	
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i> ms	2	p, s	
<i>Eryngium subdecumbens</i> ms	1	p, s	
<i>Eucalyptus argutifolia</i>	R	p, s, e	VU
<i>Eucalyptus foecunda</i>		p, e	
<i>Eucalyptus lanepoolei</i>		p	
<i>Eucalyptus mundijongensis</i> (hybrid)	1	p, s	
<i>Eucalyptus petrensis</i>		p, s, e	
<i>Evandra pauciflora</i>		r, s	
<i>Glischrocaryon aureum</i>		p	
<i>Gnephosis angianthoides</i>		d, s	
<i>Grevillea althoferorum</i>	R	p, s, d	EN
<i>Grevillea curviloba</i> subsp. <i>curviloba</i>	R	p, s, E	EN
<i>Grevillea evanescens</i>	1	p, s, e	
<i>Grevillea obtusifolia</i>		s, e	EN
<i>Grevillea thelemanniana</i>	4	p, s, E	
<i>Gyrostemon subnudus</i>		r, s	
<i>Haemodorum brevisepalum</i>		p	
<i>Haemodorum loratum</i>	3	p, s, d	
<i>Hakea conchifolia</i>		s	
<i>Hakea myrtoides</i>		p, s	
<i>Hakea</i> aff. <i>lasiantha</i> (= sp. <i>Walyunga</i> ) (L. Pen sn)		r, p, s	
<i>Haloragis aculeolata</i>	2	p, s, d	
<i>Haloragis cordiger</i>		s	
<i>Haloragis tenuifolia</i>	1	p, s	
<i>Hensmania turbinata</i>		r, s	
<i>Hibbertia cuneiformis</i>		r, s	
<i>Hibbertia spicata</i> subsp. <i>leptotheca</i>	3	p, s, e	
<i>Hibbertia perfoliata</i>		d	
<i>Hydatella dioica</i>	R	p, s, E	EN
<i>Hydrocotyle lemnoides</i>	4	p, s	
<i>Hydrocotyle striata</i>	1	X	
<i>Isopogon asper</i>		s	
<i>Isopogon drummondii</i>	3	p, s, d	





**Table 13 (continued): Significant Flora of the Perth Metropolitan Region**

Taxon	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Jacksonia gracilis</i> ms (= aff. <i>sericea</i> or swamp form)		e	
<i>Jacksonia sericea</i>	3	p, s, E	
<i>Johnsonia pubescens</i> subsp. <i>cygnorum</i> (= aff. <i>pubescens</i> ) (GJ Keighery 5249)		s	
<i>Kennedia coccinea</i>		s	
<i>Kunzea</i> aff. <i>recurva</i> (GJ Keighery 12828) (= <i>littorcola</i> ms)		e	
<i>Lachnostachys albicans</i>		r, s	
<i>Lambertia multiflora</i> var. <i>darlingensis</i>	3	p, s	
<i>Lasiopetalum angustifolium</i>		s, d	
<i>Lasiopetalum membranaceum</i>	2	p, s, e	
<i>Laxmannia grandiflora</i>		s, d	
<i>Lechenaultia linarioides</i>		p	
<i>Lepidium pseudohyssopifolium</i>	1	p, s, d	
<i>Lepidium pseudotasmanicum</i>	4	p, s	
<i>Lepidium puberulum</i>	4	p, s	
<i>Lepidosperma rostratum</i>	R	p, s, E	EN
<i>Leptocarpus</i> aff. <i>crebriculmis</i> (BJ Keighery & N Gibson 236)		S, ?E	
<i>Leptocarpus</i> sp. Forrestdale Lake (N Gibson & MN Lyons 1551)		s, ?E	
<i>Leucopogon kingianus</i>		s	
<i>Leucopogon oliganthus</i>		s	
<i>Levenhookia preissii</i>		p, s	
<i>Lomandra spartea</i>		r, s	
<i>Lycopodium serpentinum</i>		s, d	
<i>Lysinema elegans</i>		p, s, e	
<i>Macarthuria apetala</i>		s	
<i>Macarthuria keigheryi</i>	R	p, s, d, e	EN
<i>Melaleuca cardiophylla</i>		r, s	
<i>Melaleuca brevifolia</i> (= <i>bracteosa</i> )		d, p	
<i>Melaleuca lanceolata</i>		d, s	
<i>Melaleuca</i> sp. Yanchep (GJ Keighery 11242)	2	e	
<i>Melaleuca ryeae</i>		r, s	
<i>Melaleuca tuberculata</i> subsp. <i>tuberculata</i>		d	
<i>Myriocephalus appendiculatus</i>	3	p, s	
<i>Myriocephalus helichrysoides</i>		e	
<i>Myriophyllum echinatum</i>	3	X, e	
<i>Myosotis australis</i>		s, d	
<i>Nemcia dilatata</i>		s	
<i>Olax scalariformis</i>	3	p, s, d	
<i>Patersonia babianoides</i>		s	
<i>Parsonsia diaphanophleba</i>	4	p, s	
<i>Petrophile serruriae</i> subsp. nov (GJ Keighery 11421)		p, s, r	
<i>Phyllangium palustre</i>	2	X	
<i>Picris compacta</i>	1	p, s, E	
<i>Pimelea calcicola</i>		s	
<i>Pimelea imbricata</i> var. <i>major</i>		s	
<i>Pimelea villifera</i>		r, s	
<i>Pithocarpa pulchella</i> var. <i>pulchella</i>		r, s	
<i>Pityrodia bartlingii</i>		s, d	
<i>Pityrodia uncinata</i>		r, s	
<i>Platysace juncea</i>		p	
<i>Platysace ramosissima</i>	3	p, s	
<i>Pteris vittata</i>		d	
<i>Pterostylis</i> sp. cauline leaves (N Gibson & MN Lyons 1490)		d, s	
<i>Rhodanthe pyrethrum</i>	3	p, s	





# Part A



**Table 13 (continued): Significant Flora of the Perth Metropolitan Region**

Taxon	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Sarcocornia bicarinata</i> (= <i>Carpobrotus</i> sp. Hepburn)	3	p, s	
<i>Schoenus benthamii</i>	3	p, s	
<i>Schoenus capillifolius</i>	2	p, s	
<i>Schoenus latitans</i>		r, p	
<i>Schoenus pennisetis</i>	1	p, s	
<i>Schoenus</i> sp. Bullsbrook (JJ Alford 915)	2	p, s, E	
<i>Schoenus</i> sp. Waroona (GJ Keighery 12235)	3	p, s, e	
<i>Stachystemon axillaris</i>	4	p, s	
<i>Stenanthemum humile</i>		d	
<i>Stylidium aceratum</i>	2	p, s, E	
<i>Stylidium crossocephalum</i>		r, s	
<i>Stylidium longitubum</i>	3	p, s	
<i>Stylidium maritimum</i>	3	p, s	
<i>Stylidium mimeticum</i>	3	p, s	
<i>Stylidium preissii</i>		d, s	
<i>Stylidium roseo - alatum</i>		s, p	
<i>Stylidium utricularioides</i>		s	
<i>Synaphea acutiloba</i>	4	p, s, e	
<i>Synaphea pinnata</i>	3	p, s	
<i>Tetralia australiensis</i>	R	p, s, e	VU
<i>Thysanotus glaucus</i>	4	p, s	
<i>Trachymene coerulea</i>		s	
<i>Trichocline</i> sp. Treeton (BJ Keighery and N Gibson 564)	2	s, p	
<i>Trichocline spathulata</i>		s	
<i>Tripterococcus paniculatus</i> (sp. Cannington, AS George 16201)	1	p, s, E	
<i>Utricularia dichotoma</i>		s, d	
<i>Utricularia gibba</i>		s, d	
<i>Veronica</i> aff. <i>calycina</i> (BJ Keighery and N Gibson 235)		s, p	
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	4	p, s	
<i>Verticordia nitens</i>		s	
<i>Verticordia plumosa</i> var. <i>pleiobotrya</i>	R	p, s, E	EN
<i>Verticordia serrata</i> subsp. <i>linearis</i>	3	p, s	
<i>Villarsia submersa</i>	4	p, s	
<i>Villarsia violifolia</i>		p, s	
<i>Wilsonia humilis</i>		p	
<i>Xanthorrhoea acanthostachya</i>		s	
<i>Xanthorrhoea drummondii</i>		s	







### **Declared Rare and Priority Taxa**

The Department of Conservation and Land Management has statutory responsibility for flora conservation and particular responsibility for threatened flora. Section 23F of the *Wildlife Conservation Act 1950* prohibits the 'taking' of Declared Rare Flora (generally referred to as threatened flora) by any person on any land throughout the State without the consent in writing of the Minister for the Environment. Under the terms of the Act, 'taking' includes direct injury or destruction by human hand or machine and such activities as allowing stock to graze on the flora, introducing pathogens that attack it, altering water tables such that the flora is deprived of adequate soil moisture or is inundated, allowing air pollutants to harm foliage, etc. A breach of this provision may lead to a fine of up to \$10,000. The flora provisions of the Act are binding on the Crown. The 'Schedule of Declared Rare Flora' is reviewed annually and published in the government gazette. The most recent gazette was 17 December 1999.

A number of criteria are used to identify 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. The legislation only refers to the status of the plant in the wild.

Declared Rare Flora may be extant or presumed extinct (after CALM 1997 and Atkins 1998):

**'Declared Rare Flora — Extant Taxa (R):** Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been declared under Section 23F of the *Wildlife Conservation Act 1950* to be "rare flora".

**'Declared Rare Flora — Presumed Extinct Taxa (X):** Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been declared under Section 23F of the *Wildlife Conservation Act 1950* to be "rare flora".

A 'Declared Rare Flora and Priority Flora List' is published each year by CALM (Atkins 1998). Priority Flora are taxa that are under consideration for

declaration as 'rare flora' but are in need of further survey or continued monitoring. The list recognises four categories of Priority Flora:

**'Priority One — Poorly Known Taxa (1):** Taxa which are known from one or a few (generally < 5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as "rare flora", but are in urgent need of further survey.

**'Priority Two — Poorly Known Taxa (2):** Taxa which are known from one or a few (generally < 5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as "rare flora", but are in urgent need of further survey.

**'Priority Three — Poorly Known Taxa (3):** Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as "rare flora", but are in urgent need of further survey.

**'Priority Four — Rare Taxa (4):** Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.'

The priority list is also reviewed annually and distributed within CALM and to other government agencies, groups and individuals. CALM Wildlife Branch is responsible for the preparation of the list and the administration of the statutory requirements of the Act with respect to Declared Rare Flora. As this list changes annually any reference to taxa on the 'Declared Rare Flora and Priority Flora List' should be referenced.

Twenty-three Declared Rare Flora taxa are presently gazetted and 74 Priority Flora taxa are recorded for the Swan Coastal Plain in the Perth Metropolitan Region (Table 13, after Atkins 1999).

### **Endemic Taxa**

When a taxon is confined to a specific geographic area it is considered to be endemic to that area.



# Part A



Fifty taxa from Table 13 appear to be endemic to the Swan Coastal Plain and of these 19 appear to be endemic to the Perth Metropolitan Region section of the Plain.

Most of the endemics are restricted to the eastern side of the coastal plain (25 taxa, Table 13) while another smaller group (4 taxa) is confined to the outcropping Tamala Limestone (Keighery, GJ 1990, Griffin 1993).

There are also several forms of species recognised on the Plain which are significant local variants. Many of these do not have taxonomic recognition but recent work is distinguishing some of these taxonomically. For example *Diplolaena huegelii* now has two subspecies, one within the Spearwood Dunes (on the Tamala Limestones) and another on the Scarp (GJ Keighery *pers. comm.*).

### Geographic Variation

Plants occur over a geographic area in a series of populations. An understanding of the patterning of variation within a species is of significance when designing a reserve system as sufficient

representations of each species are required from different areas to ensure that the variation within the species is encompassed within the reserve system. Particular attention should be given to:

- distinctive local forms that have not been recognised taxonomically (not a species, subspecies or variety)
- populations that are outside the main geographic range i.e. disjunct populations
- populations at the ends of the plant's geographic range (on the Swan Coastal Plain this being north or south)
- populations that represent a significant number of the known individuals of the taxon in the region and/or a population in good condition (that is, a mixture of different-aged individuals — mature adults to seedlings).

Gibson *et al.* (1994) found that 77 taxa appeared to have their southern range end and 48 taxa to have their northern range end in their study area (see Map 1). Within the Swan Coastal Plain portion of the Perth Metropolitan Region 16 taxa appear to be at their range end (Table 13).

Information Source			
Source	Form	Custodian	Coverage
CALM DRF/Priority Flora database (CALM 1998)	GIS	CALM	Perth Metropolitan Region
CALM DRF/Priority Flora list (Atkins 1999)	list	CALM	WA
CALM flora survey, 1991–1993 (Gibson <i>et al.</i> 1994)	database, GIS	CALM	Swan Coastal Plain
DEP flora survey, 1994 and 1995 (DEP 1996)	database, GIS	DEP	Swan Coastal Plain
flora survey (Griffin 1994)	database, GIS	AGWEST	Swan Coastal Plain north of Perth
flora survey (Keighery, GJ 1996, 1999)	database, GIS	CALM	<i>Eucalyptus gomphocephala</i> (Tuart) woodlands on the Swan Coastal Plain
published and unpublished reports	text, lists	N/A	bushland areas on the Swan Coastal Plain

### Directory Descriptors (Appendix 2, page 495)

Significant flora known to occur in each area are listed by name. These names are annotated to indicate Declared Rare Flora (R), Priority Flora (numbers 1, 2, 3 or 4), range ends and significant disjunctions. Sources other than CALM database and regional surveys are referenced individually.





### 3.5.4 FAUNA

#### Background

Most of the native fauna around Perth is dependent on remnants of the bushland that once covered the Swan Coastal Plain and adjacent Darling Scarp and Plateau. Since the mid-1970s there has been a growing interest in documenting and evaluating the fauna that still persists on the Swan Coastal Plain around Perth. However, only over the last decade have there been any systematic surveys of the fauna of the area. The Western Australia Museum conducted a study in 1978 to document the vertebrate and aquatic fauna of the Swan Coastal Plain between the Swan and Moore Rivers and to evaluate the impact of the first 150 years of European settlement on the indigenous fauna. This study concluded that the impact of settlement had been most pronounced on the mammalian fauna, but that numerous bird species had also been affected, with several becoming locally extinct. Reptiles had been least affected by the changes induced by settlement (How 1978).

The persistence of urban bushland ecosystems is based on the intricate interaction of abiotic factors with the composite floral and faunal assemblages. There is little information on the entire suite of faunal species of bushland remnants, their spatial requirements or their responses to the effects of fragmentation and its associated perturbations, such as fire, weeds and predators. Recent research on reptiles has shown that assemblages are closely tied to landform type and not directly related to the floristics of the bushland remnant, and that remnants as small as four hectares are important in maintaining vertebrate faunal assemblages in inner urban regions. Many invertebrate groups are represented by unique or rare species in the vicinity of Perth, a fact that is not surprising given the geological history of the region and the unique flora with which the fauna has co-evolved. Such findings illustrate the need for the entire biota of remnants to be considered when identifying the significance of bushland areas and their conservation status.

#### Significant Fauna

Under the *Wildlife Conservation Act 1950* the Minister for the Environment may declare species of fauna to be 'Specially Protected' if they are likely to become extinct, or are rare, or are otherwise in

need of special protection. These species are considered threatened fauna and receive special consideration in management by CALM. This listing includes species that are presumed to be extinct (so that they receive the highest protection in case they are rediscovered, such as happened when Gilbert's Potoroo was recently rediscovered near Albany) as well as species that require special protection for other reasons, such as the possible effect of excessive harvesting.

Threatened fauna are listed in the *Wildlife Conservation (Specially Protected Fauna) Notice*, last updated in December 1999. Those species of fauna declared Specially Protected are placed in four schedules under the Notice:

- Schedule 1 — being fauna that is rare or likely to become extinct;
- Schedule 2 — being fauna that is presumed to be extinct;
- Schedule 3 — being birds that are protected under an international agreement;
- Schedule 4 — being fauna that is in need of special protection otherwise than for the reasons mentioned under Schedules 1, 2 and 3.

Of the 116 Specially Protected fauna taxa in Schedule 1, 14 have recently been recorded from the Swan Coastal Plain portion of the Perth Metropolitan Region (Tables 14 and 15). Some of the birds, mammals and reptiles that are now locally extinct on the Swan Coastal Plain around Perth are included in the Schedule 1 fauna list. A number of these taxa are protected under the *Commonwealth Environment Protection and Biodiversity Act 1999* (see Section 3.6.6). Tables 14 and 15 are annotated to indicate the taxa protected by the Act.

As with poorly known flora species, CALM also maintains a supplementary or priority list of fauna taxa (CALM 2000). There are four categories of priority fauna, these being:



# Part A



**Table 14: Threatened Fauna in the Swan Coastal Plain Portion of the Perth Metropolitan Region (Excluding Birds) (listed in Table 15)**

## Key

Column 1            Scientific Name  
 Column 2            Common Name  
 Column 3            Conservation Status:

Refers to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (see Section 3.6.6) where:

E            = Endangered  
 V            = Vulnerable

the *Wildlife Conservation (Specially Protected Fauna) Notice 1999* where:

R1            = Specially Protected Fauna – Schedule 1  
 R4            = Specially Protected Fauna – Schedule 4

and the CALM Priority Fauna List (1999) where:

P1            = Priority 1 Fauna  
 P2            = Priority 2 Fauna  
 P3            = Priority 3 Fauna  
 P4            = Priority 4 Fauna

Scientific Name	Common Name	Conservation Status
<b>MAMMALS (excluding marine)</b>		
<i>Dasyurus geoffroi</i>	Chuditch or Western Quoll	V, R1
<i>Isoodon obesulus fusciventer</i>	Quenda or Southern Brown Bandicoot	P4
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	P3
<i>Macropus eugenii derbianus</i>	Tammar Wallaby	P4
<i>Macropus ima</i>	Western Brush Wallaby	P4
<i>Setonix brachyurus</i>	Quokka	V, R1
<i>Hydromys chrysogaster</i>	Water Rat	P4
<b>REPTILES</b>		
<i>Pseudemydura umbrina</i>	Western Swamp Tortoise	E, R1
<i>Morelia spilota imbricata</i>	Carpet Python	R4
<b>FISH</b>		
<i>Galaxiella nigrostriata</i>	Black-stripe Minnow	P3
<b>MOLLUSCS (freshwater)</b>		
<i>Westralunio carteri</i>		P4
<b>NATIVE BEES</b>		
<i>Leioproctus bilobatus</i>		P2
<i>Leioproctus contrarius</i>		R1
<i>Leioproctus douglasiellus</i>		R1
<i>Neopasiphae simplicior</i>		R1
<i>Hylaeus globuliferus</i>		P3
<b>CRICKETS</b>		
<i>Austrosaga spinifer</i>		P3
<b>MOTHS</b>		
<i>Synemon gratiosa</i>	Graceful Sun Moth	R1
<b>SPRINGTAILS</b>		
<i>Australotomurus</i> sp. nov. (SAM #122621)	Guildford Springtail	R1
<b>AMPHIPOD</b>		
Undescribed <i>Crangonyctid</i> sp. (WAM #642–97)	Crystal Cave Crangonyctid	R1





**'Priority One (P1) – Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. These taxa need urgent survey and evaluation.

**'Priority Two (P2) – Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxa need urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

**'Priority Three (P3) – Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. These taxa need urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened flora.

**'Priority Four (P4) – Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.'

There are 22 taxa of Priority Fauna recently recorded for the Swan Coastal Plain portion of the Perth Metropolitan Region (Tables 14 and 15).

Other significant fauna identified in the Bush Forever Site descriptions are those birds that are habitat specialists with a reduced distribution on the Swan Coastal Plain or wide-ranging species with reduced populations on the Swan Coastal Plain; those mammals that have few populations on the Swan Coastal Plain; and those reptile species that have

reduced ranges or few recent records on the Swan Coastal Plain.

## **Faunal Groups**

### ***Birds***

Storr and Johnstone (1988) listed 311 species of birds recorded from the Swan Coastal Plain and adjacent seas. Excluding seabirds and trans-equatorial migrants, 140 species are, or were, resident in or regular visitors to the Perth area from other parts of Western Australia (Appendix 7). These 140 species comprise 94 non-passerine and 71 passerine species. Additionally a further 34 non-passerine species annually migrate to the Swan Coastal Plain from the northern hemisphere while two non-passerine species are occasional visitors from the northern hemisphere. Ten non-passerine species have also colonised the Swan Coastal Plain from other parts of Western Australia. Eight non-passerine and two passerine species have been introduced into the area from either overseas or from other parts of Australia.

About 40 per cent of the non-passerine species have decreased in number since European settlement. Some of the waterfowl species and most of the occupants of the lake and swamp edges have suffered serious reductions as these habitats have been changed or cleared. Ducks such as the Freckled Duck, the Australasian Shoveler and Hardhead, the Little, Black and Australasian Bitterns, and the Dusky Moorhen have declined seriously. Birds of prey including the Square-tailed Kite, Whistling Kite, Brown Goshawk and Collared Sparrowhawk, and habitat-specialist species like the Painted Button-quail and Brush Bronzewing have declined with habitat removal.

Nearly half of the 71 naturally occurring passerine bird species have decreased in abundance since European settlement with nearly all of the insectivorous and nectarivorous species declining as a direct result of the clearing of the natural vegetation. Some of them, such as Scarlet, Hooded and White-breasted Robins, the Golden Whistler, the Grey Shrike-thrush, Weebill, Broad-tailed, Yellow-rumped and Western Thornbills, the White-browed Scrubwren, Splendid, Variegated and White-winged



# Part A



**Table 15: Significant Birds of the Swan Coastal Plain Portion of the Perth Metropolitan Region**

**Key**

Column 1 Scientific Name Names follow Christides & Bowles 1994

Column 2 Common Name

Column 3 Significant Bird Species (see Sections 3.5.4 and 3.6.5)

- 1 = species listed under the *Wildlife Conservation Act 1950*
- 2 = species listed on the JAMBA/CAMBA agreements
- 3 = habitat specialists with a reduced distribution on the Swan Coastal Plain
- 4 = wide-ranging species with reduced populations on the Swan Coastal Plain locally extinct

Column 4 Conservation Status:

Refers to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (see Section 3.6.6.) where:

- E = Endangered
- V = Vulnerable
- I = Internationally Protected Migratory Species

the *Wildlife Conservation (Specially Protected Fauna) Notice 1999* where:

- R1 = Specially Protected Fauna – Schedule 1
- R4 = Specially Protected Fauna – Schedule 4

and the CALM Priority Fauna List (1999) where:

- P1 = Priority 1 Fauna
- P2 = Priority 2 Fauna
- P3 = Priority 3 Fauna
- P4 = Priority 4 Fauna

Scientific Name	Common Name	Significant Bird Species	Conservation Status
<b>Order STRUTHIONIFORMES</b>			
Family CASUARIIDAE			
<i>Dromaius novaehollandiae</i>	Emu	4	
<b>Order ANSERIFORMES</b>			
Family ANATIDAE			
<i>Stictonetta naevosa</i>	Freckled Duck	4	P4
<i>Oxyura australis</i>	Blue-billed Duck	3	
<i>Biziura lobata</i>	Musk Duck	3	
<i>Anas rhynchotis</i>	Australasian Shoveler	3	
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	3	
<i>Aythya australis</i>	Hardhead	3	
<b>Order CICONIIFORMES</b>			
Family ARDEIDAE			
<i>Nycticorax caledonicus</i>	Rufous Night Heron	4	
<i>Ixobrychus minutus</i>	Little Bittern	4	P4
<i>Ixobrychus flavicollis</i>	Black Bittern	4	P2
<i>Botaurus poiciloptilus</i>	Australasian Bittern	1, 4	R1
<b>Order FALCONIFORMES</b>			
Family ACCIPITRIDAE			
<i>Lophoictinia isura</i>	Square-tailed Kite	4	P4
<i>Haliastur sphenurus</i>	Whistling Kite	4	
<i>Accipiter fasciatus</i>	Brown Goshawk	4	
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	4	
<i>Aquila morphnoides</i>	Little Eagle	4	
<i>Aquila audax</i>	Wedge-tailed Eagle	4	
Family FALCONIDAE			
<i>Falco berigora</i>	Brown Falcon	4	
<i>Falco peregrinus</i>	Peregrine Falcon	1, 4	R4





**Table 15 (continued): Significant Birds of the Swan Coastal Plain Portion of the Perth Metropolitan Region**

Scientific Name	Common Name	Significant Bird Species	Conservation Status
<b>Order GRUIFORMES</b>			
Family RALLIDAE			
<i>Gallinula tenebrosa</i>	Dusky Moorhen	3	
Family OTIDIDAE			
<i>Otis australis</i>	Australian Bustard	4	
<b>Order TURNICIFORMES</b>			
Family TURNICIDAE			
<i>Turnix varia</i>	Painted Button-quail	4	
<b>Order CHARADRIIFORMES</b>			
Family SCOLOPACIDAE			
<i>Limosa limosa</i>	Black-tailed Godwit	2	I
<i>Limosa lapponica</i>	Bar-tailed Godwit	2	I
<i>Numenius minutus</i>	Little Curlew	2	I
<i>Numenius phaeopus</i>	Whimbrel	2	I
<i>Numenius madagascariensis</i>	Eastern Curlew	2	I, P4
<i>Tringa totanus</i>	Common Redshank	2	I
<i>Tringa stagnatilis</i>	Marsh Sandpiper	2	I
<i>Tringa nebularia</i>	Common Greenshank	2	I
<i>Tringa glareola</i>	Wood Sandpiper	2	I
<i>Tringa cinerea</i>	Terek Sandpiper	2	I
<i>Tringa hypoleucos</i>	Common Sandpiper	2	I
<i>Tringa brevipes</i>	Grey-tailed Tattler	2	I
<i>Arenaria interpres</i>	Ruddy Turnstone	2	I
<i>Calidris canutus</i>	Red Knot	2	I
<i>Calidris tenuirostris</i>	Great Knot	2	I
<i>Calidris alba</i>	Sanderling	2	I
<i>Calidris ruficollis</i>	Red-necked Stint	2	I
<i>Calidris minuta</i>	Little Stint	2	I
<i>Calidris subminuta</i>	Long-toed Stint	2	I
<i>Calidris fuscicollis</i>	White-rumped Sandpiper	2	I
<i>Calidris melanotos</i>	Pectoral Sandpiper	2	I
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	2	I
<i>Calidris ferruginea</i>	Curlew Sandpiper	2	I
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	2	I
<i>Philomachus pugnax</i>	Ruff	2	I
Family BURHINIDAE			
<i>Burhinus grallarius</i>	Bush Stone-curlew	locally extinct	P4
Family ROSTRATULIDAE			
<i>Rostratula benghalensis</i>	Painted Snipe	4	P3
Family CHARADRIIDAE			
<i>Pluvialis fulva</i>	Pacific Golden Plover	2	I
<i>Charadrius dubius</i>	Little Ringed Plover	2	I
<i>Charadrius bicinctus</i>	Double-banded Plover	2	I
<i>Charadrius mongolus</i>	Lesser Sand Plover	2	I
<i>Charadrius leschenaultii</i>	Greater Sand Plover	2	I
<i>Charadrius rubricollis</i>	Hooded Plover		P4
<i>Charadrius veredus</i>	Oriental Plover	2	I
<i>Erythronyx cinctus</i>	Red-kneed Dotterel	2	I
<b>Order COLUMBIFORMES</b>			
Family COLUMBIDAE			
<i>Phaps chalcoptera</i>	Common Bronzewing	3	
<i>Phaps elegans</i>	Brush Bronzewing	3	



# Part A



**Table 15 (continued): Significant Birds of the Swan Coastal Plain Portion of the Perth Metropolitan Region**

Scientific Name	Common Name	Significant Bird Species	Conservation Status
<b>Order PSITTACIFORMES</b>			
Family PSITTACIDAE			
<i>Cacatua pastinator pastinator</i>	Western Long-billed Corella	1, locally extinct	V, R1
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	locally extinct	P3
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	1, 4	E, R1
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	1, 4	V, R1
<i>Platycercus icterotis</i>	Western Rosella	4	
<i>Neophema petrophila</i>	Rock Parrot	3	
<b>Order STRIGIFORMES</b>			
Family STRIGIDAE			
<i>Ninox connivens connivens</i>	Barking Owl (south-west population)	locally extinct	P2
<i>Tyto novaehollandiae</i>	Masked Owl	4	R4
<b>Order PASSERIFORMES</b>			
Family CLIMACTERIDAE			
<i>Climacteris rufa</i>	Rufous Treecreeper	3	
Family MALURIDAE			
<i>Malurus elegans</i>	Red-winged Fairy-wren	locally extinct except for Gingin population	P1 (Gingin population)
<i>Malurus splendens</i>	Splendid Fairy-wren	3	
<i>Malurus lamberti</i>	Variiegated Fairy-wren	3	
<i>Malurus leucopterus</i>	White-winged Fairy-wren	3	
<i>Stipiturus malachurus</i>	Southern Emu-wren	3	
Family ACANTHIZIDAE			
<i>Sericornis frontalis</i>	White-browed Scrubwren	3	
<i>Smicromis brevirostris</i>	Weebill	3	
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill	3	
<i>Acanthiza inornata</i>	Western Thornbill	3	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	3	
Family MELIPHAGIDAE			
<i>Melithreptus chloropsis</i>	Western White-naped Honeyeater	4	
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	4	
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater	4	
<i>Phylidonyris melanops</i>	Tawny-crowned Honeyeater	4	
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	3	
<i>Anthochaera lunulata</i>	Western Little Wattlebird	4	
<i>Manorina flavigula</i>	Yellow-throated Miner	4	
Family PETROICIDAE			
<i>Petroica multicolor</i>	Scarlet Robin	3	
<i>Petroica cucullata</i>	Hooded Robin	3	
<i>Eopsaltria australis</i>	Yellow Robin	3	
<i>Eopsaltria georgiana</i>	White-breasted Robin	3	
Family CINCLOSOMATIDAE			
<i>Psophodes nigrogularis</i>	Western Whipbird	locally extinct	R1
Family NEOSITTIDAE			
<i>Daphoenositta chrysoptera</i>	Varied Sittella	3	
Family PACHYCEPHALIDAE			
<i>Falcunculus frontatus leucogaster</i>	Crested Shrike-tit	locally extinct	P4
<i>Pachycephala pectoralis</i>	Golden Whistler	3	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	3	
Family DICRURIDAE			
<i>Myiagra inquieta</i>	Restless Flycatcher	3	
Family ARTAMIDAE			
<i>Artamus cinereus</i>	Black-faced Woodswallow	4	
<i>Artamus cyanopterus</i>	Dusky Woodswallow	4	
Family CRACTICIDAE			
<i>Strepera versicolor</i>	Grey Currawong	4	





Fairy-wrens, the Varied Sittella, the Rufous Treecreeper, Tawny-crowned, Western White-naped, New Holland and White-cheeked Honeyeaters, Black-faced and Dusky Woodswallows, and the Grey Currawong are now absent from most of that part of the Swan Coastal Plain previously occupied by them, although most still occur in the Darling Scarp or Darling Plateau. Some of these, including the Western Thornbill and Splendid Fairy-wren, are surviving on urban remnants only recently isolated and may not persist long-term. In addition, the Yellow Robin, Restless Flycatcher, Southern Emu-wren, Red-winged Fairy-wren, Red-eared Firetail and Brown-headed Honeyeater no longer occur in the Swan Coastal Plain portion of the Perth Metropolitan Region (for boundary see Map 1).

Three non-passerine species, the Bush Stone-curlew, Western Long-billed Corella and Barking Owl, and three passerine species, the Red-winged Fairy-wren, Western Whipbird and Crested Shrike-tit, are now extinct in the area (Table 15).

Four categories of birds representing species of conservation significance on the Swan Coastal Plain are shown in Table 15. They include species listed as threatened under the *Wildlife Conservation Act 1950* and species listed under the Japan–Australia and China–Australia Migratory Bird Agreements (JAMBA and CAMBA, see Section 3.6.5), as well as species which have undergone status reductions on the Swan Coastal Plain.

### **Mammals**

Prior to European settlement, 33 species of native mammals were known from the Swan Coastal Plain around Perth (Appendix 7) with the possibility that a few additional species may have occurred there (How and Dell 1993). An extensive survey in 1978 and subsequent work on the Swan Coastal Plain confirmed the presence of 18 native species (Grey Kangaroo, Western Brush Wallaby, Common Brushtail Possum, Western Pygmy Possum, Honey Possum, Mardo, Wambenger, Quenda (Southern Brown Bandicoot), Bush Rat, Water Rat, Ash-grey Mouse, Gould's, Greater and Lesser Long-eared Bats, Southern Forest Bat, Gould's Wattled Bat, White-striped Freetail-bat and Echidna) with the possibility that another two (Chuditch and Chocolate Bat) may still be extant, as they are

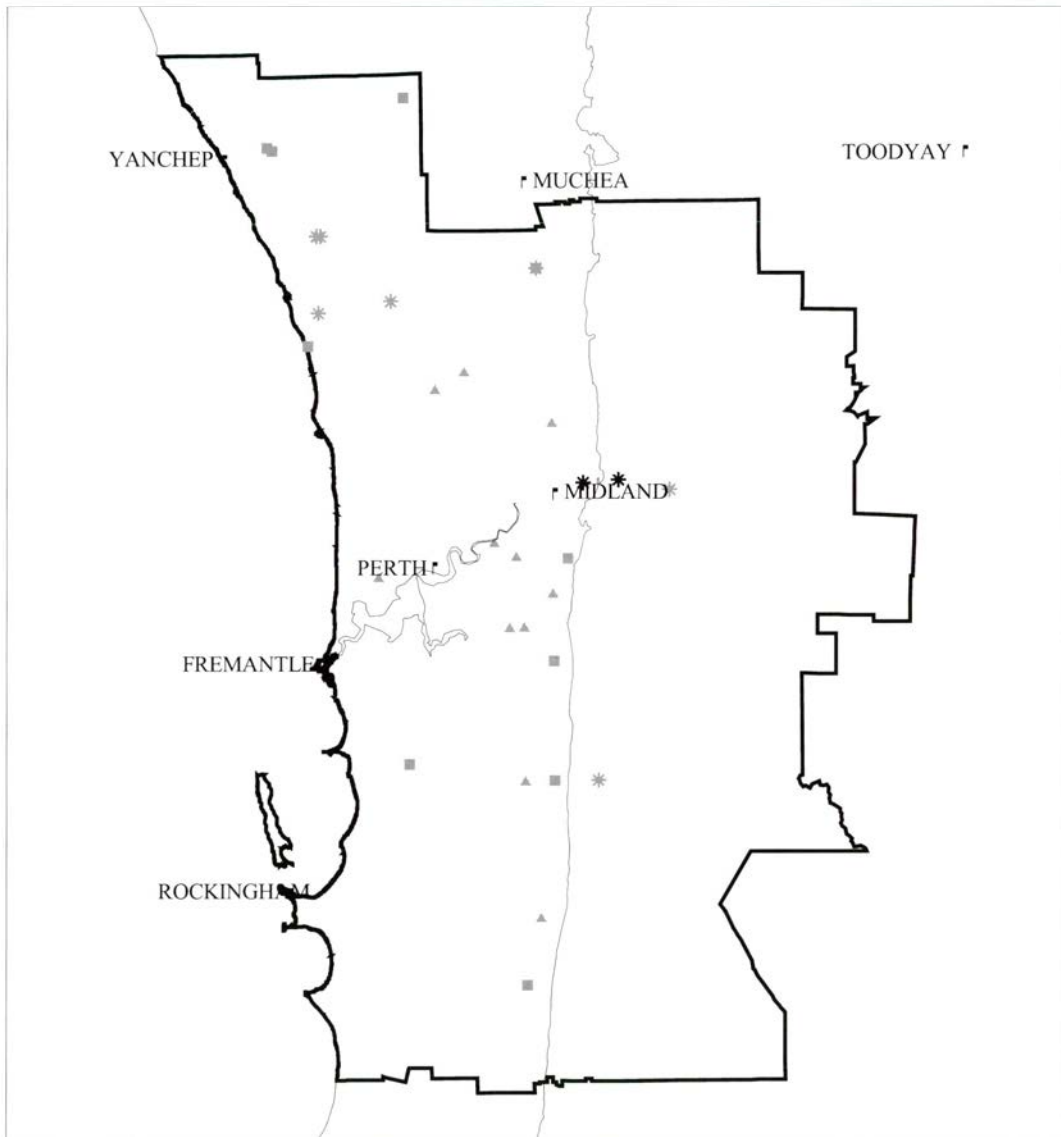
known from the nearby Darling Scarp and Plateau. An additional species, the Western False Pipistrelle, has recently been recorded on the Swan Coastal Plain near Perth (Hosken and O'Shea 1994).

The status of many of these species of mammals has declined further in the last 20 years. There has been no systematic survey of bats, so consequently there is no new information on the status of this group. Recent surveys of urban bushland remnants indicate that of the native mammals, only the Western Grey Kangaroo, Common Brushtail Possum and Quenda (Southern Brown Bandicoot) survive on several bushland remnants while the Western Brush Wallaby, Honey Possum, Wambenger and Western Pygmy Possum still occur on a select few. The two macropods only persist in larger remnants which have been recently isolated from extensive tracts of native bushland peripheral to urban areas. The Water Rat, Bush Rat and Mardo all prefer dense vegetation associated with swamps, lakes and waterways, and all have declined markedly around Perth, only persisting in small populations in surrounding areas. The Ash-grey Mouse occurs in the heaths north of Mullaloo where it occupies long-unburnt habitats but may also be found at Whiteman and Melaleuca Parks. The historical distribution of the Honey Possum (*Tarsipes rostratus*, Map 3), Wambenger (*Phascogale tapoatafa*, Map 4) and Ash-grey Mouse (*Pseudomys albocinereus*, Map 5) indicates the decline of these species on the Swan Coastal Plain.

The Department of Conservation and Land Management recently carried out a study of the Southern Brown Bandicoot (Quenda) in the Perth Metropolitan Region which included widespread media coverage encouraging the public to report sightings (Friend 1996 D). The survey commenced in March 1993 and included sightings and specimens from 1991 until 1996. This survey resulted in many records of Quenda, particularly south of the Swan River (Map 6), although many of the records were in areas which had no protection from clearing or development.



# Part A



Specimen records for the Honey Possum (Western Australian Museum 1996):-

- \* from 1981 to 1996
- from 1941 to 1980
- ▲ pre 1940

- ⌘ Perth Metropolitan Region (MIP 1997b)
- ∕ Swan Coastal Plain Boundary (CALM & ANCA 1996)
- † Locations (AUSLIG 1996)

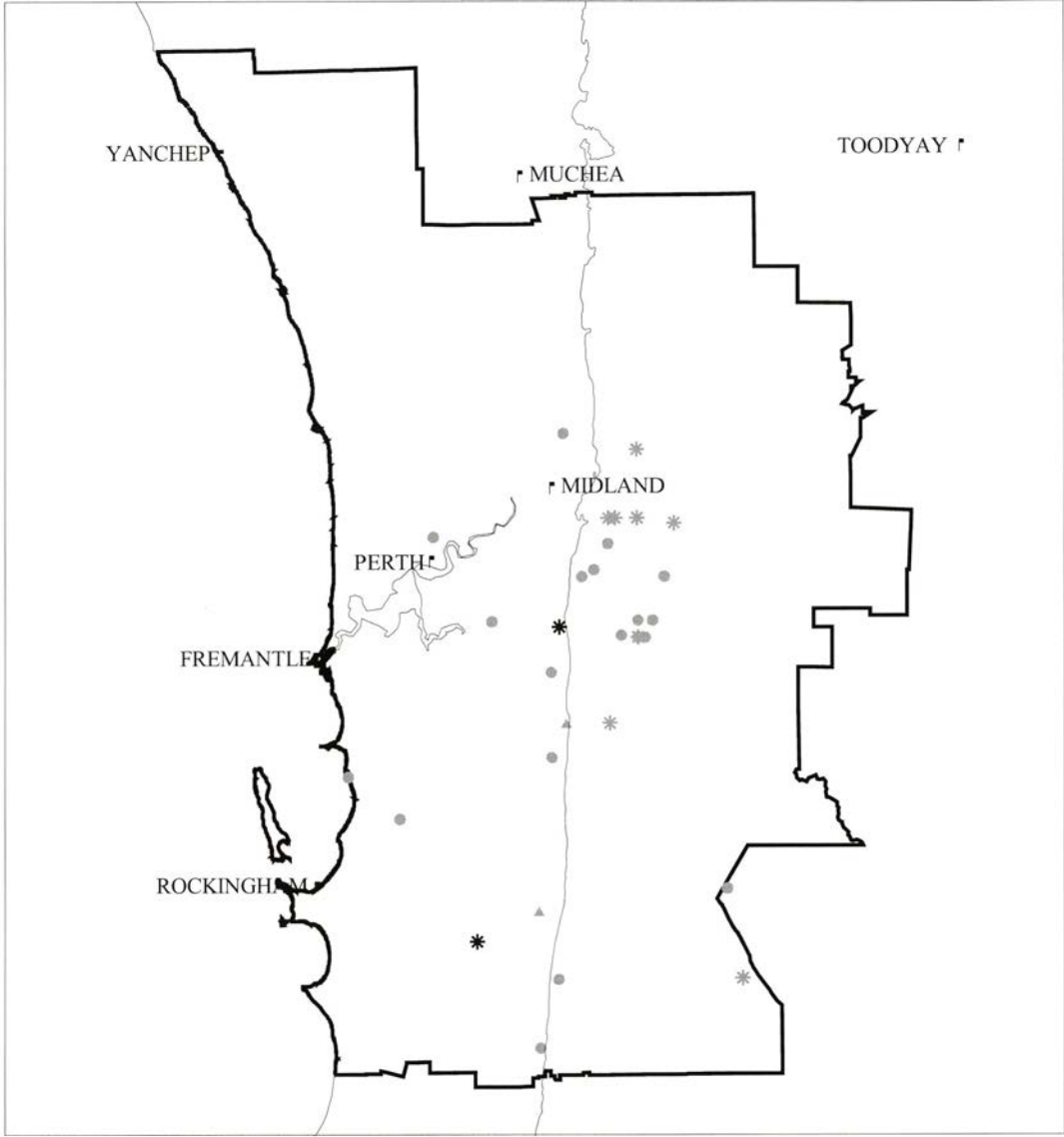


5 0 5 10 Kilometres

This map has been produced using various data from other agencies. No responsibility is accepted for any error or omission.

**Map 3: Western Australian Museum specimen records showing the distribution and abundance of the Honey Possum (*Tarsipes rostratus*) over time**





Specimen records for the Wambenger (Western Australian Museum 1996):-

- \* from 1981 to 1996
- from 1941 to 1980
- ▲ pre 1940

Perth Metropolitan Region (MfP 1997b)  
 Swan Coastal Plain Boundary (CALM & ANCA 1996)  
 † Locations (AUSLIG 1996)

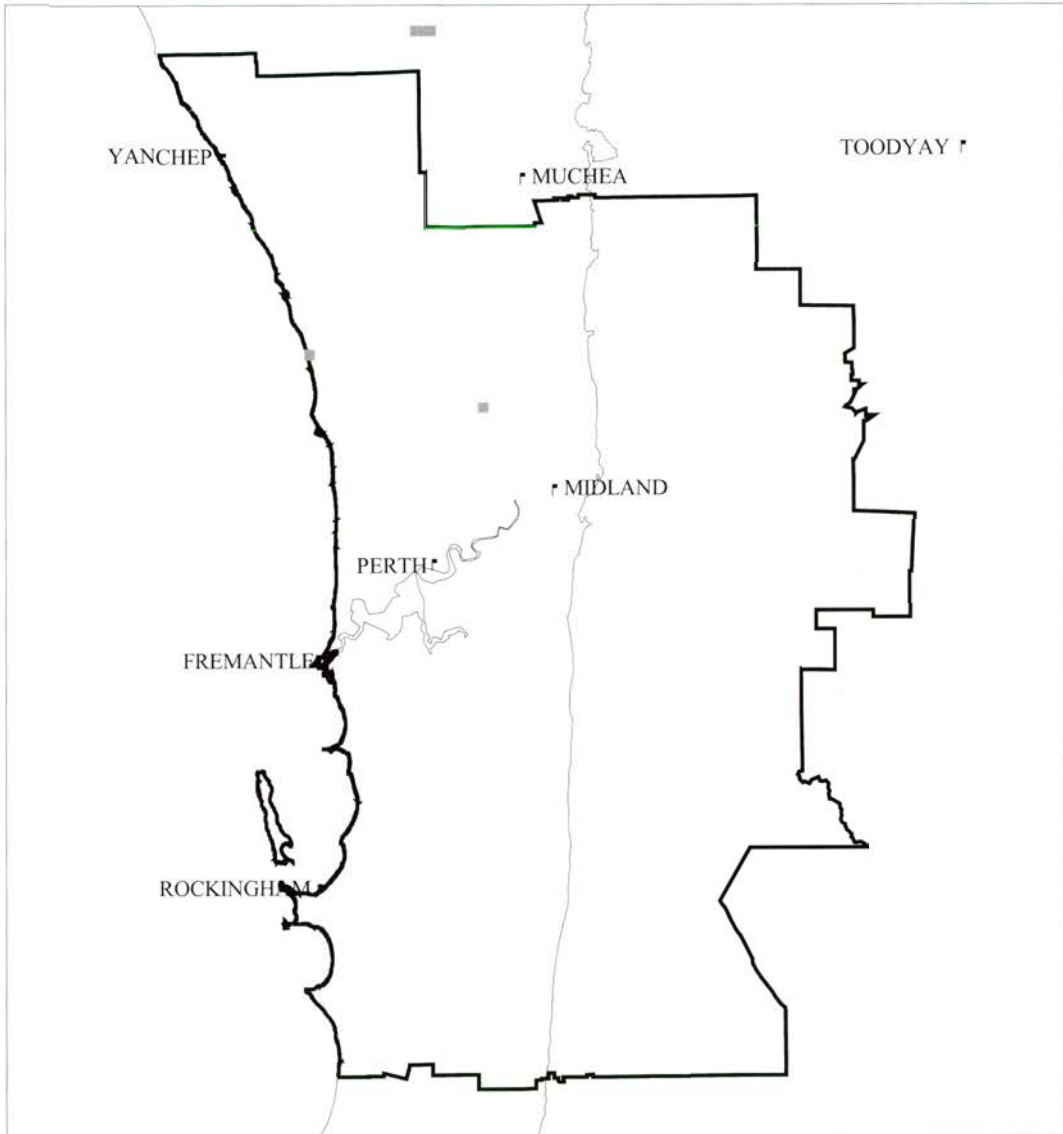
5 0 5 10 Kilometres

*This map has been produced using various data from other agencies. No responsibility is accepted for any error or omission.*

**Map 4: Western Australian Museum specimen records showing the distribution and abundance of the Wambenger (*Phascogale tapoatafa*) over time**



# Part A



Specimen records for the Ash Grey Mouse (Western Australian Museum 1996):-

- \* from 1981 to 1996
- from 1941 to 1980
- ▲ pre 1940

- ⌞ Perth Metropolitan Region (MfP 1997b)
- ⌞ Swan Coastal Plain Boundary (CALM & ANCA 1996)
- † Locations (AUSLIG 1996)

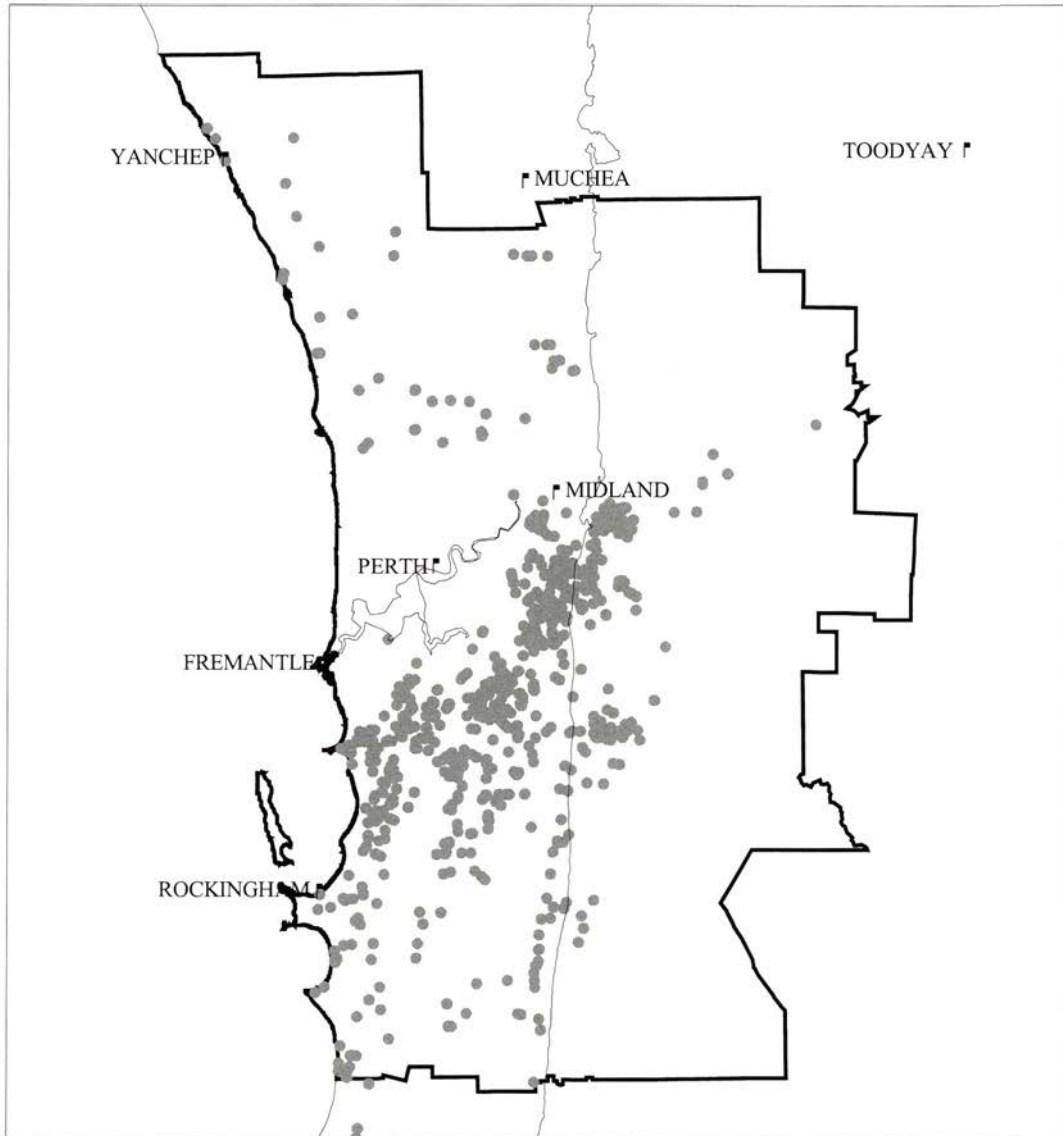


5 0 5 10 Kilometres

This map has been produced using various data from other agencies. No responsibility is accepted for any error or omission.

**Map 5: Western Australian Museum specimen records showing the distribution and abundance of the Ash Grey Mouse (*Pseudomys albocinereus*) over time**





- Quenda record 1991-1996 (Friend 1996)
- ▭ Perth Metropolitan Region (MfP 1997b)
- Swan Coastal Plain Boundary (CALM & ANCA 1996)
- ┆ Locations (AUSLIG 1996)

*This map has been produced using various data from other agencies. No responsibility is accepted for any error or omission.*

**Map 6: Sightings of the Quenda (*Isodon obesulus*) reported by the public during CALM's Bandicoot Survey 1991-1996**



# Part A



## Reptiles

The reptile fauna of the Swan Coastal Plain around Perth consists of 64 species (How and Dell 1993) in nine families and is one of the richest recorded for any major urban area anywhere in the world. The juxtaposition of diverse landform units and the varied habitats they contain is, in large part, the explanation for this rich assemblage.

The detailed documentation and survey of the herpetofauna of the northern Swan Coastal Plain by the Western Australian Museum highlighted the richness of the reptile fauna and acknowledged the lack of historical data. In the last ten years there has been a proliferation of studies on the herpetofauna of the Perth area by government, amateur and consultancy groups, such that a much more detailed knowledge of the pattern of distribution is now available (How and Dell 1994, 2000). Reptile diversity decreases from 52 species on the western near-coastal dunes to 35 species on the Darling Plateau in the east (How and Dell 1993). Most species, however, have declined in both local distribution and abundance and usually persist only on the remaining remnants of bushland.

The world's most threatened tortoise, the Western Swamp Tortoise (*Pseudemydura umbrina*), is endemic to the Perth Metropolitan Region, being restricted to two localities on the Swan Coastal Plain. Several other species are scarce or rare in the area, including the skinks *Lerista christinae* and *L. lineata*, and have relatively localised distributions. *Lerista lineata* is virtually confined to the Perth Metropolitan Region. Others such as the gecko (*Heteronotia binoei*), legless lizard (*Aclys concinna*) and snakes *Elapognathus coronatus*, *Parasuta gouldii* and *Pseudonaja modesta* are uncommon in the Perth area but more abundant elsewhere. The latter species and *Antaresia stimsoni* are now locally extinct. Species most severely affected by urban development are the larger predators in the genera *Varanus* (monitors) and *Antaresia* and *Morelia* (pythons). These species prey on a large variety of native mammals, reptiles and frogs that have become far less numerous, so that species in these genera are now confined to a few larger remnant bushlands. The skink *Egernia luctuosa* has declined dramatically due to the draining and reduction of wetland habitats. The Dugite (*Pseudonaja affinis*), however, has been decidedly advantaged since

European settlement and has become relatively common in urban bushland remnants and areas marginal to the metropolitan region. Only two species, the Marbled Gecko (*Christinus marmoratus*) and the Fence Skink (*Cryptoblepharus plagiocephalus*), occur in inner city areas although the skink *Hemiergis quadrilineata* is frequently found in urban gardens.

## Amphibians

Thirteen species of amphibians, representing two families and nine genera (How and Dell 1993) are known from the Swan Coastal Plain near Perth. Frogs reach their greatest diversity and abundance in areas where swamps, lakes or streams are more prominent on the eastern side of the Plain (Foothills and Pinjarra Plain) (How and Dell 1993). Fewer species occur on the Quindalup and Spearwood Dunes, where deep sands support fewer ephemeral wetlands.

There are no historical data on the changes in abundance or distribution of amphibians since settlement. However, the draining of wetlands and large-scale replacement of natural ecosystems with agricultural ones would have markedly reduced the habitat available for most species. In the future, the Chytrid fungus and pollutants that find their way into aquatic systems may also cause marked population declines. Responses to fire by frogs on the Swan Coastal Plain were documented by Bamford (1992) who concluded that *Heleioporus eyrei* was not greatly affected by fire, but that *Limnodynastes dorsalis* and *Myobatrachus gouldii* were more abundant in long-unburnt areas. Most other species do not occur outside the vicinity of wetlands.

## Invertebrates

Invertebrates constitute a major and essential component of every landform, but due to their vast number, remain little studied. This is true of the Swan Coastal Plain, where a recent survey by the Western Australian Museum at a variety of sites in different landforms (How *et al.* 1996, Harvey *et al.* 1997) uncovered a startlingly diverse ground fauna. This study concentrated on several arachnid and myriapod groups, as well as cockroaches and some parasitic wasps. Numerous species and genera were recorded from the Swan Coastal Plain for the first time, and many undescribed species were collected.





Some groups exhibited no correlations with landform or floristic variables, while others showed significant spatial patterning consistent with being long isolated on the north–south oriented dune system which formed during periods of sea-level reductions during the Pleistocene.

No data are available to indicate whether any of these invertebrate assemblages have been significantly reduced since European settlement, although observations on individual species, such as

the trapdoor spider (*Idiosoma sigillatum*), indicate that original ranges are diminishing rapidly due to habitat clearance (Main 1990).

Six invertebrate species found in the Perth Metropolitan Region are listed under Schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 1999* as 'fauna that is rare or likely to become extinct' (Table 14). Four other invertebrate species have been listed as 'Priority' species.

### Information Source

Source	Form	Custodian	Coverage
CALM Scheduled/Priority Fauna List (CALM 1999)	list	CALM	WA
Western Australian Museum collections and database (Western Australian Museum 1996)	database, GIS	Western Australian Museum	individual bushland areas on the Swan Coastal Plain
CALM Bandicoot database (Friend 1996)	database, GIS	CALM	individual bushland areas on the Swan Coastal Plain
RAOU (Birds Australia) Bird database (RAOU 1996)	database	RAOU	individual bushland areas on the Swan Coastal Plain
published and unpublished reports	text, lists	N/A	individual bushland areas on the Swan Coastal Plain
submissions to the System 6 and Part System 1 Update Program	text, lists	N/A	individual bushland areas on the Swan Coastal Plain

### Directory Descriptors (Appendix 2, page 495)

Information on the fauna of particular Bush Forever Sites has been collated from the Western Australian Museum fauna surveys, Quenda sightings by the public reported to CALM's Bandicoot Database (Friend 1996 D), bird survey data collected by the RAOU (1995 D) and published and unpublished studies. These studies are referenced in each instance.

The sources are categorised to indicate the scope of the survey — that is, the faunal groups surveyed, the comprehensiveness of the survey and the significance of the particular species recorded for the Site. As survey techniques and the best times for survey vary between faunal groups the comprehensiveness is related to the group surveyed. The categories are:

#### Survey information

- not known — compilers of the Directory were not aware of any information on the Site
- scope of survey — birds, mammals, reptiles, amphibians and/or invertebrates

#### Comprehensiveness of survey

- limited survey — areas visited on a limited basis (generally once or twice)
- multiple survey — repeated visits, may involve sight records and trapping over several days in one or several years
- structured survey — longer-term study involving multiple visits and permanent traplines; generally involves collection of data on birds, mammals, reptiles, amphibians and/or invertebrates in all seasons



# Part A

## Directory Descriptors (continued)

### Significant species

- birds — refers to species of conservation significance (Table 15). Four categories:
  - 1 species listed under the *Wildlife Conservation Act 1950*
  - 2 species listed on the JAMBA/CAMBA agreements
  - 3 habitat specialists with a reduced distribution on the Swan Coastal Plain
  - 4 wide-ranging species with reduced populations on the Swan Coastal Plain
- mammals — species listed as threatened under the *Wildlife Conservation Act 1950* or those that have few populations on the Swan Coastal Plain
- reptiles and amphibians — species which have reduced ranges or few recent records on the Swan Coastal Plain
- invertebrates — species listed as 'Specially Protected' or 'Priority' fauna are described where locations are known. As most records are allocated to a suburb and not a specific bushland area they are not included in the Bush Forever Site descriptions.

## 3.5.5 LINKAGE

### Background

The natural processes occurring in ecosystems are complex and poorly understood, though it is generally accepted that large consolidated areas are the best options for viable conservation of natural ecosystems and populations. Within the Perth Metropolitan Region there are few large areas available for conservation, many of the Bush Forever Sites being relatively small in size (less than 100 hectares) and isolated from other conservation areas. Issues of particular concern in fragmented ecosystems are:

- the requirement of vertebrates, such as some bird and mammal species, and many invertebrates of a large area for their home range and hence their survival
- the movement of animals being essential to maintaining genetic diversity in plant communities by moving pollen from one remnant to another
- populations of plants and animals being effectively isolated from other populations, leaving populations susceptible to local extinction
- the loss of genetic diversity through inbreeding.

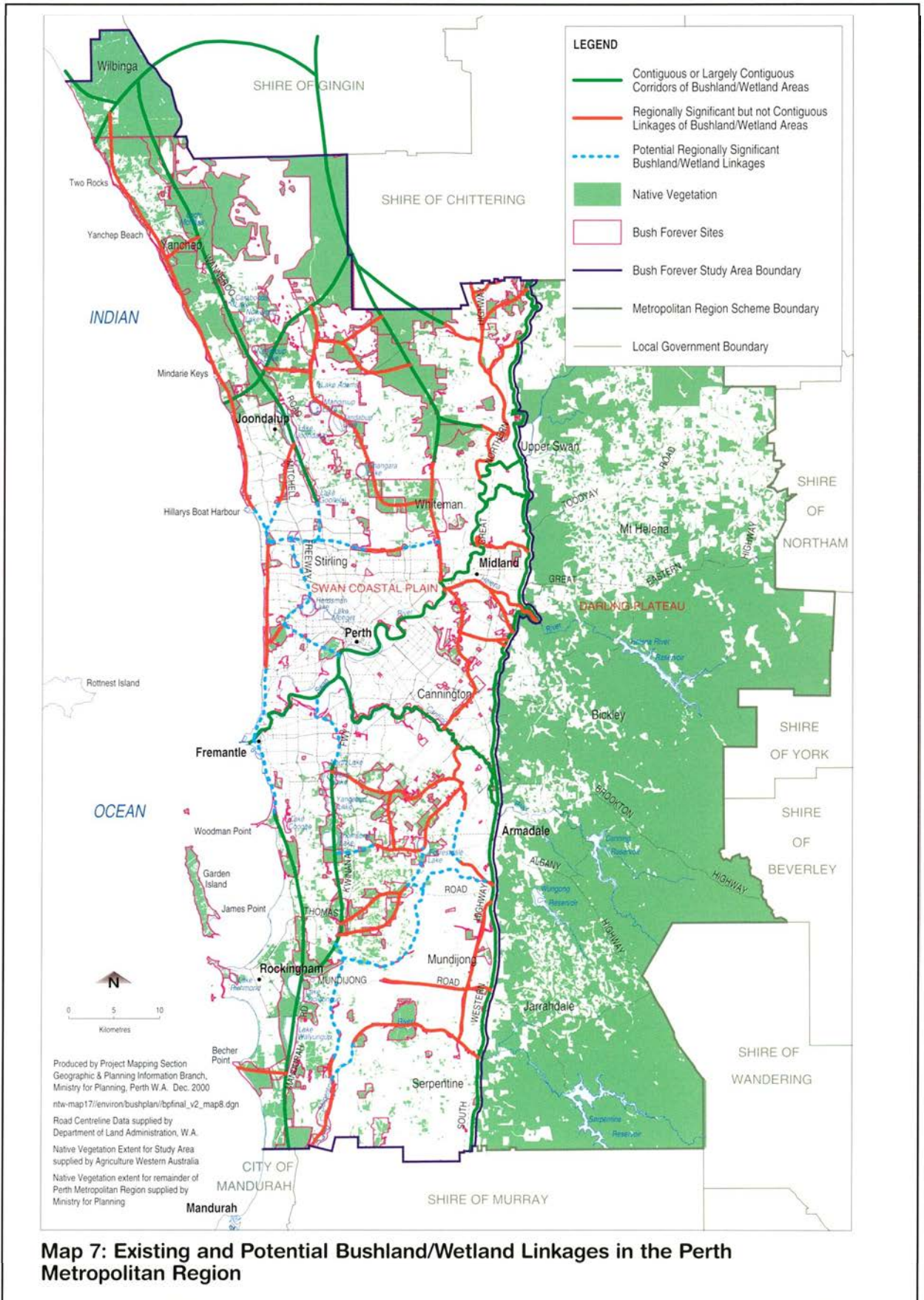
As a consequence, the consideration of the surrounding land uses and connectivity between Sites is important in the selection of conservation areas and the design of a conservation area network. Some Sites are of particular significance as they provide corridors through otherwise highly cleared lands and provide linkages of regional significance.

Map 7 (Existing and Potential Bushland/Wetland Linkages in the Perth Metropolitan Region) shows the major linkages between Sites. The linkages are defined in three categories:

- (i) Regionally significant contiguous bushland/wetland linkage
  - Contiguous or largely contiguous corridors of bushland/wetland areas, being regionally significant links that are continuous or largely continuous bushland or wetland areas.
- (ii) Regionally significant fragmented bushland/wetland linkage
  - Regionally significant but not contiguous linkages of bushland/wetland areas being those regionally significant links that as stated are not continuous bushland or wetland areas.
- (iii) Regionally significant potential bushland/wetland linkage
  - Potentially regionally significant bushland/wetland linkages being those regional scale links that follow existing features or bridge gaps between existing regionally significant areas of bushland/wetland. As stated, these linkages could potentially form links and with some management and/or revegetation could be restored.

An Australia-wide program to recognise linkages or 'greenways' in urban environments was initiated by the Commonwealth Department of Transport. As a







# Part A

consequence the *Strategic Plan for Perth's Greenways* (Tingay, Alan and Associates 1998a, see Volume 1, Map 6) has been produced to provide a basis for greenways development at a local and regional level in the Perth Metropolitan Region. The report

defines a greenway as 'a linkage connecting and encompassing conservation areas and landscape features'. Each of the proposed greenways is numbered.

## Information Source

Source	Form	Custodian	Coverage
1997 native vegetation maps (AGWEST 1998) (see Volume 1, Map 1)	GIS	AGWEST	Swan Coastal Plain portion of the Perth Metropolitan Region
1998 PanAirama (aerial photography) DOLA 1998d	CD ROM	DOLA	Southwest
report (Tingay, Alan & Associates 1998a)	map	N/A	Perth Metropolitan Region
channel wetlands (water courses) (WRC 1996a GIS)	GIS	WRC	Swan Coastal Plain

### Directory Descriptors (Appendix 2, page 496)

The following standard descriptions are used to describe each Site in relation to the surrounding area:

- no adjacent bushland
- bushland/canopy/creekline linkage to north, south, east, west (Site number(s))
- part of Greenway [Greenway number(s)] e.g. 37 (Tingay, Alan & Associates 1998a)
- part of regionally significant contiguous or regionally significant fragmented or regionally significant potential bushland/wetland linkage (see Map 7).

### 3.5.6 OTHER SPECIAL ATTRIBUTES

#### Background

In many cases some section of, or all of, a Bush Forever Site has been recognised as having significance at a regional level by previous studies or identification processes. When known and accessible these are listed in this section. Examples of such studies/processes are:

- Regional and local government studies such as Payne (1993a&b), Keighery, BJ, and Trudgen (1992), Griffin (1993), Griffin (1994), Gibson *et al.* (1994), Trudgen and Keighery (1995), etc.
- Classification by the National Trust of natural areas or landscapes that meet a series of heritage values. Classified Landscapes are entered onto the Register of the National Trust of Western Australia (National Trust of Australia (WA) 1998)
- Natural Areas identified by the interim 'Environmental and Landscape Audits' prepared for the Department of Planning and Urban Development (Semenuik, V&C Research Group from 1991 to 1994)
- 'Threatened or Poorly Reserved Plant Communities' identified by the Environmental Protection Authority (1994). This series of bushland areas on the Swan Coastal Plain was considered to be in need of interim protection under the System 6 and Part System 1 Update Program. The majority of these areas are on the eastern side of the Swan Coastal Plain, with several from the west of the Plain. Studies by Keighery, BJ, and Trudgen (1992) and Gibson *et al.* (1994) were used to identify these areas.





### Information Source

Source	Form	Custodian	Coverage
National Trust Classified Landscapes (National Trust of Australia (WA) 1998)	list	National Trust of Australia (WA)	WA
published and unpublished reports	text	N/A	individual bushland areas on the Swan Coastal Plain
Threatened or Poorly Reserved Plant Communities (EPA 1994)	GIS	DEP	individual bushland areas on the Swan Coastal Plain

#### Directory Descriptors (Appendix 2, page 496)

The additional special attribute is briefly described and referenced.

## 3.6 SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

### 3.6.1 INTRODUCTION

There are a number of national and international listings of important natural areas within the Perth Metropolitan Region. In each case a set of criteria, related to the natural value, is used to assess the significance of an area. While these listings confer added significance on an area it should not be inferred that areas not listed have a lesser value. Western Australia generally has poorly known and documented flora and fauna and the selection of areas has not been based on systematic survey. As a consequence none of the listings should be seen as definitive.

### 3.6.2 WETLANDS OF INTERNATIONAL IMPORTANCE (RAMSAR WETLANDS)

#### Background

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat, known as the Ramsar Convention (after the Iranian town of Ramsar where it was adopted in 1971), provides a framework for international cooperation in the conservation and wise use of wetlands (UNESCO 1971). In 1998, 105 nations or Contracting Parties

were party to the Ramsar Convention (Environment Australia 1998 database). Each Contracting Party is required to nominate at least one Wetland of International Importance (Ramsar site). At least one of three criteria (Table 16) must be met for the nomination to be successful. Once listed as a 'Wetland of International Importance' the Contracting Party undertakes to maintain its ecological character in perpetuity. One of the nine Ramsar sites in Western Australia (Forrestdale and Thomsons Lakes) is in the Perth Metropolitan Region (Environment Australia 1998). Ramsar sites are protected under the Commonwealth *Environment Protection and Biodiversity Act 1999* (see Section 3.6.6).

Under the Ramsar Convention wetlands are defined as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed more than six metres'. This definition is also used in the *State Wetland Conservation Policy* (Government of Western Australia 1997).



# Part A



**Table 16: Criteria for Identifying Wetlands of International Importance**

## The Ramsar Convention

A wetland is identified as being of international importance if it meets at least one of the criteria set out below:

### 1. *Criteria for representative or unique wetlands*

A wetland should be considered internationally important if:

- (a) it is a particularly good representative example of a natural, or near-natural, wetland, characteristic of the appropriate biogeographical region; or
- (b) it is a particularly good representative example of a natural, or near-natural, wetland common to more than one biogeographical region; or
- (c) it is a particularly good representative example of a wetland which plays a substantial hydrological, biological or ecological role in the natural functioning of a major river basin or coastal system, especially where it is located in a trans-border position; or
- (d) it is an example of a specific type of wetland, rare or unusual in the appropriate biogeographical region.

### 2. *Criteria based on plants and animals*

A wetland should be considered internationally important if:

- (a) it supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plants or animals, or an appreciable number of individuals of any one or more of these species; or
- (b) it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna; or
- (c) it is of special value as the habitat of plants or animals at a critical stage of their biological cycle; or
- (d) it is of special value for one or more endemic plant or animal species or communities.

### 3. *Specific criteria based on waterfowl*

A wetland should be considered internationally important if:

- (a) it regularly supports 20,000 waterfowl; or
- (b) it regularly supports substantial numbers of individuals from particular groups of waterfowl, indicative of wetland values, productivity or diversity; or
- (c) where data on populations is available, it regularly supports 1% of the individuals in a population of one species or subspecies of waterfowl.

## Information Source

Source	Form	Custodian	Coverage
Environment Australia (1998)	database	Environment Australia	international

### Directory Descriptors (Appendix 2, page 497)

Ramsar sites are listed.





### 3.6.3 DIRECTORY OF IMPORTANT WETLANDS IN AUSTRALIA

#### Background

The *Directory of Important Wetlands in Australia* (ANCA 1994, 1996) provides the most complete compilation available at present of Australia's nationally important wetlands. The Directory is the result of cooperative work between Federal, State and Territory nature conservation agencies and was compiled to assist in the conservation and wise management of wetlands.

Wetlands are essentially defined according to the definition established by the Ramsar Convention (see Section 3.6.2 above).

Six criteria are used to identify wetlands for inclusion in the Directory. The Convention states:

'A wetland may be considered nationally important if it meets at least one of the following criteria:

1. It is a good example of a wetland type occurring within a Biogeographic Region in Australia;
2. It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex;
3. It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail;
4. The wetland supports 1% or more of the national population of any plant or animal taxa;
5. The wetland supports native plant or animal taxa

or communities which are considered endangered or vulnerable at the national level;

6. The wetland is of outstanding historical or cultural significance.'

These criteria were established for the first edition of the *Directory of Important Wetlands in Australia* (ANCA 1994) and revised by the Australian and New Zealand Environment and Conservation Council Wetlands Network (ANCA 1996).

The *Directory of Important Wetlands in Australia* gives '110 site accounts' in WA which cover several hundred discrete wetlands. Thirteen of these accounts refer to wetlands on the Swan Coastal Plain in the Perth Metropolitan Region. These are: Becher Point Wetlands (part included in Site 377), Booragoon Lake (Site 337), Brixton Street Swamps (part Site 387), Ellen Brook Swamps System (Sites 301, 400), Forrestdale Lake (Site 345), Gibbs Road Swamp System (Site 344), Herdsman Lake (Site 281), Joondalup Lake (Site 299), Loch McNess System (Site 288), Perth Airport Woodland Swamps (Site 386), Spectacles Swamp (Site 269), Swan-Canning Estuary (for example, Sites 214, 224, 225, 313, 314, 333, 338 and 402) and Thomsons Lake (Site 391).

This listing for Western Australia is not definitive (Lane *et al.* 1996) as there has been no systematic survey of wetlands or wetland values across the State.

#### Information Source

Source	Form	Coverage
Directory of Important Wetlands in Australia (ANCA 1996)	text, maps	Australia (see comments in Background)

#### Directory Descriptors (Appendix 2, page 497)

All Bush Forever Sites included in the Directory of Important Wetlands in Australia are indicated.



# Part A



## 3.6.4 REGISTER OF THE NATIONAL ESTATE

### Background

The Australian Heritage Commission was established by the Commonwealth Government in 1975 with the aim of helping Australians identify and appreciate the National Estate and promoting its conservation. Aboriginal and Torres Strait Islander places, natural environment places and historical places are all considered part of the National Estate (Australian Heritage Commission 1994).

The Heritage Commission is a Commonwealth Government statutory authority and its main responsibilities are to:

- advise the Commonwealth Minister for Environment and the Government on National Estate and conservation issues

- compile an inventory of National Estate places throughout Australia — the Register of the National Estate
- coordinate the National Estate Grants Program and administer the program's national component
- encourage community appreciation of and concern for the National Estate through information, education and training.

A major task of the Commission is to compile the Register of the National Estate. Over 12,000 natural and cultural places throughout Australia, including nearly 2000 natural places, are listed on the Register (Australian Heritage Commission 2000 D). Anyone can nominate a place for registration. All places entered on the Register are assessed against the published criteria used to identify National Estate values (Table 17).

**Table 17: Criteria for the Register of the National Estate (Australian Heritage Commission 1990)**

Without limiting the generality of sub-section (1) of the Australian Heritage Commission Act, a place that is a component of the natural or cultural environment of Australia is to be taken to be a place included in the national estate if it has significance or other special value for future generations as well as for the present community because of:

**Criterion A: Its importance in the course, or pattern, of Australia's natural or cultural history.**

- A.1 Importance in the evolution of Australian flora, fauna, landscapes or climate.
- A.2 Importance in maintaining existing processes or natural systems at the regional or national scale.
- A.3 Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features.
- A.4 Importance for association with events, development or cultural phases which have had a significant role in the human occupation and evolution of the nation, State, region or community.

**Criterion B: Its possession of uncommon, rare or endangered aspects of Australia's natural or cultural history.**

- B.1 Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness.
- B.2 Importance in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised, in danger of being lost, or of exceptional interest.

**Criterion C: Its potential to yield information that will contribute to an understanding of Australia's natural or cultural history.**

- C.1 Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- C.2 Importance for information contributing to a wider understanding of the history of human occupation of Australia.

**Criterion D: Its importance in demonstrating the principal characteristics of: (I) A class of Australia's natural or cultural places; or (II) A class of Australia's natural or cultural environments.**

- D.1 Importance in demonstrating the principal characteristics of the range of landscapes, environments or ecosystems, the attributes of which identify them as being characteristic of their class.
- D.2 Importance in demonstrating the principal characteristics of the range of human activities in the Australian environment (including way of life, custom, process, land-use, function, design or technique).





**Table 17 (continued): Criteria for the Register of the National Estate**  
(Australian Heritage Commission 1990)

<b>Criterion E:</b>	<b>Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.</b>
E.1	Importance for a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
<b>Criterion F:</b>	<b>Its importance in demonstrating a high degree of creative or technical achievement of a particular period.</b>
F.1	Importance for its technical, creative, design or artistic excellence, innovation or achievement.
<b>Criterion G:</b>	<b>Its strong or special associations with a particular community or cultural group for social, cultural or spiritual reasons.</b>
G.1	Importance as a place highly valued by a community for reasons of religious, spiritual, symbolic, cultural, educational, or social associations.
<b>Criterion H:</b>	<b>Its special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.</b>
H.1	Importance for close associations with individuals whose activities have been significant within the history of the nation, State or region.

Areas proposed for listing are published in the Commonwealth of Australia Gazette and in public notices in the press. The place is then on the 'interim list'. Any person may object to or comment on the interim listing of the place on the Register. Usually objections must be made within three months of the publication of the notice. Objections may relate to any issue and are assessed by an independent expert panel. The final decision on National Estate significance is made by the Commission.

Over 50 natural places in the Perth Metropolitan Region are listed on the Register. While places are being increasingly assessed on a thematic or regional basis, both within WA and throughout Australia, listing on the Swan Coastal Plain has not been based on systematic survey and is far from complete.

The Register alerts governments, planners, decision makers, researchers and the community to the

heritage values of these places so they can take action to conserve them. Listing does not directly affect the way in which owners manage places. Thus it confers a moral rather than legal obligation on the owners. The Commission does not own or manage any National Estate places and does not have entry rights to places in the Register. The Commonwealth Government is the only body whose actions are formally constrained as a result of a listing on the Register.

The Commonwealth Government proposes to reform its heritage protection regime with the establishment of an Australian Heritage Council to replace the Australian Heritage Commission. It is proposed that changes will include a National Heritage List of sites of outstanding national heritage significance. The current Register of the National Estate will continue to be publicly accessible but no new sites will be added to the Register.

#### Information Source

Source	Form	Custodian	Coverage
AHC (2000)	database (list of natural places)	AHC	Australia (see comments in Background)

#### Directory Descriptors (Appendix 2, page 497)

Three categories of recognition by the Commission are given:

- Entered in the Register of the National Estate
- Entered in the interim list of the Register of the National Estate
- Indicative place (AHC 2000D) i.e. a place thought to have National Estate values, but the nomination has not yet been assessed by the Commission.



# Part A



### 3.6.5 MIGRATORY BIRD AGREEMENTS (JAMBA AND CAMBA)

#### Background

Some of the Bush Forever Sites are visited by birds which migrate between the northern and southern hemispheres each year. Conservation of these birds is supported by two international agreements covering these birds and their habitats (ANCA 1996). These agreements are between the Government of Australia and the governments of

Japan and the People's Republic of China, the former being the Japan–Australia Migratory Bird Agreement (JAMBA, signed 6 February 1974) and the latter the China–Australia Migratory Bird Agreement (CAMBA, signed 20 October 1986). The bird species subject to these agreements are listed in Table 15. Migratory birds covered by these agreements are protected under the Commonwealth *Environment Protection and Biodiversity Act 1999* (see Section 3.6.6).

#### Information Source

Source	Form	Coverage
Agreements	listed individual bird species	China–Japan–Australia

#### Directory Descriptors (Appendix 2, page 497)

Bush Forever Sites are noted as being a 'location for JAMBA/CAMBA species'. (Detail of the species is contained in Section 3.5.4.)

### 3.6.6 COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

#### Background

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) came into effect on 16 July 2000. The EPBC Act provides protection for matters of 'national environmental significance', these being World Heritage properties, Ramsar wetlands of international importance, nationally threatened animal and plant species and ecological communities, internationally protected migratory species, Commonwealth marine areas, and nuclear actions (including uranium mining). This Act replaces five existing Commonwealth Acts, the *Environmental Protection (Impact of Proposals) Act 1974*, the *Endangered Species Protection Act 1992*, the *National Parks and the Wildlife Conservation Act 1975*, the *World Heritage Properties Conservation Act 1983* and the *Whale Protection Act 1980*.

Actions that are likely to have a significant impact on matters of 'national environmental significance' now require Commonwealth environmental impact assessment and approval. This pertains to areas specifically protected by the Act, areas containing nationally threatened animal or plant species or ecological communities listed under the Act, and areas used by internationally protected migratory species. It also applies to Commonwealth land (even if the action is taken outside of that land) and

actions taken by the Commonwealth that may have a significant impact on the environment anywhere in the world. It introduces for the first time legislative protection for threatened ecological communities, Ramsar wetlands and migratory species.

Threatened animal and plant species are protected at State level in Western Australia under the *Wildlife Conservation Act 1950* through schedules/lists of threatened species which are updated annually (see Sections 3.5.3 & 3.5.4 above). The most threatened categories of these species are now also protected under the EPBC Act. However, there is a time delay of several years between updating of the lists of species protected at the State level and updating of those in the Commonwealth Act. For example, the endangered plants from Western Australia currently listed under the EPBC Act are those that were listed as Declared Rare Flora in 1997. Rare Flora listed as 'critically endangered' and 'endangered' at State level are listed as 'endangered' under the EPBC Act and those listed as 'vulnerable' are also termed 'vulnerable' under the EPBC Act. Specially Protected Fauna are listed in the EPBC Act as either 'endangered' or 'vulnerable' roughly equating to Schedule 1 and Schedule 4 fauna respectively under State legislation. Threatened Ecological Communities in Western Australia have been assigned to four categories by English and Blyth (1997, 1999) (see Section 3.4.4 above) but at present only those listed as 'critically endangered' are covered by the EPBC





Act and are termed 'endangered'. There are three categories of Threatened Ecological Communities under the EPBC Act and the lists for the remaining

two categories will be compiled during the first six months of the Act.

Information Source			
Source	Form	Custodian	Coverage
Environment Australia (2000)	database	Environment Australia	international & national

**Directory Descriptors (Appendix 2, page 497)**

All Bush Forever Sites which are either a location for internationally protected migratory species, contain a Ramsar wetland or contain flora/fauna/threatened ecological communities protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* are annotated with the following: 'subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*'.

**3.7 SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**3.7.1 CRITERIA**

**Background**

The selection criteria have been developed to meet objectives established in the *State Urban Bushland Strategy* (Government of Western Australia 1995a); the *Wetlands Conservation Policy* (Government of Western Australia 1997) and the *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia 1996).

A key commitment in the *Urban Bushland Strategy* is to protect 'at least 10 per cent, in accordance with guidelines set by the International Union for Conservation (IUCN 1991) (now known as the World Conservation Organisation) or 400ha, whichever is the largest, of each complex in at least five separate areas' (see Sections 1.3 and 1.4).

A primary objective of the *National Strategy* is to 'establish and manage a comprehensive, adequate and representative system of protected areas covering Australia's biological diversity'.

'Comprehensiveness', 'adequacy' and 'representativeness' are terms defined in the *National Strategy* as follows:

- comprehensiveness — the degree to which the full range of ecological communities and their biological diversity are incorporated within reserves
- adequacy — the ability of the reserve to maintain the ecological viability and integrity of populations, species, and communities. (The interactions between reserves and surrounding

areas should be taken into account in determining the reserve's ability to meet ecological viability and integrity criteria. Complementary management of the adjacent areas can play a significant role. In some instances, however, the ecological viability of the protected area itself will be paramount.)

- representativeness — the extent to which areas selected for inclusion in the national reserves system are capable of reflecting the known biological diversity and ecological patterns and processes of the ecological community or ecosystem concerned.

Bush Forever aims, within the limits of the natural areas available, to identify a comprehensive, adequate and representative system of reserved and protected areas in the Perth Metropolitan Region portion of the Swan Coastal Plain, and represents the primary means of achieving these objectives in the Perth area.

The selection criteria for the Project were developed with input from a workshop (established for the System 6 and Part System 1 Update Program) attended by conservation scientists, consultants, representatives of a range of key government agencies and the community. These draft recommendations were reviewed through a broadly based Technical Working Group and the Steering Committee established for the System 6 and Part System 1 Update Program (organised by DEP), and the Urban Bushland Advisory Group (advisory group to the Western Australian Planning Commission).

Ecological communities, rather than species, are the main unit on which selection/representation of biological diversity has been made in the Project, as this is the level:



# Part A



- at which the most comprehensive regional plot- and map-based information on the biological diversity of the Swan Coastal Plain is available
- on which both the *National Strategy* and *Urban Bushland Strategy* focus.

Each of the criteria is presented and discussed below.

## **Representation of Ecological Communities**

Representation of ecological communities is achieved in Bush Forever using a combination of regional information on landform and soils, vegetation complexes, floristic community types and wetlands (SECTION 2 of the Bush Forever Site descriptions, see Section 3.4) and, to a lesser extent, other information on the Site's natural values (SECTION 3 of the Site descriptions, see Section 3.5). The criteria are aimed at maximising the comprehensiveness and representativeness of the areas identified for conservation.

Comprehensive representation of ecological communities is achieved primarily by attempting to select replicate areas that represent each of the floristic communities, in each of the vegetation complexes in which they occur in the Perth Metropolitan Region; and to cover the geographic extent of each community within the Perth

Metropolitan Region.

Within an intensively settled and developed area such as the Perth Metropolitan Region portion of the Swan Coastal Plain, remaining bushland areas are generally fragmented. Several vegetation complexes are cleared to well beyond 90 per cent, such that the target of retaining 10 per cent of bushland in each complex cannot be uniformly met. One, the Karrakatta Central South complex, retains more than 10 per cent bushland at present, but is substantially constrained by existing development proposals and Urban/Industrial Planning Zones, to the extent that the target is unlikely to be achieved. It is notable that this complex extends north from the Perth Metropolitan Region and there are better opportunities for conservation in these areas. This is not typical of the highly cleared complexes, which more usually are even more extensively cleared in the remainder of the coastal plain.

Many Sites will be selected primarily because they provide a good representation of one or more of the ecological communities on the coastal plain. Achieving a comprehensive, adequate and representative system of protected areas is a primary objective of Bush Forever. As such, there is an emphasis on selecting sites that together provide a complete (comprehensive) representation of the ecological diversity found on the coastal plain.

## **REPRESENTATION OF ECOLOGICAL COMMUNITIES**

*A number of areas selected to represent the range of ecological communities and the places in which these communities merge*

### **Scope**

Regional representation will be primarily based upon the target of achieving:

- comprehensive and adequate representation of each floristic community type within each vegetation complex (in uplands and vegetated wetlands).
- comprehensive and adequate representation of each natural wetland group and wetland types within each group.

### **Inclusion guidelines**

- Areas which are good examples of each floristic community type, selected to be representative of the vegetation of a geomorphic unit.
- Areas contributing to at least 10 per cent or 400 hectares of each vegetation complex, whichever is the larger, in at least five separate areas.
- Best available examples of each natural wetland group and wetland types within each group.
- Areas identified as being of national or international significance through treaty/convention/policy.

### **Exclusion guidelines**

- Vegetation which does not satisfy the definition of bushland (unless it is the best example of its type with particular reference to fauna habitat).
- Areas which are not the best available examples of particular ecological communities (floristic community type/vegetation complexes/threatened ecological communities) because there are more appropriate (bigger, better condition, richer/more diverse) sites elsewhere.





### **Diversity**

Diversity is an important supporting criterion, usually used in conjunction with representativeness. Within the primary objective of maximising representation,

selections of Bush Forever Sites are made to choose sites supporting a diversity of plant communities from the aspects of both structural and floristic diversity.

## **DIVERSITY**

*Areas with a high diversity of flora and/or fauna species or communities in close association*

### **Scope**

The conservation of important areas by virtue of their richness, diversity or complexity for their physical or biological attributes at the community, species or genetic level. This will be primarily based on areas supporting:

- a wide variety of flora and/or fauna species.
- unusual concentrations of subspecies or varieties occurring together.
- a wide representation of floristic community types in close proximity.
- species-rich examples of communities of their type.
- a wide variety of plant associations, assemblages or communities.

This criterion will commonly support other criteria for selection of representative areas.

### **Inclusion guidelines**


- Areas with high flora diversity at the community, species or genetic level.
- Areas with a high diversity of plant associations, assemblages or communities relative to the area.
- Areas with a high diversity of faunal assemblages.

### **Exclusion guidelines**

- Floristic community types which are replicated in many areas.
- Areas with low to moderate diversity at the community, species or generic level.



# Part A



criterion. Protecting rare or restricted taxa of flora and fauna (may be species, subspecies or varieties) is achieved through the preferential selection of representative examples of communities that are known to support populations of these species.

## Rarity

Rarity is considered from a community and individual species perspective. Selection of Threatened Ecological Communities (after English and Blyth 1997, see Section 3.4.4) is a priority, related to this criterion and the representativeness

### RARITY

*Areas containing rare or threatened communities or species, or species of restricted distribution*

#### Scope

This criterion applies to aspects of the environment which are rare or relatively rare, and can encompass any environmental, biological or ecological feature or phenomenon which can be regarded as outstanding because it is one of the few of its type.

#### Inclusion guidelines

- Threatened ecological communities.
- Habitats of rare, uncommon or restricted flora and/or fauna species and/or species outside of or at the limit of their range.
- Areas supporting rare, uncommon or restricted communities and/or communities outside of or at the limit of their normal range.

#### Exclusion guidelines

- Habitats of species or communities whose significance (as described above) is not established.
- Areas which, if supporting outlying species or communities, are replicated by better examples elsewhere.

## Maintaining Ecological Processes or Natural Systems

The selection of areas for their role in 'maintaining ecological processes or natural systems' relates to the 'adequacy' objective of the National Strategy (Commonwealth of Australia 1996). This is the most difficult of the national criteria to achieve fully in the Perth Metropolitan Region, given the extent of clearing and the fragmented nature of much of the remaining bushland.

The protection of remaining large areas of bushland, particularly those providing representation of two or more vegetation complexes, or a range of floristic community types, is an important component of this selection criterion. These larger areas represent core Bush Forever Sites with the best opportunity for maintenance of a more complete range of ecological

function. For the same reasons, the identification, protection and enhancement of remaining linkages or corridors of bushland through the metropolitan area is considered an important component of providing for the on-going viability (adequacy) of the protected areas.

Several of the wetlands in the metropolitan area are of international importance for the protection of migratory waterbirds, serving to maintain ecological systems that extend beyond Australia.

It is notable that small bushland areas on the eastern side of the plain have demonstrated an ability to maintain good condition after many years of isolation in an agricultural environment, provided they have not been subject to gross disturbance (see Section 3.5.3 Vegetation Condition).





## **MAINTAINING ECOLOGICAL PROCESSES OR NATURAL SYSTEMS**

*Maintenance of ecological processes or natural systems at a regional or national scale*

### **Scope**

This criterion applies to areas which are important in the maintenance of existing processes or natural systems. This criterion would normally be used in conjunction with other criteria for the selection of representative areas.

### **Inclusion guidelines**

- Large areas in natural condition with natural processes intact or largely so.
- Fauna habitats providing specific requirements for feeding/breeding/nursery functions.
- Substantive wildlife corridors connecting bushland areas.
- Habitats for significant populations of migratory birds.

### **Exclusion guidelines**

- Areas which are replicated by other areas supporting significant populations or in better condition.
- Areas not recognised as being of national or international significance for migratory birds.

### **Scientific or Evolutionary Importance**

This criterion is intended to address areas supporting restricted specialist communities, for example, the Lake Richmond thrombolites, or areas

of scientific and evolutionary significance, such as study areas for regional studies and the Minim Cove foreshore fossil site on the Swan River.

## **SCIENTIFIC OR EVOLUTIONARY IMPORTANCE**

*Areas containing evidence of evolutionary processes either as fossilised material or as relict species and areas containing unusual or important geomorphological or geological sites; Areas of recognised scientific and educational interest as reference sites or as examples of the important environmental processes at work*

### **Scope**

This criterion applies generally to areas which contain evidence of past ecological or biological processes, and important geomorphological or geological sites and to areas which have recognised value as research sites, type localities or to sites having reference or benchmark value.

This criterion will usually support other criteria for selection of representative areas.

### **Inclusion guidelines**

- Areas with remains of flora and fauna now extinct (fossil sites).
- Areas with primitive or relict flora or fauna surviving from earlier times.
- Areas with fossil or other records of identifiable past climates or environments.
- Long-term scientific/educational monitoring sites or study areas.

### **Exclusion guidelines**

- Areas in which the evidence of past processes is not clearly established.
- Areas which are replicated by places with clearer evidence of the above or in better condition.
- Areas not identified as important geomorphological sites.
- Areas not identified as important geological sites.



# Part A

## **General Criteria for Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation**

Wetlands are recognised as an important feature of the Swan Coastal Plain where they are a focus of biological diversity and a key component for the maintenance of ecological functions associated with the hydrological cycle.

Conservation category wetlands (Hill *et al.* 1996a&b) are often core areas in Bush Forever Sites and their inclusion in Sites makes a significant

contribution to the protection of the diversity, representation and function of important examples of the remaining wetlands on the Swan Coastal Plain.

River foreshores and coastal vegetation are also widely recognised as important, not only for conservation of biological diversity and the opportunities for linkage that they present, but also for maintenance of the stability of these environments and their protection as key areas of public open space and landscape diversity.

### **GENERAL CRITERIA FOR PROTECTION OF WETLAND, STREAMLINE AND ESTUARINE FRINGING VEGETATION AND COASTAL VEGETATION**

*Conservation category wetland areas including fringing vegetation and associated upland vegetation;  
Coastal vegetation within the accepted coastal management zone*

#### **Scope**

This criterion applies to wetlands in good condition, their fringing vegetation and adjacent upland vegetation and to coastal vegetation within the accepted coastal management zone.

#### **Inclusion Guidelines**

- Conservation category wetlands associated with regionally significant bushland, their fringing vegetation and associated upland vegetation.
- Coastal vegetation within the accepted coastal management zone.

#### **Exclusion Guidelines**

- Conservation category wetlands not associated with regionally significant bushland (to be dealt with by other State policy mechanisms).
- Channel wetlands not supporting regionally significant bushland.
- Resource enhancement category wetlands and degraded conservation category wetlands.
- Other wetlands with vegetation removed or severely altered, such as multiple-use management category wetlands.
- Cleared or developed coastlines and estuarine fringes.





**Criteria Not Relevant to Determination of Regional Significance, but which may be Applied When Evaluating Areas Having Similar Values**

Many of the natural areas identified in Bush Forever

have additional values related to their cultural significance. While these have not been researched in a comprehensive manner for the Project such values have been taken into account in the evaluation of natural areas having similar values.

**CRITERIA NOT RELEVANT TO DETERMINATION OF REGIONAL SIGNIFICANCE, BUT WHICH MAY BE APPLIED WHEN EVALUATING AREAS HAVING SIMILAR VALUES**

*Attributes which when taken alone do not establish regional significance, but which can add to the value of bushland and enhance its contribution to Bush Forever*

- The area is a regional recreation resource.
- The area is of historic significance or contains significant sites (post-European settlement).
- The area contains a site or sites of significance for Aboriginal people.
- The area has social value to a community group.
- The area has aesthetic value as a notable landscape feature or viewpoint.

**Information Source**

All information sources referred to in the report as outlined in Sections 3.4, 3.5 and 3.6.

**Directory Descriptors (Appendix 2, page 498)**

The criteria met are listed as follows:

- Representation of ecological communities
- Diversity
- Rarity
- Maintaining ecological processes or natural systems
- Scientific or evolutionary importance
- General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation
- Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values.

**3.7.2 IMPLEMENTATION CONSIDERATIONS**

**Background**

This section provides background for the Implementation Consideration column in Volume 1, Table 3. These Bush Forever Site attributes were listed under 'Opportunities and Constraints' in the draft *Perth's Bushplan* Volume 2 but are now better considered in Volume 1 as attributes of the Site or part Site that have bearing on the implementation of the recommendations.

Attributes can be identified that support or diminish the degree to which the bushland within each Site is currently protected or able to be protected. These attributes need to be taken into consideration in the implementation of Bush Forever. These attributes or implementation considerations are discussed below. Information on many of these attributes is contained in *SECTIONS 1-4* of the Site descriptions. These implementation considerations are listed for each part Site in Table 3, Volume 1.



# Part A

Various forms of land tenure provide some existing measure of protection. The principal means of protecting natural areas is reservation under the Metropolitan Region Scheme (Parks and Recreation Reservation) and/or the *Land Administration Act 1997* (see Volume 1). A diverse suite of other mechanisms provides a level of protection to features or species of recognised conservation or heritage importance. The most effective of these opportunities are listed below. A brief description of those opportunities not described previously follows this listing.

- Declared Rare Flora and Fauna (see Sections 3.5.3 and 3.5.4)
- Conservation Category Wetlands (see Section 3.4.3)
- Environmental conditions
- Environmental Protection Policies
- Statements of Planning Policy
- Planning Control Areas
- Clearing controls

## Environmental Conditions

Environmental conditions can be set under Part IV of the *Environmental Protection Act 1986*. Part IV of the Act allows the EPA to assess proposals and schemes and impose environmental conditions to which the proposal or scheme should be subject. The conditions are set by the Minister for the Environment. An example of the setting of such conditions is outlined below under Peel Inlet–Harvey Estuary Environmental Protection Policy.

Environmental conditions can be imposed on proposals and schemes requiring that specific areas of bushland be appropriately protected and managed. These are not included in the Bush Forever Site descriptions but should be taken into account in implementation.

## Environmental Protection Policies

An Environmental Protection Policy (EPP) is prepared under Part III of the *Environmental Protection Act 1986* and has 'the force of law as though it had been enacted as part of this Act', on and from the day on which the policy is published in the *Government Gazette*.

An EPP establishes:

- the boundaries of the area and the portion of the environment to which the policy applies;
- the basis on which the environment in this area is to be protected, or pollution is to be prevented, controlled or abated.

In addition, an EPP may also:

- specify the environmental quality objectives to be achieved and maintained under the policy;
- set out the indicators, parameters or criteria to be used for measuring environmental quality in the policy area;
- relate to any activity directed towards the protection of the environment, including the discharge of waste;
- create offences and penalty provisions;
- establish a program for the protection of the environmental values within the policy area and may specify, among other things, measures designed to:
  - (i) minimise the possibility of pollution
  - (ii) protect the environment
  - (iii) achieve and maintain the environmental values to be protected.

There are a number of Environmental Protection Policies which protect portions of the Swan Coastal Plain in the Perth Metropolitan Region. Those of particular relevance are outlined below:

*Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992* (Government of Western Australia 1992a)

Stage 1 of an Environmental Review and Management Plan (ERMP) for the eutrophic Peel Inlet and Harvey Estuary was published in 1985 (Peel–Harvey Study Group 1985), with Stage 2 of the ERMP being subsequently published in 1988 (Kinhill 1988).

The EPA undertook an assessment of both Stage 1 and Stage 2 of the ERMP (EPA 1985 and EPA 1988), the result of which was the imposition of legally binding conditions by the Minister for the Environment. These environmental conditions





include a moratorium on land clearing and drainage within the Swan Coastal Plain portion of the catchment of the estuary.

The environmental conditions had the effect of requiring the proponents of the management plan (being the Ministers for Transport, Agriculture and Waterways) to exercise control on clearing and drainage in the catchment for the purpose of controlling nutrient inputs to the waterway.

In 1992 the Department of Planning and Urban Development prepared the Statement of Planning Policy No. 2 (The Peel–Harvey Coastal Plain Catchment) to give effect to both land use controls identified within the management strategy and environmental conditions of approval (Government of Western Australia 1992b). The Statement of Planning Policy (SPP) was prepared 'to ensure that land use changes within the Peel–Harvey Estuarine System likely to cause environmental damage to the estuary are brought under planning control and prevented'.

The *Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992* was proclaimed on 11 December 1992 primarily for the purpose of establishing water quality targets for the estuary and, by reference to it, to give statutory effect to the Statement of Planning Policy No. 2 by requiring implementation of the SPP by local authorities.

*Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (Government of Western Australia 1992c, see Section 3.4.3)

The Swan Coastal Plain Lakes EPP protects lakes, identified under the policy, from unauthorised draining, filling and (discharge of) pollution.

Significantly, the EPA was required under Section 36 of the *Environmental Protection Act 1986* to review and prepare a new draft policy by 18 December 1999 (EPA 1999). This review has provided the opportunity to propose new EPP provisions such that regionally significant wetlands and bushland associated with these habitats are afforded statutory protection (EPA 1999, 2000a&b).

*Environmental Protection (Gnangara Mound Crown Land) Policy 1992* (Government of Western Australia 1992d)

The Gnangara Mound Crown Land EPP was gazetted on 24 December 1992 with the objective of protecting:

- (i) the level and quality of groundwater;
- (ii) native vegetation and wetlands associated with Crown Land on the Mound.

The policy includes provisions which control unauthorised activities which may destroy or degrade native vegetation or wetlands located on Crown Land on the Mound. A person who contravenes these requirements commits an offence and is subject to penalty provisions under the *Environmental Protection Act 1986*.

*Environmental Protection (Swan and Canning Rivers) Policy 1998* (Government of Western Australia 1998b)

The Swan and Canning Rivers EPP, gazetted on 10 July 1998, declares the beneficial uses of the rivers to be protected and establishes a program of protection. The uses declared to be protected include the maintenance of the natural ecosystem, aesthetic and landscape amenity, recreation, fishing, navigation and port facilities.

In seeking to protect the beneficial uses of the rivers the EPP also identifies important values and functions of native fringing vegetation to be protected. These include when native fringing vegetation:

- is of value for bank and shoreline stabilisation, erosion control and the filtration and attenuation of the discharge of pollutants;
- is remnant vegetation, is in unusually good condition or has integrity as a sample of its type;
- is a disjunct population of a native species, is at the limit of its geographical range or is inadequately represented in reserves;
- has connective importance as, or as part of, a corridor of native vegetation or migratory route;
- is situated in an area that has high biological diversity;



# Part A

- is regionally significant remnant vegetation identified for conservation by the DEP.

This last consideration was made in direct relation to regionally significant vegetation as identified in the Project.

The EPP also required that the EPA prepare and submit to the Minister for the Environment a catchment-wide Comprehensive Management Plan (CMP) by December 1999. The CMP aims to delineate the beneficial uses and critical areas that are to be protected and to stipulate the roles and responsibilities of key decision-making bodies.

#### *Draft Western Swamp Tortoise Environmental Protection Policy (EPA 1998)*

The Western Swamp Tortoise is considered to be one of the world's rarest reptiles with, at one time, less than 40 individuals left in the wild. There was concern in the community that the animal would become extinct if immediate action was not taken to increase the size of the population and to protect its habitat. A draft EPP released in 1994 aimed to help protect the only remaining habitat for the tortoise at Twin Swamps (part Site 400) and Ellen Brook (part Site 301) Nature Reserves. Much of the land affected by the draft policy is in private ownership. The EPA sought further public comment on a revised draft towards the middle of 1998. The EPA has further refined the EPP policy.

#### *Draft State Groundwater Environmental Protection Policy (EPA 1997)*

The Draft State Groundwater Environment Protection Policy was released for public comment in December 1997 and proposed a state-wide framework for protecting the environmental values of important groundwater systems. Under such EPPs, regulations may be prepared to protect drinking water supplies, groundwater-dependent ecosystems and recreational activities associated with groundwater. The provision of water for the environment is fundamental to the maintenance of the bushland within the Bush Forever Sites, particularly where the bushland may otherwise be subject to degradation from groundwater drawdown or over-abstraction.

Groundwater-dependent ecosystems include caves, wetlands and phreatophytic (groundwater-dependent) vegetation. Water allocation strategies and water resource management plans are required to complement the environmental objectives of the policy. The State Groundwater EPP has been drafted to provide for the Gnangara Mound Crown Land, Gnangara Mound private land and the Jandakot Mound.

#### **Statements of Planning Policy**

Statements of Planning Policy (SPP) are prepared under the provisions of Section 5AA of the *Town Planning and Development Act 1928* by MfP.

Statements of Planning Policy must receive approval from the Minister for Planning and the Governor and are published in the *Government Gazette*.

Statements of Planning Policy are concerned with broad planning policies to co-ordinate planning and can be made for particular classes of development or matters which relate to a specific region or area of the State.

There are a number of SPPs that provide direction for local authorities when considering portions of the Swan Coastal Plain in the Perth Metropolitan Region. Development in these areas is guided in specific ways by the particular requirements of the SPP and provides additional opportunities for conservation. These SPPs are:

#### *Peel-Harvey Coastal Plain Catchment Statement of Planning Policy No. 2 (Government of Western Australia 1992a)*

This policy is intended to control landuses which are likely to result in pollution of surface and groundwater. A number of the specific objectives of this policy are compatible with the objective of protecting and conserving bushland. These objectives are:

- to increase high water-using vegetation cover within the Peel-Harvey Coastal Plain Catchment;
- to ensure that changes to land use within the catchment to the Peel-Harvey estuarine system are controlled so as to avoid and minimise environmental damage.





*Gnangara Mound Crown Land Statement of Planning Policy No. 3 (Government of Western Australia 1995b)*

The main purpose of the policy is to prevent development which could prejudice the long-term use of groundwater. Acceptable landuses are those which are compatible with the sustainable use of the groundwater resource and the retention of the environmental values associated with that resource. An objective of the policy is to protect wetlands and natural vegetation, which is compatible with the objective of protecting and conserving bushland.

*Jandakot Groundwater Protection Statement of Planning Policy No. 6 (Government of Western Australia 1998a)*

The main purpose of this policy is to ensure that development over the Jandakot public groundwater supply mound is compatible with the long-term use of the groundwater for human consumption. It seeks to ensure that land-use changes within the policy area that are likely to cause detrimental effects to the groundwater are brought under planning control and prevented or managed.

Reference to SPP is not included in the relevant Site descriptions but the presence of these should be taken into account in implementation.

### **Planning Control Areas**

Planning Control Areas (PCAs) are prepared under the provisions of Section 35C of the *Metropolitan Region Town Planning Scheme Act 1959*. A Planning Control Area may be declared when the West Australian Planning Commission considers that land situated within the Perth Metropolitan Region may be required for a range of purposes as specified in the Act, including Parks and Recreation.

Proposals for development within a Planning Control Area must be referred to the WAPC for determination. References to the PCAs are not included in the relevant Bush Forever Site descriptions but the presence of these should be taken into account in implementation.

### **Clearing Controls**

Under Regulation 4 of the Soil and Land Conservation Regulations 1992 the owner or occupier of any land in the State is required to lodge a Notice of Intention to Clear Land where it is intended to clear more than one hectare and where that clearing will result in a change in land use.

The Commissioner of Soil and Land Conservation may then, using the soil conservation notice provisions of the *Soil and Land Conservation Act 1945*, direct the landholder to refrain from clearing any land specified in the notice, or the landholder may enter into an agreement to reserve, or agree to protect and manage under a conservation covenant, any of the vegetation the Commissioner would not allow to be cleared. The Commissioner's concern extends only to any clearing which may result in land degradation.

The Memorandum of Understanding (Commissioner of Soil and Land Conservation 1997) on land clearing provides a process for coordinating the assessment of clearing proposals by other key agencies (DEP, CALM and WRC) in cases where other natural resource values, such as biodiversity or water resources, may be threatened by the clearing. In cases where other statutes do not provide protection (such as habitat) the process may lead to formal assessment by the Environmental Protection Authority.

The MOU covers clearing for agricultural purposes on rural-zoned land, including such land in the metropolitan region. Clearing for urban development is presumed by the Commissioner to have had the necessary assessment for controls placed on land degradation during the processes of rezoning.

### **Other Considerations**

In an area as intensively developed as the Perth Metropolitan Region most areas identified for conservation will have some constraining factors. Factors such as zoning for intensive land uses, specific requirements for purposes such as the regional road network, and mineral or basic raw material resources (and tenements) are recognised as constraints.



# Part A



In selecting areas for the conservation of a comprehensive and representative system of protected areas, the first emphasis has been on using the available information sources. These have been used to achieve the objectives established in the *Urban Bushland Strategy* and the *National Strategy for the Conservation of Australia's Biological Diversity*. Within this objective, however, selection has taken constraining factors into consideration (see Section I.4), attempting to seek the least constrained Site where equivalent areas exist.

### 3.7.3 SPECIFIC SITE RECOMMENDATIONS

#### Background

Bush Forever focuses on a range of measures to facilitate the protection of regionally significant bushland and associated wetlands identified in the Bush Forever Sites, including off-reserve conservation initiatives to complement the traditional means of achieving conservation through reservation. The off-reserve conservation initiatives

are central to the success of Bush Forever. The range of conservation measures is outlined in Volume 1, Section 2: Implementation, and includes reservation or acquisition, as well as retaining land in private or local government ownership with conservation management agreements, legally binding nature conservation covenants or other types of complementary mechanisms including various types of negotiated planning solutions.

The selection of the most appropriate mechanism for each Bush Forever Site was influenced by the characteristics of the Site including its size, shape, conservation values, position relative to existing conservation areas, zoning and associated constraints and desires of the land owners.

Bush Forever Site-specific recommendations are restricted to a limited set of options framed to reflect the circumstances of the Site. Nine categories (or types) of recommendation are recognised.

#### Information Source

A combination of sources as detailed in Volume 1, Table 3.

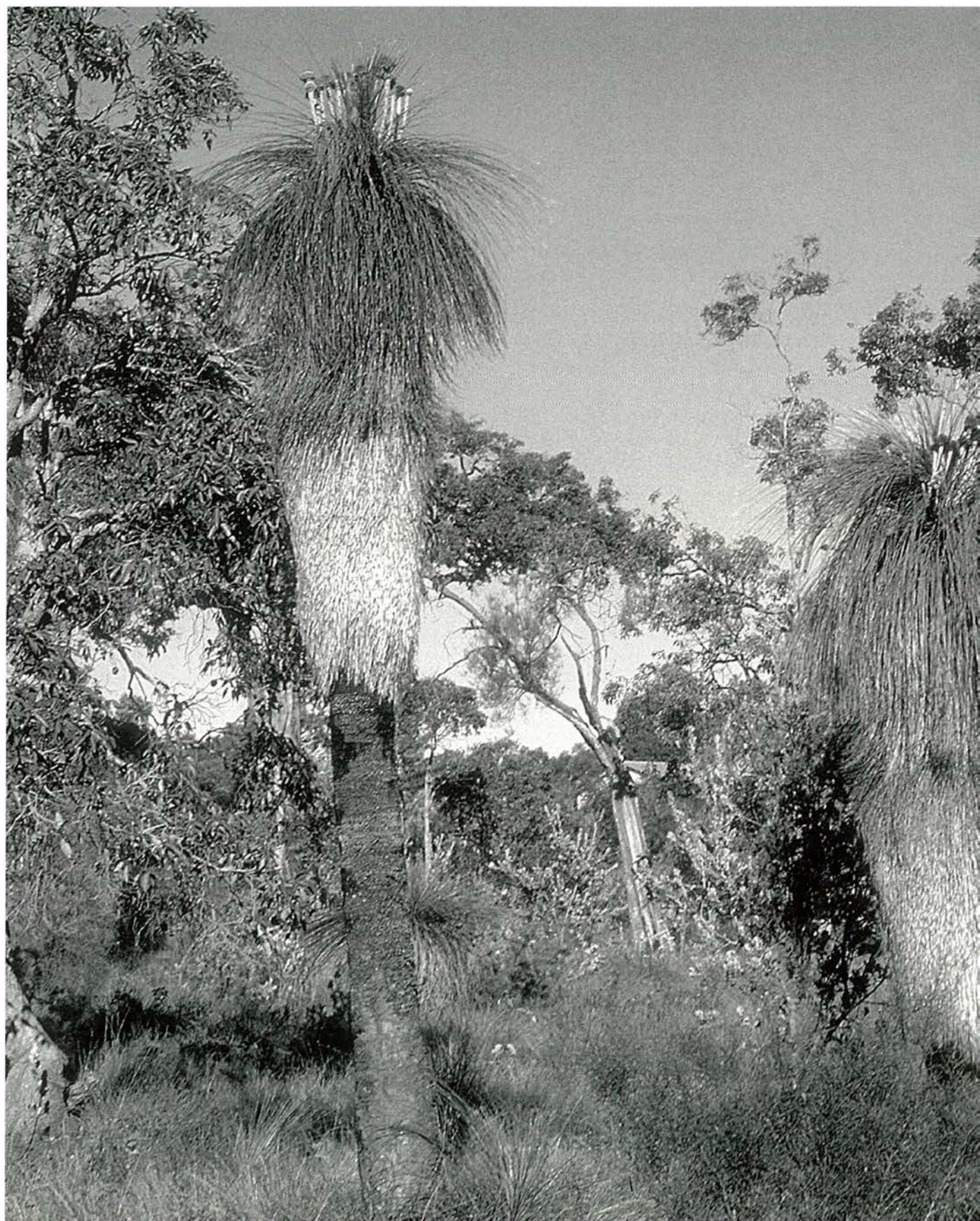
#### Directory Descriptors (Appendix 2, page 499)

The appropriate recommendation is selected from the following which are listed in Volume 1, Table 3. Some Bush Forever Sites are divided into parts which have different implementation recommendations:

- Proposed Parks and Recreation Reservation
- Urban/ Urban Deferred/ Industrial Negotiated Planning Solution
- Strategic Negotiated Planning Solution
- Basic Raw Materials Negotiated Planning Solution
- Rural Complementary Mechanism
- Cemetery Mechanism
- Other Government Land Mechanism
- Local Reserve Mechanism
- Major Road and Rail Reserve Mechanism
- Regional Creekline Mechanism
- Sites with Some Existing Protection

Some sites may also include more detailed site-specific recommendations as listed in Volume 1, Table 3.







# Part B

## BUSH FOREVER SITE DESCRIPTIONS

### 1. INTRODUCTION

The descriptions of the Bush Forever Sites are grouped according to the major landform element on which they are located (see Part A, Section 3.4.1, Landform and Soils) or their location along estuaries, rivers and creeks, the divisions being:

- **DANDARAGAN PLATEAU**
- **FOOTHILLS AND PINJARRA PLAIN**
- **BASSENDEAN DUNES**
- **SPEARWOOD DUNES**
- **QUINDALUP DUNES**
- **ESTUARIES, RIVERS AND CREEKS**

Within each group the Bush Forever Sites are ordered from the north to the south of the Perth Metropolitan Region. When a Site contains a series

of major landform elements the Site is grouped according to the predominant major landform element found in the Site.

Each group includes a series of tables outlining the regional information categories broadly associated with the major landform element. These tables include extractions from general tables in Part A, Section 3.4. The general tables in Part A from which these extractions are made are listed below alongside the tables in Part B.

Section 2.6 — Estuaries, Rivers and Creeks — only contains Tables 2 and 3 as this group traverses all the major landform elements and the general tables from Part A are applicable.

Specific values associated with a particular major landform element are also discussed in these introductory sections. Information on these specific values related to individual Bush Forever Sites is contained in each Site description.

Part A – General Tables	Part B – Extracted Tables
Table 1: Geological and geomorphological systems	Table 1a: Geological and geomorphological systems
Table 2: Landform and Soils	Table 1b: Landform and Soils (modified)
Table 8: Natural Wetland Groups	Table 2: Natural Wetland Groups
Table 5: Vegetation Complexes	Table 3: Vegetation Complexes
Table 6: Floristic Community Types	Table 4: Floristic Community Types
Table 10: Threatened Ecological Communities	Table 5: Threatened Ecological Communities
Table 13: Significant Flora	Table 6: Significant Flora







# Part B



## 2. BUSH FOREVER SITES

### 2.1 DANDARAGAN PLATEAU

#### 2.1.1 INTRODUCTION

##### Location, Landscape and Soils

The Dandaragan Plateau lies in the north-east corner but extends well beyond the Perth Metropolitan Region. Lying to the west of the Darling Scarp, the Dandaragan Plateau is geologically part of the Swan Coastal Plain and is separated from the other major landform elements identified on the Plain by the Gingin Scarp. The Dandaragan Plateau has lower relief than the Darling Plateau and is a wedge-shaped landform of about 200 metres in elevation.

Soils are predominantly deep grey or pale brown sands with outcropping laterite areas. At times the laterites are overlaid with sand (Tables 1.1a&b). Brown or red earthy sands are found along the valleys.

While a number of different wetlands are found on the Dandaragan Plateau outside the Perth Metropolitan Region, within the Region the wetlands are predominantly creeks (Table 2.1).

##### Remnant Bushland on the Dandaragan Plateau

Mapping of bushland in the Perth Metropolitan Region indicates that between 24 per cent and 40 per cent of the vegetation complexes associated with the Dandaragan Plateau (Table 3.1) remain as native vegetation. Past clearing on the Plateau has focused on the valleys where soils are most suitable for agriculture, the sandy slopes and lateritic ridges being least cleared. Recent clearing has been associated with smaller landholdings as a result of special rural subdivisions.

##### Plant Communities and their Conservation on the Dandaragan Plateau

At the regional level two vegetation complexes (Table 3.1) have been identified on the Dandaragan Plateau and associated Gingin Scarp in the Perth Metropolitan Region. Four floristic community types

(Table 4.1— one wetland type and three upland types) are the principal regional floristic groups expected to be found on the Dandaragan Plateau in the Perth Metropolitan Region.

The main vegetation associations are Woodlands to Open Forests dominated by *Eucalyptus marginata*, *E. calophylla*, *E. wandoo* and combinations of these; *E. calophylla* Woodland to Open Forest; and Low Woodlands dominated by *E. marginata*, *E. todtiana*, *Banksia attenuata* and *B. menziesii*. *Eucalyptus wandoo* is associated with the lateritic soils. These Woodlands to Open Forests are characteristically associated with a species-rich understorey (Table 4.1). There are significant differences between the species on laterites and sands (Table 4.1). The bed and banks of the watercourses support a band of wetland vegetation dominated by *Eucalyptus rudis* and *Melaleuca raphiophylla*.

A number of significant taxa are known from the Dandaragan Plateau in the Perth Metropolitan Region (Table 6.1). In addition the most southern population of *Macropidia fuliginosa* is found in the region. Other taxa associated with the Plateau are also expected to be at the southern extent of their range because the most southern extent of the Dandaragan Plateau is in the Perth Metropolitan Region. Further survey work would be expected to identify such taxa.

One of the Bush Forever Sites on the Dandaragan Plateau was recognised by the EPA as containing 'Threatened or Poorly Reserved Plant Communities' in need of interim protection under the System 6 Part System 1 Update (EPA 1994 GIS). This site (Bush Forever Site 86) was identified by Keighery, BJ, and Trudgen (1992) and occurs at the junction of the Dandaragan Plateau, Pinjarra Plain and Darling Plateau.





**Table 1.1a:** Geological and geomorphological systems of the Dandaragan Plateau. The general terms used in Bush Forever for describing the major landform elements are in **bold italics**.

Major Geological Systems (after Playford et al. 1976)	Major Geomorphological Systems (after McArthur and Bettenay 1960)	Detailed Geomorphological Units (after Churchward and McArthur 1980)
Dandaragan Plateau	<b><i>Dandaragan Plateau</i></b>	Mogumber
Gingin Scarp	Gingin Scarp	Reagan

**Table 1.1b:** Landform and soils on the Dandaragan Plateau showing the relationship between geomorphological systems, units identified in the Environmental Geology Maps and soils described on these maps on the Swan Coastal Plain in the Perth Metropolitan Region. Column One may be used to cross-reference to groups shown in Table 1a.

Major Geomorphological Systems (after McArthur and Bettenay 1960); * Detailed Geomorphological Units (after Churchward and McArthur 1980)	Major Units in the Environmental Geology Maps (after various authors)	Soils associated with each unit
Dandaragan Plateau *Mogumber	Colluvial sand Laterites Leederville Formation Osborne Formation	light grey or pale brown quartz sands, gravel or laterised granite pebbles associated with clayey sand, cemented laterite, pale brown quartz and felspar sands associated with siltstone
Gingin Scarp *Reagan	Gingin Scarp	not distinguished, as above

**Table 2.1:** Natural Wetland Groups (Consanguineous Suites) on the Dandaragan Plateau (after Semeniuk 1996)

Name & locations	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Red Gully suite</b> (DPI) 9km south of Moore River in Dandaragan Plateau	Dandaragan Plateau of gently undulating to flat surface with occasional broad gently sloping valleys alternating with incised creeks	Creeks & floodplains grading into sumplands	Quartz sand	Fluvial incision; surface runoff & depressions receiving groundwater discharge from slopes



# Part B

**Table 3.1:** Vegetation complexes (Heddl et al. 1980) and percentage remaining as native vegetation (AGWEST 1998 GIS) on the Dandaragan Plateau in the Perth Metropolitan Region

Vegetation Complex	Native Vegetation (%)
<b>Dandaragan Plateau</b>	
MOGUMBER COMPLEX – SOUTH: Open woodland of <i>Eucalyptus calophylla</i> , with some admixture of <i>E. marginata</i> and a second storey of <i>E. tottiana</i> – <i>Banksia attenuata</i> – <i>B. menziesii</i> – <i>B. illicifolia</i> .	40
<b>Gingin Scarp</b>	
REAGAN COMPLEX: Vegetation ranges from low open woodland of <i>Banksia</i> species – <i>Eucalyptus tottiana</i> to closed heath depending on the depth of soil	24

**Table 4.1:** Floristic community types identified on the Dandaragan Plateau (after Gibson et al. 1994 and DEP 1996)

## Key

### Column 1: Floristic Community Type Codes

The numbers of the types additional to Gibson et al. (1994) are italicised if they are subsets of an existing group (in types 19, 20, 23 and 30) and italicised and preceded by 'S' if they are supplementary groups.

### Column 2: General Description of Floristic Community Types

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgeland and herblands after Gibson et al. (1994).

### Column 3: Average Species Richness per Floristic Community Type

Average species richness per 10x10m plot less those species only occurring in a single plot. Some community types may have a high proportion of single records. Thus these estimates of average species richness are underestimates in some cases.

<b>Supergroup 1 – Foothills/Pinjarra Plain</b>		
S8	<i>Eucalyptus wandoo</i> Woodlands (Scarp)	44.0
<b>Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau</b>		
S9	<i>Banksia attenuata</i> woodlands over dense low shrublands	38.9
S10	<i>Calothamnus sanguineus</i> dense low shrublands on sandy laterites	44.2
S18	<i>Eucalyptus marginata</i> / <i>E. calophylla</i> woodlands on laterites	35.7





**Table 6.1:** Significant flora of the Dandaragan Plateau in the Perth Metropolitan Region

**Key**

**Column 1: Taxon**

Names follow Gibson *et al.* (1994) and Atkins (1999) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. An 'ms' after the name indicates that this is a manuscript name which is yet to be published.

**Column 2: Major landform element in which the taxon is most likely to be found in the Perth Metropolitan Region**

- DS = Darling Scarp
- D = Dandaragan Plateau
- F = Foothills
- P = Pinjarra Plain
- B = Bassendean Dunes
- S = Spearwood Dunes
- Q = Quindalup Dunes
- R = Estuaries, Rivers and Creeks
- (ML) = Muchea Limestones
- (TL) = Tamala Limestones

**Column 3: Taxa dependent on seasonal ponding, waterlogging or inundation**

- W = depends on waterlogging or inundation
- W (aquatic) = depends on standing water

**Column 4: Conservation status (Atkins 1999)**

- R = Declared Rare Flora
- 1 = Priority 1: Poorly Known Taxa
- 2 = Priority 2: Poorly Known Taxa
- 3 = Priority 3: Poorly Known Taxa
- 4 = Priority 4: Rare Taxa

**Column 5: Geographical variation**

- r = populations at the northern or southern limit of their known geographic range
- d = populations disjunct from their known geographic range
- p = considered to be poorly reserved (applies to all Declared Rare Flora and Priority taxa)
- s = significant populations (applies to all Declared Rare Flora and Priority taxa)
- X = considered lost in the Perth Metropolitan Region

**Regional ecological preferences**

- e = taxa endemic to the Swan Coastal Plain
- E = taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region

**Column 6: Species listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (see Part A, Section 3.7.5)**

- EN = Species that are endangered
- VU = Species that are vulnerable
- TD = Species that are extinct

Taxon	Major landform element	Wetland taxa	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Acacia anomala</i>	DS/D		R	p, s	VU
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	D		3	p, s	
<i>Astroloma macrocalyx</i>	D/F/S			s, p	
<i>Banksia micrantha</i>	D		3	p, s, d	
<i>Baeckea</i> sp. Darling Range (= sp. Chittering) (R. Cranfield 1673)	D		1	p, s	
<i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>	DS/F		4	p, s	
<i>Conostephium minus</i>	D/F/B		4	p, s, e	
<i>Eucalyptus lanepooliei</i>	D/F			p	
<i>Hakea</i> aff. <i>lasiantha</i> (= sp. Walyunga) (L. Pen sn)	D/F			r, p, s	
<i>Lambertia multiflora</i> var. <i>darlingensis</i>	DS/F		3	p, s	
<i>Lomandra spartea</i>	DS/F			r, s	
<i>Patersonia babianooides</i>	DS/F			s	
<i>Verticordia serrata</i> subsp. <i>linearis</i>	D		3	p, s	
<i>Xanthorrhoea acanthostachya</i>	DS/D/F			s	
<i>Xanthorrhoea drummondii</i>	DS/D/F			s	



**DANDARAGAN PLATEAU**

**2.1.2 DESCRIPTIONS**

**KEY**

**Column 1 Bush Forever Site Number**

Sites listed from north to south within the PMR.

**Column 2 Bush Forever Site(s) Name**

**Column 3 Page Number**

Refers to the page number of the Bush Forever Site description in Volume 2.

**Column 4 Bush Forever Map Number**

Refers to the number of the Bush Forever Site map in Volume 1.

**Column 5 System 6**

Refers to the System 6 Recommendation number where applicable.

Site No.	Site(s) Name	Page No.	Map No.	System 6
79	Polinelli Road Bushland, Bullsbrook	100	18	
80	Jenkins Road North Bushland, Bullsbrook	100	18	
82				
87S				
87N	Morley Road Bushland, Bullsbrook	101	18	
291	Jenkins Road South Bushland, Bullsbrook	102	18, 25	
86	Burley Park and Adjacent Bushland, Bullsbrook	103	25	



## POLINELLI ROAD BUSHLAND, BULLSBROOK

**Boundary Definition:** bushland (part taken to cadastre) boundary (PMR boundary to north)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 79

**Area (ha):** bushland 45.5

**Map no.** 18

**Map sheet series ref. no.** 2134-IV NW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

**Dandaragan Plateau/Gingin Scarp**

Laterite (Ql: G2, LA1)

#### Foothills

Colluvial Sand (Qs: S6)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Plateaus

Mogumber Complex — South (Dandaragan Plateau)

###### Scarps

Reagan Complex (Dandaragan Plateau)

**Floristic Community Types:** not sampled, types not inferred

#### WETLANDS

**Wetland Types:** creek

**Natural Wetland Groups** (undefined areas included in boundary)

##### Dandaragan Plateau

Red Gully (Dp.1)

**Wetland Management Objectives:** Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** creek, vegetated uplands

**Vegetation and Flora:** not field-surveyed (aerial photography interpretation only)

##### Structural Units

Uplands: *Eucalyptus accedens* or *E. wandoo* Woodland; *Eucalyptus marginata* Woodland to Open Forest

Wetlands: not known

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to north outside PMR; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities

**Recommendation:** Part A: Basic Raw Materials Negotiated Planning Solution; Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

## JENKINS ROAD NORTH BUSHLAND, BULLSBROOK

**Boundary Definition:** bushland (part taken to cadastre)/vegetation complex (east Site 87 southern portion) boundary (PMR boundary to north Site 80) with unmapped bushland connection between Sites 80, 82 and 87 southern portion (Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland.)





**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 80, 82, 87 southern portion  
**Area (ha):** bushland 92.5  
**Map no.** 18  
**Map sheet series ref. no.** 2134–IV NW  
**Other Names:** not known  
**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Dandaragan Plateau/Gingin Scarp**

Colluvial Sand (Qs: S6)

Laterite (Ql: G2, LA1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Plateaus**

Mogumber Complex — South (Dandaragan Plateau)

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*S9 *Banksia attenuata* woodlands over dense low shrublands

\*S10 *Calothamnus sanguineus* dense low shrublands on sandy laterites

\*S18 *Eucalyptus marginata*/*E. calophylla* woodlands on laterites

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** north—south ridge with view west to Swan Coastal Plain, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, surveyed from roadside)

**Structural Units**

Uplands: *Eucalyptus marginata* subsp. *thalassica* Woodland to Open Woodland; *Eucalyptus calophylla* Woodland; *Eucalyptus calophylla* and *E. marginata* subsp. *thalassica* over *Banksia menziesii* and *B. attenuata* Low Woodland; *Dryandra sessilis* var. *sessilis* Closed Scrub; Open Low Heath (sometimes with overstorey) dominated by *Lambertia multiflora* var. *darlingensis*, *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Scholtzia involucrata*

**Vegetation Condition:** >90% Pristine to Excellent, <10% Good to Degraded, with areas of severe localised disturbance associated with tracks

**Total Flora:** not known but variety of communities associated with species-rich shrublands

**Significant Flora:** *Lambertia multiflora* var. *darlingensis* (3), *Adenanthos cygnorum* subsp. *chamaephyton* (3), *Banksia micrantha* (3), *Verticordia serrata* subsp. *linearis* (3); adjacent populations of *Adenanthos cygnorum* subsp. *chamaephyton* and *Adenanthos cygnorum* subsp. *cygnorum*

**Fauna:** not known

**Linkage:** adjacent bushland to the east and then north outside the PMR (to Site 87 northern portion) and south (Site 291); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity

**Recommendation:**

**Site 80** Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1)

**Site 82** Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1)

**Site 87** Part A: Basic Raw Materials Negotiated Planning Solution; Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**MORLEY ROAD BUSHLAND, BULLSBROOK**

**Boundary Definition:** bushland/vegetation complex boundary (PMR boundary to north)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 87 northern portion      **Area (ha):** bushland 22.9  
**Map no.** 18      **Map sheet series ref. no.** 2134–IV NW  
**Other Names:** not known  
**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Dandaragan Plateau/Gingin Scarp

Colluvial Sand (Qs: S6)

Laterite (Ql: G2, LA1)

Quartz Mica-schist (Alb: Cm1)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Plateaus

Mogumber Complex — South (Dandaragan Plateau)

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 1: Foothills/Pinjarra Plain

\*S8 *Eucalyptus wandoo* woodlands (Scarp)

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*S9 *Banksia attenuata* woodlands over dense low shrublands

\*S10 *Calothamnus sanguineus* dense low shrublands on sandy laterites

\*S18 *Eucalyptus marginata*/*E. calophylla* woodlands on laterites

### WETLANDS

No wetlands mapped

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, surveyed from roadside)

#### Structural Units

Uplands: *Eucalyptus accedens* Woodland; *Eucalyptus marginata* subsp. *thalassica* Woodland to Open Forest over Open Low Heath (sometimes with overstorey) dominated by *Lambertia multiflora* var. *darlingensis*, *Xanthorrhoea acanthostachya*, *Kingia australis*

**Vegetation Condition:** >90% Pristine to Excellent, <10% Good to Degraded, with areas of severe localised disturbance associated with tracks

**Total Flora:** not known but variety of communities associated with species-rich shrublands

**Significant Flora:** *Stylidium carlquistii* (1), *Lambertia multiflora* var. *darlingensis* (3), *Banksia micrantha* (3); *Macropidia fuliginosa* (most southern population), *Xanthorrhoea acanthostachya*

**Fauna:** not known

**Linkage:** adjacent bushland to the east and then south outside the PMR (to Site 87 southern portion); part of fragmented and contiguous bushland/wetland linkage (Part A, Map 7)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity

**Recommendation:** Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1).

## JENKINS ROAD SOUTH BUSHLAND, BULLSBROOK

**Boundary Definition:** management/bushland (part taken to cadastre)/bushland group boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 291

**Area (ha):** bushland 320.6

**Map no.** 18, 25

**Map sheet series ref. no.** 2134-IV NW, 2134-IV SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Dandaragan Plateau/Gingin Scarp

Laterite (Ql: G2, LA1)

##### Foothills

Colluvial Sand (Qs: S6)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Plateaus**

Mogumber Complex — South (Dandaragan Plateau)

**Scarps**

Reagan Complex (Gingin Scarp, Dandaragan Plateau)

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*S8 *Eucalyptus wandoo* woodlands (Scarp)

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*S9 *Banksia attenuata* woodlands over dense low shrublands

\*S10 *Calothamnus sanguineus* dense low shrublands on sandy laterites

\*S18 *Eucalyptus marginata*/*E. calophylla* woodlands on laterites

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, surveyed from roadside; part Site -- DEP 1999)

**Structural Units**

Uplands: *Eucalyptus accedens* Woodland; *Eucalyptus marginata* subsp. *thalassica* Woodland to Open Forest over Open Low Heath dominated by *Lambertia multiflora* var. *darlingensis*, *Xanthorrhoea acanthostachya*, *Kingia australia*, patches of these heaths without overstorey; *Banksia menziesii* and *B. attenuata* Low Woodland with scattered *Eucalyptus calophylla* and/or *E. marginata* subsp. *thalassica*; *E. wandoo* and/or *E. accedens* Woodland over mixed Closed Low Heath

**Vegetation Condition:** >80% Pristine to Excellent, <20% Very Good to Good, with areas of severe localised disturbance associated with tracks and cleared patches

**Total Flora:** not known but variety of communities associated with species-rich shrublands

**Significant Flora:** *Acacia anomala* (R); *Baeckea* sp. Chittering (RJ Cranfield 1983) (1), *Lambertia multiflora* var. *darlingensis* (3); *Isopogon attenuatus*, *Xanthorrhoea acanthostachya*

**Fauna:** not known

**Linkage:** adjacent native vegetation (condition does not warrant inclusion in the Site) to the north (Site 87 southern portion); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity

**Recommendation:** Part A: Other Government Land Mechanism. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**BURLEY PARK AND ADJACENT BUSHLAND, BULLSBROOK**

**Boundary Definition:** bushland (part taken to cadastre)/vegetation complex boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 86

**Area (ha):** bushland: 65.2

**Map no.** 25

**Map sheet series ref. no.** 2134-IV SW

**Other Names:** Pearce 6; Submission Area 314; Location 105 (Keighery, BJ and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Dandaragan Plateau/Gingin Scarp**

Laterite (Ql: G2)

**Foothills**

Colluvial Sand (Qs: S6)

Leederville Formation (Klb: ST1)





## VEGETATION AND FLORA

### Vegetation Complexes

#### Plateaus

Mogumber Complex — South (Dandaragan Plateau, most southern occurrence)

#### Scarps

Reagan Complex (Dandaragan Plateau, one of two most southern occurrences)

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 1: Foothills/Pinjarra Plain

\*S8 *Eucalyptus wandoo* woodlands (Scarp)

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*S9 *Banksia attenuata* woodlands over dense low shrublands

\*S18 *Eucalyptus marginata*/*E. calophylla* woodlands on laterites

#### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands (eastern representation of this community type)

## WETLANDS

**Wetland Types:** creek

**Natural Wetland Groups** (undefined areas included in boundary)

#### Darling Plateau

Walyunga (D.1)

**Wetland Management Objectives:** Conservation (DEP 1999)

**Swan Coastal Plain Lakes EPP:** none identified

## THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** very steep quartzite bluff and sand patches adjacent to a creek (small area within boundary)

**Vegetation and Flora:** limited survey (DEP 1999, Keighery, BJ, and Trudgen 1992, Stephens 1998)

**Structural Units:** mapping (Keighery, BJ and Trudgen 1992)

Uplands: *Eucalyptus accedens* and *E. wandoo* Woodland; *Eucalyptus accedens*, *E. calophylla* and *E. marginata* Open Forest to Woodland; *Allocasuarina humilis* and *Calytrix angulata* Open Heath; *Eucalyptus calophylla* and *E. marginata* Low Woodland to Low Open Forest; *Eucalyptus marginata* and *E. accedens* Woodland

Wetlands: *Eucalyptus rudis* and *E. calophylla* Woodland to Open Forest

**Scattered Native Plants:** adjacent canopy connection to Ki-it Monger Brook outside Site

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 170 native taxa, 10 weeds (estimated >60% expected flora) (DEP 1999, Keighery, BJ, and Trudgen 1992, Stephens 1998)

**Significant Flora:** *Acacia anomala* (R), *Lambertia multiflora* var. *darlingensis* (3); *Brachysema praemorsa* (disjunct, unusual form), *Astroloma macrocalyx*, *Hakea* aff. *lasiantha* (L. Pen s.n.), *Gastrolobium spinosum* (typically a Darling Scarp species)

**Fauna:** not known

**Linkage:** no adjacent bushland; part of fragmented and contiguous bushland/wetland linkages (Part A, Map 7)

**Other Special Attributes:** the creek is completely vegetated and apparently free of weeds, no other similar creek has been observed (DEP 1999); part of the Bullsbrook Bushland area recommended for inclusion in a regional park (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Other Government Land Mechanism. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).



# Part B

## 2.2 FOOTHILLS AND PINJARRA PLAIN (Eastern Side of the Swan Coastal Plain)

### 2.2.1 INTRODUCTION

#### Location, Landscape and Soils

The Foothills and the Pinjarra Plain lie on the east of the Swan Coastal Plain and are often collectively referred to as the 'eastern side of the Swan Coastal Plain', sharing similar soils and plant communities.

The Dandaragan Plateau is also included in the eastern side of the Plain by some studies (Keighery, Bj, and Trudgen 1992) but for the purposes of the Project it is grouped separately.

The gentle slopes of the foothills are predominantly light grey colluvial quartz sands, clays and silts with intrusions of gravel which may be at the surface or at depth (Tables 1.2a&b). Creeklines are characterised by clays and sandy clays.

The Pinjarra Plain is a flat plain that rises gently to the east to meet the Foothills. The alluvial soils of the Pinjarra Plain are predominantly clays and silts (Tables 1.2a&b). In places, low dunes of aeolian sands from the west or colluvial sands from the east may overlay the alluvial soils. In areas of the Pinjarra Plain deposits of ironstones (bog iron ore) and limestones (Muchea Limestones) have formed. At times the different soils and the ironstones and limestones interleave. The interleaving of layers, of very different permeability, contributes to complex drainage patterns that are often not apparent at the surface (Table 2.2). The other major factor contributing to the complexity of the patterns of seasonal inundation and waterlogging is extensive surface water run-off from the Darling Plateau as most of the creeks entering the flat Pinjarra Plain form ill-defined channels on the Plain. Before the extensive drainage system was instigated early this century most of the Pinjarra Plain would have been a vast seasonal wetland extending between the Foothills and the Bassendean Dunes.

#### Remnant Bushland on the Eastern Side of the Plain

The eastern side of the Plain is characterised by high levels of clearing as the relatively fertile soils of the area have been selectively cleared for agriculture. In 1990 the Department of

Conservation and Land Management estimated that the eastern side of the Swan Coastal Plain was 97 per cent cleared of vegetation. In the same year, JS Beard estimated that there was 'no virgin vegetation left' on the eastern side of the Swan Coastal Plain. The level of clearing on the eastern side of the Plain was greater than that on the Wheatbelt which was considered to be 93 per cent cleared (Beard 1990).

More recent mapping for the Perth Metropolitan Region indicates that between one per cent and 18 per cent of the vegetation complexes associated with the eastern side of the Plain remain as native vegetation (Table 3.2).

#### Plant Communities and their Conservation on the Eastern Side of the Plain

At the regional level ten vegetation complexes (Table 3.2) are associated with the eastern side of the Plain in the Perth Metropolitan Region. Two of these complexes are associated with the Foothills and the other six with the Pinjarra Plain.

The boundaries of the vegetation complexes associated with the Foothills and the Pinjarra Plain can be used to delineate the majority of the area of the eastern side of the Plain (Table 3.2 and Volume 1, Map 1). While the Southern River contains pockets of alluvial and colluvial soils which support plant communities characteristic of the eastern side of the Plain, the majority of the area of this complex supports communities associated with the Bassendean Dunes. This is to be expected as the Southern River Complex is characterised by being in the transition between the Pinjarra Plain and the Bassendean Dunes. Sites in the Southern River Complex are described under Section 2.3 — Bassendean Dunes. The Cannington Complex is also associated with the transition between the Pinjarra Plain and other major landform units but is grouped here as the vegetation remaining on the Cannington Complex is more closely allied with the communities of the Pinjarra Plain.

Twenty-two floristic community types (Table 4.2 — 13 wetland types and nine upland types) are the principal regional floristic groups identified on the eastern side of the Plain in the Perth Metropolitan Region.





Thirteen of the floristic community types associated with the eastern side of the Plain (Table 4.2) are considered to be threatened ecological communities (Table 5.2). Two other communities are also identified as threatened ecological communities, namely plant communities associated with Muchea Limestones and a faunal wetland ecological community. The wetland community is associated with tumulus springs.

A complex suite of vegetation associations has been identified on the eastern side of the Plain in response to changes in topography and soils, both surface and subsurface (Keighery, GJ, and Keighery 1991, 1993a, Keighery, BJ, and Trudgen 1992, Gibson *et al.* 1994, Trudgen and Keighery 1995, Keighery, BJ 1996c, Keighery, BJ, *et al.* 1997a). The main associations are listed below.

### Uplands

The uplands are associated with woodlands to open forests over a very diverse understorey, some communities having the highest species diversity on the Plain (Table 4.2). The broad units and associated dominant species are:

#### Open Forests and Woodlands

Eucalypts — *Eucalyptus calophylla*, *E. wandoo*, *E. marginata*, *E. lanepoolei*, *E. haematoxylon*  
Sheoaks — *Allocasuarina fraseriana*  
Banksias — *Banksia attenuata*, *B. menziesii*, *B. prionotes*, *B. ilicifolia*, *B. grandis*  
Others — *Acacia saligna*

#### Shrublands

*Jacksonia densiflora*, *Bossiaea eriocarpa*, *Daviesia triflora*, *D. nudiflora*, *D. physodes*, *Dryandra lindleyana* subsp. *lindleyana*, *Scaevola repens*, *Conostephium pendulum*, *Philothea spicatus*, *Gompholobium tomentosum*, *Hibbertia hypericoides*, *H. huegelii*, *Xanthorrhoea preissii*, *X. acanthostachya*, *Kingia australis*, *Acacia willdenowiana*, *A. sessilis*, *A. pulchella*

#### Herblands

*Lomandra* species, *Conostylis aurea*, *C. setigera*, *Patersonia occidentalis*, *Dampiera linearis*, *Burchardia congesta*, *Haemodorum laxum*, *Drosera* species, *Stylidium piliferum*

### Sedgeland

*Mesomelaena tetragona*, *M. pseudostygia*, *Tetraria octandra*, *Alexgeorgea nitens*, *Cyathochaeta clandestina*, *C. avenacea*, *Desmocladus flexuosus*

### Grasslands

*Austrodanthonia occidentalis*, *Neurachne alopecuroidea*, *Amphipogon turbinatus*

### Wetlands

The wetlands are associated with a variety of shrublands, herblands and sedgelands and, less commonly, forests. Some of the wetland communities have the highest wetland species diversity on the Plain (Table 4.2). These broad units and associated dominant species are:

#### Forests and Woodlands

Eucalypts — *Eucalyptus calophylla*, *E. rudis*  
Sheoaks — *Casuarina obesa*  
Melaleucas — *Melaleuca preissiana*, *M. raphiophylla*

#### Shrublands

*Actinostrobos pyramidalis*, *Viminaria juncea*, *Melaleuca raphiophylla* (shrub form), *M. uncinata*, *M. teretifolia*, *M. viminea*, *M. lateritia* (and *M. huegelii* on Muchea Limestones) *Astartea* aff. *fascicularis*, *Hypocalymma angustifolium*, *Dryandra lindleyana* subsp. *lindleyana*, *Grevillea thelemanniana*, *Hakea varia*, *H. sulcata*, *Calytrix aurea*, *Verticordia densiflora*, *Pericalymma ellipticum*, *Halosarcia indica*, *Sarcocornia quinqueflora*, *Xanthorrhoea preissii*, *Kingia australis*, *Acacia lasiocarpa* var. *bracteolata*

#### Herblands

*Borya* species, *Burchardia multiflora*, *Lomandra* species, *Patersonia occidentalis*, *Drosera* species, *Stylidium utricularioides*, *S. longitubum*, *S. calcaratum*, *Polypompholyx multifida*

#### Sedgeland

*Schoenus rigens*, *Mesomelaena tetragona*, *Cyathochaeta avenacea*, *Meeboldinia cana*, *M. aristatus*, *M. coangustata*, a variety of annual sedges including *Centrolepis aristatus*

#### Grasslands

*Neurachne alopecuroidea*



# Part B

These woodland and wetland communities are typified by large numbers of significant taxa (113 in Table 6.2). In the Perth Metropolitan Region these include 15 endemic taxa, 17 Declared Rare Flora and 53 Priority Flora. The communities of the eastern side of the Plain have the highest levels of species endemism on the Plain (Keighery, GJ, and Keighery 1991, 1993a, Keighery, BJ, and Trudgen 1992, Gibson *et al.* 1994, Keighery, BJ, 1996c, Keighery, BJ, *et al.* 1997) and some of the highest levels of species diversity. Many of the significant taxa (69 of the 113) and most of the endemic taxa (12 of the 15) are associated with species-rich wetland communities.

Communities of the eastern side of the Swan Coastal Plain are also typified by the presence of many taxa also associated with the Darling Scarp and Plateau such as *Hakea trifurcata*, *Grevillea bipinnatifida*, *G. wilsonii*, *Trymalium ledifolium*, *Diplopeltis huegelii*, *Eucalyptus lanepolei* and *E. wandoo*. Some of these taxa, or closely related taxa, are also found on the shallow sands over outcropping Tamala Limestone. These include *Hakea trifurcata*, *Trymalium ledifolium* and *Diplopeltis huegelii*. Other taxa characteristic of the plant communities of the eastern side of the Swan Coastal Plain are also found associated with the Spearwood Dunes. The communities associated with Muchea Limestones are typified by taxa normally found in the Spearwood Dunes such as *Melaleuca huegelii*, *Eucalyptus decipiens*, *Stipa flavescens* and *Ithyanotus arenarius* (Keighery, GJ, and Keighery 1995). At times these are represented by closely related species rather than the same taxon such as *Grevillea thelemanniana* from wetlands on the Pinjarra Plain and *Grevillea preissii* from the Tamala Limestones.

In consideration of the diversity and complexity of the plant communities of the eastern side of the Plain, and the high levels of clearing, the two most recent regional studies of the Plain (Keighery, BJ, and Trudgen 1992 and Gibson *et al.* 1994) both made direct recommendations concerning the high conservation value of all remnants on the eastern side of the Plain, regardless of the size of the remnant. Following these two studies and further evidence supporting the significance of remaining

areas of bushland on the eastern side of the Plain, the Environmental Protection Authority recognised a number of bushland areas on the Swan Coastal Plain as being 'Threatened or Poorly Reserved Plant Communities' in need of interim protection, under the System 6 Part System 1 Update (EPA 1994 GIS). While several of these areas were on geomorphic elements on the west of the Plain (see Section 2.4) the majority were from the eastern side of the Swan Coastal Plain.

As a consequence of the increasing evidence for the conservation significance of the plant communities of the eastern side of the Plain and the high level of clearing, Bush Forever has determined that remnant bushland on the eastern side of the Plain is in need of urgent recognition and protection. This need for recognition is encompassed in a specific policy statement in Volume 1 (see Policy Statement, Volume 1).





**Table 1.2a:** Geological and geomorphological systems of the Foothills and Pinjarra Plain.

The general terms used in Bush Forever for describing the major landform elements are in **bold italics**.

Major Geological Systems (after Playford et al. 1976)	Major Geomorphological Systems (after McArthur and Bettenay 1960)	Detailed Geomorphological Units (after Churchward and McArthur 1980)
Foothills	Ridge Hill Shelf, the <b>Foothills</b> of the Darling and Dandaragan plateaus	Forrestfield (on foothills of the Darling Plateau) Coonambidgee (on foothills of the Dandaragan Plateau)
Guildford Formation	<b>Pinjarra Plain</b>	Guildford Beermullah Yanga Cannington Serpentine Swan Dardanup Cannington# Vasse#
Wetlands (within the Guildford Formation)	Not applicable	Herdsmen

# Combined here under Pinjarra Plain for major landform elements, see Part A, Tables 1 and 2

**Table 1.2b:** Landform and soils of the Foothills and Pinjarra Plain showing the relationship between geomorphological units, units identified in the Environmental Geology Maps and soils described on these maps on the Swan Coastal Plain in the Perth Metropolitan Region. Column One may be used to cross-reference to groups shown in Table 1a.

Major Geomorphological Systems (after McArthur and Bettenay 1960); *Detailed Geomorphological Units (after Churchward and McArthur 1980)	Major Units in the Environmental Geology Maps (after various authors)	Soils associated with each unit
Foothills: *Forrestfield, on foothills of the Darling Plateau; Coonambidgee (on foothills of the Dandaragan Plateau)	Colluvial deposits Colluvial sand Yoganup Formation Ridge Hill Sandstone Armadales Shales	quartz sands with differing amounts of silt, gravel and clay; light grey quartz sands and white quartz sands
Pinjarra Plain: *Guildford, Beermullah, Yanga, Serpentine, Swan, Dardanup. #Cannington, #Vasse	Guildford Formation Alluvial/colluvial deposit Alluvial/colluvial deposit (Pinjarra Plain over Ridge Hill)	clays with silts, sands and peat; also areas of ironstone at depth or surface associated with red-brown silts, and limestones associated with clays and orange sands
Wetlands – within the Pinjarra Plain, Bassendean Dunes, Spearwood Dunes, Quindalup Dunes: *Herdsmen	Holocene swamp deposits	peats associated with clays, sands and silts in various proportions

# Combined here under Pinjarra Plain for major landform elements, see Part A, Tables 1 and 2



# Part B

**Table 2.2: Natural Wetland Groups (Consanguineous Suites) on the Foothills and Pinjarra Plain**  
(after Semeniuk 1996)

Name & locations	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Keysbrook suite</b> (P1) Alluvial fans along the foothills of the Darling Scarp occurring south of Forrestfield Lake & continuing as far south as Brunswick Junction	Alluvial fans & creeks of the Pinjarra Plain – gently undulating plain dissected by channels	Palusplains, floodplains, creeks	Clay overlying lateritic clay & sand	Sediment discharge to develop alluvial fans; groundwater seepage & surface runoff from the plateau; & ponding of precipitation
<b>Ellen Brook suite</b> (R3) Ellen Brook area	Pinjarra Plain	Creek, floodplain river	Clays & sandy clays overlying laterite & sandstones	Fluvial incision; sedimentation; surface runoff
<b>Bassendean – Pinjarra transition OR Bassendean with fluvial features</b>				
<b>Mungala suite</b> (B/P2) Perth Airport surrounds including Wright Lake	Transition between Bassendean Dunes & Pinjarra Plain. Underlying stratigraphy is a complex of sands, clays, calcrete & laterite. Wetlands lie along depressions at the distributary ends of the creeks or adjacent to intermittent disconnected drainage channels	Lakes, sumplands, floodplains & creeks	Variable: clays to clay overlying quartz; sand to quartz sand overlying laterite or calcrete	Alluvial fan distributaries of creeks terminate in wetlands already present in Bassendean sandplain, bringing water & sediment
<b>Muchea suite</b> (B/P3) 1. Western margin of Whitfield Brook e.g. Six Mile Swamp 2. Western margin of Ellen Brook	Complex transition between Bassendean Dunes & Pinjarra Plain. Wetlands lie along the depressions at the base of Bassendean Dunes & at the headwaters of the tributaries of creeks	Sumplands & floodplains	Complex & variable pattern of quartz sand, clays, laterite & calcrete	Discharge of groundwater into basins, flats & creeks. Ponding of rainwater & groundwater occurs over impermeable sediments
<b>Bennett Brook suite</b> (B/P4) 1. Ballajura: In Bennett Brook area west of West Swan 2. Balannup: In Southern River area north of Forrestdale Lake 3. Yangedi: In Serpentine River area west of Serpentine township	Bassendean Dune – with microscale creeks	Sumplands creeks palusplains floodplains	Quartz sands, or clay overlying quartz sand	Depressions which intersect the water table. Precipitation is ponded by clay lenses in the sub-surface. Palusplains are situated between tributaries





**Table 3.2:** Vegetation complexes (Hedde *et al.* 1980) and percentage remaining as native vegetation (AGWEST 1998 GIS) on the Foothills and Pinjarra Plain in the Perth Metropolitan Region

Vegetation Complex	Native Vegetation (%)
<b>Foothills (Ridge Hill Shelf)</b>	
COONAMBIDGEE COMPLEX: Vegetation ranges from a low open forest and low woodland of <i>Eucalyptus tottiana</i> – <i>Banksia attenuata</i> – <i>B. menziesii</i> – <i>B. ilicifolia</i> with localised admixtures of <i>B. prionotes</i> to an open woodland of <i>E. calophylla</i> – <i>Banksia</i> species	7
FORRESTFIELD COMPLEX: Vegetation ranges from open forest of <i>Eucalyptus calophylla</i> – <i>E. wandoo</i> – <i>E. marginata</i> to open forest of <i>E. marginata</i> – <i>E. calophylla</i> – <i>Allocasuarina fraseriana</i> – <i>Banksia</i> species. Fringing woodland of <i>E. rudis</i> in the gullies that dissect this landform.	9
<b>Pinjarra Plain</b>	
GUILDFORD COMPLEX: A mixture of open forest to tall open forest of <i>Eucalyptus calophylla</i> – <i>E. wandoo</i> – <i>E. marginata</i> and woodland of <i>E. wandoo</i> (with rare occurrences of <i>E. lane-pooliei</i> ). Minor components include <i>E. rudis</i> – <i>Melaleuca raphiophylla</i> .	6
SWAN COMPLEX: Fringing woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca raphiophylla</i> with localised occurrence of low open forest of <i>Casuarina obesa</i> and <i>M. cuticularis</i> .	11
DARDANUP COMPLEX: Mosaic of vegetation types characteristic of adjacent vegetation complexes such as Serpentine River, Southern River and Guildford.	15
SERPENTINE RIVER COMPLEX: Closed scrub of <i>Melaleuca</i> species and fringing woodland of <i>Eucalyptus rudis</i> – <i>M. raphiophylla</i> along streams.	9
BEERMULLAH COMPLEX: Mixture of low open forest of <i>Casuarina obesa</i> and open woodland of <i>Eucalyptus calophylla</i> – <i>E. wandoo</i> – <i>E. marginata</i> . Minor components include closed scrub of <i>Melaleuca</i> species and occurrence of <i>Actinostrobus pyramidalis</i> .	6
YANGA COMPLEX: Predominantly a closed scrub of <i>Melaleuca</i> species and low open forest of <i>Casuarina obesa</i> on the flats subject to inundation. On drier sites the vegetation reflects the adjacent vegetation complexes of Bassendean and Coonambidgee.	18
#CANNINGTON COMPLEX : Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.	1
#*VASSE COMPLEX : Mixture of the closed scrub of <i>Melaleuca</i> species fringing woodland of <i>E. rudis</i> – <i>Melaleuca</i> species and open forest of <i>E. gomphocephala</i> – <i>E. marginata</i> – <i>E. calophylla</i> .	1
# Combined here under Pinjarra Plain for major landform elements, see Part A, Table 5	
* Also included in Section 2.6 ESTUARIES, RIVERS AND CREEKS	



# Part B

**Table 4.2:** Floristic community types identified on the Foothills and Pinjarra Plain  
(after Gibson *et al.* 1994 and DEP 1996)

## Key

### Column 1: Floristic Community Type Codes

The numbers of the types additional to Gibson *et al.* are italicised if they are subsets of an existing group (in types 19, 20, 23 and 30) and italicised and preceded by 'S' if they are supplementary groups. '#' indicates uncommon on this landform.

### Column 2: General Description of Floristic Community Types

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgelands and herblands after Gibson *et al.* (1994).

### Column 3: Average Species Richness per Floristic Community Type

Average species richness per 10x10m plot less those species only occurring in a single plot. Some community types may have a high proportion of single records. Thus these estimates of average species richness are underestimates in some cases.

#### Supergroup 1 – Foothills/Pinjarra Plain

1a	<i>Eucalyptus haematoxylon</i> – <i>E. marginata</i> woodlands on Whicher foothills	66.2
2	Southern wet shrublands	50.3
3a	<i>Eucalyptus calophylla</i> – <i>Kingia australis</i> woodlands on heavy soils	58.2
3b	<i>Eucalyptus calophylla</i> – <i>E. marginata</i> woodlands on sandy clay soils	57.3
3c	<i>Eucalyptus calophylla</i> – <i>Xanthorrhoea preissii</i> woodlands and shrublands	47.7
#58	<i>Eucalyptus wandoo</i> woodlands (Scarp)	44.0

#### Supergroup 2 – Seasonal Wetlands

5	Mixed shrub damplands	38.4
7	Herb rich saline shrublands in clay pans	44.8
8	Herb rich shrublands in clay pans	50.8
9	Dense shrublands on clay flats	34.8
10a	Shrublands on dry clay flats	45.9
11	Wet forests and woodlands	28.0
13	Deeper wetlands on heavy soils	16.9
15	Forests and woodlands of deep seasonal wetlands	16.8
S2	Northern <i>Pericalymma ellipticum</i> dense low shrublands	17.7
S5	<i>Acacia saligna</i> wetlands	23.3
S6	Northern dense low shrublands	35.4
S7	Northern woodlands to forests over tall sedgelands alongside permanent wetlands	17.7

#### Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau

20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	64.5
20b	Eastern <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands	59.7
20c	Eastern shrublands and woodlands	60.4
21c	Low-lying <i>Banksia attenuata</i> woodlands or shrublands	38.5





**Table 5.2: Threatened Ecological Communities on the Foothills and Pinjarra Plain in the Perth Metropolitan Region** (after English and Blyth 1997 and Blyth pers. comm. 2000)

**Key**

- CR Critically Endangered
- EN Endangered
- VU Vulnerable
- + Listed as 'endangered' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (see Part A, Section 3.6.6)

**A. Floristic Community Types** (as identified in Gibson et al. 1994)

<b>Supergroup 1 – Foothills/Pinjarra Plain</b>		
2	Southern wet shrublands	EN
3a	<i>Eucalyptus calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils	CR+
3b	<i>Eucalyptus calophylla</i> - <i>Eucalyptus marginata</i> woodlands on sandy clay soils	VU
3c	<i>Eucalyptus calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands	CR+
<b>Supergroup 2 – Seasonal Wetlands</b>		
7	Herb rich saline shrublands in clay pans	VU
8	Herb rich shrublands in clay pans	VU
9	Dense shrublands on clay flats	VU
10a	Shrublands on dry clay flats	EN
15	Forests and woodlands of deep seasonal wetlands	VU
18	Shrublands on calcareous silts	VU
<b>Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau</b>		
20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	EN
20b	Eastern <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands	EN
20c	Eastern shrublands and woodlands	CR+
<b>B: Restricted floristic community type mosaics</b>		
	Shrublands and woodlands on Muchea Limestones (Keighery, GJ, and Keighery 1995)	EN+
<b>C: Freshwater communities</b>		
	Communities of Tumulus Springs (Jasinska and Knott 1994, Ahmat 1993)	CR+



# Part B



**Table 6.2:** Significant flora of the Foothills and Pinjarra Plain in the Perth Metropolitan Region

## Key

### Column 1: Taxon

Names follow Gibson *et al.* (1994) and Atkins (1999) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. An 'ms' after the name indicates that this is a manuscript name which is yet to be published.

### Column 2: Major landform element in which the taxon is most likely to be found in the Perth Metropolitan Region

DS	= Darling Scarp
D	= Dandaragan Plateau
F	= Foothills
P	= Pinjarra Plain
B	= Bassendean Dunes
S	= Spearwood Dunes
Q	= Quindalup Dunes
R	= Estuaries, Rivers and Creeks
(ML)	= Muchea Limestones
(TL)	= Tamala Limestones

### Column 3: Taxa dependent on seasonal ponding, waterlogging or inundation

W	= depends on waterlogging or inundation
W (aquatic)	= depends on standing water

### Column 4: Conservation status (Atkins 1999)

R	= Declared Rare Flora
1	= Priority 1: Poorly Known Taxa
2	= Priority 2: Poorly Known Taxa
3	= Priority 3: Poorly Known Taxa
4	= Priority 4: Rare Taxa

### Column 5: Geographical variation

r	= populations at the northern or southern limit of their known geographic range
d	= populations disjunct from their known geographic range
p	= considered to be poorly reserved (applies to all Declared Rare Flora and Priority taxa)
s	= significant populations (applies to all Declared Rare Flora and Priority taxa)
X	= considered lost in the Perth Metropolitan Region

### Regional ecological preferences

e	= taxa endemic to the Swan Coastal Plain
E	= taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region

### Column 6: Species listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (see Part A, Section 3.7.5)

EN	= Species that are endangered
VU	= Species that are vulnerable
TD	= Species that are extinct

Taxon	Major landform element	Wetland taxa	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Acacia benthamii</i>	P/S		2	p, s, E	
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> (long peduncle variant) (GJ Keighery 5026)	P		1	p, s, e	
<i>Actinodium cunninghamii</i>	F/P	W		X	
<i>Actinostrobos acuminatus</i>	F/P			p, d	
<i>Amperea protensa</i>	P	W	2	p, s	
<i>Andersonia gracilis</i>	P	W	R	p, s, d	EN
<i>Angianthus micropodioides</i>	P/B	W	3	p, s, d	
<i>Anthotium junciforme</i>	P/B	W	4	p, s	
<i>Aotus cordifolia</i>	P/B	W	3	p, s	
<i>Aponogeton hexatepalus</i>	P	W (aquatic)	4	p, s, e	
<i>Aristida ramosa</i>	F		1	p, s, d	
<i>Astroloma macrocalyx</i>	D/F/S			s, p	
<i>Baeckea tenuifolia</i>	P		3	p, s, d	





Table 6.2 (continued)

<i>Blancoa canescens</i>	F/P/B			d, p	
<i>Burchardia bairdiae</i>	P/B	W		r, s	
<i>Byblis lindleyana</i> (= <i>gigantea</i> )	P/B	W	2	d, p, r, E	
<i>Caesia micrantha</i> (Large swamp form) (Bj Keighery & N Gibson 094)	P	W		e	
<i>Caladenia huegelii</i>	P/B	W	R	p, s, e	EN
<i>Calandrinia</i> sp. Kenwick (= aff. <i>composita</i> ) (Gj Keighery 10905)	P	W	1	p, s, E	
<i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>	DS/F		4	p, s	
<i>Calytrix breviseta</i> subsp. <i>brevisetata</i>	P	W	R	p, s, E	EN
<i>Centrolepis caespitosa</i>	P	W	R	p, s	EN
<i>Chamaescilla gibsonii</i> ms (= sp. Ellen Brook and aff. <i>spiralis</i> ) (Gj Keighery 12501)	P	W	3	s, e	
<i>Comesperma rhadinocarpum</i>	P	W	2	p, s, d	
<i>Conospermum huegelii</i>	F/P			s	
<i>Conospermum incurvum</i>	F			r, s	
<i>Conospermum triplinervium</i>	P/B/S			s, p	
<i>Conospermum undulatum</i>	F		R	p, s, E	VU
<i>Conostephium minus</i>	D/F/B		4	p, s, e	
<i>Cyathochaeta teretifolia</i>	P/B	W	3	p, s	
<i>Cyathochaeta equitans</i> (= <i>clandestina</i> )	P/B/S			r, s	
<i>Cyclosorus interruptus</i>	P/R	W		s, d	
<i>Darwinia</i> sp. 'Muchea' (Bj Keighery 2006)	P	W		s, p	
<i>Dasyogon obliquifolius</i>	F/P			s, d	
<i>Dielsia stenostachyus</i>	P/B	W		e	
<i>Dillwynia dillwynioides</i>	P/B	W	3	p, s, e	
<i>Diuris drummondii</i>	P	W	R	p, s	VU
<i>Diuris purdiei</i>	P/B	W	R	p, s, e	
<i>Drakaea elastica</i>	P/B		R	p, s	
<i>Drosera bulbigena</i>	P	W		e	
<i>Drosera gigantea</i> subsp. <i>geniculata</i>	P/B	W		s	
<i>Drosera macrantha</i> (Swan Coastal Plain form) (Bj Keighery & N Gibson 228)	F/P			?e	
<i>Drosera occidentalis</i> subsp. <i>occidentalis</i>	P	W	4	p, s, e	
<i>Dryandra kippistiana</i>	F			d, r	
<i>Dryandra mimica</i>	F		R	p, s, e	VU
<i>Dysphania glomulifera</i> subsp. <i>glomulifera</i>	P	W		r, s	



# Part B

Table 6.2 (continued)

<i>Epaltes australis</i>	F/P	W		s, d	
<i>Eleocharis keigheryi</i> (= sp. Kenwick, GJ Keighery 5180)	P	W	R	p, s	VU
<i>Eremaea asterocarpa</i> subsp. <i>brachyclada</i>	F		l	p, s, e	
<i>Eremaea purpurea</i>	F			d, p	
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i> ms	P	W	2	p, s	
<i>Eryngium subdecumbens</i> ms	P	W	l	p, s	
<i>Eucalyptus lanepooliei</i>	D/F			p	
<i>Eucalyptus mundijongensis</i> (hybrid)	F/S		l	p, s	
<i>Glischrocaryon aureum</i>	F/B/S			p	
<i>Grevillea althoferorum</i>	F		R	p, s, d	EN
<i>Grevillea curviloba</i> subsp. <i>curviloba</i>	P (ML)	W	R	p, s, E	EN
<i>Grevillea evanescens</i>	P/S	W	l	p, s, e	
<i>Grevillea obtusifolia</i>	P	W		s, e	EN
<i>Grevillea thelemanniana</i>	P	W	4	p, s, E	
<i>Haemodorum brevisepalum</i>	P	W		p	
<i>Haemodorum loratum</i>	F		3	p, s, d	
<i>Hakea conchifolia</i>	F			s	
<i>Hakea myrtoides</i>	DS/F			p, s	
<i>Hakea</i> aff. <i>lasiantha</i> (= sp. Walyunga) (L. Pen sn)	D/F			r, p, s	
<i>Haloragis aculeolata</i>	P (ML)/ S (TL)		2	p, s, d	
<i>Haloragis cordiger</i>	P/B			s	
<i>Haloragis tenuifolia</i>	P	W	l	p, s	
<i>Hensmania turbinata</i>	P/B			r, s	
<i>Hibbertia perfoliata</i>	P/B	W		d	
<i>Hydatella dioica</i>	P	W <sub>(aquatic)</sub>	R	p, s, E	EN
<i>Hydrocotyle lemnoides</i>	P	W <sub>(aquatic)</sub>	4	p, s	
<i>Hydrocotyle striata</i>	P	W	l	X	
<i>Isopogon asper</i>	F/P			s	
<i>Isopogon drummondii</i>	F		3	p, s, d	
<i>Jacksonia gracilis</i> ms (= aff. <i>sericea</i> or swamp form)	P/B			e	
<i>Johnsonia pubescens</i> subsp. <i>cygnorum</i> (= aff. <i>pubescens</i> ) (GJ Keighery 5249)	F/P/B			s	
<i>Kennedia coccinea</i>	P/S/Q			s	
<i>Kunzea</i> aff. <i>recurva</i> (GJ Keighery 12828) (= <i>littoricola</i> ms)	P/B	W		e	





Table 6.2 (continued)

<i>Lambertia multiflora</i> var. <i>darlingensis</i>	DS/F		3	p, s	
<i>Laxmannia grandiflora</i>	F			s, d	
<i>Lechenaultia linarioides</i>	P (ML)/S/Q			p	
<i>Lepidosperma rostratum</i>	P	W	R	p, s, E	EN
<i>Leptocarpus</i> aff. <i>crebriculmis</i> (BJ Keighery & N Gibson 236)	P	W		S, ?E	
<i>Leptocarpus</i> sp. Forrestdale Lake (N Gibson & MN Lyons 1551)	P	W		s, ?E	
<i>Leucopogon oliganthus</i>	F			s	
<i>Levenhookia preissii</i>	P/B			p, s	
<i>Lomandra spartea</i>	DS/F			r, s	
<i>Lycopodium serpentum</i>	P/B	W		s, d	
<i>Macarthuria keigheryi</i>	F		R	p, s, d, e	EN
<i>Melaleuca brevifolia</i> (= <i>bracteosa</i> )	P	W		d, p	
<i>Melaleuca ryeae</i>	P	W		r, s	
<i>Melaleuca tuberculata</i> subsp. <i>tuberculata</i>	F	W		d	
<i>Myriocephalus appendiculatus</i>	P	W	3	p, s	
<i>Myriocephalus helichrysoides</i>	P	W		e	
<i>Myriophyllum echinatum</i>	P	W	3	X, e	
<i>Nemcia dilatata</i>	F			s	
<i>Olax scalariformis</i>	F/B		3	p, s, d	
<i>Patersonia babianoides</i>	DS/F			s	
<i>Phyllangium palustre</i>	P	W	2	X	
<i>Pimelea imbricata</i> var. <i>major</i>	P	W		s	
<i>Pithocarpa pulchella</i> var. <i>pulchella</i>	F			r, s	
<i>Pityrodia bartlingii</i>	F/P			s, d	
<i>Pityrodia uncinata</i>	P/B			r, s	
<i>Platysace juncea</i>	F/B			p	
<i>Platysace ramosissima</i>	F		3	p, s	
<i>Pteris vittata</i>	F/S	W		d	
<i>Rhodanthe pyrethrum</i>	P	W	3	p, s	
<i>Schoenus benthamii</i>	P	W	3	p, s	
<i>Schoenus capillifolius</i>	P	W (aquatic)	2	p, s	
<i>Schoenus pennisetis</i>	P	W	1	p, s	
<i>Schoenus</i> sp. Bullsbrook (JJ Alford 915)	P	W	2	p, s, E	
<i>Schoenus</i> sp. Waroona (GJ Keighery 12235)	P	W	3	p, s, e	
<i>Stachystemon axillaris</i>	F/P/B		4	p, s	



# Part B



Table 6.2 (continued)

<i>Stenanthemum humile</i>	F			d	
<i>Stylidium aceratum</i>	P	W	2	p, s, E	
<i>Stylidium crossocephalum</i>	F/B			r, s	
<i>Stylidium longitubum</i>	P	W	3	p, s	
<i>Stylidium mimeticum</i>	P/B	W	3	p, s	
<i>Stylidium preissii</i>	B			d, s	
<i>Stylidium roseo - alatum</i>	P	W		s, p	
<i>Stylidium utricularioides</i>	P	W		s	
<i>Synaphea acutiloba</i>	F/P		4	p, s, e	
<i>Synaphea pinnata</i>	F		3	p, s	
<i>Tetraria australiensis</i>	F/P		R	p, s, e	VU
<i>Thysanotus glaucus</i>	F/B		4	p, s	
<i>Trachymene coerulea</i>	P/S/Q			s	
<i>Trichocline</i> sp. Treeton (BJ Keighery and N Gibson 564)	P	W	2	s, p	
<i>Trichocline spathulata</i>	F/P			s	
<i>Tripterococcus paniculatus</i> (sp. Cannington, AS George 16201)	P/B		1	p, s, E	
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	P/B	W	4	p, s	
<i>Verticordia nitens</i>	F/B			s	
<i>Verticordia plumosa</i> var. <i>pleiobotrya</i>	P	W	R	p, s, E	EN
<i>Villarsia submersa</i>	P	W (aquatic)	4	p, s	
<i>Villarsia violifolia</i>	P/B	W (aquatic)		p, s	
<i>Xanthorrhoea acanthostachya</i>	DS/D/F			s	
<i>Xanthorrhoea drummondii</i>	DS/D/F			s	







## FOOTHILLS AND PINJARRA PLAIN

### 2.2.2 DESCRIPTIONS

#### KEY

**Column 1 Bush Forever Site Number**

Sites listed from north to south within the PMR.

**Column 2 Bush Forever Site(s) Name**

**Column 3 Page Number**

Refers to the page number of the Bush Forever Site description in Volume 2.

**Column 4 Bush Forever Map Number**

Refers to the number of the Bush Forever Site map in Volume 1.

**Column 5 System 6**

Refers to the System 6 Recommendation number where applicable.

Site No.	Site(s) Name	Page No.	Map No.	System 6
81	Wandena Road Bushland, Bullsbrook	121	17	
2	North East Ellen Brook Bushland, Bullsbrook	122	17, 24	
292	Bullsbrook Nature Reserve and Adjacent Bushland, Bullsbrook	123	24, 25	M14
100	Neaves Road Creek, Bullsbrook	125	24	
294	Pearce Aerodrome and Adjacent Bushland, Bullsbrook	126	24, 25	M15
89	Maroubra Avenue Bushland, Bullsbrook	127	24, 25	
88	Ashton Road Bushland, Bullsbrook	128	25	
298	Della Road South Bushland, Bullsbrook	129	30, 31	
13	Sawpit Road Bushland, Bullsbrook	130	31	
400	Twin Swamps Nature Reserve and Adjacent Bushland, Bullsbrook	131	31	M17
412	Walyunga Road Bushland, Bullsbrook	133	32	
301	Ellenbrook Nature Reserve and Adjacent Bushland, Upper Swan	134	32	M17
42	Toodyay Road Bushland, Red Hill	135	38	
306	Talbot Road Bushland, Stratton/Swan View	136	44	
309	Farrall Road Bushland, Stratton	137	44	
311	South Guildford Bushland, Hazelmere	138	43	
481	Stirling Crescent Bushland, Hazelmere	139	43	
213	Bushmead Bushland, Swan	140	43, 44, 50	M34
216	Adelaide Crescent Bushland, Helena Valley	142	44	
466	Gooseberry Hill Road Bushland, Gooseberry Hill	143	50	
122	Hawkevale Bushland, High Wycombe	144	43, 49	
217	Ridge Hill Road Bushland, Gooseberry Hill	145	50	
316	Maida Vale Reserve and Adjacent Bushland, Maida Vale	146	49, 50	
45	Poison Gully Bushland, High Wycombe	147	49	
123	Sultana Road West Bushland, High Wycombe	148	49	
319	Dundas Road Bushland, Forrestfield	149	49	M53
440	Pioneer Park Bushland, Forrestfield	150	49	M53
282	Tomah Road Bushland, Wattle Grove	151	49	
424	McDowell Street Bushland, Welshpool	152	48, 49	
283	Queens Park Bushland, Queens Park	153	48, 49	
456	Nicholson Road Bushland, Langford/Thornlie	155	54	
401	Bougainvillea Avenue Bushland, Forrestfield	156	49	
320	Hartfield Park Bushland, Forrestfield	157	49	
50	Welshpool Road Bushland, Wattle Grove	158	49	
387	Greater Brixton Street Wetlands, Kenwick	159	49, 55	M69





# Part B DESCRIPTIONS

Site No.	Site(s) Name	Page No.	Map No.	System 6
422	Kenwick Road Bushland, Kenwick	161	55	
51	White Road Bushland, Orange Grove	162	55	
53	Clifford Street Bushland, Maddington	163	55	
124	Mary Carroll Park and Adjacent Bushland, Gosnells	164	55	M76
61	Connell Avenue Bushland, Kelmscott	165	61	
62	Bob Blackburn Reserve Bushland, Armadale	166	61	
264	Lambert Lane Bushland, Wungong	167	67	
449	Oscar Bruns Reserve, Wungong	168	67	
65	Abernethy Road Bushland, Oakford	169	67	
350 365 375	Byford to Serpentine Rail/Road Reserves and Adjacent Bushland	170	67, 73, 78	
321	Brickwood Reserve and Adjacent Bushland, Byford	172	67	
271 351	Cardup Brook Bushland, Cardup/Peel Estate	174	67	
352	Cardup Nature Reserve and Adjacent Bushland, Cardup	175	67, 73	M83
354 361	Norman Road Bushland, Whitby/Cardup	177	73	
68	Jackson Road Bushland, Peel Estate	178	72	
362	Roman Road Bushland, Whitby	179	73	
360	Mundijong and Watkins Roads Bushland, Mundijong/Peel Estate	180	71, 72, 73	
71	Transit Road Bushland, Jarrahdale	182	73	
369	Doghill Road Bushland, Baldyvis	183	71, 76	
418	Folly Pool, Baldyvis	184	70, 71, 75	
419	Maramanup Pool, Baldyvis	185	76	
74	Rapids Road Bushland, Peel Estate	186	77	
277	River, Stakehill and Harvey Roads Bushland, Karnup	187	75, 76	
468	Serpentine National Park and Adjacent Bushland, Serpentine	188	78	
76	Kingsbury Drive Bushland, Keysbrook	189	83	M76
426	Myara Brook Bushland, Keysbrook	190	83	
78	Page Road Bushland, Keysbrook	191	83	





## WANDENA ROAD BUSHLAND, BULLSBROOK

**Boundary Definition:** bushland taken to cadastre boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 81

**Area (ha):** bushland 3.1

**Map no.** 17

**Map sheet series ref. no.** 2134-IV NW

**Other Names:** Location 112 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Foothills

Colluvial Deposits (Qc: S5)

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1) (Qa: Ms1)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Foothills

Coonambidgee Complex (Dandaragan Plateau, most southern occurrence)

###### Pinjarra Plain

Bermullah Complex (most northern occurrence)

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 1:** Foothills/Pinjarra Plain

**Supergroup 2:** Seasonal Wetlands

#### WETLANDS

**Wetland Types:** palusplain, creek

##### Natural Wetland Groups

###### Dandaragan Plateau

Red Gully (Dp.1)

###### Swan Coastal Plain Rivers

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (1.6ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992, Matiske Consulting Pty Ltd 1997)

##### Structural Units

Uplands: *Eucalyptus calophylla* Woodland

Wetlands: *Melaleuca preissiana* Low Open Forest

**Vegetation Condition:** Very Good

**Total Flora:** not known

**Significant Flora:** Matiske Consulting Pty Ltd 1997 — *Lambertia multiflora* (most likely *L. multiflora* var. *darlingensis* (3))

**Fauna:** not known

**Linkage:** no adjacent bushland; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).





## NORTH EAST ELLEN BROOK BUSHLAND, BULLSBROOK

**Boundary Definition:** management/bushland/conservation wetland boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 2

**Area (ha):** bushland 50.8

**Map no.** 17, 24

**Map sheet series ref. no.** 2034-I NE, 2134-IV NW

**Other Names:** Submission Area 279, Location 110 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

Fluvial Channel with Seasonal Flow (Qpa: S11)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Pinjarra Plain

Beermullah Complex (at northern limit)

Yanga Complex (in area of southern limit)

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

5 Mixed shrub damplands

\*11 Wet forests and woodlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands (eastern representation of this community type)

#### WETLANDS

**Wetland Types:** palusplain, creek

##### Natural Wetland Groups

###### Swan Coastal Plain Rivers

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (19.7ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, river (Ellen Brook), vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Mill 01), DEP 2000)

##### Structural Units

Uplands: *Banksia attenuata* and *Banksia menziesii* Low Woodland

Wetlands: *Eucalyptus rudis* Closed Forest; *Melaleuca raphiophylla* Low Forest; *Melaleuca* sp. B Open Low

Heath with *Actinostrobus pyramidalis* clumps; *Melaleuca* sp. B, *Scholtzia involucrata* and *Pericalymma*

*ellipticum* Closed Low Heath; Herblands dominated by *Borya sphaerocephala* and Asteraceae species; Sedgeland

dominated by *Harperia lateriflora* and mixed species

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >75% Excellent to Very Good, 25% Good to Degraded, with areas of severe localised disturbance in woodland beside river

**Total Flora:** 36 native taxa, 12 weed taxa (plot-generated list, DEP 1996)

**Significant Flora:** *Verticordia lindleyi* subsp. *lindleyi* (4); *Burchardia bairdiae*, *Agrostocrinum scabrum* (non-scabrid form, uncommon on the Swan Coastal Plain), *Darwinia* sp. *Muchea* (BJK 2006) (uncommon taxon confined to *Muchea* area), *Harperia lateriflora*

**Fauna:** not known

**Linkage:** canopy linkage to north and south along Ellen Brook; part of Greenway 44 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain; contains 1828m of regionally significant river (WRC 1996a GIS)





**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Regional Creeklane Mechanism (with mapped vegetation). Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**BULLSBROOK NATURE RESERVE AND ADJACENT BUSHLAND,  
BULLSBROOK**

**Boundary Definition:** protected area/conservation wetland/bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 292

**Area (ha):** bushland 191.8

**Map no.** 24, 25

**Map sheet series ref. no.** 2134-IV NW, 2134-IV SW

**Other Names:** Location 109 (Keighery, BJ, and Trudgen 1992), part Site — Bullsbrook Nature Reserve

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**Includes CALM Managed Land:** Reserve C1654 (Conservation of Flora and Fauna)

**System 6 (1983):** M14 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Dandaragan Plateau/Gingin Scarp**

Laterite (Ql: G2)

**Foothills**

Colluvial Sand (Qc: S5)

Colluvial Sand (Qs: S6)

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)

**Wetlands (within the Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Scarps**

Reagan Complex

**Pinjarra Plain**

Beermullah Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

5 Mixed shrub damplands

7 Herb-rich saline shrublands in clay pans

11 Wet forests and woodlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

23a Central *Banksia attenuata* — *B. menziesii* woodlands (most northerly occurrence)

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands (eastern representation of this community type)

**WETLANDS**

**Wetland Types:** palusplain

**Natural Wetland Groups** (undefined areas included in boundary)

**Swan Coastal Plain Rivers**

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (56.3ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Vulnerable (floristic community type 7)





### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek (seepage at base of eastern dunes), vegetated uplands

**Vegetation and Flora:** limited survey (part Site — Alford 1996a, DEP 1999, Chambers 1997 a&b, Gibson *et al.* 1994 (Bull 01–12), Gray 1994a, Keighery, BJ, and Trudgen 1992); detailed survey (part Site — Keighery, GJ, *et al.* 1997a (Bullsbrook Nature Reserve))

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992, Keighery, GJ, *et al.* 1997a)

Uplands: *Eucalyptus marginata* Woodland to Forest; *Eucalyptus calophylla* Woodland; *Banksia attenuata* and *B. menziesii* Woodland with scattered *Eucalyptus todtiana*; *Banksia ilicifolia*, *B. attenuata* and *B. menziesii* Woodland; *Xanthorrhoea drummondii*, *Calothamnus sanguineus*, *Daviesia nudiflora* and *Hakea stenocarpa* Open Low Heath

Wetlands: *Eucalyptus rudis* Woodland; *Melaleuca preissii* Low Closed Forest; Shrublands dominated by *Melaleuca raphiophylla*, *M. viminea*, *M. uncinata* and *Actinostrobos pyramidalis* and combinations of these; *Melaleuca scabra* and *Verticordia densiflora* Open Low Heath; Mixed Open Heath; Mixed Herbland; Sedgeland dominated by *Meeboldinia cana*, *L. aristatus*, *Anarthria laevis*, *Dielsia stenostachya* and *Lepidosperma longitudinale* and combinations of these; *Lepidosperma longitudinale* and *Baumea vaginalis* Sedgelands; *Cyclosorus interruptus* and *Pteris vittata* Fernland

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good, with areas of severe localised disturbance

**Total Flora:** 440 native taxa, 63 weed taxa (Keighery, GJ, *et al.* 1997a) (estimated >90% of flora of entire Site)

**Significant Flora:** Keighery, GJ, *et al.* 1997a — *Grevillea althoferorum* (R) (southern limit of range, only secure population); *Tripterococcus paniculatus* ms (1), *Eryngium pinnatifidum* subsp. *palustre* ms (2) (northern limit of range), *Stylidium aceratum* (2) (only known population, Lowrie and Kennealy 1999), *Schoenus* sp. Bullsbrook (JJ Alford 915) (2) (only known location), *Haemodorum loratum* (3) (disjunct population), *Lambertia multiflora* var. *darlingensis* (3), *Platysace ramosissima* (3), *Conostephium minus* (4), *Anthotium junciforme* (4), *Myriocephalus appendiculatus* (3), *Stylidium longitubum* (3); *Persoonia angustiflora* and *Grevillea obtusifolia* (southern limit of ranges), *Hakea cristata*, *Cyathochaeta avenacea* and *Pultenaea ericifolia* (northern limit of ranges), *Pteris vittata* and *Cyclosorus interruptus* (disjunct populations), *Podolepis gracilis* (Swamp form), *Eucalyptus marginata* subsp. *thalassica* (only known population on the Swan Coastal Plain), co-occurrence of *Hovea trisperma* var. *grandiflora* and *Hovea trisperma* var. *trisperma*, *Hakea cristata* (only record on the Swan Coastal Plain), swamp and sand forms of *Stirlingia latifolia*, *Philothea spicata* and *Stylidium brunonianum*, *Tetratheca nuda* (very uncommon on the Plain, confined to a few localities on the foothills of the Darling Range and Dandaragan Plateau), *Melaleuca ryeae*, *Melaleuca brevifolia*

**Fauna:** not known

**Linkage:** canopy linkage to bushland to the east (Site 291); part of Greenway 57 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part of the Bullsbrook Bushland area recommended for inclusion in a regional park (Keighery, BJ, and Trudgen 1992); area of 'outstanding conservation value' (Keighery, GJ, *et al.* 1997a); part Site — Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Indicative place (AHC 2000 D) (Gray 1994a, Chambers, 1997 a&b); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management of Reserve C1654 is endorsed. Part B: Proposed Parks and Recreation Reservation. Part C: Rural Complementary Mechanism (see Table 3, Volume 1).





## NEAVES ROAD CREEK, BULLSBROOK

**Boundary Definition:** management/bushland/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 100

**Area (ha):** bushland 26.9

**Map no.** 24

**Map sheet series ref. no.** 2034-I SE, 2134-IV SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Pinjarra Plain

Yanga Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2:** Seasonal Wetlands

#### WETLANDS

**Wetland Types:** palusplain, creek

##### Natural Wetland Groups

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Swan Coastal Plain Rivers**

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (7.2ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek

**Vegetation and Flora:** limited survey (Connell 1995, DEP 1998 (surveyed from roadside), DEP 2000, Matiske Consulting Pty Ltd 1997)

##### Structural Units

Wetlands: *Melaleuca raphiophylla* Low Open Forest with scattered *M. preissiana* and *Eucalyptus rudis*; *Baumea preissii* Sedgeland; *Juncus pallidus* Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Good to Degraded (Connell 1995, Matiske Consulting Pty Ltd 1997)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the west; part of Greenway 42 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).





## PEARCE AERODROME AND ADJACENT BUSHLAND, BULLSBROOK

**Boundary Definition:** bushland (part taken to cadastre)/bushland group boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 294

**Area (ha):** bushland 213.5

**Map no.** 24, 25

**Map sheet series ref. no.** 2134–IV SW

**Other Names:** Includes Pearce 2, Locations 101, 102, 106–108 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**System 6 (1983):** M15 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Foothills

Colluvial Deposits (Qc: S5)

Colluvial Sand (Qs: S6)

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1, S11)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Scarps

Reagan Complex (Dandaragan Plateau)

###### Pinjarra Plain

Guildford Complex (most northern occurrence)

Yanga Complex

Beermullah Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 1: Foothills/Pinjarra Plain

\*3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands

S8 *Eucalyptus wandoo* woodlands (Scarp)

##### Supergroup 2: Seasonal Wetlands

8 Herb-rich shrublands in clay pans (some areas with overstorey of Wandoo, only such woodlands in Very Good condition on the Plain)

15 Forests and woodlands of deep seasonal wetlands

\*S5 *Acacia saligna* wetlands

S7 Northern woodlands to forests over tall sedgelands alongside permanent wetlands

#### WETLANDS

**Wetland Types:** artificial channel, river (Ellen Brook), creek (Ki-it Monger Brook), palusplain

**Natural Wetland Groups** (undefined areas included in boundary)

##### Dandaragan Plateau

Red Gully (Dp.1)

##### Swan Coastal Plain Rivers

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (41.6ha, 221m), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined, Critically Endangered (floristic community type 3c), Endangered (Shrublands and woodlands on Muchea Limestones — Degraded Condition, but survey limited), Vulnerable (floristic community types 8 and 15)

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** Muchea Limestone, vegetated wetland, river, vegetated creekline and adjacent upland, vegetated uplands

**Vegetation and Flora:** limited survey (Alford 1996b, DEP 1996 (xPearce 01–05), Keighery, BJ, 1995a, Keighery, BJ, and Trudgen 1992)



**Structural Units:** mapping (part Site — Keighery, BJ, and Trudgen 1992)

Uplands: *Banksia attenuata* and *B. menziesii* Woodland with scattered *Eucalyptus todtiana*; *Eucalyptus calophylla*

Woodland: *Eucalyptus wandoo* Tall Woodland

Wetlands: *Casuarina obesa* Woodland; *Acacia saligna* Low Woodland; Scattered *Eucalyptus wandoo* over *Xanthorrhoea preissii*, *Acacia lasiocarpa* var. *bracteolata* and *Hypocalymma angustifolium* Open Low Heath; *Kunzea* aff. *recurva* (GJK 12828) and *densiflora* Shrubland; *Melaleuca raphiophylla* Low Woodland to Forest; *Viminaria juncea* Tall Shrubland; *Pericalymma* Open Heath, *Melaleuca* species Tall Open Scrub; *Hakea trifurcata*, *Allocasuarina humilis* and *Xanthorrhoea preissii* Open Heath; *Borya scirpoidea* Herbland; Mixed Herbland and *Meeboldinia coangustata* Closed Sedgeland

**Scattered Native Plants:** *Eleocharis keigheryi* Sedgelands (in claypans in the mown areas); Ellen Brook and Ki-it Monger Brook rarely with native understorey — regionally significant vegetation recognised as being included in area of Site in need of protection

**Vegetation Condition:** >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 170 native taxa (estimated and plot-generated list, estimated >50% expected flora)

**Significant Flora:** *Centrolepis caespitosa* (R), *Eleocharis keigheryi* (R); *Acacia lasiocarpa* var. *bracteolata* (1), *Schoenus capillifolius* (2), *Synaphea acutiloba* (3) (Keighery, BJ, and Trudgen 1992); *Isopogon asper*, *Kunzea* aff. *recurva* (GJK 12828), *Stylidium roseo-alatum*, *Astroloma macrocalyx*, *Myriocephalus helichrysoides*

**Fauna:** limited survey of birds (30 species) and amphibians (2 species) (J. Dell pers. comm. 1996). Significant bird species: category 3 (3)

**Linkage:** adjacent bushland to the south (Site 296) and east (Site 89); part of Greenways 42, 44, 57 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Muchea Limestone area; part of the Bullsbrook Bushland area recommended for inclusion in a regional park (Keighery, BJ, and Trudgen 1992); part Site Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain; contains 5234m of regionally significant river (WRC 1996a GIS)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Indicative place (AHC 2000 D); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Regional Creekline Mechanism (with mapped vegetation). Part B: Local Reserve Mechanism. Part C: Other Government Land Mechanism. Part D: Rural Complementary Mechanism (see Table 3, Volume 1).

## MAROUBRA AVENUE BUSHLAND, BULLSBROOK

**Boundary Definition:** bushland taken to cadastre/bushland group boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 89

**Area (ha):** bushland 10.2

**Map no.** 24, 25

**Map sheet series ref. no.** 2134-IV SW

**Other Names:** Pearce 3 and Pearce 5; Location 100 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Foothills

Colluvial Deposits (Qc: Msg, S5)

###### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Guildford Complex





**Floristic Community Types**

**Supergroup 1: Foothills/Pinjarra Plain**

3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands (most northern representation sampled)

**Supergroup 2: Seasonal Wetlands**

6 Weed dominated wetlands on heavy soils

**WETLANDS**

**Wetland Types:** palusplain

**Natural Wetland Groups** (undefined areas included in boundary)

**Darling Plateau**

Walyunga (D.1)

**Swan Coastal Plain Rivers**

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (1.86ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Critically Endangered (floristic community type 3c)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Pearce 01–02), Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus wandoo* Open Woodland

Wetlands: *Eucalyptus wandoo* Open Woodland; *Hakea prostrata*, *Jacksonia sternbergiana*, *Daviesia horrida* and *Xanthorrhoea preissii* Shrubland; *Hypocalymma angustifolium* Open Low Heath; Sedgeland; Herbland

**Vegetation Condition:** >75% Very Good to Good, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 84 native taxa, 19 weed taxa (plot-generated list, Gibson, *et al.* 1994)

**Significant Flora:** *Acacia lasiocarpa* var. *bracteolata* (1)

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 57 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part of the Bullsbrook Bushland area recommended for inclusion in a regional park (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**ASHTON ROAD BUSHLAND, BULLSBROOK**

**Boundary Definition:** bushland (part taken to cadastre)/bushland group boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 88

**Area (ha):** bushland 20.4

**Map no.** 25

**Map sheet series ref. no.** 2134–IV SW

**Other Names:** Pearce 4; Submission Area 314; Location 103 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Dandaragan Plateau/Gingin Scarp**

Osborne Formation (Ko: ST2)



**Foothills**

Colluvial Deposits (Qc: S5)

Colluvial Sand (Qs: S6)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Scarps**

Reagan Complex (Dandaragan Plateau, one of two most southern occurrences)

**Pinjarra Plain**

Guildford Complex (in area of most northern location)

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*S8 *Eucalyptus wandoo* woodlands (Scarp)

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*23a Central *Banksia attenuata* *B. menziesii* woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands (eastern representation of this community type)

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined, Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996, Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* and *E. marginata* Open Woodland; *Eucalyptus calophylla* and *E. wandoo* Woodland to Open Forest; *Eucalyptus marginata* Woodland; scattered *Eucalyptus calophylla* over *Banksia attenuata* and *B. menziesii* Low Woodland; mixed Open Low Heath

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Very Good to Excellent, <40 % Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 56 native taxa (estimated >50% expected flora)

**Significant Flora:** *Astrolooma macrocalyx*

**Fauna:** not known

**Linkage:** no adjacent bushland

**Other Special Attributes:** part of the Bullsbrook bushland area recommended for inclusion in a regional park (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity

**Recommendation:** Part A: Local Reserve Mechanism. Part B: Other Government Land Mechanism. Part C: Rural Complementary Mechanism (see Table 3, Volume 1).

**DELLA ROAD SOUTH BUSHLAND, BULLSBROOK**

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 298

**Area (ha):** bushland 10.1

**Map no.** 30, 31

**Map sheet series ref. no.** 2034-I SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)





**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Yanga Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** floodplain, creek

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Wetland Management Objectives:** Conservation (9.3ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995, Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Wetlands: *Melaleuca raphiophylla*, *Eucalyptus wandoo* Low Open Woodland; *Jacksonia sternbergiana*

*Xanthorrhoea preissii* Open Shrubland to Shrubland; *Dasypogon bromeliifolius* Low Open Shrubland

**Vegetation Condition:** Excellent to Good (Connell 1995, Mattiske Consulting Pty Ltd 1997)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the south, east and west (Site 399); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**SAWPIT ROAD BUSHLAND, BULLSBROOK**

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 13

**Area (ha):** bushland 14.8

**Map no.** 31

**Map sheet series ref. no.** 2034-I SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)





**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Yanga Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** sumpland, palusplain, creek

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Wetland Management Objectives:** Conservation (12.2ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek

**Vegetation and Flora:** limited survey (Connell 1995)

**Structural Units:** not surveyed

**Vegetation Condition:** Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the east; part of Greenway 40 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).

**TWIN SWAMPS NATURE RESERVE AND ADJACENT BUSHLAND, BULLSBROOK**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 400

**Area (ha):** bushland 170.7 (Site also includes open water.)

**Map no.** 31

**Map sheet series ref. no.** 2134-IV SW

**Other Names:** Location 96 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**Includes CALM Managed Land:** Reserve A27621 (Preservation of Fauna: Short-Necked Tortoise)

**System 6 (1983):** Part M17 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)





## VEGETATION AND FLORA

### Vegetation Complexes

#### Pinjarra Plain

Yanga Complex (in area of southern limit)

Beermullah Complex

### Floristic Community Types

#### Supergroup 2: Seasonal Wetlands

6 Weed dominated wetlands on heavy soils

11 Wet forests and woodlands

15 Forests and woodlands of deep seasonal wetlands

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21c Low-lying *Banksia attenuata* woodlands or shrublands

## WETLANDS

**Wetland Types:** sumpland, palusplain

### Natural Wetland Groups

#### Bassendean—Pinjarra transition

Muchea (B/P.3)

**Wetland Management Objectives:** Conservation (95.9ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** 3.6ha + 1.8ha = 5.4ha (total)

## THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Vulnerable (floristic community type 15)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — DEP 1999, Gibson *et al.* 1994 (Twin 01–08, 10–11, 13) (Twin Swamps Nature Reserve), Keighery, BJ, and Trudgen 1992); detailed survey (Keighery, GJ, 1996)

**Structural Units:** mapping (part Site — Keighery, BJ, and Trudgen 1992 (Twin Swamps Nature Reserve))

Uplands: Woodland to Open Forest dominated by *Banksia menziesii* and/or *B. attenuata*

Wetlands: *Melaleuca raphiophylla* Low Closed to Open Forest; *Acacia saligna* Low Open Woodland; *Melaleuca viminea* Tall Open Scrub; Closed to Open Heath dominated by *Melaleuca lateritia*, *M. teretifolia*, *Regelia ciliata* and *Astartea* aff. *fascicularis* and combinations of these with scattered emergent *Acacia saligna*; *Regelia ciliata* and *Pericalymma ellipticum* Open Low Heath; Herblands; Sedgeland

**Vegetation Condition:** >90% Very Good to Good, <10% Degraded, with areas of severe localised disturbance

**Total Flora:** 201 native taxa (Keighery, GJ, 1996) (estimated >70% expected flora)

**Significant Flora:** *Stylidium longitubum* (3); *Burchardia bairdiae*, *Kunzea* aff. *recurva* (GJK 12828)

**Fauna:** limited survey. Significant reptile species: Western Swamp Tortoise (*Pseudemys umbrina*) (one of two remaining areas for this threatened species (Burbidge and Kuchling 1994)). Significant mammal species: Quenda (L. Mutter pers. comm. 1998)

**Linkage:** no adjacent bushland; part of Greenway 40 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** see Fauna; contains plant communities representative of the eastern side of the Swan Coastal Plain

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserve 27621 is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).



## WALYUNGA ROAD BUSHLAND, BULLSBROOK

**Boundary Definition:** bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 412

**Area (ha):** bushland 44.5

**Map no.** 32

**Map sheet series ref. no.** 2134-IV SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

**Darling Plateau (Darling Range)/Darling Scarp**

Even-grained Granite (Ae, Aes: GR)

Conglomerate (PPG: CG)

#### Foothills

Leederville Formation (Klb: ST1) (generally associated with the Dandaragan Plateau/ Gingin Scarp)

Colluvial Deposits (Qc: Msg)

Ridge Hill Sandstone (Qph: SS)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 1: Foothills/Pinjarra Plain**

**Supergroup 2: Seasonal Wetlands**

#### WETLANDS

**Wetland Types:** creek

##### Natural Wetland Groups

###### Darling Plateau

Walyunga (D.1)

**Wetland Management Objectives:** not assessed

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** creek, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, surveyed from roadside)

##### Structural Units

Uplands: *Eucalyptus marginata* Woodland; *Eucalyptus wandoo* Woodland with occasional *E. calophylla*;

*Eucalyptus wandoo* Woodland; *Dryandra sessilis* Open Shrubland; *Acacia pulchella*, *Hakea lissocarpa* Open Shrubland

Wetlands: not known

**Vegetation Condition:** 60% Very Good, 35% Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the east protected in the Walyunga National Park; part of Greenway 44 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).





## ELLENBROOK NATURE RESERVE AND ADJACENT BUSHLAND, UPPER SWAN

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Boundary adjusted from that in draft *Perth's Bushplan*.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 301

**Area (ha):** bushland 63.6

**Map no.** 32

**Map sheet series ref. no.** 2134–III NW, 2134–IV SW

**Other Names:** J and B Martyn Reserve, part Location 95 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Upper Swan)

**Includes CALM Managed Land:** Reserve A27620 (Preservation of Fauna: Short - Necked Tortoise)

**System 6 (1983):** Part M17 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1, S11)

##### Wetlands (within the Pinjarra Plain)

Holocene Swamp Deposits (Qhw: Cps)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Pinjarra Plain

Guildford Complex

Yanga Complex (in area of southern limit)

##### Floristic Community Types

###### Supergroup 1: Foothills/Pinjarra Plain

3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands

###### Supergroup 2: Seasonal Wetlands

6 Weed dominated wetlands on heavy soils

8 Herb-rich shrublands in clay pans

#### WETLANDS

**Wetland Types:** floodplain, palusplain, creek (Ellen Brook), river

##### Natural Wetland Groups

###### Swan Coastal Plain Rivers

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (38.4ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 3c), Vulnerable (floristic community type 8)

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — DEP 1999, Gibson *et al.* 1994 (Ellen 01–07) (Ellenbrook Nature Reserve), Keighery, BJ, and Trudgen 1992); detailed survey (part Site — Keighery, BJ, 1996 (Ellenbrook Nature Reserve))

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Open Forest to Woodland

Wetlands: *Eucalyptus calophylla* Open Forest to Woodland; *Eucalyptus rudis* Open Forest; *Viminaria juncea* and *Acacia saligna* Tall Open Scrub; *Kunzea* aff. *recurva* (GJK 12828) and *Verticordia densiflora* Open Low Heath, sometimes with scattered emergent *Eucalyptus rudis*; *Melaleuca lateritia* Shrubland; Herbland dominated by *Borya scirpoidea*, *Tribonanthes australis*, Asteraceae and Stylidiaceae species and combinations of these; *Neurachne alopecuroidea* Open Grassland; Sedgeland dominated by *Meeboldinia cana*, *Chorizandra enodis*, *Cyathochaeta avenacea*; mixed Sedgeland

**Scattered Native Plants:** *Eucalyptus rudis* Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance





**Total Flora:** 236 native taxa (Keighery, BJ, 1996) (estimated >60% expected flora)

**Significant Flora:** *Eleocharis keigheryi* (R), *Hydatella dioica* (R); *Stylidium longitubum* (1), *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Schoenus capillifolius* (2), *Chamaescilla gibsonii* (3), *Myriocephalus appendiculatus* (3) (southern limit of range), *Rhodanthe pyrethrum* (3), *Stylidium mimeticum* (3), *Hydrocotyle lemnooides* (4); *Pimelea imbricata* var. *major*

**Fauna:** limited survey. Significant reptile species: Western Swamp Tortoise (*Pseudemydura umbrina*) (one of two remaining areas for this threatened species (Burbidge and Kuchling 1994)). Significant mammal species: Quenda (L. Mutter pers. comm. 1998)

**Linkage:** adjacent bushland to the north (Site 296) and west (Site 300); part of Greenway 44 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** see Fauna; contains plant communities representative of the eastern side of the Swan Coastal Plain; contains 1046m of regionally significant river (WRC 1996a GIS)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserve A27620 is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

### TOODYAY ROAD BUSHLAND, RED HILL

**Boundary Definition:** bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 42

**Area (ha):** bushland 3.9

**Map no.** 38

**Map sheet series ref. no.** 2134-III NW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Red Hill)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

**Darling Plateau (Darling Range)/Darling Scarp**

Even-grained Granite (Ae, Aes: M3)

##### Foothills

Colluvial Deposits (Qc: Smg)

##### VEGETATION AND FLORA

##### Vegetation Complexes

###### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** \*not sampled, type inferred

###### Supergroup 1: Foothills/Pinjarra Plain

\*3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands

##### WETLANDS

**Wetland Types:** creek

##### Natural Wetland Groups

###### Darling Plateau

Walyunga (D.1)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

##### THREATENED ECOLOGICAL COMMUNITIES

Critically Endangered (floristic community type 3c)

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** creek, vegetated uplands





**Vegetation and Flora:** limited survey (DEP 1998 (surveyed from roadside), DEP 1999, DEP 2000, Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Uplands: Scattered *Eucalyptus calophylla* and *Eucalyptus wandoo* over Mixed Open Heath

Wetlands: *Eucalyptus wandoo* and *E. rudis* Woodland

**Vegetation Condition:** Very Good to Excellent

**Total Flora:** 62 native taxa (<70% of the expected flora)

**Significant Flora:** *Lambertia multiflora* var. *darlingensis* (3), *Synaphea acutiloba* (3), *Synaphea pinnata* (3); *Grevillea endlicheriana*

**Fauna:** not known

**Linkage:** no adjacent bushland

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain; National Trust of Australia (WA) Classification

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**TALBOT ROAD BUSHLAND, STRATTON/SWAN VIEW**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 306

**Area (ha):** bushland 95.2

**Map no.** 44

**Map sheet series ref. no.** 2134–III NW, 2134–III SW

**Other Names:** Location 86 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Swan (Stratton, Swan View)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Darling Plateau (Darling Range)/Darling Scarp**

Even-grained Granite (Ae, Aes: M3)

**Foothills**

Colluvial Deposits (Qc: Mgs2)

Yoganup Formation (Qpr: S12)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf along base of Darling Plateau)

**Pinjarra Plain**

Guildford Complex

**Floristic Community Types**

**Supergroup 1: Foothills/Pinjarra Plain**

3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20c Eastern shrublands and woodlands (only significant area)

**WETLANDS**

**Wetland Types:** creek, artificial channel

**Natural Wetland Groups**

**Darling Plateau**

Walyunga (D1)

**Wetland Management Objectives:** not assessed, Conservation (Keighery, GJ, and Keighery 1993a)

**Swan Coastal Plain Lakes EPP:** none identified





**THREATENED ECOLOGICAL COMMUNITIES**

Critically Endangered (floristic community types 3c, 20c)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands (slope with view to Plain), vegetated creek

**Vegetation and Flora:** limited survey (DEP 1999, Gibson *et al.* 1994 (Talb 01-13), Keighery, BJ, and Trudgen 1992); detailed survey (Keighery, GJ, and Keighery 1993a)

**Structural Units:** mapping (Keighery, GJ, and Keighery 1993a)

Uplands: *Eucalyptus wandoo* Open Woodland; *Eucalyptus calophylla* and *E. wandoo* Woodland; *Eucalyptus calophylla* Open Woodland to Woodland; *Eucalyptus calophylla* and *E. marginata* Woodland; *Banksia attenuata* and *B. menziesii* Open Low Woodland to Low Woodland; *Adenanthos cygnorum* and *Allocasuarina humilis* Open Shrubland; *Hakea ruscifolia* Open Shrubland; *Hakea varia* and *H. ruscifolia* Heath; *Hakea trifurcata*, *H. undulata*, *Allocasuarina humilis* and *Beaufortia purpurea* Open Heath

Wetlands: *Eucalyptus calophylla* Open Woodland to Woodland; *Melaleuca raphiophylla* Low Woodland

**Vegetation Condition:** >90% Excellent to Very Good, <10 % Good to Degraded, with areas of severe localised disturbance associated with mining and tracks

**Total Flora:** 366 native taxa (Keighery, GJ, and Keighery 1993a) (estimated >90% expected flora)

**Significant Flora:** *Isopogon drummondii* (3), *Synaphea acutiloba* (3), *Synaphea pinnata* (3), *Hakea myrtoides*, *Lambertia multiflora* var. *darlingensis* (3), *Thysanotus glaucus* (4); *Trichocline spathulata*, *Lomandra spartea*, *Haemodorum brevisepalum*, Keighery, GJ, and Keighery 1993a — *Aristida contorta*, *Stylidium affine*, *Grevillea endlicheriana*, *Grevillea glabrata* subsp. *glabrata*, *Conospermum incurvum* (most southern population in a reserve in the Perth Region), *Melaleuca tuberculata* subsp. *tuberculata*, *Eremaea fimbriata*

**Fauna:** structured surveys for birds (47 species), native mammals (3 species), reptiles (13 species) and amphibians (7 species) (How *et al.* 1996). Significant bird species: category 1 (1), category 3 (4) and category 4 (3). Significant mammal species: Honey Possum. High frog diversity

**Linkage:** no adjacent bushland; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended to be managed as a flora conservation area (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); National Trust of Australia (WA) Classification; contains plant communities representative of the eastern side of the Swan Coastal Plain; recommended that 'to encompass and protect the Talbot Road woodlands, Swan Locations 11764 and 11313 and Reserve #23 953 are amalgamated into a single A-class Nature Reserve with vesting in the NPNCA.' (Markey 1997); Largest significant area of floristic community type 20c

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Cemetery Mechanism. Part C: Local Reserve Mechanism. Part D: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**FARRALL ROAD BUSHLAND, STRATTON**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 309

**Area (ha):** bushland 1.6

**Map no.** 44

**Map sheet series ref. no.** 2134-III SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Midvale)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Guildford Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**WETLANDS**

**Wetland Types:** palusplain, creek

**Natural Wetland Groups**

**Swan Coastal Plain Rivers**

Swan River (R.2)

**Wetland Management Objectives:** Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1998, DEP 1999)

**Structural Units**

Wetlands: *Melaleuca preissiana* Low Forest to Woodland

**Vegetation Condition:** Very Good to Degraded

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** no adjacent bushland

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Urban Negotiated Planning Solution (see Table 3, Volume 1).

**SOUTH GUILDFORD BUSHLAND**

**Boundary Definition:** bushland (part taken to cadastre)/bushland group boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 311

**Area (ha):** bushland 21.4

**Map no.** 43

**Map sheet series ref. no.** 2034-II SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (South Guildford)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Guildford Complex





**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 1:** Foothills/Pinjarra Plain

**Supergroup 2:** Seasonal Wetlands

**Supergroup 3:** Uplands centred on Bassendean Dunes and Dandaragan Plateau

**WETLANDS**

**Wetland Types:** sumpland, dampland, artificial channel

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (2.2ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998 (surveyed from roadside), Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Uplands: *Banksia menziesii*, *B. attenuata* and *Allocasuarina fraseriana* Woodland; *Banksia menziesii* and *B. grandis* Woodland; *Eucalyptus calophylla* Open Woodland over *Banksia menziesii*, *B. attenuata*, *Allocasuarina fraseriana* Low Open Woodland

Wetlands: *Eucalyptus rudis* Woodland over *Banksia ilicifolia*

**Vegetation Condition:** >20% Excellent, <40% Very Good to Good, <15% Degraded, with areas of severe localised disturbance (surveyed from roadside)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenway 110 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**STIRLING CRESCENT BUSHLAND, HAZELMERE**

**Boundary Definition:** bushland boundary (Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 481

**Area (ha):** bushland 31.5

**Map no.** 43

**Map sheet series ref. no.** 2134–III SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Hazelmere)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)





## VEGETATION AND FLORA

### Vegetation Complexes

#### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

#### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \* not sampled, types inferred

#### Supergroup 1: Foothills/Pinjarra Plain

\*3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils (most northerly with Site 319 and Site 45)

**Supergroup 2: Seasonal Wetlands** (not sampled, types not inferred)

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*20c Eastern shrublands and woodlands

## WETLANDS

**Wetland Types:** palusplain

### Natural Wetland Groups

#### Darling Plateau

Walyunga (D.1)

#### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Mungala (B/P.2)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

## THREATENED ECOLOGICAL COMMUNITIES

Not determined, Critically Endangered (floristic community types 3a and 20c)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998)

### Structural Units

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland; scattered *Eucalyptus calophylla* over *Caustis dioica* Sedgeland

Wetlands: scattered *Eucalyptus calophylla* over Herbland and Sedgeland

**Vegetation Condition:** >70% Very Good, <30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Conospermum incurvum* (most southern population known in the Perth Metropolitan Region)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** bushland linkage to north (across road) and to east (Site 213); part of Greenway 50 (Tingay Alan & Associates, 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria met for inclusion:** Representation of ecological communities, Rarity

**Recommendation:** Part A: Major Road and Rail Reserve Mechanism; MRWA Road Reserve (design and management). Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

## BUSHMEAD BUSHLAND, SWAN

**Boundary Definition:** protected area/bushland (part taken to cadastre)/vegetation complex/management boundary (Boundary adjusted after negotiations.)

## SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 213

**Area (ha):** bushland 127.6 (Proposed boundary circumscribes 126.4ha bushland.)





Map no. 43, 44, 50

Map sheet series ref. no. 2134–III SW

Other Names: Submission Area 284; Location 89 (Keighery, BJ, and Trudgen 1992)

Local Authorities (Suburb): Shire of Mundaring (Helena Valley), Shire of Kalamunda (Gooseberry Hill)

System 6 (1983): part M34 area of bushland goes beyond System area boundaries, all bushland described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

**Darling Plateau (Darling Range)/Darling Scarp**

Laterite (Ql: G2, LA1)

Even-grained Granite (Ae, Aes: GR)

#### Foothills

Colluvial Deposits (Qc: Msg, Mgs2)

Yoganup Formation (Qpr: S12)

Ridge Hill Sandstone (Qph: SS)

#### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Foothills

Forrestfield Complex

**Floristic Community Types:** \*not sampled, type inferred

#### Supergroup 1: Foothills/Pinjarra Plain

\*3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands (areas within boundaries degraded, not suitable to be identified as threatened ecological community)

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

20a *Banksia attenuata* woodlands over species-rich dense shrublands

20c Eastern shrublands and woodlands (most southern representation but atypical)

### WETLANDS

**Wetland Types:** creek

#### Natural Wetland Groups

##### Darling Plateau

Walyunga (D.1)

##### Bassendean—Pinjarra transition

Mungala (B/P.2)

##### Swan Coastal Plain Rivers

Swan River (R.2)

**Wetland Management Objectives:** Conservation (4019.8m)

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Critically Endangered (floristic community type 20c), Endangered (floristic community type 20a)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** creek (Kadina Brook), vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Bushm 01-03), Markey 1997 (Bush 01, in adjacent bushland); detailed survey (*ecologia* 1991)

**Structural Units:** mapping (*ecologia* 1991)

Uplands: *Eucalyptus wandoo* Woodland; *Banksia attenuata* and *Allocasuarina fraseriana* Open Woodland to Open Forest; *Eucalyptus calophylla* Woodland; *Lambertia multiflora* var. *darlingensis*, *Daviesia physodes* and *Isopogon drummondii* Shrubland

Wetlands: *Eucalyptus rudis* Woodland to Forest

**Scattered Native Plants:** Forest to Open Woodlands dominated by *Eucalyptus calophylla*, *E. rudis*, *E. marginata* and *Melaleuca raphiophylla* — regionally significant vegetation recognised as being included in the area of Site in need of protection





**Vegetation Condition:** >70% Excellent to Very Good, <30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 305 native taxa (*ecologia* 1991) (estimated >75% expected flora)

**Significant Flora:** *Isopogon drummondii* (3), *Lambertia multiflora* var. *darlingensis* (3), *Persoonia sulcata* (3) (*ecologia* 1991); *Blancoa canescens*, *Eremaea fimbriata*, *Pityrodia bartlingii*, *Dasyogon obliquifolius*

**Fauna:** structured survey for birds (19 species), native mammals (1 species), reptiles (8 species) and amphibians (5 species) (Harvey *et al.* 1997). Significant bird species: category 3 (1) and category 4 (2). Significant mammal species: Quenda (*ecologia* 1991)

**Linkage:** adjacent bushland to the north (Site 216), south (Site 217) and west (Site 481); part of Greenway 49 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** one of a few areas in the PMR where the Plain and the Plateau meet through naturally vegetated areas (canopy and some bushland); contains plant communities representative of the eastern side of the Swan Coastal Plain; probably contains *Eucalyptus wandoo* Woodland from 'Eucalyptus wandoo woodland of community 1a' which is part of the only known example of this community type on the Ridge Hill Shelf and 'therefore requires secure protection'. (Markey 1997)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

## ADELAIDE CRESCENT BUSHLAND, HELENA VALLEY

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 216

**Area (ha):** bushland 14.7

**Map no.** 44

**Map sheet series ref. no.** 2134-III SW

**Other Names:** Location 88 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Mundaring (Helena Valley)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

**Darling Plateau (Darling Range)/Darling Scarp**

Laterite (Ql: LA1)

##### Foothills

Colluvial Deposits (Qc: Msg)

Yoganup Formation (Qpr: S12)

Ridge Hill Sandstone (Qph: SS)

##### VEGETATION AND FLORA

##### Vegetation Complexes

##### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 1: Foothills/Pinjarra Plain**

**Supergroup 2: Seasonal Wetlands**

##### WETLANDS

**Wetland Types:** creek

##### Natural Wetland Groups

**Darling Plateau**

Walyunga (D.1)





**Wetland Management Objectives:** Conservation (385.6m)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** creek, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998 (surveyed from roadside), DEP 2000, Keighery, BJ, and Trudgen 1992, Mattiske Consulting Pty Ltd 1997)

**Structural Units:**

Uplands: *Eucalyptus wandoo* Low Open Woodland to Open Woodland; *Eucalyptus calophylla* Open Woodland to Open Forest; *Hakea lissocarpha* and *Acacia pulchella* Open Heath, *Hakea trifurcata* and *Petrophile biloba* Open Shrubland

Wetlands: not known

**Vegetation Condition:** 70% Excellent, <25% Very Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south (Site 213) and east; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain; contains Ridge Hill Sandstone, a thin (10m) sequence of shoreline sandstone and conglomerate, forming a geomorphic feature which is a reference level for global eustatic sea-level correlations. Deposits are remnants of the oldest and highest shoreline feature in the Perth basin, thought to have been formed during the early Pleistocene (Lemmon *et al.* 1979)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Proposed Parks and Recreation Reservation, Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**GOOSEBERRY HILL ROAD BUSHLAND, GOOSEBERRY HILL**

**Boundary Definition:** protected area/vegetation complex boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 466

**Area (ha):** bushland 21.2

**Map no.** 50

**Map sheet series ref. no.** 2134-III SW

**Other Names:** Location 90 (Keighery, BJ, and Trudgen 1992); Gooseberry Hill Regional Open Space

**Local Authorities (Suburb):** Shire of Kalamunda (Gooseberry Hill, Maida Vale)

**System 6 (1983):** Part M34 Part System area bushland and part scattered native plants (canopy), only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Darling Plateau (Darling Range)/Darling Scarp**

Even-grained Granite (Ae, Aes: GR)

**Foothills**

Colluvial Deposits (Qc: Mgs2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types** \*not sampled, type inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands



**Natural Wetland Groups**

**Darling Plateau**

Walyunga (D.1)

**Wetland Management Objectives:** Conservation (108m)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** creek, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998)

**Structural Units**

Uplands: *Eucalyptus calophylla* Open Woodland; *Calothamnus quadrifidus* Shrubland

Wetlands: not known

**Vegetation Condition:** >50% Excellent, <40% Very Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north (Site 213) and east (Darling Range Regional Park DPUD 1993); part of Greenway 113 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Other Government Land Mechanism. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**MAIDA VALE RESERVE AND ADJACENT BUSHLAND, MAIDA VALE**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 316

**Area (ha):** bushland 15.0

**Map no.** 49, 50

**Map sheet series ref. no.** 2134-III SW

**Other Names:** Submission Area 275, part Location 90 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Kalamunda (Maida Vale)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Mgs2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20a *Banksia attenuata* woodlands over species-rich dense shrublands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)





**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Maida 01–02), DEP 1999)

**Structural Units**

Uplands: *Eucalyptus marginata* Open Woodland; *Mesomelaena pseudostygia* Sedgeland

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good, with areas of severe localised disturbance

**Total Flora:** 90 native taxa, 4 weed taxa (plot-generated list only) (estimated <60% expected flora)

**Significant Flora:** *Conospermum undulatum* (R); *Haemodorum loratum* (3), *Lambertia multiflora* var. *darlingensis* (3), *Templetonia drummondii* (4); *Xanthorrhoea acanthostachya*, *Dasyogon obliquifolius*, *Pityrodia bartlingii*

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 113 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance

**Recommendation:** Part A: Proposed Parks and Recreation Reservation. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**POISON GULLY BUSHLAND, HIGH WYCOMBE**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 45

**Area (ha):** bushland 11.6

**Map no.** 49

**Map sheet series ref. no.** 2134–III SW, 2034 II SE

**Other Names:** Locations 77 and 78 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Kalamunda (High Wycombe)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Foothills**

Yoganup Formation (Qpr: S12)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils (most northerly with Site 319 and Site 481)

**WETLANDS**

**Wetland Types:** palusplain, creek

**Natural Wetland Groups**

**Darling Plateau**

Walyunga (D.1)

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (2152.2m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified



**THREATENED ECOLOGICAL COMMUNITIES**

Critically Endangered (floristic community type 3a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, vegetated upland

**Vegetation and Flora:** limited survey (Mattiske Consulting Pty Ltd 1997, part Site — Keighery, BJ, and Trudgen 1992)

**Structural Units**

Uplands: *Eucalyptus calophylla* and *E. wandoo* Woodland; *Eucalyptus calophylla*, *E. marginata* and *Allocasuarina fraseriana* Open Woodland

Wetlands: *Eucalyptus calophylla* Open Forest

**Vegetation Condition:** Very Good to Poor

**Total Flora:** not known

**Significant Flora:** *Conospermum undulatum* (R)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south; part of Greenway 52 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**SULTANA ROAD WEST BUSHLAND, HIGH WYCOMBE**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 123

**Area (ha):** bushland 15.1 (part area cleared after bushland mapping)

**Map no.** 49

**Map sheet series ref. no.** 2034–II SE, 2134–III SW

**Other Names:** Location 75 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Kalamunda (High Wycombe, Forrestfield)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20a *Banksia attenuata* woodlands over species-rich dense shrublands

**WETLANDS**

**Wetland Types:** palusplain, sumpland

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Resource Enhancement





Swan Coastal Plain Lakes EPP: none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands, vegetated wetlands

**Vegetation and Flora:** limited survey (part Site — DEP 1996 (Sultana plot located outside Site), DEP 1999, Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Upland: *Banksia attenuata* and *B. menziesii* Open Low Forest to Woodland over species-rich Mixed Closed Heath to Open Low Heath

Wetland: *Melaleuca preissiana* Low Open Woodland

**Vegetation Condition:** >80% Excellent to Pristine, <20% Very Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 73 native taxa (plot-generated list only) (estimated 50% expected flora)

**Significant Flora:** *Conospermum undulatum* (R); *Haemodorum loratum* (3), *Isopogon drummondii* (3), *Lambertia multiflora* var. *darlingensis* (3); *Dasyogon obliquifolius*, *Eremaea fimbriata*, *Xanthorrhoea drummondii*, *Banksia incana*, *Hakea conchifolia*, *Pityrodia bartlingii*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent canopy/bushland to the south and unmapped bushland to south-east to bushland along the Roe Highway; part of Greenway 50 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** recommended to be managed for flora conservation, with a view to purchase by CALM (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**DUNDAS ROAD BUSHLAND, FORRESTFIELD**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 319

**Area (ha):** bushland 58.1

**Map no.** 49

**Map sheet series ref. no.** 2034-II SE

**Other Names:** Reserve C29880 Forrestfield; Submission Area 92; Location 73 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Kalamunda (Forrestfield)

**System 6 (1983):** Part M53, part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 1: Foothills/Pinjarra Plain**

2 Southern wet shrublands (most northern representation, only representation in PMR, disjunct from southern representations)





3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils (most northerly representation with Site 45 and Site 481)

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20a *Banksia attenuata* woodlands over species-rich dense shrublands

**WETLANDS**

**Wetland Types:** palusplain, artificial channel, creek (not previously described (Keighery, BJ 1994b))

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (27.8ha) and Conservation (unknown length) (Keighery, BJ 1994c), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Critically Endangered (floristic community type 3a), Endangered (floristic community types 2 and 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated creek, wetlands and uplands

**Vegetation and Flora:** limited survey (DEP 1996 (M53 02–06), Gibson *et al.* (M53), Keighery, BJ 1994b, Keighery, BJ, and Trudgen 1992, Tingay 1990)

**Structural Units:** mapping (Keighery, BJ 1994b, Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus marginata* Open Woodland; *Eucalyptus calophylla* Woodland; scattered *Eucalyptus calophylla* and *Nuytsia floribunda* over *Caustis dioica* Sedgeland; *Banksia attenuata* and *B. menziesii* Woodland; scattered *Hakea trifurcata* clumps over *H. incrassata*, *Acacia pulchella* and *Petrophile striata* Low Shrubland; *Stirlingia latifolia*, *Daviesia physodes*, *Allocasuarina humilis* and *Verticordia densiflora* Open Low Heath  
Wetlands: *Eucalyptus calophylla* Woodland; *Pericalymma ellipticum*, *Hakea sulcata* and *Stirlingia latifolia* Open Low Heath

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good, with areas of severe localised disturbance

**Total Flora:** 223 native taxa (Keighery, BJ 1994b) (estimated >75% expected flora)

**Significant Flora:** *Conospermum undulatum* (R), *Macarthuria keigheryi* (R); *Schoenus pennisetis* (1), *Isopogon drummondii* (3), *Schoenus benthamii* (3), *Lambertia multiflora* var. *darlingensis* (3), *Conostephium minus* (4); *Verticordia lindleyi* subsp. *lindleyi* (4); *Actinostrobos acuminatus*, *Dasyopogon obliquifolius*, *Platysace juncea*, *Xanthorrhoea drummondii*, *Hakea conchifolia*, *Pityrodia bartlingii*, *Byblis lindleyana*, *Drosera macrantha* (Swan Coastal Plain form, BJK and NG 228), *Isopogon asper*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenways 50, 98, 103 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** unusual combination of a series of rare, uncommon and restricted floristic community types; recommended to be managed as a flora conservation area (Keighery, BJ, and Trudgen 1992); recommended to be declared as an A-class Nature Reserve for the protection of flora and fauna in Gibson *et al.* 1994; part Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**PIONEER PARK BUSHLAND, FORRESTFIELD**

**Boundary Definition:** bushland (part taken to zoning) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 440

**Area (ha):** bushland 11.5

**Map no.** 49

**Map sheet series ref. no.** 2034–II SE

**Other Names:** not known





**Local Authorities (Suburb):** Shire of Kalamunda (Forrestfield)  
**System 6 (1983):** Part M53 Part System area bushland, only bushland described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, type inferred

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*20a *Banksia attenuata* woodlands over species-rich dense shrublands

### WETLANDS

No wetlands mapped

### THREATENED ECOLOGICAL COMMUNITIES

Endangered (floristic community type 20a)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998)

#### Structural Units

Uplands: *Eucalyptus marginata* Open Woodland; mixed *Eucalyptus marginata*, *Allocasuarina fraseriana* Woodland; *Allocasuarina fraseriana* Woodland; mixed Open Heath; *Adenanthos barbigerus* Open Heath

**Vegetation Condition:** <50% Excellent to Very Good, >50% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Conospermum undulatum* (R); *Isopogon drummondii* (3), *Olax scalariformis* (3)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenway 50 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity

**Recommendation:** Local Reserve Mechanism (see Table 3, Volume 1).

## TOMAH ROAD BUSHLAND, WATTLE GROVE

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 282

**Area (ha):** bushland 5.6

**Map no.** 49

**Map sheet series ref. no.** 2034-II SE

**Other Names:** Submission Area 274

**Local Authorities (Suburb):** Shire of Kalamunda (Wattle Grove)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

#### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)



**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

**WETLANDS**

**Wetland Types:** sumpland, palusplain, creek, artificial channel

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (1.2ha, 113.7m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** detailed survey (LeProvost *et al.* 1987)

**Structural Units:** mapping (LeProvost *et al.* 1987)

Uplands: *Eucalyptus calophylla* Woodland

Wetlands: *Melaleuca raphiophylla* Low Forest with emergent *Eucalyptus rudis*; *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* and *Kunzea ericifolia* Low Woodland; *Melaleuca raphiophylla* Tall Closed Scrub; *Melaleuca viminea* Tall Closed Scrub; *Lepidosperma longitudinale* Sedgeland

**Vegetation Condition:** Very Good to Degraded, with areas of severe localised disturbance (inferred from LeProvost *et al.* 1987 and Submission no. 170d)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenway 109 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** Category One Area Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; Existing Parks and Recreation Reserve (see Table 3, Volume 1).

**MCDOWELL STREET BUSHLAND, WELSHPOOL**

**Boundary Definition:** bushland taken to zoning boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 424

**Area (ha):** bushland 8.1

**Map no.** 48, 49

**Map sheet series ref. no.** 2033–I NE, 2034–II SE

**Other Names:** Location 69 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** City of Canning (Welshpool)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)





**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20a *Banksia attenuata* woodlands over species-rich dense shrublands AND/OR

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** artificial lake, dampland

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (0.3ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, possibly Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Woodland to Open Forest; *Banksia attenuata* and *B. menziesii* Low Woodland

Wetlands: *Melaleuca preissiana* and *Acacia saligna* Low Open woodland

**Vegetation Condition:** Very Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Conospermum triplinervium*

**Fauna:** not known

**Linkage:** adjacent bushland to the south (Site 283)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**QUEENS PARK BUSHLAND, QUEENS PARK**

**Boundary Definition:** protected area/Western Australian Planning Commission-owned land boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 283

**Area (ha):** bushland 14.4 (Site also includes open water.)

**Map no.** 48, 49

**Map sheet series ref. no.** 2033–I NE, 2034–II SE

**Other Names:** Part Submission Area 140, 31; Location 69 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** City of Canning (Queens Park, East Cannington)



## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 1: Foothills/Pinjarra Plain

\*3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

##### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands AND/OR

\*20a *Banksia attenuata* woodlands over species-rich dense shrublands

### WETLANDS

**Wetland Types:** dampland, artificial channel

#### Natural Wetland Groups

Bassendean—Pinjarra transition OR Bassendean with fluvial features

Mungala (B/P.2)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 1ha

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 3a), possibly Endangered (floristic community type 20a)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996, Hames Sharley Australia 1993); detailed survey (Tauss 1997)

**Structural Units:** mapping (Hames Sharley Australia 1993)

Uplands: *Eucalyptus calophylla* Woodland to Forest; *Banksia attenuata* and *B. menziesii* Low Woodland to Low Forest; *Jacksonia furcellata* Shrubland

Wetlands: *Eucalyptus calophylla* Woodland and *Melaleuca preissiana* Low Open Woodland

**Scattered Native Plants:** within protected area *Eucalyptus rudis* Woodland; *Melaleuca raphiophylla* Low Forest; some scattered and clumped trees in Completely Degraded area, habitat provided by drain into artificial lake

**Vegetation Condition:** >25% Very Good to Excellent, >70% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 167 native taxa (Tauss 1997) (estimated >85% expected flora)

**Significant Flora:** *Macarthuria keigheryi* (R) (Tauss 1997)

**Fauna:** not known

**Linkage:** adjacent bushland to the north across Welshpool Road (Site 424)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).





## NICHOLSON ROAD BUSHLAND, LANGFORD/THORNLIE

**Boundary Definition:** protected area boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Boundary adjusted from that in draft *Perth's Bushplan*.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 456

**Area (ha):** bushland 13.4

**Map no.** 54

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Area of the Tom Bateman Sporting Complex; Gosnells remnant bushland areas 33 and 34 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Gosnells (Thornlie, Langford)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Cs, Sc)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, type inferred

##### Supergroup 2: Seasonal Wetlands

4 *Melaleuca preissiana* damplands

8 Herb-rich shrublands in clay pans

10a Shrublands on dry clay flats

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

#### WETLANDS

**Wetland Types:** dampland, artificial channel

##### Natural Wetland Groups

###### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (6.3ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Endangered (floristic community type 10a), Vulnerable (floristic community type 8)

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Trudgen and Keighery 1995 (Gosn 6–11))

**Structural Units:** mapping (Trudgen and Keighery 1995)

Uplands: Low Open Woodlands to Low Closed Forests dominated by combinations of *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* and *Allocasuarina fraseriana*; *Eucalyptus calophylla*, *E. marginata* and *Allocasuarina fraseriana* Woodland to Open Forest; *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland to Low Open Forest; *Banksia attenuata*, *B. menziesii* and *E. todtiana* Low Woodland to Low Open Forest

Wetlands: Low Open Woodlands to Low Woodlands dominated by combinations of *Melaleuca preissiana*, *Eucalyptus todtiana*, *Allocasuarina fraseriana*, *Banksia attenuata* and *Nuytsia floribunda*; *Melaleuca preissiana* Low Open Woodland to Low Open Forest; *Melaleuca raphiophylla* Low Open Woodland to Low Open Forest; *Melaleuca incana*, *M. viminea* and *M. raphiophylla* Low Open Forest; *Melaleuca raphiophylla* and *M. viminea* Low Open Woodland to Open Woodland; *Regelia ciliata* Closed Heath to Closed Tall Scrub; *Pericalymma ellipticum* Closed Heath; *Astartea* sp. Brixton Street and *Regelia ciliata* Shrubland to Open Heath; *Hypocalymma angustifolium* and *Melaleuca* sp. B Low Open Heath; *Evandra pauciflora* Closed Sedgeland



**Vegetation Condition:** >60% Very Good to Excellent, <40% Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** Trudgen and Keighery 1995 — *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Verticordia lindleyi* subsp. *lindleyi* (4); *Jacksonia gracilis*; at least 10 taxa characteristic of the eastern side of the Swan Coastal Plain

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenway 73 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

#### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

#### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

### **BOUGAINVILLE AVENUE BUSHLAND, FORRESTFIELD**

**Boundary Definition:** protected area boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

#### **SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 401

**Area (ha):** bushland 5.4

**Map no.** 49

**Map sheet series ref. no.** 2034–II SE, 2134–III SW

**Other Names:** Agriculture Protection Board

**Local Authorities (Suburb):** Shire of Kalamunda (Forrestfield)

**Includes CALM Managed Land:** Reserve 29815 (Use and requirements of Agricultural Protection Board and conservation)

#### **SECTION 2: REGIONAL INFORMATION**

##### **LANDFORMS AND SOILS**

##### **Bassendean Dunes**

Bassendean Sands (Qpb: S8)

##### **VEGETATION AND FLORA**

##### **Vegetation Complexes**

Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

##### **Floristic Community Types**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20a *Banksia attenuata* woodlands over species-rich dense shrublands

##### **WETLANDS**

No wetlands mapped

##### **THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)

#### **SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (APBF 01–02)); detailed survey (Robinson and Mawson 1992)

##### **Structural Units**

Uplands: *Eucalyptus marginata* Open Woodland; *Banksia menziesii* and *B. attenuata* Open Forest to Woodland over Mixed Open Heath; Mixed Open Heath





**Vegetation Condition:** >90% Excellent, <10% Pristine, with areas of severe localised disturbance

**Total Flora:** 182 native taxa (Robinson and Mawson 1992) (estimated >90% expected flora)

**Significant Flora:** *Conospermum undulatum* (R); *Haemodorum loratum* (3), *Lambertia multiflora* var. *darlingensis* (3), *Isopogon drummondii* (3), *Dryandra pteridifolia* subsp. *vernalis* (3) (Robinson and Mawson 1992). *Olax scalariformis* (3) (Robinson and Mawson 1992); *Dasyogon obliquifolius*, *Schoenus latitans*, *Xanthorrhoea drummondii*, *Eremaea fimbriata*, *Hakea conchifolia*, *Pityrodia bartlingii*, *Stenanthemum humile*, *Banksia incana*

**Fauna:** multiple survey for birds (55 species) (Mawson and Massam 1995). Good assemblage of resident and seasonal visitors. Significant bird species: category 1 (2), category 3 (4) and category 4 (7). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland

**Other Special Attributes:** Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance

**Recommendation:** Local Reserve Mechanism (see Table 3, Volume 1).

### HARTFIELD PARK BUSHLAND, FORRESTFIELD

**Boundary Definition:** protected area boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 320

**Area (ha):** bushland 73.6

**Map no.** 49

**Map sheet series ref. no.** 2033-I NE, 2034-II SE, 2133-IV NW, 2134-III SW

**Other Names:** Submission Area 242; Location 68 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Kalamunda (Forrestfield, Wattle Grove)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: Mgs1) (Qha: Ms4)

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

###### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

S2 Northern *Pericalymma ellipticum* dense low shrublands (most southern representation)

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

20a *Banksia attenuata* woodlands over species-rich dense shrublands (in area of most southern representation)

23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### WETLANDS

**Wetland Types:** palusplain, creek, artificial channel

###### Natural Wetland Groups

###### Darling Plateau

Walyunga (D.1)

###### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (68.4ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified





**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Hart 01–04), Keighery, BJ, and Trudgen 1992, Shire of Kalamunda 1996)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992, Shire of Kalamunda 1996)

Uplands: *Eucalyptus calophylla* and *E. marginata* Low Forest; *Eucalyptus calophylla* Low Woodland; Low Woodlands dominated by *Eucalyptus marginata*, *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* and combinations of these; *Banksia attenuata* and *B. menziesii* Low Woodland

Wetlands: *Eucalyptus rudis* and *E. calophylla* Low Woodland; *Melaleuca preissiana* Open Low Woodland; Closed to Open Low Heath dominated by *Hypocalymma angustifolium*, *Pericalymma ellipticum*, *Hakea sulcata* and combinations of these with scattered clumps of *Actinostrobos pyramidalis* and *Beaufortia squarrosa*; scattered clumps of *Melaleuca viminea* over *Meeboldinia coangustatus* Closed Sedgeland

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance (Shire of Kalamunda 1996)

**Total Flora:** 119 native taxa, 8 weeds (plot-generated list only) (DEP 1996)

**Significant Flora:** *Conospermum undulatum* (R); *Isopogon drummondii* (3), *Lambertia multiflora* var. *darlingensis* (3), *Stachystemon axillaris* (4), *Verticordia lindleyi* subsp. *lindleyi* (4); *Beaufortia squarrosa*, *Dasyopogon obliquifolius*, *Hakea conchifolia*, *Xanthorrhoea drummondii*

**Fauna:** structured survey for birds (25 species), native mammals (1 species), reptiles (11 species) and amphibians (3 species) (Harvey *et al.* 1997). Significant bird species: category 4 (3). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south (canopy across road to Site 387) and west; part of Greenways 101, 102, 98 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended to be managed as a flora conservation (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); majority Site Category One Area Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**WELSHPOOL ROAD BUSHLAND, WATTLE GROVE**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 50

**Area (ha):** bushland 4.7

**Map no.** 49

**Map sheet series ref. no.** 2133–IV NW

**Other Names:** Location 67 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Kalamunda (Wattle Grove)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Mgs2)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20a *Banksia attenuata* woodlands over species-rich dense shrublands (in area of most southern representation)

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, Keighery, BJ, and Trudgen 1992, Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Uplands: *Banksia attenuata*, *B. menziesii*, *Eucalyptus marginata* subsp. *elegantella* and *Nuytsia floribunda*  
Woodland; *Eucalyptus calophylla* Open Woodland

**Vegetation Condition:** >65% Excellent to Very Good, <35% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Conospermum undulatum* (R), *Eucalyptus marginata* subsp. *elegantella* (2), *Isopogon drummondii* (3), *Lambertia multiflora* var. *darlingensis* (3); *Dasypogon obliquifolius*, *Hakea conchifolia*, *Xanthorrhoea acanthostachya*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north through road reserve and canopy to the Darling Range Regional Park (DPUD 1993) and south; part of Greenway 102 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Category One Area Middle Canning Catchment (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity

**Recommendation:** Part A: Other Government Land Mechanism. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**GREATER BRIXTON STREET WETLANDS, KENWICK**

**Boundary Definition:** protected area/bushland (part taken to cadastre)/management boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 387

**Area (ha):** bushland 126.7

**Map no.** 49, 55

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Brixton Street Wetlands, Kenwick Swamp/Yule Brook Reserve, Submission Areas 16 and 227, Locations 62–65 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Kalamunda (Wattle Grove), City of Gosnells (Kenwick)

**System 6 (1983):** M69 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Cs, Sc)

**Bassendean Dunes**





Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Guildford Complex

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 1: Foothills/Pinjarra Plain**

3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

**Supergroup 2: Seasonal Wetlands**

7 Herb-rich saline shrublands in clay pans

8 Herb-rich shrublands in clay pans

10a Shrublands on dry clay flats (most northern representation, except for outlier at Lake Pinjar)

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21c Low-lying *Banksia attenuata* woodlands or shrublands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, palusplain, creek

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (144.7ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Critically Endangered (floristic community type 3a), Endangered (floristic community type 10a),

Vulnerable (floristic community types 7, 8)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland (including claypans), creek (Yule Brook), vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996, DEP 1999, Gibson *et al.* 1994 (Brix 01–05, Yule 01–05), part Site — Hames Sharley Australia 1991a, Mattiske and Associates 1992); detailed survey (part Site — Goble-Garratt 1991, Keighery, GJ, and Keighery 1991, Keighery, GJ, 1993a, Keighery, BJ, and Keighery 1995, Keighery, BJ 1995b, Keighery, BJ 1995d, Speck and Baird 1984)

**Structural Units:** mapping (Goble-Garratt 1991, Hames Sharley Australia 1991a, Mattiske and Associates 1992, Speck and Baird 1984)

Uplands: *Eucalyptus calophylla* Open Forest to Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland  
 Wetlands: *Eucalyptus calophylla* Woodland; *Viminaria juncea* Tall Shrubland; *Melaleuca* Tall Shrublands to Closed Tall Scrub dominated by *Melaleuca viminea*, *Melaleuca raphiophylla*, *M. uncinata*, *M. cuticularis* and combinations of these; *Actinostrobilus pyramidalis* Closed Tall Scrub to Shrubland; Closed Heaths to Shrublands dominated by *Regelia ciliata*, *Kunzea recurva*, *Melaleuca lateritia*, *Pericalymma ellipticum* and *Astartea* sp. Brixton; *Verticordia* species and *Calytrix breviseta* subsp. *breviseta* Low Open Heath; mixed Open Low Heaths to Shrublands; *Halosarcia indica* Low Shrubland; Herblands dominated by *Borya* species, *Tribonanthes* species, *Stylidium* species and others in combination; Sedgeland dominated by *Meeboldinia cana*, *C. aristatus*, *M. coangustata*, *Tremulina tremula*, *Cyathochaeta avenacea*, *Lepidosperma rostratum* and combinations of these; *Amphibromus neesii* Grassland

**Scattered Native Plants:** *Banksia attenuata* and *B. menziesii* Low Woodland; *Melaleuca viminea* and *Melaleuca raphiophylla* Closed Tall Scrub — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** >555 native taxa (Keighery, GJ, and Keighery, BJ, 2000) (estimated >80% expected flora)

**Significant Flora:** *Eleocharis keigheryi* (R), *Andersonia gracilis* (R), *Calytrix breviseta* subsp. *breviseta* (R), *Diuris purdiei* (R), *Lepidosperma rostratum* (R), *Hydatella dioica* (R), *Acacia lasiocarpa* var. *bracteolata* (1), *Calandrinia* sp. Kenwick (GJK 10905) (1), *Schoenus pennisetis* (1), *Byblis lindleyi* (2), *Comesperma*





*radinocarpum* (2), *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Eryngium subdecumbens* ms (2), *Baeckea tenuifolia* (3), *Chamaescilla gibsonii* ms (3), *Stylidium mimeticum* (3), *Rhodanthe pyrethrum* (3), *Haemodorum loratum* (3), *Triglochin stowardii* (2), *Schoenus capillifolius* (2), *Schoenus benthamii* (3), *Schoenus* sp Waroona (GJK 12235) (3), *Synaphea acutiloba* (3), *Trichocline* sp. Treeton (BJK and NG 564) (3), *Anthotium junciforme* (4), *Aponogeton hexatepalus* (4), *Drosera occidentalis* subsp. *occidentalis*, *Grevillea thelemanniana* (4), *Hydrocotyle lemnoides* (4), *Verticordia lindleyi* subsp. *lindleyi* (4), *Villarsia submersa* (4); *Melaleuca brevifolia*, *Pimelea imbricata* var. *major*, *Stylidium roseo-alatum*; at least 80 significant taxa are found on the Site of which 30 are restricted in their natural distribution, 16 are endemic to the eastern side of the Swan Coastal Plain, 45 are normally associated with the Darling Scarp or Plateau and 15 are at the southern or northern limit of their ranges.

**Fauna:** structured surveys for birds (41 species), native mammals (1 species), reptiles (19 species) and amphibians (5 species) (How and Dell 1994, Dell 1995). Significant bird species: category 3 (1) and category 4 (4). Significant mammal species: Quenda (Friend 1996 D). Significant reptile species: Rosenberg's Goanna (*Varanus rosenbergi*), Gould's Goanna (*V. gouldii*), legless lizard (*Pletholax gracilis*) and a dragon (*Tympanocryptis adelaidensis*)

**Linkage:** adjacent bushland/canopy to the east (across Welshpool Road to Hartfield Park) and west; part of Greenways 98, 102, 106 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Outstanding flora diversity with at least 518 native taxa (a third of the taxa recorded for the Swan Coastal Plain); nominated for Register of the National Estate; recommended to be managed as a flora conservation area (Keighery, BJ, and Trudgen 1992); recommended to be designated as the Yule Brook Nature Reserve (Conservation Council of WA 1994); an area of long-term research studies and a reference area for identification of flora of the eastern side of the Swan Coastal Plain; Planning Control Area (WAPC/142 24-9-1996); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); majority Site Category One and Two Areas Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Interim List of the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the parts of the Site reserved for Parks and Recreation in the MRS should be purchased for National Park, Conservation Park, Nature Reserve or Regional Park. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

## KENWICK ROAD BUSHLAND, KENWICK

**Boundary Definition:** bushland (part taken to zoning) boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 422

**Area (ha):** bushland 0.8

**Map no.** 55

**Map sheet series ref. no.** 2033-I NE

**Other Names:** not known

**Local Authorities (Suburb):** City of Gosnells (Kenwick)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: Cs)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Guildford Complex

**Floristic Community Types:** \*not sampled, types inferred

###### Supergroup 2: Seasonal Wetlands

\*7 Herb-rich saline shrublands in clay pans





\*8 Herb-rich shrublands in clay pans

**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (1.1ha) (DEP 1998)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Vulnerable (floristic community types 7, 8)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1998, DEP 1999)

**Structural Units**

Wetlands: *Viminaria juncea* Tall Shrubland; *Verticordia densiflora* Low Open Heath; Sedgeland dominated by *Meeboldinia cana*, *M. aristatus*, *M. coangustata* and *Eleocharis keigheryi*

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Eleocharis keigheryi* (R), *Aponogeton hexatepalus* (4)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the west (cleared 1997)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Local Reserve Mechanism. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

**WHITE ROAD BUSHLAND, ORANGE GROVE**

**Boundary Definition:** bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 51

**Area (ha):** bushland 4.3

**Map no.** 55

**Map sheet series ref. no.** 2133-IV NW

**Other Names:** Location 59 (Keighery, BJ, and Trudgen 1992); part Gosnells remnant bushland area 59 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Gosnells (Orange Grove)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Yoganup Formation (Qpr: S12)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20a *Banksia attenuata* woodlands over species-rich dense shrublands (most southern representation)

**WETLANDS**

No wetlands mapped





**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992, Mattiske Consulting Pty Ltd 1997, Trudgen and Keighery 1995)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland over species-rich Open Heath

**Vegetation Condition:** >90% Excellent to Very Good

**Total Flora:** not known

**Significant Flora:** *Conospermum undulatum* (R), *Isopogon drummondii* (3), *Lambertia multiflora* var. *darlingensis* (3)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (worthy of protection) and east; part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Category One Area Middle Canning Catchment (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).

**CLIFFORD STREET BUSHLAND, MADDINGTON**

**Boundary Definition:** bushland taken to cadastre boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 53

**Area (ha):** bushland 7.74

**Map no.** 55

**Map sheet series ref. no.** 2033-I NE, 2133-IV NW

**Other Names:** Location 60 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** City of Gosnells (Maddington)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Cs)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**

Guildford Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*3b *Eucalyptus calophylla* — *E. marginata* woodlands on sandy clay soils

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands

**WETLANDS**

**Wetland Types:** palusplain

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (2.2ha)

**Swan Coastal Plain Lakes EPP:** none identified





**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20b), Vulnerable (floristic community type 3b)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992, Mattiske Consulting Pty Ltd 1997)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Allocasuarina fraseriana* Low Open Woodland; *Eucalyptus calophylla* Woodland; Mixed Open Shrubland; *Eucalyptus calophylla* and *Eucalyptus wandoo* Woodland

Wetlands: Mixed Open Shrubland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Excellent to Very Good, <40% Good to Degraded, with severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Conospermum undulatum* (R), *Lambertia multiflora* var. *darlingensis* (3)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland

**Other Special Attributes:** Category One Area Middle Canning Catchment (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Other Government Land Mechanism. Part B: MRWA Road Reserve (design and management) (see Table 3, Volume 1).

**MARY CARROLL PARK AND ADJACENT BUSHLAND, GOSNELLS**

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 124

**Area (ha):** bushland 6.5 (Site also includes open water.)

**Map no.** 55

**Map sheet series ref. no.** 2033-I NE, 2133-IV NW

**Other Names:** Location 51 (Keighery, BJ, and Trudgen 1992); Gosnells remnant bushland area 28 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Gosnells (Gosnells)

**System 6 (1983):** M76 Part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qrw: Sp2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 2: Seasonal Wetlands**

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

**WETLANDS**

**Wetland Types:** lake

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

Bennet Brook (B/P.4)





**Wetland Management Objectives:** Conservation (13.5ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, EPA and WAWA 1990, Keighery, BJ, and Trudgen 1992, Trudgen and Keighery 1995)

**Structural Units:** mapping (EPA and WAWA 1990)

Uplands: *Banksia menziesii* and *B. attenuata* Low Open Woodland

Wetlands: *Eucalyptus rudis* Open Forest to Woodland; *Melaleuca raphiophylla* Low Closed Forest to Woodland; *Eucalyptus calophylla* and *Melaleuca preissiana* Woodland; *M. teretifolia* Closed Scrub to High Open Shrubland; *Baumea articulata* Sedgeland

**Vegetation Condition:** Very Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** limited survey for birds (46 species) (RAOU 1996 D). Important feeding area for large assemblage of waterbirds including Blue-billed, Musk and Hardhead Ducks. Significant bird species: category 3 (5) and category 4 (2)

**Linkage:** no adjacent bushland

**Other Special Attributes:** 'Wetland of special note' (Payne 1993b); Category One Area Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**CONNELL AVENUE BUSHLAND, KELMSCOTT**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 61

**Area (ha):** bushland 19.9

**Map no.** 61

**Map sheet series ref. no.** 2133-IV NW

**Other Names:** Submission Area 243 and 273; Location 48 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** City of Armadale (Kelmescott)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Csg)

Yoganup Formation (Qpr: S12)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**

Swan Complex

**Floristic Community Types:** \*not sampled, types inferred (wetland unit unable to be inferred)

**Supergroup 1: Foothills/Pinjarra Plain**

\*S8 *Eucalyptus wandoo* woodlands (Scarp)

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands



**WETLANDS**

**Wetland Types:** dampland (Keighery, BJ, and Trudgen 1992)

**Wetland Management Objectives:** Conservation (0.97ha)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Endangered (floristic community type 20b)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1998, Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus marginata* and *Allocasuarina fraseriana* Woodland; *Eucalyptus wandoo* Low Open Woodland; *Jacksonia sternbergiana* Open Scrub

Wetlands: *Eucalyptus rudis* Woodland over *Melaleuca preissiana* Open Forest; *Melaleuca raphiophylla* High Open Shrubland

**Vegetation Condition:** >75% Very Good to Excellent, <25 % Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Eucalyptus marginata* subsp. *elegantella* (2)

**Fauna:** not known

**Linkage:** adjacent bushland east to the Darling Range Regional Park (DPUD 1993) and west, bushland/canopy to the Canning River (Site 246); part of Greenway 71 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** One of few areas in the PMR where the Plain and the Darling Scarp and Plateau meet through naturally vegetated areas; recommended to be managed as a flora conservation area (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); included in Darling Range Regional Park (MfP 1995); Category Two Area Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological systems or natural processes, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; Existing Parks and Recreation Reserve. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**BOB BLACKBURN RESERVE BUSHLAND, ARMADALE**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 62

**Area (ha):** bushland 5.1

**Map no.** 61

**Map sheet series ref. no.** 2033-I SE, 2133-IV SW

**Other Names:** Submission Area 166; Location 41 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** City of Armadale (Armadale)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Cs)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

Foothills





Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**

Guildford Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Endangered (floristic community type 20b)

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla*, *E. marginata* and *Banksia attenuata* Woodland

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Lambertia multiflora* var. *darlingensis* (S. Wallace pers. comm.)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland

**Other Special Attributes:** part Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity

**Recommendation:** Local Reserve Mechanism (see Table 3, Volume 1).

### LAMBERT LANE BUSHLAND, WUNGONG

**Boundary Definition:** bushland (part taken to cadastre)/bushland group boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 264

**Area (ha):** bushland 8.3

**Map no.** 67

**Map sheet series ref. no.** 2133-IV SW

**Other Names:** Submission Area 269; Location 5 (Keighery, BJ, and Trudgen 1994)

**Local Authorities (Suburb):** City of Armadale (Armadale, Brookdale)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Foothills

Colluvial Deposits (Qc: Csg)

##### VEGETATION AND FLORA

##### Vegetation Complexes

##### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

##### Floristic Community Types

##### Supergroup 1: Foothills/Pinjarra Plain

3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

##### Supergroup 2: Seasonal Wetlands

##### WETLANDS

**Wetland Types:** palusplain, creek





**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Conservation (3.7ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Critically Endangered (floristic community type 3a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated upland, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1999, Gibson *et al.* 1994 (Lamb 01–02), Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Upland: *Eucalyptus calophylla* and *E. lanepolei* Low Open Woodland; *Eucalyptus calophylla* and *E. lane-polei* Low Open Woodland; mixed Open Low Heath

Wetlands: not known

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 107 native taxa (plot-generated list only)

**Significant Flora:** *Synaphea acutiloba* (3); *Lomandra spartea*, *Eucalyptus lane-polei*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenways 106, 128 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); recommended to be managed as a flora conservation area (Keighery, BJ, and Trudgen 1992); contains plant communities representative of the eastern side of the Swan Coastal Plain; part Site Category One Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation.

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**OSCAR BRUNS RESERVE, BYFORD**

**Boundary Definition:** bushland (part taken to zoning) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 449

**Area (ha):** bushland 1.3 (boundary matches the bushland, which is unmapped)

**Map no.** 67

**Map sheet series ref. no.** 2133–IV SW

**Other Names:** Location 2 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Darling Downs)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Csg)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**

Guildford Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 1: Foothills/Pinjarra Plain**





\*3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands

\*S8 *Eucalyptus wandoo* woodlands (Scarp)

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined, Critically Endangered (floristic community type 3c)

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* and *E. wandoo* Woodland

**Vegetation Condition:** >50% Very Good to Good, <50% Degraded to Good, with areas of severe localised disturbance associated with past mining activity

**Total Flora:** not known

**Significant Flora:** *Lambertia multiflora* var. *darlingensis* (3); at least six taxa associated with the Darling Scarp and eastern side of the Swan Coastal Plain

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 77 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity

**Recommendation:** Local Reserve Mechanism (see Table 3, Volume 1).

### ABERNETHY ROAD BUSHLAND, OAKFORD

**Boundary Definition:** management boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 65

**Area (ha):** bushland 11.8

**Map no.** 67

**Map sheet series ref. no.** 2033-I SE

**Other Names:** Submission Area 282; Location 8 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Oakford)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: Cs)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Lagoonal and Estuarine Deposits (within the Bassendean Dunes/Pinjarra Plain)

Lagoonal deposits in Bassendean dunes (Qpw: S9)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Beermullah Complex

**Floristic Community Types:** \*not sampled, types inferred

###### Supergroup 1: Foothills/Pinjarra Plain

\*3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

###### Supergroup 2: Seasonal Wetlands

\*8 Herb-rich shrublands in clay pans





**WETLANDS**

**Wetland Types:** palusplain, artificial channel

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Multiple Use, and Resource Enhancement. Also possible DRF presence therefore may be Conservation (22.8ha), yet to be determined (DEP 1998)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Critically Endangered (floristic community type 3a), Vulnerable (floristic community type 8)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996, DEP 1998, DEP 1999, Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Open Forest to Woodland

Wetlands: *Actinostrobus pyramidalis* and *Melaleuca* Tall Shrublands to Tall Open Scrub dominated by *Melaleuca viminea*, *Melaleuca lateriflora*, *Melaleuca uncinata*, *Melaleuca lateritia* and combinations of these; Closed to Open Heath dominated by *Kunzea recurva*, *Regelia ciliata* and *Pericalymma ellipticum*; Open Low Heath to Low Shrubland dominated by *Verticordia plumosa* var. *pleiobotrya* or *Baeckea tenuifolia*; Herblands dominated by *Borya* species, *Tribonanthes* species, *Stylidium* species and others in combination; Sedgeland dominated by *Chaetanthes aristatus*, *M. cana* and *M. coangustata* or combinations of these; *Lepidosperma longitudinale* Sedgeland; *Baumea juncea* Sedgeland

**Scattered Native Plants:** *Eucalyptus calophylla* Open Forest to Woodland, *Casuarina obesa* Low Open Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >50% Good, <50 % Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Verticordia plumosa* var. *pleiobotrya* (R), *Eryngium subdecumbens* ms (1), *Baeckea tenuifolia* (3)

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenways 62, 114 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).

**BYFORD TO SERPENTINE RAIL/ROAD RESERVES AND ADJACENT BUSHLAND**

**Boundary Definition:** management boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 350, 365, 375                      **Area (ha):** bushland 33.1

**Map no.** 67, 73, 78

**Map sheet series ref. no.** 2033–I SE, 2033–II NE, 2133–IV SW

**Other Names:** Site includes Bella Cumming Reserve, Paul Robinson Park and Lambkin Reserve

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Byford, Mundijong, Serpentine)

**Includes CALM Managed Land:** Reserve 32352 (Preservation of Flora)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**





Colluvial Deposits (Qc: Csg)

**Pinjarra Plain**

Guildford Formation (Qpa: Cs) (Qha: Msc1)

Alluvial/Colluvial Deposits (Qpo: FS1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Spc)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**

Guildford Complex

Beermullah Complex (unmapped bushland, most southern occurrence)

**Floristic Community Types** \*not sampled, types inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

\*3b *Eucalyptus calophylla* — *E. marginata* woodlands on sandy clay soils

\*3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands

**Supergroup 2: Seasonal Wetlands**

\*2 Southern wet shrublands

\*8 Herb-rich shrublands in clay pans

\*9 Dense shrublands on clay flats

\*10a Shrublands on dry clay flats

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands

**WETLANDS**

**Wetland Types:** dampland, palusplain, creek, artificial channel

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Swan Coastal Plain Rivers**

Goegrup (R.4)

**Wetland Management Objectives:** Conservation (58.7ha), Resource Enhancement, Multiple Use, not assessed

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED COMMUNITIES**

Critically Endangered (floristic community type 3a, 3c), Endangered (floristic community type 2, 10a, 20b),

Vulnerable (floristic community type 3b, 8, 9)

**SECTION 3: SPECIFIC SITE DETAIL** (Site described in parts)

**Soldiers Road** (Sites 350, 365 — road and rail reserve from Byford to Serpentine)

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** detailed survey (part Site — Keighery, BJ, 1996c (Byford to Mundijong))

**Structural Units:** mapping (part Site — Keighery, BJ, 1996c (Byford to Mundijong))

Uplands: *Eucalyptus calophylla* Forest to Woodland; *Eucalyptus marginata* subsp. *elegantella*, *E. calophylla* and *E. lane-poolei* Low Forest to Woodland; *Eucalyptus marginata* subsp. *elegantella*, *Banksia attenuata* and *B. menziesii* Woodland

Wetlands: *Eucalyptus rudis* Forest to Woodland; *Pericalymma ellipticum* Open Heath; mixed Open Heath; *Viminaria juncea* Tall Shrubland; *Melaleuca viminea*, *Melaleuca lateriflora* and *Viminaria juncea* Open Scrub

**Scattered Native Plants:** areas of canopy only or few scattered native plants — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >50% Excellent to Very Good, <50% Good to Completely Degraded, with areas of severe localised disturbance (mapped in Keighery, BJ, 1996 from Byford to Mundijong)





**Total Flora:** 144 native taxa (Keighery, BJ, 1996c) (estimated >60% expected flora based on Byford to Mundijong area)

**Significant Flora:** *Eryngium pinnatifidum* subsp. *palustre* (2), *Anthotium junciforme* (4), *Drosera occidentalis* subsp. *occidentalis* (4), *Aristida ramosa* (1), *Eucalyptus marginata* subsp. *elegantella* (2)

**Bella Cumming Reserve** (part Site 350 in Mundijong Townsite)

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992); detailed survey (Keighery, BJ, 1996c)

**Structural Units:** mapping (Keighery, BJ, 1996c)

Uplands: *Eucalyptus marginata*, *Banksia attenuata*, *B. menziesii*, *B. grandis* and *Allocasuarina fraseriana*  
Woodland to Open Woodland

**Vegetation Condition:** Excellent to Very Good (Keighery, BJ, 1996c)

**Total Flora:** 102 native taxa (Keighery, BJ, 1996c) (estimated 85% expected flora)

**Significant Flora:** none recorded

**Lambkin Reserve and bushland in Paul Robinson Park/Serpentine Golf Course** (Site 375)

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (xLamb 01), DEP 1998); detailed survey (Keighery, GJ, and Keighery 1996)

**Structural Units:** mapping (Keighery, GJ, and Keighery 1996)

Uplands: *Eucalyptus marginata* subsp. *elegantella* and *E. calophylla* Woodland

Wetlands: *Melaleuca raphiophylla* Low Forest; *Kunzea recurva* and *Pericalymma ellipticum* Open to Closed Low Heath; Herbland; Sedgeland

**Vegetation Condition:** >60% Very Good to Excellent, <40% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 136 native taxa (Keighery, GJ, and Keighery 1996) (>85% expected flora)

**Significant Flora:** *Tetraria australiensis* (R), *Eucalyptus marginata* subsp. *elegantella* (2), *Actinostrobos acuminatus*, *Epaltis australis*, *Lomandra sonderi*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the east (Sites 361, 354, 362 and 371) and west (Sites 321, 352 and 371); part of Greenways 61, 62, 63, 64, 65, 66, 106 (Tingay, Alan & Associates 1998a); Sites 350 and 365 are part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Soldiers Road recognised as an important flora road by the Shire of Serpentine-Jarrahdale (Shire of Serpentine-Jarrahdale 1992, Keighery, BJ, 1996c); contains a north-south transect of plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:**

**Site 350** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Local Reserve Mechanism. Part C: Major Road and Rail Reserve Mechanism; MRWA Road Reserve (design and management) (see Table 3, Volume 1).

**Site 365** Part A: Local Reserve Mechanism. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**Site 375** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Major Road and Rail Reserve Mechanism; MRWA Road Reserve (design and management) (see Table 3, Volume 1).

**BRICKWOOD RESERVE AND ADJACENT BUSHLAND, BYFORD**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

**SECTION 1:**

**Bush Forever Site no.** 321

**Area (ha):** bushland 44.9

**Map no.** 67

**Map sheet series ref. no.** 2033-I SE, 2133-IV SW

**Other Names:** Location 10 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Byford)





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Foothills

Colluvial Deposits (Qc: Csg)

#### Pinjarra Plain

Guildford Formation (Qpa: Cs)

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

##### Pinjarra Plain

Guildford Complex

#### Floristic Community Types

##### Supergroup 1: Foothills/Pinjarra Plain

3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

##### Supergroup 2: Seasonal Wetland

9 Dense shrublands on clay flats (most northern representation)

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands

### WETLANDS

**Wetland Types:** palusplain, creek

#### Natural Wetland Groups

##### Pinjarra Plain

Keysbrook (P.1)

**Wetland Management Objectives:** Conservation (17.7ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 3a), Endangered (floristic community type 20b)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Brick 01–08), Keighery, BJ, and Trudgen 1992); detailed survey (part Site — Keighery, GJ, and Keighery 1993a)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992, Keighery, GJ, and Keighery 1993a)

Uplands: *Eucalyptus calophylla* and *E. marginata* Woodland; *Banksia attenuata* and *B. menziesii* Woodland

Wetlands: *Eucalyptus calophylla* Open Woodland; *Melaleuca viminea*, *M. lateriflora* and *Viminaria juncea* Scrub; *Pericalymma ellipticum* Closed Low Heath; mixed Herbland; *Meeboldinia coangustata* and *Lepidosperma longitudinale* Sedgeland

**Vegetation Condition:** >80% Excellent to Very Good, <20% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 309 native taxa, 24 weeds (Keighery, GJ, and Keighery 1993a) (estimated >90% expected flora)

**Significant Flora:** *Schoenus pennisetis* (1), *Trichocline* sp. Treeton (BJK & NG 561) (2), *Stylidium mimeticum* (3), *Lambertia multiflora* var. *darlingensis* (3), *Drosera occidentalis* subsp. *occidentalis* (4), *Verticordia lindleyi* subsp. *lindleyi* (4); *Isopogon asper*, *Stylidium utricularioides*, *Johnsonia pubescens* subsp. *cygnorum* (one of three known populations), *Eucalyptus lane-poolei* (one of the few patches on the Swan Coastal Plain), *Jacksonia gracilis*

**Fauna:** structured survey for birds (28 species), native mammals (2 species), reptiles (12 species) and amphibians (5 species) (Harvey *et al.* 1997). Significant bird species: category 1 (1), category 3 (1), category 4 (4) including the Painted Button-quail. Significant mammal species: Quenda (Friend 1996 D, Harvey *et al.* 1997)

**Linkage:** adjacent bushland to the east (Site 350); part of Greenway 62, 106 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); recommended to be managed as a flora conservation area (Keighery, BJ, and Trudgen 1992); National Trust of Australia (WA) Classification; contains plant communities representative of the eastern side of the Swan Coastal Plain









**Vegetation and Flora:** limited survey (DEP 1998, DEP 1999, Tingay, Alan & Associates 1998b)

**Structural Units:** mapping (Tingay, Alan & Associates 1998b)

Uplands: *Eucalyptus calophylla* and *E. marginata* subsp. *elegantella* Woodlands; *Banksia attenuata* and *B. menziesii* Low Woodland

Wetlands: Woodlands dominated by *Eucalyptus rudis*, *E. calophylla* and *E. wandoo*

**Scattered Native Plants:** *Eucalyptus rudis*, *E. calophylla* and/or *E. wandoo* Woodland — included at the subdivision stage as buffer for creekline bushland

**Vegetation Condition:** >20% Excellent to Very Good, <70% Very Good to Good, with Degraded patches and areas of severe localised disturbance

**Total Flora:** 155 native taxa, 7 weeds (DEP 1998, Tingay, Alan & Associates 1998b)

**Significant Flora:** DEP 1998 — *Aristida ramosa* (1), *Eucalyptus marginata* subsp. *elegantella* (2); at least 17 taxa representative of the eastern side of the Swan Coastal Plain

**Linkage:** part of Greenway 77 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

#### Site 351

**Landscape Features:** creek

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992)

**Scattered Native Plants:** *Eucalyptus calophylla* and *E. marginata* Open Woodland

**Linkage:** part of Greenway 61 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:**

**Site 271** Part A: Rural Complementary Mechanism. Part B: Strategic Negotiated Planning Solution. Part C: Urban Negotiated Planning Solution (see Table 3, Volume 1)

**Site 351** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

## CARDUP NATURE RESERVE AND ADJACENT BUSHLAND CARDUP

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 352

**Area (ha):** bushland 86.2

**Map no.** 67, 73

**Map sheet series ref. no.** 2033-I SE, 2033-II NE

**Other Names:** Reserve C2457 Mundijong; Location 11 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Cardup)

**Includes CALM Managed Land:** Reserve 2457 (Conservation of Flora and Fauna)

**System 6 (1983):** M83 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Foothills

Colluvial Deposits (Qc: Csg)

##### Pinjarra Plain

Guildford Formation (Qpa: Cs)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### VEGETATION AND FLORA

##### Vegetation Complexes

##### Pinjarra Plain

Guildford Complex





**Floristic Community Types**

**Supergroup 1: Foothills/Pinjarra Plain**

3b *Eucalyptus calophylla* — *E. marginata* woodlands on sandy clay soils

**Supergroup 2: Seasonal Wetlands**

6 Weed dominated wetlands on heavy soils

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

**WETLANDS**

**Wetland Types:** palusplain, creek, sumland (wetland not previously described, Keighery, GJ, and Keighery 1993a)

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Multiple Use, Conservation (Keighery, GJ, and Keighery 1993a), not assessed

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Endangered (floristic community type 20b), Vulnerable (floristic community type 3b)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated upland, vegetated wetland, creek

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Card 01–13), Keighery, BJ, and Trudgen 1992); detailed survey (part Site — Keighery, GJ, and Keighery 1993a (Cardup Nature Reserve))

**Structural Units:** mapping (Keighery, GJ, and Keighery 1993a, Keighery, BJ, and Trudgen 1992)

Uplands: Woodlands dominated by *Eucalyptus calophylla* and/or *E. marginata*; *Banksia attenuata*, *B. menziesii* and *B. grandis* Woodland to Open Forest with scattered to co-dominant *Xylomelum occidentale* and *Nuytsia floribunda*; *Allocasuarina humilis*, *Hakea ruscifolia*, *Hibbertia hypericoides* Low Shrubland

Wetlands: *Melaleuca preissiana* Low Woodland; *Mesomelaena tetragona* and *Hypolaena exsulca* Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 253 native taxa, 47 weeds (Keighery, GJ, and Keighery 1993b) (estimated >90% expected flora)

**Significant Flora**

*Eryngium pinnatifidum* subsp. *palustre* ms (2), *Lambertia multiflora* var. *darlingensis* (3), *Drosera macrantha* (BJK and NG 228), *Johnsonia pubescens* subsp. *cygnorum* (known from only two other bushland areas), *Dasyopogon obliquifolius* (most southern record), *Dasyopogon obliquifolius*, *D. bromeliifolius* (co-occurrence of these two *Dasyopogon* species is not common on the eastern side of the Swan Coastal Plain)

**Fauna:** structured survey for birds (37 species), native mammals (1 species), reptiles (14 species) and amphibians (4 species) (Harvey *et al.* 1997). Significant bird species: category 1 (1), category 3 (6) and category 4 (6).

Significant mammal species: Quenda

**Linkage:** adjacent canopy to the north and bushland east (Site 350); part of Greenways 61, 106 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain; National Trust of Australia (WA) Classification

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Sites with Some Existing Protection; the existing purpose, care, control and management of Reserve 2457 is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).



## NORMAN ROAD BUSHLAND, WHITBY/CARDUP

**Boundary Definition:** Site 354 — management boundary (Boundary adjusted from that in draft *Perth's Bushplan.*); Site 361 — bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 354, 361

**Area (ha):** bushland 113.6

**Map no.** 73

**Map sheet series ref. no.** 2033-II NE, 2133-III NW

**Other Names:** Submission Area 187; Locations 16, 17 and 18 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Whitby, Cardup)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: FS1, Cs)

##### Foothills

Colluvial Deposits (Qc: Csg)

Yoganup Formation (Qpr: S12)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

###### Pinjarra Plain

Guildford Complex

##### Floristic Community Types

###### Supergroup 1: Foothills/Pinjarra Plain

1a *Eucalyptus haematoxylon* — *E. marginata* woodlands on Whicher foothills (most northern occurrence, disjunct)

3b *Eucalyptus calophylla* — *E. marginata* woodlands on sandy clay soils

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands

#### WETLANDS

**Wetland Types:** palusplain, creek, artificial channel

##### Natural Wetland Groups

###### Darling Plateau

Little Dardanup (D.2)

###### Pinjarra Plain

Keysbrook (P.1)

**Wetland Management Objectives:** Conservation (0.1ha), Multiple Use and Conservation (length unknown, DEP 1996), not assessed

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Endangered (floristic community type 20b), Vulnerable (floristic community type 3b)

### SECTION 3: SPECIFIC SITE DETAIL

#### Site 354

**Landscape Features:** vegetated upland, vegetated creek

**Vegetation and Flora:** limited survey (DEP 1996 (Norm 01-07), Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Open Forest to Woodland; *Eucalyptus marginata* subsp. *elegantella* Open Forest to open Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus lanepolei* and *E. marginata* Open Forest

Wetlands: *Eucalyptus calophylla* Open Forest to Woodland (occasional *Eucalyptus rudis*)

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good

**Scattered Native Plants:** *Eucalyptus calophylla* and *E. lanepolei* Open Forest to Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Total Flora:** 155 native taxa, 18 exotic taxa (plot-generated list only)

**Significant Flora:** *Drakaea elastica* (R), *Tetraria australiensis* (R), *Eucalyptus marginata* subsp. *elegantella* (2), *Lambertia multiflora* var. *darlingensis* (3); *Xanthorrhoea acanthostachya*, *Patersonia babianoides*, *Dryandra kippistiana*, *Eucalyptus lanepolei*, *Lomandra spartea*, *Trichocline spathulata*, *Patersonia rudis*





**Fauna:** structured survey for birds (20 species), native mammals (3 species), reptiles (11 species) and amphibians (4 species) (Harvey *et al.* 1997). Significant birds: Scarlet Robin, Weebill, Yellow-rumped and Western thornbills and Splendid Fairy-wren. Significant bird species: category 1 (1), category 3 (4) and category 4 (1). Significant mammal species: Pygmy Possum and Mardo

**Linkage:** part of Greenways 77, 106 (Tingay, Alan & Associates 1998a)

**Site 361**

**Landscape Features:** vegetated upland

**Vegetation and Flora:** limited survey (DEP 1996)

**Scattered Native Plants:** *Eucalyptus calophylla* and *E. lanepolei* Open Forest to Woodland over scattered native shrubs and herbs — regionally significant vegetation

**Linkage:** adjacent bushland/canopy along Site 350 Byford to Serpentine Rail/Road Reserve, east along creekline to Darling Range Regional Park (DPUD 1993); part of Greenway 106 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part Site 354 Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:**

**Site 354 Part A:** Site with Some Existing Protection; part of this Site is already reserved for Parks and Recreation in the Metropolitan Region Scheme and should be set aside as a Conservation Park or Nature Reserve. **Part B:** Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1)

**Site 361** Rural Complementary Mechanism (see Table 3, Volume 1).

**JACKSON ROAD BUSHLAND, PEEL ESTATE**

**Boundary Definition:** bushland (part taken to cadastre)/wetland (Swan Coastal Plain Lakes EPP) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 68

**Area (ha):** bushland 19.3 (Site possibly includes open water.)

**Map no.** 72

**Map sheet series ref. no.** 2033-II NE

**Other Names:** Locations 13 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Oldbury)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: CS, Sc)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Spc)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Serpentine River Complex (most northern occurrence)

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**WETLANDS**

**Wetland Types:** lake, palusplain, sumpland, artificial channel





**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 13.9ha + 1.4ha = 15.3ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** possibly includes open water, vegetated wetland

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992, Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Wetlands: *Eucalyptus rudis* Open Forest

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Very Good to Degraded

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**ROMAN ROAD BUSHLAND, WHITBY**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 362

**Area (ha):** bushland 8.4

**Map no.** 73

**Map sheet series ref. no.** 2033-II NE

**Other Names:** Location 20 (Keighery, BJ, and Trudgen 1992), part Submission Area 180

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Mundijong)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: CS)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

\*3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands

**WETLANDS**

**Wetland Types:** palusplain

**Natural Wetland Groups**

**Pinjarra Plain**





Keysbrook (P.1)

**Wetland Management Objectives:** Conservation (2.7ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Critically Endangered (floristic community type 3a, 3c), Endangered (floristic community type 20b)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999 (edge), Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Open Forest to Woodland; *Banksia* species Low Woodland

Wetlands: *Eucalyptus calophylla* Open Forest to Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >90% Very Good to Good, <25% Degraded

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north and west (Site 350); part of Greenway 106 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**MUNDIJONG AND WATKINS ROADS BUSHLAND, MUNDIJONG/PEEL ESTATE**

**Boundary Definition:** protected area/bushland (part taken to cadastre)/management boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 360

**Area (ha):** bushland 73.8 (some not mapped)

**Map no.** 71, 72, 73

**Map sheet series ref. no.** 2033-II NE, 2133-III NW

**Other Names:** Submission Area 281, Location 21 and 22 (Keighery, BJ, and Trudgen 1992), Watkins Rd Reserve

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Mundijong, Mardella, Oldbury)

**Includes CALM Managed Land:** Reserve 23012 (Conservation of Flora)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Csg)

Yoganup Formation (Qpr: S12)

Armadale Shale (Pa: SH)

**Pinjarra Plain**

Guildford Formation (Qpa: CS, C2) (Qha: Msc1)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**





Guildford Complex

**Floristic Community Types** \*not sampled, types inferred

**Supergroup 1: Foothills/Pinjarra Plain**

3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils (Mundijong Rd)

3c *Eucalyptus calophylla* — *Xanthorrhoea preissii* woodlands and shrublands (Mundijong Rd)

\*S8 *Eucalyptus wandoo* woodlands (Scarp) (Watkins Rd)

**Supergroup 2: Seasonal Wetlands**

\*2 Southern wet shrublands (Watkins Rd)

8 Herb-rich shrublands in clay pans (Mundijong Rd)

9 Dense shrublands on clay flats (Mundijong Rd)

\*10a Shrublands on dry clay flats (Watkins Rd)

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands (Watkins Rd)

**WETLANDS**

**Wetland Types:** palusplain, artificial channel, creek, sumpland

**Natural Wetland Groups**

**Darling Plateau**

Little Dardanup (D.2)

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Conservation (51.5ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** 2.5ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Critically Endangered (floristic community types 2, 3a, 3c, 10a, 20b), Vulnerable (floristic community types 8, 9)

**SECTION 3: SPECIFIC SITE DETAIL** (described in two parts)

**Mundijong Road** (from intersection Duckpond and Mundijong Roads, east to Watkins Road)

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Duck 0–03, Mud 02–09), Keighery, BJ, and Trudgen 1992, Keighery, GJ, *et al.* 1995, Shire of Serpentine-Jarrahdale 1992); detailed survey (Keighery, GJ, 1996c, Keighery, BJ, *et al.* 1997)

**Structural Units:** mapping (Keighery, BJ, 1996c, Keighery, BJ, *et al.* 1997)

Uplands: *Eucalyptus calophylla* Forest to Woodland

Wetlands: *Eucalyptus calophylla* Forest to Woodland; *Casuarina obesa* Forest to Woodland; *Eucalyptus rudis* Woodland to Forest; *Melaleuca raphiophylla* Woodland to Forest; *Melaleuca* Open Heath to Shrubland dominated by *Melaleuca viminea*, *Melaleuca uncinata*, *M. lateriflora* and combinations of these; *Actinostrobos pyramidalis* Closed Tall Scrub to Shrubland; *Viminaria juncea* High Shrubland; *Melaleuca viminea* Tall Shrubland; *Pericalymma ellipticum* Heath; *Regelia ciliata* Heath; mixed Low Open Heath; Herblands dominated by *Borya* species, *Tribonanthes* species, *Stylidium* species and others in combination; Sedgelands dominated by *Meeboldinia cana*, *M. aristatus*, *M. coangustatus*, *Cyathochaeta avenacea*, *Chorizandra enodis* and combinations of these; *Themeda triandra* Grassland

**Scattered Native Plants:** scattered areas of Woodland to Forest dominated by *Eucalyptus calophylla*, *Casuarina obesa* and *Melaleuca raphiophylla* Low Forest to Woodland

**Vegetation Condition:** >50% Excellent to Very Good, <50% Good to Completely Degraded, with areas of severe localised disturbance (Keighery, BJ, 1996c, Keighery, BJ, *et al.* 1997a)

**Total Flora:** 253 native taxa (Keighery, BJ, *et al.* 1997c) (estimated 90% expected flora)

**Significant Flora:** *Verticordia plumosa* var. *pleiobotrya* ((R), only known from the Mundijong area), *Tetraria australiensis* (R), *Acacia lasiocarpa* var. *bracteolata* (1), *Eryngium pinnatifidum* subsp. *palustre* (2), *Muriophyllum echinatum* (3), *Stylidium mimeticum* (3), *Stylidium longitubum* (3), *Baeckea tenuifolia* (3), *Anthotium junciforme* (4), *Aponogeton hexatepalus* (4); *Angianthus drummondii* — *preissianus* — *micropodioides* group, *Podolepis gracilis* (Swamp form), *Pogonolepis stricta* 'long bract form', *Drosera micrantha* subsp. *micrantha* (Swan Coastal Plain form), *Themeda triandra* (normally occurring in Wandoo Woodland, here occurring in Marri Woodland), *Leptocarpus* aff. *crebriculmis* (BJK and NG 236), *Kennedia stirlingii* (most western record), *Trichocline spathulata*; including 74 taxa characteristic of the eastern side of the Swan Coastal Plain and at least 12 taxa endemic to the eastern side of the Plain

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)





**Linkage:** adjacent bushland to the north (Site 350), south (Site 365) and east; part of Greenways 66, 87, 88, 129 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** identified since the early 1990s in a series of reports as being a regionally significant roadside remnant (Shire of Serpentine-Jarrahdale 1992, Keighery, BJ, and Trudgen 1992, Keighery, GJ, and Keighery 1992, Keighery, GJ, *et al.* 1995, Keighery, BJ, 1996c, Keighery, BJ, *et al.* 1997b); part Site Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

**Watkins Road Nature Reserve and bushland to east and north** (corner South West Highway and Watkins Road)

**Landscape Features:** vegetated wetland, vegetated upland

**Vegetation and Flora:** limited survey (Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Low Open Woodland; *Eucalyptus wandoo* Woodland; *Banksia menziesii*, *B. attenuata* and *B. grandis* Low Woodland; *Eucalyptus marginata* Low Woodland

Wetlands: scattered *Melaleuca preissiana* in *Viminaria juncea* and *Hakea trifurcata* Tall Shrubland to Tall Open Shrubland; *Pericalymma ellipticum* Closed Heath; *Melaleuca* Low Woodland; *Lepidosperma longitudinale* Sedgeland

**Vegetation Condition:** >50% Excellent to Good, <50% Good to Completely Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Tetraria australiensis* (R)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** fragmented bushland/canopy linkage to east (Darling Range Regional Park (DPUD 1993)); part of Greenway 66 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserve 23012 is endorsed. Part B: Other Government Land Mechanism. Part C: Proposed Parks and Recreation Reservation. Part D: Major Road and Rail Reserve Mechanism; MRWA Road Reserve (design and management). Part E: Rural Complementary Mechanism (see Table 3, Volume 1).

### TRANSIT ROAD BUSHLAND, JARRAHDAL

**Boundary Definition:** bushland (part taken to cadastre)/management boundary (Boundary adjusted after vegetation survey and negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan.*)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 71

**Area (ha):** bushland 2.5

**Map no.** 73

**Map sheet series ref. no.** 2133-III NW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Mardella)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Foothills

Colluvial Deposits (Qc: Csg)

Yoganup Formation (Qpr: S12)

##### VEGETATION AND FLORA

##### Vegetation Complexes





**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 1: Foothills/Pinjarra Plain**

\*3b *Eucalyptus calophylla* — *E. marginata* woodlands on sandy clay soils

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Vulnerable (floristic community type 3b)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Uplands: *Eucalyptus calophylla*, *Allocasuarina fraseriana*, *Banksia grandis* and *Eucalyptus marginata* Woodland

**Vegetation Condition:** Excellent (Mattiske Consulting Pty Ltd 1997)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the east; Site 71 part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity

**Recommendation:** Part A: Other Government Land Mechanism. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**DOGHILL ROAD BUSHLAND, BALDIVIS**

**Boundary Definition:** management/bushland taken to cadastre boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 369

**Area (ha):** bushland 58.8

**Map no.** 71, 76

**Map sheet series ref. no.** 2033-II NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Rockingham (Baldivis)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Dardanup Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* – *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined





### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995, DEP 1998, DEP 1999)

**Structural Units**

Uplands: *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland; Scattered *Eucalyptus marginata* and/or *Eucalyptus gomphocephala* over *Banksia* species Low Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Very Good (DEP 1999)

**Total Flora:** >69 native taxa (DEP 1999) (estimated >50% expected flora)

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north, south, east and west

**Other Special Attributes:** mapped within the boundaries of the eastern side of the Swan Coastal Plain

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).

## FOLLY POOL, BALDIVIS

**Boundary Definition:** cadastre/zoning boundary (Boundary adjusted in response to a submission to draft *Perth's Bushplan.*)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 418

**Area (ha):** bushland 15.5 (Site also includes open water.)

**Map no.** 70, 71, 75

**Map sheet series ref. no.** 2033-II NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Rockingham (Baldivis)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

**Pinjarra Plain**

Guildford Formation (Qpa: Mc2, C2)

#### VEGETATION AND FLORA

**Vegetation Complexes**

**Pinjarra Plain**

Serpentine River Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

#### WETLANDS

**Wetland Types:** sumpland, palusplain, artificial channel, principal channel

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 6.9ha

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1998)

**Structural Units**

Wetlands: *Eucalyptus rudis* Woodland over *Melaleuca raphiophylla* Low Forest; *Baumea* sp. Sedgeland

**Vegetation Condition:** Very Good to Degraded

**Total Flora:** not known





**Significant Flora:** none recorded

**Fauna:** limited survey for birds (21 species) (AHC 2000 D)

**Linkage:** no adjacent bushland; part of Greenway 121 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** mapped within the boundaries of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed, Indicative place (AHC 2000 D)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

**MARAMANUP POOL, BALDIVIS**

**Boundary Definition:** bushland taken to cadastre/zoning boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 419

**Area (ha):** bushland 13.8 (Site also includes open water.)

**Map no.** 76

**Map sheet series ref. no.** 2033-II NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Rockingham (Baldivis)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mc2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Serpentine River Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**WETLANDS**

**Wetland Types:** sumpland, palusplain, creek

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 5.6ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora** not surveyed from aerial photography interpretation, expected to be similar to Site 418

**Vegetation Condition:** Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenway 121 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** mapped within the boundaries of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed, Indicative place (AHC 2000 D)





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; Crown Reserve – Purpose; Preservation of natural vegetation and drainage. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

**RAPIDS ROAD BUSHLAND, PEEL ESTATE**

**Boundary Definition:** bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 74

**Area (ha):** bushland 33.18

**Map no.** 77

**Map sheet series ref. no.** 2033-II NE

**Other Names:** Part Location 32 (Keighery, BJ, and Trudgen 1992)

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Serpentine)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 1: Foothills/Pinjarra Plain**

3a *Eucalyptus calophylla* — *Kingia australis* woodlands on heavy soils

**Supergroup 2: Seasonal Wetlands**

7 Herb-rich saline shrublands in clay pans

10a Shrublands on dry clay flats

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

not sampled, types not inferred

**WETLANDS**

**Wetland Types:** dampland, artificial channel

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (2.1ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Critically Endangered (floristic community type 3a), Endangered (floristic community type 10a), Vulnerable (floristic community type 7)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated upland, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1996, surveyed from roadside (Punr 01–03, in roadside verge), Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Woodland; *Banksia* Woodland

Wetlands: *Eucalyptus calophylla* Woodland; *Melaleuca viminea* and *Viminaria juncea* Tall Open Scrub; Open

Low Heath dominated by *Regelia ciliata*, *Hakea sulcata*, *Pericalymma ellipticum*, *Astartea* aff. *fascicularis*,

*Kunzea micrantha*, *Verticordia densiflora* and combinations of these sometimes with scattered clumps of

*Actinostrobilus pyramidalis*; Herblands dominated by *Stylidium* species and Asteraceous species; Sedgeland

dominated by *Lepyrodia macra*, *Meeboldinia cana*, *C. aristatus* and *Lepidosperma longitudinale*

**Scattered Native Plants:** not assessed





**Vegetation Condition:** <60% Very Good to Excellent, >40% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 100 native taxa (plot-generated list only)

**Significant Flora:** *Acacia lasiocarpa* var. *bracteolata* (1), *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Stylidium mimeticum* (3), *Verticordia lindleyi* subsp. *lindleyi* (4); *Stylidium roseo-alatum*, *Pimelea imbricata* var. *major*, *Myriocephalus helichrysoides*, *Conospermum huegelii*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland

**Other Special Attributes:** recommended to be managed for flora (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Local Reserve Mechanism. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

## RIVER, STAKEHILL AND HARVEY ROADS BUSHLAND, KARNUP

**Boundary Definition** bushland (part taken to cadastre)/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 277

**Area (ha):** bushland 27. (Site also includes open water.)

**Map no.** 75, 76

**Map sheet series ref. no.** 2033-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Rockingham (Karnup)

**Includes CALM Managed Land:** Reserve 37090 (Explosives and Forestry Purposes)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: C2)

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Serpentine River Complex

**Floristic Community Types:** not sampled, types not inferred

###### Supergroup 2: Seasonal Wetlands

##### WETLANDS

**Wetland Types:** sumpland, floodplain

###### Natural Wetland Groups

###### Swan Coastal Plain Rivers

Goegrup (R.4)

**Wetland Management Objectives:** Conservation (25.4ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 0.4ha and 7.5ha (total 7.9ha)

##### THREATENED ECOLOGICAL COMMUNITIES

Not determined

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora:** limited survey (Connell 1995)





**Structural Units:** not known  
**Vegetation Condition:** Very Good (Connell 1995)  
**Total Flora:** not known  
**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** no adjacent bushland; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** mapped within the boundaries of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

**SERPENTINE NATIONAL PARK AND ADJACENT BUSHLAND, SERPENTINE**

**Boundary Definition:** protected area/bushland (part taken to cadastre)/vegetation complex boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 468

**Area (ha):** bushland 4.9

**Map no.** 78

**Map sheet series ref. no.** 2033-II NE, 2033-II SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Serpentine)

**Includes CALM Managed Land:** Reserve 28862 (National Park)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Csg)

**Pinjarra Plain**

Alluvial/Colluvial Deposit (Qa: FS1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types:**

**Supergroup 1: Foothills/Pinjarra Plain**

3b *Eucalyptus calophylla* — *E. marginata* woodlands on sandy clay soils

**WETLANDS**

**Wetland Types:** creek

**Natural Wetland Groups**

**Darling Plateau**

Little Dardanup (D.2)

**Pinjarra Plain**

Keysbrook (P.1)

**Swan Coastal Plain Rivers**

Goegrup (R.4)

**Wetland Management Objectives:** not assessed

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Vulnerable (floristic community type 3b)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** creek, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Serp 01-04))

**Structural Units**





Uplands: Woodlands dominated by *Eucalyptus calophylla* or *E. marginata* subsp. *elegantella*, sometimes over *Eucalyptus lane-poolei* Low Woodland over species-rich Mixed Open Low Heaths

Wetlands: *Eucalyptus calophylla* Woodland

**Vegetation Condition:** Excellent

**Total Flora:** not known

**Significant Flora:** *Eucalyptus marginata* subsp. *elegantella* (2), *Lambertia multiflora* var. *darlingensis* (3); *Xanthorrhoea acanthostachya*, *Isopogon asper*, *Eucalyptus lane-poolei*, *Nemcia dilatata*

**Fauna:** not known

**Linkage:** adjacent bushland to the east; part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; Existing Parks and Recreation Reserve (see Table 3, Volume 1).

### KINGSBURY DRIVE BUSHLAND, KEYSBROOK

**Boundary Definition:** bushland/vegetation complex boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 76

**Area (ha):** bushland 40.6

**Map no.** 83

**Map sheet series ref. no.** 2033-II SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Keysbrook)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

**Darling Plateau (Darling Range)/Darling Scarp**

Even-grained Granite (Ae, Aes: GR)

##### Foothills

Colluvial Deposits (Qc: Scg)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

###### Pinjarra Plain

Guildford Complex

**Floristic Community Types:** not sampled, types not inferred

##### WETLANDS

No wetlands mapped

##### THREATENED ECOLOGICAL COMMUNITIES

Not determined

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands, north-south ridge with extensive views across the Swan Coastal Plain

**Vegetation and Flora:** limited survey (Connell 1995, DEP 1998, surveyed from roadside)

##### Structural Units

Uplands: *Eucalyptus calophylla* Woodlands with scattered clumps of *E. wandoo* and occasional *E. lanepoolei*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Excellent (Connell 1995)

**Total Flora:** not known





**Significant Flora:** *Eucalyptus lanepolei* and most northern record of *E. haematoxylon* in adjacent bushland to north and north-east

**Fauna:** not known

**Linkage:** adjacent bushland to the east forming linkage to Darling Range Regional Park (DPUD 1993); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Contains plant communities representative of the eastern side of the Swan Coastal Plain or Scarp; one of a few areas in the PMR where the Plain and the Plateau meet through naturally vegetated areas

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).

**MYARA BROOK BUSHLAND, KEYSBROOK**

**Boundary Definition:** bushland taken to zoning boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 426

**Area (ha):** bushland 8.7

**Map no.** 83

**Map sheet series ref. no.** 2033-II SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Keysbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Csg)

**Pinjarra Plain**

Guildford Formation (Qpa: Cs)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Guildford Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**WETLANDS**

**Wetland Types:** palusplain, creek

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Conservation (6.3ha, 1008.6m), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek

**Vegetation and Flora:** limited survey (Connell 1995, DEP 1998)

**Structural Units**

Wetlands: *Eucalyptus rudis* Woodland to Forest

**Vegetation Condition:** Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 124 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain





**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; existing Crown Reserve with a conservation purpose (see Table 3, Volume 1).

**PAGE ROAD BUSHLAND, KEYSBROOK**

**Boundary Definition:** bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 78

**Area (ha):** bushland 1.2

**Map no.** 83

**Map sheet series ref. no.** 2033-II SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Keysbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Csg)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Floristic Community Types**

**Supergroup 1: Foothills/Pinjarra Plain**

3b *Eucalyptus calophylla* — *E. marginata* woodlands on sandy clay soils

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Vulnerable (floristic community type 3b)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands, vegetated wetlands

**Vegetation and Flora:** limited survey (DEP 1996 (Page 01))

**Structural Units**

Uplands: *Eucalyptus marginata* subsp. *elegantella* Open Woodland over species-rich Mixed Open Low Heath

Wetlands: not known

**Vegetation Condition:** >90% Excellent

**Total Flora:** 58 native taxa (plot-generated list only)

**Significant Flora:** *Tetraria australiensis* (R); *Eucalyptus marginata* subsp. *elegantella* (2), *Calothamnus graniticus* subsp. *leptophyllus* (4); *Nemcia dilatata*, *Patersonia babianoides*, *Xanthorrhoea acanthostachya*

**Fauna:** not known

**Linkage:** no adjacent bushland

**Other Special Attributes:** recommended to be managed for flora (Keighery, BJ, and Trudgen 1992); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).









# Part B



## 2.3 BASSENDEAN DUNES

### 2.3.1 INTRODUCTION

#### Location, Landscape and Soils

The Bassendean Dunes lie in the centre of the Swan Coastal Plain and are the oldest of the three aeolian dune systems. The dunes of the Bassendean system are generally of low relief, often with broad swales or relatively flat sand sheets between the low dunes. The tallest dunes, of up to 80 metres, occur in the north of the Perth Metropolitan Region, in the area east of Lake Pinjar.

Soils are predominantly deep grey leached quartz sands (Tables 1.3a&b). To the west the Bassendean Dunes overlay the Pinjarra Plain and wetlands which interleave the dunes or sand sheets have a clay base (Table 2.3). Towards the west the wetlands are generally associated with peaty sands formed between the dunes (Table 2.3). As a consequence a diversity of wetlands occurs within the Bassendean Dunes (five natural groups, Table 2.3). In addition distinctive wetlands occur where the Bassendean Dunes and Pinjarra Plain interface (two natural groups) and where the Spearwood and Bassendean Dunes interface.

#### Remnant Bushland on the Bassendean Dunes

Until recently the Bassendean Dunes were characterised by low levels of clearing, the infertile sands being unsuitable for agriculture or forestry. The predominant land use was low-level grazing, the interleaving wetlands being the focus for more intensive grazing or horticulture. In recent times, with the expansion of urban areas, these dunes have proved suitable for housing lands.

Recent mapping of native vegetation in the Perth Metropolitan Region indicates that between 13 per cent and 100 per cent of the vegetation complexes associated with the Bassendean Dunes remain as native vegetation (Table 3.3). The Herdsman, which traverses two major landform elements — the Bassendean and Spearwood Dunes — has 31 per cent remaining. The Pinjar Complex, which is confined to the Perth Metropolitan Region, has 25 per cent of its area remaining as native vegetation.

#### Plant Communities and their Conservation on the Bassendean Dunes

At the regional level four vegetation complexes (Table 3.3) are confined to the Bassendean Dunes and three others are associated with the Bassendean Dunes. Two of these complexes are confined to the Perth Metropolitan Region — the Pinjar and Bassendean Central and South transition. Nineteen floristic community types (Table 4.3 — including 13 wetland groups and six upland groups) are the principal regional floristic groups identified on the Bassendean Dunes in the Perth Metropolitan Region. The most species-rich of the woodlands — floristic community type 23a — is virtually confined to the Perth Metropolitan Region.

Nine plant and faunal communities associated with the area of the Bassendean Dunes are identified as threatened ecological communities (Table 5.3). The eight threatened plant communities are not common within the Bassendean Dunes, generally being associated with the Pinjarra Plain and Foothills. They are found on the clay-based wetlands of the Pinjar Complex, on the Muchea Limestones and on the clay-based wetlands and sands of the interface of the Bassendean Dunes and Pinjarra Plain, principally within the Southern River Complex. The ninth group is a faunal wetland community associated with tumulus springs.

A diverse suite of vegetation associations has been identified on the Bassendean Dunes. The main associations are listed below.

#### Uplands

The main upland associations are low forests to low woodlands associated with a very diverse understorey (Table 4.3). These broad units and associated dominant species are:

##### Forests and Woodlands

Eucalypts — *Eucalyptus marginata*, *E. todtiana*, *E. calophylla*

Sheoaks — *Allocasuarina fraseriana*

Banksias — *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *B. grandis*

Others — *Nuytsia floribunda*, *Acacia saligna*

##### Shrublands

*Adenanthos cygnorum*, *Bossiaea eriocarpa*, *Hovea*





*trisperma*, *Leucopogon conostephioides*, *Daviesia physodes*, *Dryandra lindleyana* subsp. *lindleyana*, *Petrophile linearis*, *Stirlingia linearis*, *Scholtzia involucrata*, *Calytrix flavescens*, *Conostephium pendulum*, *Gompholobium tomentosum*, *Hibbertia hypericoides*, *H. huegelii*, *Xanthorrhoea preissii*, *Acacia pulchella*

#### **Herblands**

*Phlebocarya ciliata*, *Lomandra* species, *Conostylis aculeata*, *C. juncea*, *Patersonia occidentalis*, *Dampiera linearis*, *Burchardia congesta*, *Drosera* species, *Stylidium bulbiferum*, *S. repens*, *S. piliferum*

#### **Sedgelands**

*Schoenus curvifolius*, *Lyginia barbata*, *Lepidosperma angustatum*, *Desmodcladus flexuosus*

#### **Grasslands**

*Austrodanthonia occidentalis*, *Amphipogon turbinatus*

#### **Wetlands**

These broad units and associated dominant species are:

##### **Open Forests and Woodlands**

Eucalypts — *Eucalyptus rudis*, *E. calophylla*  
Banksias — *Banksia ilicifolia*, *B. littoralis*  
Melaleucas — *Melaleuca preissiana*,  
*M. raphiophylla*  
Others — *Acacia saligna*

##### **Shrublands**

*Kunzea glabrescens*, *Regelia ciliata*, *Hypocalymma angustifolium*, *Hakea varia*, *Pericalymma ellipticum*,

*Melaleuca teretifolia*, *Xanthorrhoea preissii*, *Acacia pulchella*

#### **Herblands**

*Phlebocarya ciliata*, *Conostylis juncea*, *Patersonia occidentalis*, *Drosera* species, *Stylidium repens*, *S. bulbiferum*, *Villarsia* species

#### **Sedgelands**

*Baumea vaginalis*, *B. articulata*, *B. juncea*, *Lyginia barbata*, *Hypolaena exsulca*, *H. pubescens*, *Evandra pauciflora*, *Lepidosperma longitudinale*, *Dielsia stenostachya*, *Juncus pallidus*

#### **Grasslands**

*Amphipogon debilis*

The woodland communities of the Bassendean Dunes have high levels of species diversity (Table 3.3). Fifty-two significant taxa are associated with the Dunes in the Perth Metropolitan Region (Table 6.3). These include five Declared Rare Flora and 13 Priority Flora taxa. A few species such as *Lysinema elegans* are endemic to the Bassendean Dunes but extend beyond the Perth Metropolitan Region and two species are endemic to the PMR.

The area of Bassendean Dunes vegetation remaining on the Swan Coastal Plain is comparatively large when compared with the area remaining vegetated of the other major landform elements. With appropriate planning and protection the plant communities and flora of the Bassendean Dunes will be able to be protected in areas of sufficient size and diversity to allow for the continuation of natural processes.



# Part B



**Table 1.3a:** Geological and geomorphological systems of the Bassendean Dunes.

The general terms used in Bush Forever for describing the major landform elements are in **bold italics**.

Major Geological Systems (after Playford et al. 1976)	Major Geomorphological Systems (after McArthur and Bettenay 1960)	Detailed Geomorphological Units (after Churchward and McArthur 1980)
Bassendean Sand	<b><i>Bassendean Dunes</i></b>	Bassendean
Bassendean Sand / Guildford Formation	Not applicable	Southern River#
Wetlands (within the Guildford Formation, Bassendean Sand, Tamala Limestone)	Not applicable	Herdsmen

# Combined here under Bassendean Dunes for major landform elements, see Part A, Tables 1 and 2

**Table 1.3b:** Landform and soils of the Bassendean Dunes showing the relationship between geomorphological units, units identified in the Environmental Geology Maps and soils described on these maps on the Swan Coastal Plain in the Perth Metropolitan Region.

Column One may be used to cross-reference to groups shown in Table 1a.

Major Geomorphological Systems (after McArthur and Bettenay 1960); *Detailed Geomorphological Units (after Churchward and McArthur 1980)	Major Units in the Environmental Geology Maps (after various authors)	Soils associated with each unit
Bassendean Dunes: *Bassendean, #Southern River	Bassendean Sands and Bassendean Sands over Guildford Formation	light grey quartz sands and light grey quartz sands over silty sands
Wetlands – within the Pinjarra Plain, Bassendean Dunes, Spearwood Dunes, Quindalup Dunes (Herdsmen)	Holocene swamp deposits	peats associated with clays, sands and silts in various proportions

# Combined here under Bassendean Dunes for major landform elements, see Part A, Tables 1 and 2





**Table 2.3: Natural Wetland Groups (Consanguineous Suites) on the Bassendean Dunes**  
(after Semeniuk 1996)

Name & locations	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Bassendean Dunes</b>				
<b>Lake Pinjar suite (B1)</b> Lake Pinjar area	Bassendean Dunes with higher undulating dunes on the western margin of the wetland	Sumpland	Quartz sand sheet overlying clay sheet on Bassendean Sand	Coalesced Bassendean Dune wetlands; meteoric water & discharge water from Gnangara Mound ponded by clay bed
<b>Gnangara suite (B2)</b> East of Wanneroo includes Lake Gnangara & Lake Jandabup	Bassendean Dunes with slightly higher undulating dunes on western margin of this area. Wetlands enclosed by saddles or ridges	Lakes & sumplands & occasional damplands	Diatom mud, peaty sand, & clay overlying quartz sand. Hardpans (ferricreted quartz sand) at level of water table	Groundwater wetlands. Large lakes appear as coalesced smaller basins. Drainage is impeded by thin clay, diatom mud or ferricrete layers superimposed on, or within the quartzose Bassendean sand
<b>Jandakot suite (B3)</b> 1. Nine Mile Swamp area 2. Spade Lake to Caladenia Lake area 3. Bindjar area 4. Gnangara Pine Forest area 5. Jandakot area 6. West Bengier area	Bassendean Dunes comprised of low dunes & depressions	Damplands & sumplands	Peat or peaty sand or humic sand overlying quartz sand	Groundwater surfacing or near surface in depressions to develop water table basins
<b>Riverdale suite (B4)</b> 1. West of Gingin, north & south of Gingin Brook. 2. East Pinjar Lake area	Bassendean Dunes comprised of low, regularly undulating dunes	Sumplands	Clay, peat or peaty sand overlying quartz sand	Wetlands occur in regularly spaced depressions as parallel microscale interdunal swales to form linear; parallel chains; recharge by precipitation & groundwater rise, often maintained by ponding on a clay or peat bed
<b>Bennett Brook suite (B/P4)</b> 1. Ballajura: In Bennett Brook area west of West Swan 2. Balannup: In Southern River area north of Forrestdale Lake 3. Yangedi: In Serpentine River area west of Serpentine township	Bassendean Dunes – with microscale creeks	Sumplands creeks palusplains floodplains	Quartz sands, or clay overlying quartz sand	Depressions which intersect the water table. Precipitation is ponded by clay lenses in the sub-surface. Palusplains are situated between tributaries



# Part B

Table 2.3 (continued)

Name & locations	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Pinjarra Plain – Bassendean Dunes transition OR Bassendean with fluvial features</b>				
<b>Mungala suite (B/P2)</b> Perth Airport surrounds including Wright Lake	Transition between Bassendean Dunes & Pinjarra Plain. Underlying stratigraphy is a complex of sands, clays, calcrete & laterite. Wetlands lie along depressions at the distributary ends of the creeks or adjacent to intermittent disconnected drainage channels	Lakes & sumplands floodplains, & creeks	Variable: clays to clay overlying quartz sand to quartz sand overlying laterite or calcrete	Alluvial fan distributaries of creeks terminate in wetlands already present in Bassendean sandplain, bringing water & sediment
<b>Muchea suite (B/P3)</b> 1. Western margin of Whitfield Brook e.g. Six Mile Swamp 2. Western margin of Ellen Brook	Complex transition between Bassendean Dunes & Pinjarra Plain. Wetlands lie along the depressions at the base Bassendean Dunes & at the headwaters of the tributaries of creeks	Sumplands Floodplains	Complex & variable pattern of quartz sand, clays, laterite & calcrete	Discharge of groundwater into basins, flats & creeks. Ponding of rainwater & groundwater occurs over impermeable sediments
<b>Bassendean – Spearwood Dunes Interface</b>				
<b>Bibra suite (SB1)</b> 1. Linear belt extending south from Bidaminna to Caladenia Cave 2. Linear belt extending from Murdoch to Wellard, in a N/S orientation approximately 5-7km east of the coast	Spearwood Dunes & Bassendean Dunes contact depression. Continuous high dune ridges to the west & a series of discontinuous hollows & hills with lower relief to the east	Lakes & sumplands in a north-south oriented chain	Mud, peat, or peaty sand overlying Bassendean Sand	Contact depressions with groundwater impounded against Spearwood Dune ridge





**Table 3.3:** Vegetation complexes (Heddle et al. 1980) and percentage remaining as native vegetation (AGWEST 1998 GIS) on the Bassendean Dunes in the Perth Metropolitan Region

Vegetation Complex	Native Vegetation (%)
<b>Bassendean Dunes</b>	
BASSENDEAN COMPLEX – NORTH:Vegetation ranges from a low open forest and low open woodland of <i>Banksia</i> species – <i>Eucalyptus todtiana</i> to low woodland of <i>Melaleuca</i> species and sedgeland which occupy the moister sites.	54
BASSENDEAN COMPLEX – CENTRAL AND SOUTH:Vegetation ranges from woodland of <i>Eucalyptus marginata</i> – <i>Allocasuarina fraseriana</i> – <i>Banksia</i> species to low woodland of <i>Melaleuca</i> species, and sedgeland on the moister sites. This area includes the transition of <i>E. marginata</i> to <i>E. todtiana</i> in the vicinity of Perth.	24
BASSENDEAN COMPLEX – NORTH – TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of <i>Banksia</i> species – <i>Eucalyptus todtiana</i> on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean-North and Karrakatta-North vegetation complexes.	72
BASSENDEAN COMPLEX – CENTRAL AND SOUTH – TRANSITION VEGETATION COMPLEX: Woodland of <i>Eucalyptus marginata</i> – <i>E. calophylla</i> with well defined second storey of <i>Allocasuarina fraseriana</i> and <i>Banksia grandis</i> on the deeper soils and a closed scrub on the moister sites. The understorey species reflect similarities with the adjacent vegetation complexes.	100
<b>Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes</b>	
SOUTHERN RIVER COMPLEX: Open woodland of <i>Eucalyptus calophylla</i> – <i>E. marginata</i> – <i>Banksia</i> species with fringing woodland of <i>E. rudis</i> – <i>Melaleuca raphiophylla</i> along creek beds.	17
<b>Wetlands</b>	
*HERDSMAN COMPLEX: Sedgeland and fringing woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca</i> species	31
PINJAR COMPLEX:Vegetation ranges from woodland of <i>Eucalyptus marginata</i> – <i>Banksia</i> species to a fringing woodland of <i>E. rudis</i> – <i>Melaleuca preissiana</i> and sedgeland.	25

\* Also included in Section 2.4 SPEARWOOD DUNES

**Table 4.3:** Floristic community types identified on the Bassendean Dunes (after Gibson et al. 1994 and DEP 1996)

**Key**

**Column 1: Floristic Community Type Codes**

The numbers of the types additional to Gibson et al. (1994) are italicised if they are subsets of an existing group (in types 19, 20, 23 and 30) and italicised and preceded by 'S' if they are supplementary groups.

**Column 2: General Description of Floristic Community Types**

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgeland and herblands after Gibson et al. (1994).

**Column 3: Average Species Richness per Floristic Community Type**

Average species richness per 10x10m plot less those species only occurring in a single plot. Some community types may have a high proportion of single records. Thus these estimates of average species richness are underestimates in some cases.

<b>Supergroup 2 – Seasonal Wetlands</b>		
4	<i>Melaleuca preissiana</i> damplands	33.2
5	Mixed shrub damplands	38.4
11	Wet forests and woodlands	28.0



# Part B

Table 4.3 (continued)

12	<i>Melaleuca teretifolia</i> and/or <i>Astartea</i> aff. <i>fascicularis</i> shrublands	27.3
13	Deeper wetlands on heavy soils	16.9
14	Deeper wetlands on sandy soils	16.5
S1	<i>Astartea</i> aff. <i>fascicularis</i> / <i>Melaleuca</i> species dense shrublands	22.4
S2	Northern <i>Pericalymma ellipticum</i> dense low shrublands	17.7
S3	Wet sedgelands on sandy clays	10.6
S5	<i>Acacia saligna</i> wetlands	23.3
S6	Northern dense low shrublands	35.4
S7	Northern woodlands to forests over tall sedgelands alongside permanent wetlands	17.7
S17	<i>Eucalyptus rudis</i> / <i>Agonis linearifolia</i> wetlands in Bassendean Dunes	15.2

### Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau

21a	Central <i>Banksia attenuata</i> – <i>Eucalyptus marginata</i> woodlands	52.0
21c	Low-lying <i>Banksia attenuata</i> woodlands or shrublands	38.5
22	<i>Banksia ilicifolia</i> woodlands	30.0
23a	Central <i>Banksia attenuata</i> – <i>Banksia menziesii</i> woodlands	59.0
23b	Northern <i>Banksia attenuata</i> – <i>B. menziesii</i> woodlands	47.0
S9	<i>Banksia attenuata</i> woodlands over dense low shrublands	38.9

**Table 5.3: Threatened Ecological Communities on the Bassendean Dunes in the Perth Metropolitan Region** (after English and Blyth 1997 and Blyth pers. comm. 2000)

#### Key

CR Critically Endangered      EN Endangered      VU Vulnerable  
 + Listed as 'endangered' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*  
 (see Part A, Section 3.6.6)

#### A. Floristic Community Types (as identified in Gibson *et al.* 1994)

##### Supergroup 2 – Seasonal Wetlands

7	Herb rich saline shrublands in clay pans	VU
8	Herb rich shrublands in clay pans	VU
10a	Shrublands on dry clay flats	EN
15	Forests and woodlands of deep seasonal wetlands	VU
18	Shrublands on calcareous silts	VU

##### Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau

20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	EN
20b	Eastern <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands	EN

#### B: Restricted floristic community type mosaics

Shrublands and woodlands on Muchea Limestones (Keighery, GJ, and Keighery 1995)	EN+
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#### C: Freshwater communities

Communities of Tumulus Springs (Jasinska and Knott 1994, Ahmat 1993)	CR+
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**Table 6.3: Significant flora of the Bassendean Dunes in the Perth Metropolitan Region**

**Key**

**Column 1: Taxon**

Names follow Gibson *et al.* (1994) and Atkins (1999) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. An 'ms' after the name indicates that this is a manuscript name which is yet to be published.

**Column 2: Major landform element in which the taxon is most likely to be found in the Perth Metropolitan Region**

- DS = Darling Scarp
- D = Dandaragan Plateau
- F = Foothills
- P = Pinjarra Plain
- B = Bassendean Dunes
- S = Spearwood Dunes
- Q = Quindalup Dunes
- R = Estuaries, Rivers and Creeks
- (ML) = Muchea Limestones
- (TL) = Tamala Limestones

**Column 3: Taxa dependent on seasonal ponding, waterlogging or inundation**

- W = depends on waterlogging or inundation
- W (aquatic) = depends on standing water

**Column 4: Conservation status (Atkins 1999)**

- R = Declared Rare Flora
- 1 = Priority 1: Poorly Known Taxa
- 2 = Priority 2: Poorly Known Taxa
- 3 = Priority 3: Poorly Known Taxa
- 4 = Priority 4: Rare Taxa

**Column 5: Geographical variation**

- r = populations at the northern or southern limit of their known geographic range
- d = populations disjunct from their known geographic range
- p = considered to be poorly reserved (applies to all Declared Rare Flora and Priority taxa)
- s = significant populations (applies to all Declared Rare Flora and Priority taxa)
- X = considered lost in the Perth Metropolitan Region

**Regional ecological preferences**

- e = taxa endemic to the Swan Coastal Plain
- E = taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region

**Column 6: Species listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (see Part A, Section 3.7.5)**

- EN = Species that are endangered
- VU = Species that are vulnerable
- TD = Species that are extinct

Taxon	Major landform element	Wetland taxa	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Angianthus micropodioides</i>	P/B	W	3	p, s, d	
<i>Anthotium junciforme</i>	P/B	W	4	p, s	
<i>Aotus cordifolia</i>	P/B	W	3	p, s	
<i>Blancoa canescens</i>	F/P/B			d, p	
<i>Boronia crenulata</i> subsp. <i>viminea</i> (= var. <i>gracilis</i> )	B			s	
<i>Boronia purdieana</i>	B/S			r, s	
<i>Burchardia bairdiae</i>	P/B	W		r, s	
<i>Byblis lindleyana</i> (= <i>gigantea</i> )	P/B	W	2	d, p, r, E	
<i>Caladenia huegelii</i>	P/B	W	R	p, s, e	EN
<i>Conospermum triplinervium</i>	P/B/S			s, p	
<i>Conostephium minus</i>	D/F/B		4	p, s, e	
<i>Conostylis aculeata</i> subsp. <i>cygnorum</i> ,	B/S			e	
<i>Cyathochaeta teretifolia</i>	P/B	W	3	p, s	
<i>Cyathochaeta equitans</i> (= <i>clandestina</i> )	P/B/S			r, s	



# Part B



Table 6.3 (continued)

<i>Dielsia stenostachyus</i>	P/B	W		e	
<i>Dillwynia dillwynioides</i>	P/B	W	3	p, s, e	
<i>Diuris purdiei</i>	P/B	W	R	p, s, e	
<i>Drakaea elastica</i>	P/B		R	p, s	
<i>Drakaea micrantha</i>	B		R	p, s	
<i>Drosera gigantea</i> subsp. <i>geniculata</i>	P/B	W		s	
<i>Epiblema grandiflorum</i> var. <i>cyanea</i> ms	B	W	R	p, s	EN
<i>Eremaea fimbriata</i>	B			r, s	
<i>Evandra pauciflora</i>	B	W		r, s	
<i>Glischrocaryon aureum</i>	F/B/S			p	
<i>Gyrostemon subnudus</i>	B			r, s	
<i>Haloragis cordiger</i>	P/B			s	
<i>Hensmania turbinata</i>	P/B			r, s	
<i>Hibbertia perfoliata</i>	P/B	W		d	
<i>Jacksonia gracilis</i> ms (= aff. <i>sericea</i> or swamp form)	P/B			e	
<i>Johnsonia pubescens</i> subsp. <i>cygnorum</i> (= aff. <i>pubescens</i> ) (GJ Keighery 5249)	F/P/B			s	
<i>Kunzea</i> aff. <i>recurva</i> (GJ Keighery 12828) (= <i>littoricola</i> ms)	P/B	W		e	
<i>Lachnostachys albicans</i>	B			r, s	
<i>Leucopogon kingianus</i>	B			s	
<i>Levenhookia preissii</i>	P/B			p, s	
<i>Lycopodium serpentum</i>	P/B	W		s, d	
<i>Lysinema elegans</i>	B			p, s, e	
<i>Macarthuria apetala</i>	B			s	
<i>Olox scalariformis</i>	F/B		3	p, s, d	
<i>Pityrodia uncinata</i>	P/B			r, s	
<i>Platysace juncea</i>	F/B			p	
<i>Schoenus latitans</i>	B/S			r, p	
<i>Stachystemon axillaris</i>	F/P/B		4	p, s	
<i>Stylidium crossocephalum</i>	F/B			r, s	
<i>Stylidium mimeticum</i>	P/B	W	3	p, s	
<i>Stylidium preissii</i>	B			d, s	
<i>Thysanotus glaucus</i>	F/B		4	p, s	
<i>Tripterococcus paniculatus</i> (sp. Cannington, AS George 16201)	P/B		1	p, s, E	
<i>Utricularia dichotoma</i>	B	W (aquatic)		s, d	
<i>Utricularia gibba</i>	B	W (aquatic)		s, d	
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	P/B	W	4	p, s	
<i>Verticordia nitens</i>	F/B			s	
<i>Villarsia violifolia</i>	P/B	W (aquatic)		p, s	







**BASSEDEAN DUNES**

**2.3.2 DESCRIPTIONS**

**KEY**

- Column 1 Bush Forever Site Number**  
Sites listed from north to south within the PMR.
- Column 2 Bush Forever Site(s) Name**
- Column 3 Page Number**  
Refers to the page number of the Bush Forever Site description in Volume 2.
- Column 4 Bush Forever Map Number**  
Refers to the number of the Bush Forever Site map in Volume 1.
- Column 5 System 6**  
Refers to the System 6 Recommendation number where applicable.

Site No.	Site(s) Name	Page No.	Map No.	System 6
380	Rosella Road Bushland, Bullsbrook	206	9, 10, 11, 15, 16, 21, 22	M5
94 285 286	State Forest 65 - Pinjar Plantation North Bushland, Yanchep	207	9, 10	
96 99 101 102 103 104 105 106 107 108 126 427 432 433 434 441 442 448 450 452 459 461	State Forest 65 - Gnangara Plantation Bushland, Pinjar	208	21, 22	M8
382	Lake Pinjar and Adjacent Bushland, Pinjar	209	15, 21	M8
398	Chitty Road Bushland, Pinjar	211	21, 22	
462	Department of Defence - Muchea Air Weapons Range Bushland, Pinjar	212	22, 23	
97	Kirby Road Bushland, Bullsbrook	214	23, 24	
141 146	Numbat Road Bushland, Mariginiup	215	29	
399	Melaleuca Park and Adjacent Bushland, Bullsbrook/Lexia	216	22, 23, 29, 30, 31, 36	M9
6	Cooper Road Water Reserve and Adjacent Bushland, Bullsbrook	218	23, 24, 30, 31	





# Part B DESCRIPTIONS

Site No.	Site(s) Name	Page No.	Map No.	System 6
324	Jandabup Lake and Adjacent Bushland, Jandabup/Mariginiup	219	28, 29	M8
326	Hawkins Road Bushland, Jandabup/Gnangara	221	29	
300	Maralla Road Bushland, Ellenbrook/Upper Swan	222	30, 31, 32, 37	
23	Cardinal Drive Bushland, Ellenbrook	224	31	
22	Egerton Mound Spring and Adjacent Bushland, Ellenbrook	226	31	
193	Gnangara Lake and Adjacent Bushland, Gnangara/Lexia	227	35	M8
192	Wetherell Road Bushland, Lexia/Ellenbrook	228	36	
195				
196	Gnangara Road Bushland, Landsdale/Cullacabardee	229	35	
198	Beechboro Road Bushland, Cullacabardee/Ballajura	231	35, 36	
304	Whiteman Park, Whiteman/West Swan	232	35, 36, 37, 42	M13
480	Victoria Road Bushland, Malaga/Beechboro	233	42	
200	Caversham Airbase Bushland, West Swan/Whiteman	235	37	
307	Lightning Swamp and Adjacent Bushland, Noranda	236	41, 42	
280	Dianella Open Space	237	41	M40
386	Perth Airport and Adjacent Bushland	238	43, 48, 49	M52
48	Kensington Bushland, Kensington	240	47	
228	Blue Gum Reserve, Brentwood/Mount Pleasant	240	53	
337	Booragoon Lake, Booragoon	242	53	M73
339	Piney Lake Reserve, Winthrop	243	52, 53	
244	North Lake and Bibra Lake, North Lake/Bibra Lake	244	52, 53, 58, 59	M93
254	South Lake	245	58	M93
256	Yangebup and Little Rush Lakes, Yangebup	246	58, 59	M93
391	Thomsons Lake Nature Reserve and Adjacent Bushland, Beeliar	248	58, 59	M93
392	Harry Waring Marsupial Reserve, Wattleup	249	58, 59, 64, 65	M93
393	Wattleup Lake and Adjacent Bushland, Wattleup/Mandogalup	250	64	M93
245	Ken Hurst Park, Leeming	252	53	
388	Jandakot Airport, Jandakot	253	53, 54, 59	M94
389	Acourt Road Bushland, Banjup	254	59, 60	
467	Gosnells Golf Course Bushland, Canning Vale	255	60	
472	Canning Vale Prison Bushland	256	60	
253	Harrisdale Swamp and Adjacent Bushland, Forrestdale	257	60	
125	Holmes Street Bushland, Southern River/Huntingdale	258	54, 55, 60, 61	
413	Balannup Lake and Adjacent Bushland, Southern River/Forrestdale	260	60	
340	Phoebe Street Bushland, Southern River	261	61	
464	Matson Street Bushland, Southern River	262	61	
465	Passmore Street Bushland, Southern River	263	61	
492	Lyon Road Bushland, Banjup	264	59	
390	Fraser Road Bushland, Banjup	265	59, 60	
262	Piarra Nature Reserve, Forrestdale	267	60	
263	Banjup Bushland, Banjup	268	59	
342	Anstey/Keane Dampland and Adjacent Bushland, Forrestdale	269	60	



# Part B DESCRIPTIONS

Site No.	Site(s) Name	Page No.	Map No.	System 6
344	Dennis De Young Reserve and Gibbs Road Swamp Bushland, Banjup/Forrestdale	270	59, 60, 65, 66	
345	Forrestdale Lake and Adjacent Bushland, Forrestdale	272	60, 61, 66	M95
347	Wandi Nature Reserve and Anketell Road Bushland, Wandii/Oakford	273	65, 66	M96
268	Mandogalup Road Bushland, Mandogalup	275	64, 65	
269	The Spectacles	276	64, 65	
270	Sandy Lake and Adjacent Bushland, Anketell	277	65	
348	Modong Nature Reserve and Adjacent Bushland, Oakford	278	65, 66	M99
273	Casuarina Prison Bushland	280	65, 71	M98
70	Duckpond Bushland, Peel Estate	281	71	
353	Banksia Road Nature Reserve, Peel Estate	282	71	M100
368	Lowlands Bushland - Eastern Block, Peel Estate	283	72, 76, 77	M105
372	Lowlands Bushland - Western Block (Hymus Swamp), Peel Estate	284	76	M105
376	Baldivis Road Bushland, Baldivis	285	75	
378	Henderson Road Bushland, Peel Estate	287	76, 81	
77	Yangedi Swamp, Keysbrook	288	81, 82	





## ROSELLA ROAD BUSHLAND, BULLSBROOK

**Boundary Definition:** protected area with bushland/bushland (part taken to cadastre) boundary (PMR boundary to north) (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 380

**Area (ha)** bushland 8001.6

**Map no.** 9, 10, 11, 15, 16, 21, 22

**Map sheet series ref. no.** 2034-I NW, 2034-I SW, 2035-II SW

**Other Names:** Submission Area 288, part Department of Defence Muchea Air Weapons Range, part State Forest 65, part Yeal Nature Reserve, part of proposed Gnaragara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Pinjar, Yanchep), Shire of Chittering (Muchea), Shire of Gingin (Yeal)

**Includes CALM Managed Land:** Reserve 42450 (Conservation of Flora and Fauna and Water), State Forest 65

**System 6 (1983):** Part M5, part C13 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Wetlands (within the Spearwood and Bassendean Dunes)

Holocene Swamp Deposits (Qhw: Cps, S4)

##### Lagoonal and Estuarine Deposits (within the Bassendean Dunes)

Lagoonal Deposits in Bassendean Dunes (Qpw: S9)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — North

Bassendean Complex — North Transition (restricted complex, contains significant area)

Bassendean Complex — Central and South Transition (restricted complex, contains significant area, most southern occurrence)

**Spearwood Dunes** (revised vegetation complex boundaries exclude all Karrakatta except, possibly, on yellow sand north of Lake Pinjar, in the southwest corner of Site: McArthur and Mattiske 1985)

Karrakatta Complex — North (most southern occurrence)

Karrakatta Complex — North Transition (restricted complex, contains significant area, most northern occurrence)

Karrakatta Complex — Central and South (restricted complex, contains significant area)

##### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

5 Mixed shrub damplands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21c Low-lying *Banksia attenuata* woodlands or shrublands

22 *Banksia ilicifolia* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

23b Northern *Banksia attenuata* — *B. menziesii* woodlands

#### REGIONAL WETLANDS

**Wetland Types:** sumpland, dampland, creek

**Natural Wetland Groups:** undefined areas included in boundary

##### Bassendean Dunes

Pinjar (B.1)

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (319.3ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed



### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** tall dunes, open water, vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (McArthur and Mattiske 1985, Trudgen 1996; part Site — DEP 1996 (Pinj 14), Gibson *et al.* 1994 (Pline 05–07, RAAF 02–03, Sint 01, Waterrd 01), Havel 1968 (Plots 2, 3, 32, 33, 39, 68, 82, 86; adjacent to Plots 1, 31, 36, 37, 38, 54))

**Structural Units:** mapping (McArthur and Mattiske 1985)

Uplands: *Banksia attenuata*, *B. menziesii* and *Eucalyptus todtiana* Low Open Forest to Low Woodland, with *Banksia ilicifolia*, *Eucalyptus calophylla* or *Nuytsia floribunda*; *Eucalyptus calophylla* and *E. marginata* Open Forest, with *Banksia grandis*; Closed Heaths to Low Shrublands dominated by *Eremaea pauciflora*, *Melaleuca* aff. *scabra*, *Xanthorrhoea preissii*, *Conospermum* species, *Verticordia nitens* and other species

Wetlands: Closed Forests to Low Woodlands of *Eucalyptus rudis*, *Melaleuca preissiana*, *M. raphiophylla*, *Banksia littoralis* or *B. ilicifolia* and combinations; Closed Tall Scrub to Low Shrublands dominated by *Agonis linearifolia*, *Astartea* aff. *fascicularis*, *Pericalymma ellipticum*, *Kunzea ericifolia*, *Melaleuca* species and others or combinations of these; Herblands dominated by *Phlebocarya ciliata* and other herbs such as *Patersonia occidentalis* often in combination with a variety of sedges; Sedgeland of *Baumea articulata*, *B.* species or *Lepidosperma longitudinale* or *Leptocarpus* species

**Vegetation Condition:** >90% Pristine to Excellent, <10% Very Good, with areas of localised disturbance along tracks

**Total Flora:** not known (estimated >200 native taxa and >30 weed taxa)

**Significant Flora:** the following are recorded from State Forest 65 and would be expected in the Site — *Stachystemon axillaris* (4), *Conostephium minus* (4); *Verticordia nitens*, *Boronia purdieana*, *Astrolooma xerophyllum*, *Stylidium crossocephalum*, *Leucopogon kingianus*

**Fauna:** not known

**Linkage:** adjacent bushland to the south (Sites 382 and 96) and north-east outside of PMR; part of Greenway 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains the northernmost major stands of Jarrah (also smaller areas in adjacent Gingin Water Reserve) (McArthur and Mattiske 1985) contains the steepest area of Bassendean Dunes identified on the Plain, >10m in relief adjacent to the most eastern area of the Pinjar Complex (McArthur and Mattiske 1985); recommended for protection in study of City of Wanneroo bushland (Trudgen 1996); part Site proposed to become State Forest in Forest Management Plan 1994–2003 (CALM 1994); included in Gngangara Park proposal (Bailey 1997)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate (Yeal Nature Reserve)

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of CALM managed lands (Reserve 42450 and State Forest 65) is endorsed. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

## STATE FOREST 65 — PINJAR PLANTATION, NORTH BUSHLAND, PINJAR

**Boundary Definition:** protected area with bushland boundaries (remnants in pine plantation)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 94, 285, 286

**Area (ha):** bushland 87.9 (3 remnants from 3.3 to 53.4 ha)

**Map no.** 9, 10

**Map sheet series ref. no.** 2034–I NW

**Other Names:** part of proposed Gngangara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Yanchep)

**Includes CALM Managed Land:** State Forest 65

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)





**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — North

**Floristic Community Types:** not sampled, unable to infer types

**Supergroup 3:** Uplands centred on Bassendean Dunes and Dandaragan Plateau

**Supergroup 4:** Uplands centred on Spearwood and Quindalup Dunes

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (McArthur and Mattiske 1985, Connell 1995)

**Structural Units:** mapping (McArthur and Mattiske 1985)

Uplands: *Dryandra sessilis*, *Melaleuca huegelii* and *Grevillea* sp. Open Shrubland to Open Heath; *Banksia attenuata* and *B. menziesii* Low Open Forest to low Woodland

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** the Heath/Shrubland limestone vegetation is the most eastern occurrence of its type and warrants further field study

**Fauna:** not known

**Linkage:** no adjacent native vegetation

**Other Special Attributes:** included in Gnaragara Park proposal (Bailey 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Sites with Some Existing Protection; the existing care, control and management of these Sites is endorsed. (Proposed 'Gnaragara Park' - Cabinet 1996) (see Table 3, Volume 1).

**STATE FOREST 65 — GNANGARA PLANTATION BUSHLAND, PINJAR**

**Boundary Definition:** protected area with bushland (Sites 96, 101, 102, 103, 104, 105, 107, 126, 432, 433, 441, 450, 459); protected area with bushland/conservation category wetland (Sites 99, 106, 108, 427, 448, 452, 461); protected area with conservation category wetland (Site 434) (Site 434 — areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; remnants in pine plantation.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 96, 99, 101–108, 126, 427, 432–434, 441, 442, 448, 450, 452, 459, 461

**Area (ha):** bushland 31.5 (21 remnants from 0.6 to 6.2 ha)

**Map no.** 21, 22

**Map sheet series ref. no.** 2034–I NW, 2034–I SW, 2034–I SE

**Other Names:** part of proposed Gnaragara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Pinjar), Shire of Swan (Bullsbrook)

**Includes CALM Managed Land:** State Forest 65

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Cps)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — North

**Wetlands**

Pinjar Complex

**Floristic Community Types:** not sampled, unable to infer types

**Supergroup 2: Seasonal Wetlands**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

**WETLANDS**

**Wetland Types:** dampland, sumpland, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

Jandakot (B.3)

Riverdale (B.4)

**Wetland Management Objectives:** Conservation (Site 99 4.5ha, Site 106 2.4ha, Site 108 1.1ha, Site 427 1.2ha, Site 432 0.5ha, Site 434 0.7ha, Site 452 0.6ha), Resource Enhancement (Sites 96, 101–102, 104–105, 107, 126, 461, 459, 448, 450, 461), Multiple Use (Site 103)

**Swan Coastal Plain Lakes EPP:** none identified

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (McArthur and Mattiske 1985, Connell 1995, Trudgen 1996)

**Structural Units:** generally only broad regional information is given for Site descriptions for combined remnants in pine plantations

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** the Heath/Shrubland limestone vegetation is the most eastern occurrence of its type and warrants further field study

**Fauna:** not known

**Linkage:** adjacent native vegetation south (Site 398) of Site 434, south (Site 459) of Site 448, south (Site 398) of Site 126, north (Site 380) of Site 96 and north (Site 448) of Site 459; Site 96 is part of contiguous; and Site 126 and Site 434 are parts of contiguous and fragmented bushland/wetland (Part A, Map 7)

**Other Special Attributes:** included in Gnangara Park proposal (Bailey 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Sites with Some Existing Protection; the existing care, control and management of these Sites is endorsed. (Proposed 'Gnangara Park' - Cabinet 1996) (see Table 3, Volume 1).

**LAKE PINJAR AND ADJACENT BUSHLAND, PINJAR**

**Boundary Definition:** Conservation wetland/protected area/bushland (part taken to cadastre)/bushland group boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 382

**Area (ha):** bushland 735.4 (Site also includes open water.)

**Map no.** 15, 21

**Map sheet series ref. no.** 2034-I NW, 2034-I SW

**Other Names:** Part Submission Area 233, part of Wanneroo Wetlands Eastern chain

**Local Authorities (Suburb):** Shire of Wanneroo (Pinjar, Neerabup)

**System 6 (1983):** Part M8 part System area bushland, only bushland described





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

#### Wetlands (within the Spearwood and Bassendean Dune interface)

Holocene Swamp Deposits (Qhw: Cps, S4)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — North

##### Spearwood Dunes

Karrakatta Complex — Central and South

##### Wetlands

Pinjar Complex (restricted complex, largest intact area; boundaries modified from Hedde *et al.* (1980) in McArthur and Mattiske (1985); area reduced south but is an occurrence in RAAF land to the east, most northern occurrence)

#### Floristic Community Types

##### Supergroup 2: Seasonal Wetlands

- 5 Mixed shrub damplands
- 10a Shrublands on dry clay flats (most northerly and only sampled occurrence off the Pinjarra Plain)
- 12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands (most northerly occurrence)
- S1 *Astartea* aff. *fascicularis*/*Melaleuca* species dense shrublands (most northerly occurrence)
- S2 Northern *Pericalymma ellipticum* dense low shrublands
- S3 Wet sedgeland on sandy clays

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

- 21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands
- 22 *Banksia ilicifolia* woodlands
- 23a Central *Banksia attenuata* — *B. menziesii* woodlands

### WETLANDS

**Wetland Types:** sumpland, creek, artificial channel

#### Natural Wetland Groups

##### Bassendean Dunes

- Pinjar (B.1)
- Jandakot (B.3)

**Wetland Management Objectives:** Conservation (1107.5ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** 3ha + 160ha = 163ha (total)

### THREATENED ECOLOGICAL COMMUNITIES

Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Pinj 01–13, 15), DEP 1999, McArthur and Mattiske 1985, Trudgen 1993a)

**Structural Units:** mapping (McArthur and Mattiske 1983, Trudgen 1993a)

Uplands: *Eucalyptus marginata* Woodland; *Banksia attenuata* and *B. menziesii* Low Open Forest to Low Woodland with scattered *Eucalyptus todtiana* and *E. marginata*; *Banksia attenuata* and *B. ilicifolia* Low Open Woodland

Wetlands: *Eucalyptus rudis* Open Forest to Open Woodland; *Acacia saligna*, *Exocarpos sparteus* and *Viminaria juncea* Low Open Woodland; *Melaleuca preissiana* and *Banksia ilicifolia* Low Woodland to Low Open Forest; Open Scrub to Tall Open Shrublands dominated by *Melaleuca teretifolia* or *Hakea varia*; Closed Heath to Low Open Heath dominated by *Hypocalymma angustifolium*, *Pericalymma ellipticum*; *Kunzea ericifolia* Open Scrub to Closed Scrub; Herblands dominated by *Stylidium* species; Closed to Open Sedgeland dominated by *Chaethanthus aristatus*, *Lepidosperma longitudinale* and combinations of *Baumea articulata*, *Lepyrodia muiirii* and *Meeboldinia scariosa*



**Scattered Native Plants:** not assessed

**Vegetation Condition:** >80% Excellent to Very Good with Pristine areas, <20% Good, with areas of severe localised disturbance

**Total Flora:** 170 native taxa, 15 weed taxa (plot-generated list only, DEP 1996)

**Significant Flora:** *Tripterococcus paniculatus* (1), *Stylidium longitubum* (3), *Anthotium junciforme* (4); *Stylidium utricularioides*, *Burchardia bairdiae*, *Boronia purdieana*, *Hensmania turbinata*, *Stylidium crossocephalum*, *Verticordia nitens*, *Epiblema grandiflora* (large populations in wetlands)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 380), east (Sites 380 and 398) and south (Site 295); part of Greenways 16, 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous and fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority recommended for protection in study of City of Wanneroo bushland (Trudgen, 1996); contains nine floristic community types in a unique combination; contains plant communities representative of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed; Indicative place (AHC 2000 D)

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve, may become National/ Conservation/ Regional Park or Nature Reserve. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

## CHITTY ROAD BUSHLAND, PINJAR

**Boundary Definition:** protected area with bushland (part taken to cadastre)/conservation wetland boundary (areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 398

**Area (ha):** bushland 928.5 (Site also includes open water.)

**Map no.** 21, 22

**Map sheet series ref. no.** 2034-I SE, 2034-I SW

**Other Names:** State Forest East of Lake Pinjar, part Submission Area 288, part of proposed Gnangara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Pinjar), Shire of Swan (Bullsbrook)

**Includes CALM Managed Land:** State Forest 65

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Wetlands (within the Bassendean Dunes)

Holocene Swamp Deposits (Qhw: Cps)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — North

Bassendean Complex — North Transition

###### Wetlands

Pinjar Complex

**Floristic Community Types:** \*not sampled, types inferred

###### Supergroup 2: Seasonal Wetlands

\*5 Mixed shrub damplands





**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

- \*21c Low-lying *Banksia attenuata* woodlands or shrublands
- \*22 *Banksia ilicifolia* woodlands
- \*23a Central *Banksia attenuata* — *B. menziesii* woodlands
- \*23b Northern *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** creek, dampland, sumpland

**Natural Wetland Groups**

**Bassendean Dunes**

- Pinjar (B.1)
- Gnangara (B.2)
- Jandakot (B.3)
- Riverdale (B.4)

**Wetland Management Objectives:** Conservation (108.9ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998 (observations from roadside), McArthur and Mattiske 1985, Trudgen 1996)

**Structural Units:** mapping (McArthur and Mattiske 1985)

Uplands: *Eucalyptus tottiana*, *Banksia attenuata*, *B. menziesii* Low Woodland with occasional *Nuytsia floribunda* and *Banksia ilicifolia*; Very Open Woodland of *Banksia menziesii*, *B. attenuata*, *B. ilicifolia* and *Nuytsia floribunda* over mixed Shrubland dominated by *Xanthorrhoea preissii*, *Verticordia nitens*, *Regelia inops*, *Hypocalymma angustifolium*

Wetlands: *Regelia inops* Open Heath with occasional *Xanthorrhoea* sp. and occasional emergent *Banksia ilicifolia*; *Regelia inops* Closed Heath with emergent trees of *Melaleuca preissiana* and *Eucalyptus rudis*; Mixed Open Low Heath dominated by *Hypocalymma angustifolium* and *Dasyogon bromeliifolius*, *Hypocalymma angustifolium* Low Shrubland, *Phlebocarya ?ciliata*. Open Herblands

**Vegetation Condition:** >60% Pristine to Excellent, >20% Very Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** the following are recorded from State Forest 65 and would be expected in the Site — *Stachystemon axillaris* (4), *Conostephium minus* (4); *Verticordia nitens*, *Boronia purdieana*, *Hensmania turbinata*, *Astroloma xerophyllum*, *Stylidium crossocephalum*, *Leucopogon kingianus*

**Fauna:** not known

**Linkage:** adjacent native vegetation to east (Sites 462 and 399); part of Greenways 36, 41 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen, 1996); included in Gnangara Park proposal (Bailey 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (Proposed 'Gnangara Park' - Cabinet 1996) (see Table 3, Volume 1).

**DEPARTMENT OF DEFENCE — MUCHEA AIR WEAPONS RANGE  
BUSHLAND, PINJAR**

**Boundary Definition:** management boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)



**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 462 **Area (ha):** bushland 1759.3  
**Map no.** 22, 23 **Map sheet series ref. no.** 2034-I SE, 2034-I SW  
**Other Names:** not known  
**Local Authorities (Suburb):** Shire of Swan (Bullsbrook), Shire of Wanneroo (Pinjar), Shire of Chittering (Muehea)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**  
 Bassendean Sands (Qpb: S8)  
**Bassendean Dunes/Pinjarra Plain**  
 Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)  
**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**  
 Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**  
**Bassendean Dunes**  
 Bassendean Complex — North  
**Floristic Community Types:** \*not sampled, types inferred  
**Supergroup 2: Seasonal Wetlands**  
 \*4 *Melaleuca preissiana* damplands  
 \*S2 Northern *Pericalymma ellipticum* dense low shrublands  
**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**  
 \*21c Low-lying *Banksia attenuata* woodlands or shrublands  
 \*22 *Banksia ilicifolia* woodlands  
 \*23a Central *Banksia attenuata* — *B. menziesii* woodlands  
 \*23b Northern *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, dampland, palusplain  
**Natural Wetland Groups**  
**Bassendean—Pinjarra transition OR Bassendean with fluvial features**  
 Muehea (B/P.3)  
**Bassendean Dunes**  
 Jandakot (B.3)  
 Riverdale (B.4)

**Wetland Management Objectives:** Conservation (45.6ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands  
**Vegetation and Flora:** limited survey (Connell 1995, McArthur and Mattiske 1985)  
**Structural Units:** mapping (McArthur and Mattiske 1985)  
 Uplands: *Banksia* species Low Open Woodland  
 Wetlands: *Banksia* species Low Open Woodland with occasional emergent *Eucalyptus calophylla* and *Melaleuca preissiana*; *Melaleuca preissiana*, *M. raphiophylla* and *Eucalyptus rudis* Low Open Forest to Closed Forest; Open to Closed Sedgeland  
**Scattered Native Plants:** not assessed  
**Vegetation Condition:** Excellent (Connell 1995)  
**Total Flora:** not known  
**Significant Flora:** none recorded  
**Fauna:** not known  
**Linkage:** adjacent native vegetation to the south (Site 399), east (Site 97) and west (Site 398); part of Greenway 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)  
**Other Special Attributes:** part recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)





**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**KIRBY ROAD BUSHLAND, BULLSBROOK**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 97

**Area (ha):** bushland 440.7

**Map no.** 23, 24

**Map sheet series ref. no.** 2034-I SE

**Other Names:** part Submission Area 288

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Yanga Complex

**Bassendean Dunes**

Bassendean Complex — North

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*4 *Melaleuca preissiana* damplands

\*S2 Northern *Pericalymma ellipticum* dense low shrublands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*22 *Banksia ilicifolia* woodlands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

\*23b Northern *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** dampland, sumpland, palusplain, artificial channel

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Bassendean Dunes**

Jandakot (B.3)

**Swan Coastal Plain Rivers**

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (29.3ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Critically Endangered (Communities of Tumulus Springs)



### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998 (viewed from fence line), DEP 1999, Connell 1995, McArthur and Mattiske 1985, Trudgen 1996)

#### Structural Units

Uplands: *Banksia attenuata* Low Woodland with occasional *Nuytsia floribunda*, *Allocasuarina fraseriana*, *Eucalyptus calophylla* and *Banksia ilicifolia*; Mixed *Banksia attenuata*, *B. ilicifolia* Low Open Forest, occasionally with emergent *Banksia menziesii* and *Eucalyptus calophylla*; *Adenanthos cygnorum* Tall Open Shrubland; Mixed *Xanthorrhoea ? preissii*, *Dasypogon bromeliifolius* Open Low Heath

Wetlands: *Melaleuca preissiana* Low Open Woodland to Low Forest; *Astartea* aff. *fascicularis* Shrubland; *Astartea* aff. *fascicularis* and *Hypocalymma angustifolium* Shrubland with occasional emergent trees of *Melaleuca preissiana*; *Kunzea ericifolia* Tall Shrubland to Closed Scrub with occasional emergent *Eucalyptus calophylla*; *Regelia inops* and *Astartea* aff. *fascicularis* Open Heath; *Hypocalymma angustifolium* Shrubland with emergent *Xanthorrhoea preissii*; *Xanthorrhoea preissii* Shrubland; *Hypocalymma angustifolium* Open Low Heath

**Vegetation Condition:** Very Good to Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent native vegetation to the south and west (Site 462); part of Greenway 42 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Other Government Land Mechanism. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

## NUMBAT ROAD BUSHLAND, MARIGINIUP

**Boundary Definition:** protected area with bushland (Site 14); protected area with bushland/conservation wetland boundary (Site 146) (remnants in pine plantation)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 141, 146

**Area (ha):** bushland 64.4

**Map no.** 29

**Map sheet series ref. no.** 2034-I SW

**Other Names:** part of proposed Gnangara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Mariginiup, Jandabup)

**Includes CALM Managed Land:** State Forest 65

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qhw: Cps)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — North

Bassendean Complex — North Transition

**Floristic Community Types:** not sampled, types not inferred

#### WETLANDS

**Wetland Types:** dampland, artificial channel





**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (4.4ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, McArthur and Mattiske 1985, Trudgen 1996)

**Structural Units**

Uplands: *Banksia attenuata*, *B. ilicifolia*, *B. menziesii* Low Woodland; *Banksia menziesii*, *B. attenuata* Low Open Woodland

Wetlands: *Melaleuca preissiana* Low Open Forest over *Astartea* aff. *fascicularis* Open Shrubland; *Melaleuca preissiana* Low Open Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >40% Excellent, >40% Very Good, <15% Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** no adjacent native vegetation

**Other Special Attributes:** included in Gngangara Park proposal (Bailey 1997); majority recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Sites with Some Existing Protection; the existing care, control and management of these Sites is endorsed (Proposed 'Gngangara Park' - Cabinet 1996) (see Table 3, Volume 1).

**MELALEUCA PARK AND ADJACENT BUSHLAND, BULLSBROOK/LEXIA**

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary (mostly associated with protected area) (Areas of bushland within the boundaries of the Site are not accurately mapped.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 399

**Area (ha):** bushland 4150.9 (Site also includes open water.)

**Map no.** 22, 23, 29, 30, 31, 36

**Map sheet series ref. no.** 2034-I SE, 2034-I SW, 2034-II NE

**Other Names:** M9, part Submission Areas 117 and 288, part of proposed Gngangara Park

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook, Ellenbrook, Lexia)

**Includes CALM Managed Land:** State Forest 65

**System 6 (1983):** M9 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Cps)



## VEGETATION AND FLORA

### Vegetation Complexes

#### Pinjarra Plain

Yanga Complex

#### Bassendean Dunes

Bassendean Complex — North

Bassendean Complex — North Transition (restricted complex, contains significant area)

### Floristic Community Types

#### Supergroup 2: Seasonal Wetlands

4 *Melaleuca preissiana* damplands

S2 Northern *Pericalymma ellipticum* dense low shrublands

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21c Low-lying *Banksia attenuata* woodlands or shrublands

22 *Banksia ilicifolia* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

23b Northern *Banksia attenuata* — *B. menziesii* woodlands

## REGIONAL WETLANDS

**Wetland Types:** sumpland, dampland, floodplain, creek, artificial channel

### Natural Wetland Groups

#### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Muchea (B/P.3)

#### Bassendean Dunes

Jandakot (B.3)

Riverdale (B.4)

**Wetland Management Objectives:** Conservation (240.4ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 5.9ha + 3.4ha + 1ha + 1ha + 1.1ha = 12.4ha (total)

## THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** tall dune, open water, vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — DEP 1998 (viewed from fence line), EPA and WAWA 1990, Gibson *et al.* 1994 (MELA 01–03, 05–10; ELE 15–16; WARB 01–04), Griffin 1994 (MP 01–11; SF 01–04), Havel 1968 (Transect 3 and Plots 8, 9, 72), Hedde 1980 (Neaves Transect), McArthur and Matisse 1985, Muir 1983, Trudgen, 1996); detailed survey (Keighery, GJ, 1996 & 1999)

**Structural Units:** mapping (EPA and WAWA 1990, McArthur and Matisse 1985)

Uplands: Low Open Forests to Low Open Woodlands of *Banksia attenuata*, *B. menziesii* or *B. ilicifolia* or combinations of these, sometimes with *Eucalyptus todtiana*, *E. marginata*, *Nuytsia floribunda* or *Melaleuca preissiana* over mixed Open Heaths to Low Shrublands, sometimes with *Verticordia nitens*, *Adenanthos cygnorum*, *Xanthorrhoea preissii*, *Eremaea pauciflora* or species of *Leucopogon* or *Hibbertia*

Wetlands: Open Forests to Low Open Woodlands of *Eucalyptus rudis*, *Melaleuca preissiana*, *M. raphiophylla* or *Banksia littoralis* or combinations of these; Closed Heaths to Low Shrublands of *Astartea aff. fascicularis*, *Hypocalymma angustifolium*, *Regelia ciliata*, *Pericalymma ellipticum* or *Pultenaea reticulata* or combinations of these; Herblands dominated by *Phlebocarya ciliata* and other herbs such as *Patersonia occidentalis* often in combination with a variety of sedges; Sedgeland of *Baumea articulata*, other *Baumea* species, *Juncus pallidus* and *Lepidosperma* species

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >5% Pristine, >85% Excellent to Very Good, <10% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 272 native taxa (Keighery, GJ 1996) (estimated >60% expected flora)

**Significant Flora:** *Caladenia huegelii* (R); *Conostephium minus* (4), *Stachystemon axillaris* (4); *Boronia purdieana*, *Verticordia nitens*, *Astroloma xerophyllum*, *Eremaea purpurea*, *Hensmania turbinata*, *Stylidium crosscephalum*, *Burchardia bairdiae*; *Lachnostachys albicans* (Keighery, GJ 1999) (most southern record on Swan Coastal Plain)

**Fauna:** multiple survey for reptiles (26 species) and amphibians (8 species) (How & Dell 1994). Significant reptile species: legless lizard (*Pletholax gracilis*), dragon (*Tympanocryptis adelaidensis*), skinks (*Ctenotus gemmula*, *Egernia napoleonis* and *Acritoscincus trilineatum*), Black-headed Snake (*Parasuta gouldii*) and Black-striped Snake (*Simoselaps calonotos*). Good assemblage of insectivorous birds including Splendid Fairy-wren and nectarivorous birds (J. Dell pers. comm.)





**Linkage:** adjacent native vegetation to the north (Site 462), east (Sites 6, 298 and 300) and west (Sites 398); part of Greenways 40, 41, 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous and fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part recommended for protection in study of City of Wanneroo (Trudgen, 1996), 'contains the most important example remaining in State Forest of the coastal vegetation type characteristic of the Bassendean Dune System' (DCE 1983), part of catchment for Ellenbrook and Egerton wetlands and mound springs (Sites 300 and 93); part Site proposed to become Nature Reserve in Forest Management Plan 1994–2003 (CALM 1994); included in Gnaragara Park proposal (Bailey 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (Proposed 'Gnaragara Park' - Cabinet 1996). Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**COOPER ROAD WATER RESERVE AND ADJACENT BUSHLAND, BULLSBROOK**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 6 **Area (ha):** bushland 113.8  
**Map no.** 23, 24, 30, 31 **Map sheet series ref. no.** 2034-I SE  
**Other Names:** not known  
**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**  
 Bassendean Sands (Qpb: S8)  
**Bassendean Dunes/Pinjarra Plain**  
 Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)  
**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**  
 Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Yanga Complex

**Bassendean Dunes**

Bassendean Complex — North

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

- \*4 *Melaleuca preissiana* damplands
- \*S2 Northern *Pericalymma ellipticum* dense low shrublands
- \*S17 *Eucalyptus rudis/Agonis linearifolia* wetlands in Bassendean Dunes

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

- \*21c Low-lying *Banksia attenuata* woodlands or shrublands
- \*23a Central *Banksia attenuata* — *B. menziesii* woodlands
- \*23b Northern *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, palusplain, floodplain, creek

**Natural Wetland Groups**



**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Wetland Management Objectives:** Conservation (49.5ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, surveyed from roadside, McArthur and Mattiske 1985, Muir 1983, Trudgen 1996)

**Structural Units**

Uplands: *Banksia attenuata*, *B. menziesii* Low Woodland with occasional *Nuyisia floribunda*, *Banksia littoralis* and *Eucalyptus todtiana*

Wetlands: *Melaleuca preissiana* Closed Forest with occasional *Eucalyptus patens* over *Agonis linearifolia* Tall Shrubland: *Hypocalymma angustifolium* and *Astartea* aff. *fascicularis* Closed Heath with emergent *Xanthorrhoea preissii*; Sedgelands to Closed Sedgelands

**Scattered Native Plants:** not assessed

**Vegetation Condition:** 90% Pristine to Excellent, <10% Very Good

**Total Flora:** not known

**Significant Flora:** *Verticordia nitens*

**Fauna:** not known

**Linkage:** adjacent native vegetation to the north, east and west (Sites 399); part of Greenway 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**JANDABUP LAKE AND ADJACENT BUSHLAND, JANDABUP/MARIGINIUP**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 324

**Area (ha):** bushland 107.5 (Site also includes open water.)

**Map no.** 28, 29

**Map sheet series ref. no.** 2034-I SW, 2034-II NW

**Other Names:** Part Submission Area 233, part of Wanneroo Wetlands Eastern Chain

**Local Authorities (Suburb):** Shire of Wanneroo (Jandabup, Mariginiup)

**Includes CALM Managed Land:** Reserve 7349 (Conservation of Fauna)

**System 6 (1983):** Part M8 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Spearwood/Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Cps)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Wetlands**

Pinjar Complex (most southern occurrence)

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*S3 Wet sedgelands on sandy clays

\*S17 *Eucalyptus rudis*/*Agonis linearifolia* wetlands in Bassendean Dunes

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**REGIONAL WETLANDS**

**Wetland Types:** lake, sumpland

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

**Wetland Management Objectives:** Conservation (298.9ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 346ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, including observations from roadside, EPA and WAWA 1990, McArthur and Mattiske 1985, Trudgen 1993a, WAWA 1995)

**Structural Units:** mapping (EPA and WAWA 1990, McArthur and Mattiske 1985, Trudgen 1993a, WAWA 1995)

Uplands: *Eucalyptus marginata* Closed Forest; *Banksia attenuata* and *B. menziesii* Low Open Forest; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest; *Acacia saligna* Tall Open Scrub

Wetlands: *Eucalyptus rudis* Woodland to Open Forest; *Melaleuca raphiophylla* Low Woodland to Low Open Forest; *Viminaria juncea* Tall Open Scrub; *Astartea* aff. *fascicularis* and *Regelia ciliata* Open Heath with emergent scattered *Melaleuca preissiana*; *Villarsia* sp. Herbland; Closed Sedgeland to Sedgeland dominated by *Baumea articulata*, *B. preissii*, *B. juncea*, *Lepyrodia muirii* and *Meeboldinia scariosa*

**Scattered Native Plants:** not assessed

**Vegetation Condition**

Uplands: <80% Excellent to Very Good, >20% Good to Degraded, with areas of severe localised disturbance

Wetland: <70% Excellent to Pristine, >30% Very Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Podolepis gracilis* (Swamp form), *Utricularia dichotoma* (only record for the Swan Coastal Plain, otherwise Stirlings/south coast); Lowrie 1998 — *Utricularia gibba* (only record for WA, considered a weed in Marchant *et al.* 1987 but here considered native), *U. volubilis*

**Fauna:** multiple survey for birds (76 species) (RAOU 1996 D, 5 visits). Significant populations of Blue-billed, Musk, Australasian Shoveler and Pink-eared Ducks and insectivorous passerine birds. Significant bird species: category 1 (2), category 2 (3), category 3 (8) and category 4 (3). High species-richness of aquatic invertebrates (Davis *et al.* 1993, Balla and Davis 1993)

**Linkage:** adjacent native vegetation to the south (outside Site), east and west; part of Greenways 15, 14 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** 'most diverse sedge and macrophyte vegetation of all the Bassendean dune wetlands studied in the area ... appears to be the most pristine of the wetlands within the wetland suite to which it belongs' (WAWA 1995, pp.124–125); part recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate (Jandabup Nature Reserve); Indicative place (AHC 2000 D)(Jandabup Lake); location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management intent of Reserve 7349 is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**HAWKINS ROAD BUSHLAND, JANDABUP/GNANGARA**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 326

**Area (ha):** bushland 313.9

**Map no.** 29

**Map sheet series ref. no.** 2034-I SW, 2034-II NW

**Other Names:** East of Lake Jandabup, part Submission Area 298, part of proposed Gngangara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Jandabup, Gngangara)

**Includes CALM Managed Land:** State Forest 65

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — North

Bassendean Complex — Central and South (most northern occurrence)

Bassendean Complex — North Transition

**Wetlands**

Pinjar Complex

**Floristic Community Types** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*4 *Melaleuca preissiana* damplands

\*14 Deeper wetlands on sandy soils

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

23a Central *Banksia attenuata* — *B. menziesii* woodlands

\*23b Northern *Banksia attenuata* — *B. menziesii* woodlands

**REGIONAL WETLANDS**

**Wetland Types:** dampland

**Natural Wetland Groups**

**Bassendean Dunes**

Gngangara (B.2)

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (9.9ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Data Deficient (floristic community type 14)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Trudgen 1993a; part Site — Gibson *et al.* 1994 (Wirr 02), Trudgen 1995)

**Structural Units:** mapping (Trudgen 1993a)





Uplands: *Banksia attenuata*, *B. menziesii*, *Eucalyptus todtiana* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Open Forest; *Banksia attenuata* and *B. ilicifolia* Low Woodland; *Adenanthos cygnorum* Tall Open Shrubland; Low Shrublands to Open Heaths dominated by *Stirlingia latifolia*, *Leucopogon conostephioides*, *Acacia pulchella*, *Conospermum stoechadis*, *Hibbertia hypericoides*, *Calytrix fraseri* and *Xanthorrhoea preissii* and combinations of these

Wetlands: *Eucalyptus rudis* Woodland; *Melaleuca preissiana* and *Banksia ilicifolia* Low Woodland to Open Forest; Mixed Tall Shrubland; *Astartea* aff. *fascicularis* Open Heath to Closed Tall Scrub; *Pultenaea reticulata* Open Scrub, *Pericalymma ellipticum* Shrubland; *Hypocalymma angustifolium* Low Open Heath; *Cyathochaeta avenacea* Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >30% Excellent to Pristine, <40% Very Good to Good and <30% Degraded, with areas of severe localised disturbance (mapping Trudgen 1993a)

**Total Flora:** 96 native taxa (part Site — Trudgen 1995) (estimated >50% expected flora)

**Significant Flora:** *Verticordia nitens* (Trudgen 1995)

**Fauna:** not known

**Linkage:** adjacent native vegetation to the south and west; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996); part Site included in Gngangara Park proposal (Bailey 1997)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of CALM managed land is endorsed (Proposed 'Gngangara Park' - Cabinet 1996). Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

## MARALLA ROAD BUSHLAND, ELLENBROOK/UPPER SWAN

**Boundary Definition:** protected area/ bushland taken to cadastre/bushland group/conservation wetland boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 300 **Area (ha):** bushland 641.5 (Site also includes open water.)

**Map no.** 30, 31, 32, 37

**Map sheet series ref. no.** 2034-I SE, 2034-II NE, 2134-III NW, 2134-IV SW

**Other Names:** Ellenbrook Bushland Conservation Area, part Submission Areas 116 and 117

**Local Authorities (Suburb):** Shire of Swan (Ellenbrook, The Vines, Upper Swan)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: Mgs1, S11)

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qhw: Cps)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Guildford Complex (none in Site)

Swan Complex

Yanga Complex

###### Bassendean Dunes

Bassendean Complex — North (most southern occurrence)

Bassendean Complex — North Transition (restricted complex)



**Floristic Community Types:** \* not sampled, type inferred

**Supergroup 2: Seasonal Wetlands**

- 4 *Melaleuca preissiana* damplands
- \*5 Mixed shrub damplands
- 18 Shrublands on calcareous silts
- S2 Northern *Pericalymma ellipticum* dense low shrublands
- S3 Wet sedgeland on sandy clays
- S5 *Acacia saligna* wetlands (restricted type, known from two localities, this is the only area in the PMR)
- S6 Northern dense low shrublands (most southern occurrence)
- S17 *Eucalyptus rudis*/*Agonis linearifolia* wetlands in Bassendean Dunes

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

- 21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands
- 21c Low-lying *Banksia attenuata* woodlands or shrublands
- 22 *Banksia ilicifolia* woodlands
- 23b Northern *Banksia attenuata* — *B. menziesii* woodlands (most southern occurrence)
- S9 *Banksia attenuata* woodlands over dense low shrublands (most southern and only occurrence)

**REGIONAL WETLANDS**

**Wetland Types:** sumpland, dampland, palusplain, floodplain, creek, river

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Bassendean Dunes**

Jandakot (B.3)

**Swan Coastal Plain Rivers**

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (221.6ha, 3235.3m), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 2.2ha + 0.6ha + 63.5ha + 7.2ha + 33.9ha + 0.8ha = 108ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Vulnerable (floristic community type 18)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** tall dune, open water, vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — Dames and Moore 1990 and 1992, DEP 1999); detailed survey (part Site — Weston *et al.* 1993)

**Structural Units:** mapping (part Site — Weston *et al.* 1993)

Uplands (mainly Bassendean Sands): Low Closed Woodlands to Low Open Woodlands of *Banksia attenuata*, *B. menziesii* or *B. ilicifolia* and combinations of these, sometimes with *Eucalyptus todtiana*, *E. calophylla* or *E. marginata*; *E. calophylla* Woodland

Wetlands: Low Closed Forests and Closed Forests to Woodlands of *Eucalyptus rudis*, *Melaleuca preissiana*, *M. raphiophylla*, *Banksia littoralis* or *Acacia saligna* and combinations; Closed Tall Scrub to Low Shrubland of *Agonis linearifolia*, *Astartea* aff. *fascicularis*, *Pericalymma ellipticum*, *Acacia saligna*, *Melaleuca viminea*, *Kunzea recurva*, *Regelia ciliata* or others and in combination; Mixed Herblands of species of *Utricularia*, *Stylidium*, *Drosera* and other small plants; Herblands dominated by *Phlebocarya ciliata* and other herbs such as *Patersonia occidentalis* often in combination with a variety of sedges; Sedgelands of *Baumea articulata*, *Baumea* species, *Lepidosperma longitudinale*, *Carex appressa* and *Harperia lateriflora*

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 427 native taxa, 50 weed taxa (Weston *et al.* 1993) (area greater than that of the Site, estimated <10% not in Site, estimated >85% expected flora)

**Significant Flora:** *Caladenia huegelii* (R); *Grevillea curviloba* subsp. *curviloba* (R); *Haloragis tenuifolia* (1), *Eryngium subdecumbens* ms (1), *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Aotus cordifolia* (3), *Anthotium junciforme* (4), *Conostephium minus* (4), *Stachystemon axillaris* (4); *Astroloma macrocalyx*, *Burchardia bairdii*, *Blancoa canescens*, *Boronia purdieana*, *Conospermum triplinervium*, *Kunzea* aff. *recurva* (GJK 12828), *Darwinia* sp. Muchea (BJK 2006), *Eremaea purpurea*, *Hibbertia perfoliata*, *Leucopogon kingianus*, *Levenhookia preissii*, *Macarthuria apetala*, *Dielsia stenostachya*, *Verticordia nitens*; significant groups of species: 4 species of *Mesomelaena* recorded in Site; >30 species characteristic of heavy soils on the eastern side of the coastal plain





**Fauna:** limited survey for birds (57 species), native mammals (3 species), reptiles (31 species) and amphibians (9 species) (Watkins, Bamford and Bamford 1993). Significant bird species: category 3 (13) and category 4 (10). Significant populations of Scarlet Robin, Hooded Robin, Golden Whistler, Splendid Fairy-wren, Western, Yellow-rumped and Broad-tailed Thornbills, and Australian Sittella. Significant mammal species: Quenda and Western Brush Wallaby. Significant reptile species: Spiny-tailed Gecko (*Diplodactylus spinigerus*), dragon (*Tympanocryptis adelaidensis*), skink lizards (*Ctenotus gemmula* and *Lerista christinae*), Black-striped Snake (*Simoselaps calanotus*), legless lizard (*Pletholax gracilis*) and Black-Headed Snake (*Parasuta gouldii*)

**Linkage:** adjacent native vegetation to the north and south outside of the Site, east (Site 301) and west (Site 399); adjacent bushland north available; part of Greenways 36, 40, 59 (Tingay, Alan & Associates 1998a) part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains diversity of floristic community types (13) and mapped vegetation types (19) (Weston *et al.* 1993); contains plant communities representative of the eastern side of the Swan Coastal Plain; contains outstanding flora diversity (>380 native species recorded for Site), (i) an exceptionally large number of significant flora and (ii) high conservation value for vegetation (Weston *et al.* 1993, p. 74) including: (a) a variety of wetlands in near-pristine condition (b) many other vegetation types in excellent or better condition and (c) a number of vegetation types on a range of landform/soil complexes that are in conjunction (a conjunction which does not exist elsewhere in the PMR except possibly in Locations 1500 and 2766, north of Muchea); contains a relatively rich fauna compared to bushland remnants closer to Perth (Bowman Bishaw Gorham 1993); National Trust of Australia (WA) Classification; contains part of the channels (Saw Pit Gully and Ellen Brook) recommended for conservation by Semeniuk, V&C Research Group (1992); contains part of the area recommended for conservation by Semeniuk, V&C Research Group (1992); contains 4010m of regionally significant river and 728m of regionally significant creek (WRC 1996a GIS)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the Site is already reserved for Parks and Recreation in the Metropolitan Region Scheme and should be purchased for National Park, Conservation Park, Nature Reserve or Regional Park. Part B: Regional Creekline Mechanism (with mapped vegetation). Part C: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

### CARDINAL DRIVE BUSHLAND, ELLENBROOK

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary (Boundary adjusted after negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 23

**Area (ha):** bushland 26.8

**Map no.** 31

**Map sheet series ref. no.** 2034-II NE

**Other Names:** Part Submission Area 116, part of Ellenbrook National Estate Area

**Local Authorities (Suburb):** Shire of Swan (Ellenbrook, The Vines)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qhw: Cps)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Yanga Complex (most southern occurrence)





**Bassendean Dunes**

Bassendean Complex — North

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex (most northern occurrence)

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

5 Mixed shrub damplands

\*18 Shrublands on calcareous silts

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*23b Northern *Banksia attenuata* — *B. menziesii* woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands (atypical member of this type associated with Muchea Limestones)

**REGIONAL WETLANDS**

**Wetland Types:** palusplain, sumpland

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Wetland Management Objectives:** Conservation (9.127ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Endangered (Shrublands and woodlands on Muchea Limestones), Vulnerable (floristic community type 18)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** Muchea Limestone, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Vines 01–02), DEP 1999, Weston 1999)

**Structural Units:** mapping (Weston 1999)

Uplands: Low Closed Woodlands to Low Open Woodlands of *Banksia attenuata*, *B. menziesii* or *B. ilicifolia* and combinations of these, sometimes with *Eucalyptus calophylla*; *Eucalyptus calophylla* Woodland

Wetlands: Closed Tall Scrubs to Tall Shrublands of *Acacia saligna*, *Melaleuca raphiophylla*, *M. viminea* and *M. huegelii* or combinations of these

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >80% Very Good to Excellent, <20% Good to Degraded areas, with areas of severe localised disturbance associated with tracks (Weston 1999 and DEP 1999)

**Total Flora:** 427 native taxa, 50 weed taxa (Weston *et al.* 1993) (area greater than that of Site, estimated >50% not in Site)

**Significant Flora:** *Grevillea curviloba* subsp. *curviloba* (R) (largest population known in a bushland area, estimated to be less than 200 plants in the wild of this taxon); *Haloragis tenuifolia* (1), *Eryngium pimmatifidum* subsp. *palustre* (2), *Stylidium longitubum* (3); at least five taxa typical of Muchea Limestones *Grevillea curviloba* subsp. *curviloba*, *Melaleuca huegelii*, *Austrostipa flavescens*, *Anthocercis littorea*, *Daucus glochidiatus*; at least nine taxa typical of the heavy soils of the eastern side of the Swan Coastal Plain

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent native vegetation to the north and west (connects to Site 300); part of Greenway 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains diversity of floristic community types (7) and mapped vegetation types (10, Weston *et al.* 1993); contains plant communities representative of the eastern side of the Swan Coastal Plain; contains the only intact area of Muchea Limestone communities known in the PMR and the largest known population of *Grevillea curviloba* subsp. *curviloba* which is only found on soils associated with Muchea Limestones; National Trust of Australia (WA) Classification; contains part of the area recommended for conservation by Semeniuk, V&C Research Group (1992)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Urban Negotiated Planning Solution (see Table 3, Volume 1).

**EGERTON MOUND SPRING AND ADJACENT BUSHLAND, ELLENBROOK**

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland (Boundary adjusted after negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan.*)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 22

**Area (ha):** bushland 20.3

**Map no.** 31

**Map sheet series ref. no.** 2034-II NE

**Other Names:** Submission Area 115, part of Ellenbrook National Estate Area

**Local Authorities (Suburb):** Shire of Swan (Ellenbrook)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — North

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*S17 *Eucalyptus rudis* — *Agonis linearifolia* wetlands in Bassendean Dunes

**REGIONAL WETLANDS**

**Wetland Types:** sumpland, creek, palusplain

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (21.2ha, 12m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Critically Endangered (Communities of Tumulus Springs)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, Jasinska and Knott 1994, GJ Keighery pers. comm.); detailed survey (Tingay, Alan & Associates 1994a)

**Structural Units:** mapping (Tingay, Alan & Associates 1994a)

Wetlands: *Eucalyptus rudis* Closed Forest to Open Forest, often with *Melaleuca preissiana* and *Banksia littoralis*; *Melaleuca preissiana* Low Woodland to Low Open Woodland, *Melaleuca raphiophylla* Low Closed Forest, often with *Eucalyptus rudis*; Closed Heaths to Open Low Heaths of *Agonis linearifolia*, *Astartea* aff. *fascicularis*,

*Hypocalymma angustifolium* or *Pericalymma ellipticum*; Sedgeland of *Baumea articulata* or *Cyathochaeta teretifolia*

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good to Degraded, with small areas of severe localised disturbance

**Total Flora:** >80 native taxa (Tingay, Alan & Associates 1994a, with additions from Jasinska and Knott 1994 and GJ Keighery pers. comm.) (>75% expected native flora of Site)

**Significant Flora:** *Cyathochaeta teretifolia* (3), *Aotus cordifolia* (3); *Hibbertia perfoliata*, *Lycopodium serpentinum*; taxa uncommon on the Swan Coastal Plain found in association with permanent freshwater seepages or springs — *Hibbertia perfoliata*, *Lycopodium serpentinum*, *Goebelobryum unguiculatum*, *Hyalolepidozia longiscypha*

**Fauna:** structured survey for birds (8 species), native mammals (3 species), reptiles (5 species) and amphibians (5 species) (Tingay, Alan & Associates 1994d). Significant bird species: category 3 (1) and category 4 (1). Significant mammal species: Honey Possum and Quenda (Friend 1996 D). Contains a rich and diverse aquatic invertebrate fauna (Jasinska and Knott 1994)

**Linkage:** no adjacent bushland; part of Greenway 36 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** the only Ellen Brook mound spring studied by Jasinska and Knott (1994) without degraded vegetation and with a new, monotypic genus of amphipod discovered in 1994; only known occurrence of the club moss *Lycopodium serpentinum* and the leafy liverworts *Goebelobryum unguiculatum* and *Hyalolepidozia longiscypha* in the PMR dependent on water regime in spring; National Trust of Australia (WA) Classification; contains part of the area recommended for conservation by Semeniuk, V&C Research Group (1992)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Urban Negotiated Planning Solution (see Table 3, Volume 1).

## GNANGARA LAKE AND ADJACENT BUSHLAND, GNANGARA/LEXIA

**Boundary Definition:** protected area/bushland boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 193

**Area (ha):** bushland 162.3 (Site also includes open water.)

**Map no.** 35

**Map sheet series ref. no.** 2034-II NE, 2034-II NW

**Other Names:** Part Submission Area 233, part of proposed Gnangara Park, part of Wanneroo Wetlands Eastern Chain

**Local Authorities (Suburb):** Shire of Wanneroo (Gnangara)

**Includes CALM Managed Land:** State Forest 65

**System 6 (1983):** Part M8 area of bushland goes beyond System area boundaries, all bushland described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### Wetlands (within the Spearwood/Bassendean Dunes)

Holocene Swamp Deposits (Qhw: Cps)

#### VEGETATION AND FLORA

##### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — North

Bassendean Complex — Central and South

Bassendean Complex — North Transition





**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

S3 Wet sedgelands on sandy clays

S17 *Eucalyptus rudis*/*Agonis linearifolia* wetlands in Bassendean Dunes

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**REGIONAL WETLANDS**

**Wetland Types:** lake

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (117.3ha)

**Swan Coastal Plain Lakes EPP:** 124.3ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Gnan 01–03), EPA and WAWA 1990, Trudgen 1993a, WAWA 1995)

**Structural Units:** mapping (EPA and WAWA 1990, Trudgen 1993a)

Uplands: *Banksia attenuata*, *B. menziesii*, *Eucalyptus todtiana* Low Open Woodland; *Eucalyptus marginata* Open Forest; *Banksia attenuata* and *B. menziesii* Low Open Forest; *Banksia attenuata*, *B. ilicifolia*, *B. menziesii*, *Nyctia floribunda* and *Eucalyptus todtiana* Low Open Woodland

Wetlands: *Eucalyptus rudis* Open Forest; *Melaleuca raphiophylla* Low Open Forest to Closed Forest; Mixed Closed Herbland; Mixed Closed Sedgeland; Closed Sedgelands of *Baumea articulata* and *B. juncea*

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance (mapping Trudgen, 1993a)

**Total Flora:** 170 native taxa, 15 weed taxa (plot-generated list only) (estimated >50% expected flora)

**Significant Flora:** *Cyathochaeta teretifolia* (3)

**Fauna:** limited survey for birds (50 species) (RAOU 1996 D, 2 visits). Significant populations of Musk Duck and insectivorous passerine birds including Splendid Fairy-wren and Western Thornbill. Significant bird species: category 1 (1), category 2 (3), category 3 (5) and category 4 (4)

**Linkage:** adjacent native vegetation to the north, south (Site 196) and west; part of Greenway 22, 13 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996); part Site included in Gnangara Park proposal (Bailey 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Indicative place (AHC 2000 D); location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (Proposed “Gnangara Park” – Cabinet 1996) (see Table 3, Volume 1).

**WETHERELL ROAD BUSHLAND, LEXIA/ELLENBROOK**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 192, 195

**Area (ha):** bushland 40.7

**Map no.** 36

**Map sheet series ref. no.** 2034–II NE

**Other Names:** part of proposed Gnangara Park

**Local Authorities (Suburb):** Shire of Swan (Ellenbrook)

**Includes CALM Managed Land:** State Forest 65



## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — Central and South

Bassendean Complex — North Transition (most southern occurrence)

**Floristic Community Types:** \*not sampled, type inferred

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

### WETLANDS

No wetlands mapped

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998) (viewed from fenceline)

#### Structural Units

Uplands: *Banksia menziesii*, *B. ilicifolia*, *B. attenuata*, *Eucalyptus todtiana* Low Open Forest with emergent *E. calophylla*; *Allocasuarina fraseriana* Woodland over *Banksia ilicifolia*, *Eucalyptus todtiana*, *Nuytsia floribunda* mixed Low Open Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** 5% Excellent, <60% Very Good, >30% Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent native vegetation (Site 399 across road to north); part of Greenway 40 (Tingay, Alan & Associates 1998a); part of contiguous and fragmented bushland/wetland linkages (Part A, Map 7)

**Other Special Attributes:** included in Gnangara Park proposal (Bailey 1997)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Sites with Some Existing Protection; the existing care, control and management of these Sites is endorsed (Proposed 'Gnangara Park' - Cabinet 1996) (see Table 3, Volume 1).

## GNANGARA ROAD BUSHLAND, LANDSDALE/CULLACABARDEE

**Boundary Definition:** bushland taken to cadastre boundary (Boundary adjusted from that in draft *Perth's Bushplan*.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 196

**Area (ha):** bushland 236.6

**Map no.** 35

**Map sheet series ref. no.** 2034-II NE, 2034-II NW

**Other Names:** Part Submission Area 299, Telecommunication Centre

**Local Authorities (Suburb):** Shire of Wanneroo (Landsdale), Shire of Swan (Cullacabardee)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes





Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*4 *Melaleuca preissiana* damplands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20a *Banksia attenuata* woodlands over species-rich dense shrublands (Dames and Moore 1998)

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*22 *Banksia ilicifolia* woodlands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**REGIONAL WETLANDS**

**Wetland Types:** dampland, palusplain

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Bassendean Dunes**

Gnangara (B.2)

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (119.2ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Clarke and Keighery 2000a, Dames and Moore 1998, DEP 1996 & 1998 fenceline observations)

**Structural Units:** mapping (Clarke and Keighery 2000a, Dames and Moore 1998)

Uplands: Woodland to Low Woodland dominated by combinations of *Eucalyptus calophylla*, *E. marginata*, *Banksia menziesii*, *B. attenuata* and *B. ilicifolia* over species-rich Shrublands over Herblands and Sedgeland

Wetlands: Woodland, Low Open Forest, Low Woodland, Open Woodland and Low Open Woodland dominated by *Melaleuca preissiana*, *Eucalyptus calophylla* and *Banksia ilicifolia* and combinations of these (*Banksia menziesii* and *B. attenuata* may also be present); Closed to Open Low Heaths dominated by *Verticordia nitens*, *Astartea* aff. *fascicularis*, *Hypocalymma angustifolium* and *Pericalymma ellipticum*; Mixed Sedgeland of *Lyginia barbata* and *Desmocladius flexuosus*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >80% Excellent, <15% Very Good, with areas of severe localised disturbance

**Total Flora:** >170 native taxa (Clarke and Keighery 2000a) (estimated >50% expected flora)

**Significant Flora:** *Verticordia nitens*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent native vegetation to the north (Site 193 across road), south (Site 198 across road) and east; part of Greenways 13, 22 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).



## BEECHBORO ROAD BUSHLAND, CULLACABARDEE/BALLAJURA

**Boundary Definition:** proposed protected area boundary (Boundary adjusted from that in draft *Perth's Bushplan*.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 198

**Area (ha):** bushland 431.4

**Map no.** 35, 36

**Map sheet series ref. no.** 2034-II NE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Cullacabardee, Ballajura)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*22 *Banksia ilicifolia* woodlands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

#### WETLANDS

**Wetland Types:** dampland, palusplain

##### Natural Wetland Groups

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennet Brook (B/P.4)

**Wetland Management Objectives:** Conservation (91.2ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

##### Vegetation and Flora

**Structural Units:** limited survey (DEP 1996, Mattiske Consulting Pty Ltd 1997)

Uplands: *Eucalyptus calophylla* Woodland over Low Woodlands to Low Open Woodlands dominated by *Melaleuca preissiana* and *Banksia ilicifolia*; Low Woodland dominated by *Allocasuarina fraseriana*, *Banksia attenuata* and *B. menziesii* with scattered *Eucalyptus todtiana*

Wetlands: *Eucalyptus calophylla* Forest to Open Woodland over *Melaleuca preissiana* Open Woodland; *Eucalyptus calophylla* and *Acacia saligna* Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** <10% Excellent, >90% Very Good to Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Verticordia nitens*

**Fauna:** not known

**Linkage:** adjacent native vegetation to the north (Site 196 across road), south and east (Site 304 across road); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of Shire of Wanneroo bushland (Trudgen 1996)





**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**WHITEMAN PARK, WHITEMAN/WEST SWAN**

**Boundary Definition:** protected area/proposed protected area boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland. Boundary adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 304

**Area (ha):** bushland 1547.9

**Map no.** 35, 36, 37, 42

**Map sheet series ref. no.** 2034-II NE

**Other Names:** Mussel Pool

**Local Authorities (Suburb):** Shire of Swan (Whiteman, West Swan)

**System 6 (1983):** M13, part M41 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1) (Qha: Mc1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

S17 *Eucalyptus rudis*/*Agonis linearifolia* wetlands in Bassendean Dunes

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21c Low-lying *Banksia attenuata* woodlands or shrublands

22 *Banksia ilicifolia* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** dampland, floodplain, palusplain, sumpland, artificial channel, creek

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (336.5ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, vegetated uplands



**Vegetation and Flora:** limited survey (DEP 1996 (White 03–08), Gibson *et al.* 1994 (White 01–02), Griffin 1994 (WIS 01–02)); detailed survey (part Site — Arnold *et al.* 1991, Jackson *et al.* 1975, Mattiske & Associates 1989)

**Structural Units:** mapping (part Site — Arnold *et al.* 1991, Jackson *et al.* 1975, Mattiske & Associates 1989)

Uplands (mainly Bassendean Sands): *Eucalyptus calophylla* Woodland to Low Open Woodland, often with *E. marginata*, *Melaleuca preissiana*, *Banksia ilicifolia* or *B. grandis* and combinations of these, and generally over *Verticordia nitens* or mixed Open Low Heath to Low Shrubland; Low Open Forest to Low Open Woodland dominated by *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *Allocasuarina fraseriana* or *Eucalyptus tottiana* and combinations of these

Wetlands: Open Forest to Low Open Forest of *Eucalyptus rudis*, *Melaleuca preissiana*, *M. raphiophylla* or *Banksia littoralis* and combinations; Heaths and Shrublands of *Melaleuca lateritia*, *Astartea aff. fascicularis*, *Pericalymma ellipticum* and others; Sedgeland of *Baumea ?vaginata*, *Lepidosperma longitudinale*, *Cyathochaeta teretifolia* and other species

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >70% Very Good to Excellent, <30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 340 native taxa, 76 weed taxa (Mattiske & Associates 1989; with additions from DEP 1996 (White 03–08), Gibson *et al.* 1994 (WHITE 01–02) and pers. comm. D. Bright, H. Gratte, J. Wann, T. Comber, A. Brown, WA Native Orchid Study and Conservation Group, Wildflower Society of WA) (estimated >85% expected flora)

**Significant Flora:** *Cyathochaeta teretifolia* (3), *Aotus cordifolia* (3), *Isopogon drummondii* (3) (Mattiske & Associates 1989), *Stachystemon axillaris* (4), *Conostephium minus* (4), *Verticordia lindleyi* subsp. *lindleyi* (4); *Astroloma xerophyllum*, *Eremaea fimbriata*, *Verticordia nitens*, *Conospermum triplinervium*, *Boronia purdieana*, *Burchardia bairdiae*, *Drosera macrantha* (swamp form)

**Fauna:** structured survey for birds (103 species), native mammals (6 species), reptiles (30 species) and amphibians (8 species) (Jackson *et al.* 1975 and Arnold *et al.* 1991). Rich assemblage of insectivorous and nectarivorous birds. Significant bird species: category 1 (2), category 3 (13) and category 4 (13). Significant mammal species: Ash Grey Mouse, Honey Possum, Quenda and Western Brush Wallaby. Rich reptile assemblage including a dragon (*Tympanocryptis adelaidensis*), Black-headed Snake (*Parasuta gouldii*), a gecko (*Diplodactylus alboguttatus*), skink lizards (*Acritoscincus trilineatum* and *Ctenotus gemmula*), Rosenberg's Monitor (*Varanus rosenbergi*) and Black-striped Snake (*Simoselaps calonotos*)

**Linkage:** adjacent native vegetation to the south (Site 305) and west (Site 198 across road); part of Greenways 32, 39, 21, 40, 38 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** rich and diverse flora and fauna, with a relatively large number of significant species, including the largest known stands of the significant sedge *Cyathochaeta teretifolia*; contains part of the channel (Bennett Brook) recommended for conservation by Semeniuk, V&C Research Group (1992); contains area of significant undeveloped remnant vegetation and/or regional open space identified by Semeniuk, V&C Research Group (1992); contains 956m of regionally significant river (WRC 1996a GIS)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of this Site is endorsed. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

### VICTORIA ROAD BUSHLAND, MALAGA/BEECHBORO

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 480

**Area (ha):** bushland 20.6

**Map no.** 42

**Map sheet series ref. no.** 2034–II NE





**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Malaga, Beechboro)

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

### VEGETATION AND FLORA

#### Vegetation Complexes

**Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes**

Southern River Complex

**Floristic Community Types** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*S2 Northern *Pericalymma ellipticum* dense low shrublands

\*4 *Melaleuca preissiana* damplands

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*22 *Banksia ilicifolia* woodlands

### WETLANDS

**Wetland Types:** sumpland

#### Natural Wetland Groups

##### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (7.9ha)

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1998 surveyed from roadside, DEP 1999)

#### Structural Units

Uplands: Low Open Forest to Low Open Woodland dominated by *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* or *Allocasuarina fraseriana* and combinations of these

Wetlands: Heaths and Shrublands of *Astartea* aff. *fascicularis*, *Pericalymma ellipticum* and others; Sedgelands of *Lepidosperma longitudinale*, *Leptocarpus* species and other species

**Vegetation Condition:** >70% Excellent to Very Good, <30% Good with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the west; part of Greenway 38 (Tingay, Alan & Associates 1998a); part of regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part of a complex group of wetlands

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Major Road and Rail Reserve Mechanism; MRWA Road Reserve (design and management) (see Table 3, Volume 1).

## CAVERSHAM AIRBASE BUSHLAND, WEST SWAN/WHITEMAN

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 200

**Area (ha):** bushland 97.0

**Map no.** 37

**Map sheet series ref. no.** 2034-II NE

**Other Names:** Submission Area 199

**Local Authorities (Suburb):** Shire of Swan (West Swan)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

##### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

S1 *Astartea* aff. *fascicularis*/*Melaleuca* species dense shrublands

S2 Northern *Pericalymma ellipticum* dense low shrublands

S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

#### REGIONAL WETLANDS

**Wetland Types:** palusplain, sumpland, artificial channel

##### Natural Wetland Groups

###### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands, vegetated wetlands

**Vegetation and Flora:** limited survey (DEP 1996 (Cavs 02, 06–07, 09–11))

##### Structural Units

Uplands: *Eucalyptus marginata* Woodland to Open Woodland over *Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus calophylla* Tall Woodland

Wetlands: *Melaleuca raphiophylla* and *Eucalyptus rudis* Closed Forest; *Melaleuca preissiana* Low Woodland; *Hypocalymma angustifolium* and *Pericalymma ellipticum* Open Low Heath

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Very Good, <40% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 110 native taxa, 33 weed taxa (plot-generated list, DEP 1996)

**Significant Flora:** *Kunzea* aff. *recurva* (GJK 12828), *Burchardia bairdiae*

**Fauna:** not known

**Linkage:** adjacent native vegetation to the north and west; part of Greenway 39 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains area of significant undeveloped remnant vegetation and/or regional open space identified by Semeniuk, V&C Research Group (1992)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed (see Table 3, Volume 1).

**LIGHTNING SWAMP AND ADJACENT BUSHLAND, NORANDA**

**Boundary Definition:** protected area/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 307

**Area (ha):** bushland 72.6

**Map no.** 41, 42

**Map sheet series ref. no.** 2034-II NE

**Other Names:** Submission Area 178

**Local Authorities (Suburb):** Shire of Swan (Noranda), City of Bayswater (Noranda)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**REGIONAL WETLANDS**

**Wetland Types:** sumpland, dampland, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (0.7ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Light 01-04))

**Structural Units**

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland with scattered *Eucalyptus todtiana*; Low Open Forest to Low Woodland dominated by *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* or *Nuytsia floribunda* and combinations of these; *Phlebocarya ciliata* Herblands

Wetland: *Eucalyptus rudis* Woodland to Open Forest; *Melaleuca preissiana* Low Open Woodland

**Vegetation Condition:** >80% Very Good to Excellent, <20% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 112 native taxa, 13 weed taxa (plot-generated list, DEP 1996)

**Significant Flora:** *Macarthuria apetalata*, *Astroloma xerophyllum*



**Fauna:** limited survey for birds (29 species), reptiles (5 species) and amphibians (4 species) (Murdoch University 1996). Significant bird species: category 3 (4) and category 4 (3)

**Linkage:** no adjacent native vegetation; part of Greenway 38 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

#### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

#### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed (see Table 3, Volume 1).

### **DIANELLA OPEN SPACE**

**Boundary Definition:** protected area boundary

#### **SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 280

**Area (ha):** bushland 16.0

**Map no.** 41

**Map sheet series ref. no.** 2034-II SE, 2034-II SW

**Other Names:** M40 Dianella Open Space

**Local Authorities (Suburb):** City of Stirling (Dianella)

**System 6 (1983):** M40 part System area bushland, only bushland described

#### **SECTION 2: REGIONAL INFORMATION**

##### **LANDFORMS AND SOILS**

###### **Bassendean Dunes**

Bassendean Sands (Qpb: S8)

###### **Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### **Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

##### **VEGETATION AND FLORA**

###### **Vegetation Complexes**

###### **Bassendean Dunes**

Bassendean Complex — Central and South

###### **Floristic Community Types**

###### **Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

###### **Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### **REGIONAL WETLANDS**

**Wetland Types:** artificial lake, artificial channel

**Natural Wetland Groups** (undefined areas included in boundary)

###### **Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (0.9ha)

**Swan Coastal Plain Lakes EPP:** none identified

##### **THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

#### **SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Dian 01-02))

###### **Structural Units**

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent trees of *Eucalyptus marginata*

Wetlands: *Melaleuca preissiana* Low Woodland





**Vegetation Condition:** >70% Very Good to Excellent, <30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 77 native taxa, 10 weed taxa (plot-generated list only) (estimated >50% expected flora)

**Significant Flora:** none recorded

**Fauna:** structured survey by Western Australian Museum (How *et al.* 1996) for birds (29 species), reptiles (13 species) and amphibians (4 species). Significant bird species: category 4 (2). Significant reptile species: a gecko (*Diplodactylus polyophthalmus*)

**Linkage:** no adjacent native vegetation; part of Greenway 29 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** National Trust of Australia (WA) classification

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**PERTH AIRPORT AND ADJACENT BUSHLAND**

**Boundary Definition:** bushland (part taken to cadastre) boundary (Boundary adjusted in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 386

**Area (ha):** bushland 629.5 (Site also includes open water.)

**Map no.** 43, 48, 49

**Map sheet series ref. no.** 2034-II SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Perth Airport, South Guildford), Shire of Kalamunda (High Wycombe), City of Belmont (Forrestfield, Perth Airport)

**System 6 (1983):** M52 Part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes and Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Guildford Complex

**Bassendean Dunes**

Bassendean Complex — Central and South

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

5 Mixed shrub damplands

7 Herb-rich saline shrublands in clay pans

\*11 Wet forests and woodlands

12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

\*15 Forests and woodlands of deep seasonal wetlands



**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

- 20a *Banksia attenuata* woodlands over species-rich dense shrublands  
 20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands (most northern occurrence)  
 23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** lake, sumpland, dampland, palusplain, artificial channel, creek

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (22ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 30.4ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Endangered (floristic community types 20a, 20b), Vulnerable (floristic community types 7, 15)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Perth 01–10), Keighery, BJ, 1995e, DEP 1998, DEP 1999); detailed survey (Tingay, Alan & Associates 1994c)

**Structural Units:** mapping (Tingay, Alan & Associates 1994c)

Uplands: *Eucalyptus calophylla* Woodland; *Eucalyptus marginata* Woodland; *Eucalyptus rudis* Woodland; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Woodland; *Banksia attenuata*, *B. menziesii* and *B. ilicifolia* Woodland

Wetlands: *Banksia littoralis* Low Woodland to Forest; *Melaleuca preissiana* Low Woodland; *Melaleuca raphiophylla* Low Woodland; *Melaleuca raphiophylla* and *Eucalyptus rudis* Forest; *Jacksonia sternbergiana* Closed Tall Scrub to Tall Shrubland; *Jacksonia furcellata* Open Shrubland; *Adenanthos cygnorum* Shrubland; *Kunzea glabrescens* Tall Shrubland; *Hakea varia* Closed Heath; *Regelia ciliata* Shrubland; *Astartea* aff. *fascicularis* Closed Heath; *Pericalymma ellipticum* Shrubland; *Melaleuca teretifolia* Open to Closed tall Scrub; *Melaleuca viminea* Open Heath; Mixed Open Heath; *Acacia saligna* Shrubland to Open Tall Scrub; Sedgeland of *Leptocarpus* species, *Baumea articulata* and *Typha domingensis*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Excellent to Very Good, <40% Good to Degraded (mapping Tingay, Alan & Associates 1994c)

**Total Flora:** 295 native taxa (Tingay, Alan & Associates 1994c, DEP 1996) (estimated >70% expected flora)

**Significant Flora:** *Conospermum undulatum* (R), *Macarthuria keigheryi* (R); *Eucalyptus marginata* subsp. *elegantella* (1), *Tripterococcus paniculatus* ms (1), *Myriophyllum echinatum* (3), *Stylidium longitubum* (3), *Haemodorum loratum* (3), *Conostephium minus* (4), *Villarsia submersa* (4), *Verticordia lindleyi* subsp. *lindleyi* (4); *Platysace juncea*, *Byblis lindleyana*, *Conospermum triplinervium* (hybrids with *C. undulatum*), *Levenhookia preissii* (rarely recorded on the Swan Coastal Plain), *Cheilanthes austrotenuifolia* (Tingay, Alan & Associates 1994; DEP 1996, uncommon on the Plain, associated with communities that are heavily cleared), *Verticordia nitens* (Tingay, Alan & Associates 1994; DEP 1996, only currently recorded population south of Gngangara in the Perth Metropolitan Region), *Villarsia violifolia* (uncommon on Plain); 34 taxa associated with eastern side of the Plain

**Fauna:** structured survey for birds (87 species) (How and Dell 1994; RAOU 1996 D; Tingay, Alan & Associates 1994b), native mammals (2 species), reptiles (20 species) and amphibians (8 species) (How and Dell 1994; Tingay, Alan & Associates 1994b). Significant bird species: category 3 (2) and category 4 (7). Munday Swamp is in the top 6% of wetlands for breeding waterbirds (Jaensch *et al.* 1993). Significant mammal species: Quenda and Echidna. Significant reptile species: 1970 record of Western Swamp Tortoise. Rich frog assemblage typical of the eastern side of the Swan Coastal Plain. Only two other areas match the vertebrate species richness in the Perth Metropolitan Region. The only significant populations of two WA-endemic fish, the Western Pygmy Perch (*Edelia vittata*) and Western Minnow (*Galaxias occidentalis*) in the PMR (Robson and Charter 1989). Munday Swamp has an unusually rich and diverse invertebrate fauna (82 species), including several rare species

**Linkage:** no adjacent bushland; part of Greenways 26, 99, 109, 110 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Munday Swamp and adjacent lands and lands to the north are considered to be of Aboriginal heritage value (Australian Archaeological Survey Consultants 1995); a number of uplands and wetlands are suitable for Western Swamp Tortoise release (Kuchling and Burbidge 1996); Munday Swamp, Runway Swamp, Link Road Swamp and sumplands east of the main runway are wetlands of national importance (ANCA 1996); National Trust of Australia (WA) Classification; contains a substantial sweep of soils and communities from eastern to central Plain (Bassendean Sands); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; Directory of Important Wetlands in Australia; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation  
**Recommendation:** Part A: Cemetery Mechanism. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

**KENSINGTON BUSHLAND, KENSINGTON**

**Boundary Definition:** bushland (part taken to cadastre and zoning) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 48 **Area (ha):** bushland: 9.1  
**Map no.** 47 **Map sheet series ref. no.** 2034-II SE  
**Other Names:** Submission Area 212  
**Local Authorities (Suburb):** Town of Victoria Park (Kensington)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**  
 Bassendean Sands (Qpb: S8)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**  
 Bassendean Complex — Central and South

**Floristic Community Types**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**  
 23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Kens 01)); detailed survey (Cranfield and Parker 1992)

**Structural Units:** mapping (Cranfield and Parker 1992)

Uplands: *Eucalyptus marginata*, *B. menziesii* and *B. attenuata* Forest to Woodland; *Banksia menziesii* and *B. attenuata* Woodland; mixed Low Shrubland

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded

**Total Flora:** 146 native taxa, 60 weed taxa (Cranfield and Parker 1992) (estimated >90% expected flora)

**Significant Flora:** Cranfield and Parker 1992 — *Dodonaea hackettiana* (4); *Conostylis aculeata* subsp. *cygnorum*

**Fauna:** structured survey for birds (20 species), reptiles (14 species) and amphibians (1 species) (Turpin 1990, 1991). Significant bird species: category 1 (2) and category 4 (2). One of only two known localities south of the Swan River for the gecko *Diplodactylus alboguttatus*

**Linkage:** no adjacent bushland

**Other Special Attributes:** managed by the City of Victoria Park as a bushland reserve

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**BLUE GUM RESERVE, BRENTWOOD/MOUNT PLEASANT**

**Boundary Definition:** protected area/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 228 **Area (ha):** bushland 2.9 (Site also includes open water.)



Map no. 53

Map sheet series ref. no. 2033-I NW

**Other names:** part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Melville (Brentwood, Mt Pleasant)

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

**Lagoonal and Estuarine Deposits** (near interface of Spearwood and Bassendean Dunes)

Lagoonal and Estuarine Deposits (Vasse) (Qhg: Sm2)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*5 Mixed shrub damplands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

### WETLANDS

**Wetland Types:** sumpland

#### Natural Wetland Groups

##### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (5.6ha)

**Swan Coastal Plain Lakes EPP:** 5.7ha

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (City of Melville 1992, DEP 1999, EPA and WAWA 1990, Keighery, BJ, 1996a)

**Structural Units:** limited survey (City of Melville 1992, EPA and WAWA, 1990)

Uplands: *Banksia menziesii*, *B. attenuata* and *B. ilicifolia* Low Woodland, with scattered *Allocasuarina fraseriana* and *Eucalyptus marginata*

Wetlands: Mixed *Melaleuca raphiophylla*, *M. preissiana* and *Eucalyptus rudis* Woodland to Low Closed Forest; *Eucalyptus rudis* Low Open Forest; *Acacia saligna* Tall Open Scrub

**Scattered Native Plants:** *Eucalyptus calophylla* Open Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >60% Good to Very Good, <40% Degraded, with areas of severe localised disturbance

**Total Flora:** 62 native taxa, 19 weed taxa (City of Melville 1992) (estimated >75% expected flora)

**Significant Flora:** none recorded

**Fauna:** multiple survey for birds (73 species) (RAOU 1996 D, 5 visits, and Street 1992). Significant populations of Blue-billed and Hardhead Ducks and Dusky Moorhen. Significant bird species: category 1 (1), category 2 (2), category 3 (6) and category 4 (4)

**Linkage:** no adjacent bushland

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Protected A-class Crown Reserve; the purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).





## BOORAGOON LAKE, BOORAGOON

**Boundary Definition:** bushland taken to zoning boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 337

**Area (ha):** bushland 9.9 (Site also includes open water.)

**Map no.** 53

**Map sheet series ref. no.** 2033-I NW

**Other names:** part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Melville (Booragoon)

**System 6 (1983):** M73 Part System area bushland and part scattered native plants (canopy), all vegetation described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7) (near interface of Bassendean and Spearwood Dunes)

##### Wetlands (near the Spearwood/Bassendean Dune interface)

Holocene Swamp Deposits (Qhw: Msp)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South (near interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)

**Floristic Community Types:** \*not sampled, type inferred

###### Supergroup 2: Seasonal Wetlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

#### WETLANDS

**Wetland Types:** lake

##### Natural Wetland Groups

###### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (12.1ha)

**Swan Coastal Plain Lakes EPP:** 8.9ha

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990); detailed survey (Smith 1985a)

**Structural Units:** mapping (EPA and WAWA 1990, Smith 1985a)

Wetlands: *Eucalyptus rudis* Closed Forest; *Melaleuca raphiophylla* Low Closed Forest; *Melaleuca teretifolia*

Closed Tall Scrub; *Polypogon* Closed Heath; mixed Closed Sedgeland

**Scattered Native Plants:** *Pteridium esculentum* Fernland

**Vegetation Condition:** >50% Good to Very Good, <50% Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** 34 native taxa, 6 weed taxa (Smith 1985a) (estimated >90% of expected flora)

**Significant Flora:** none recorded

**Fauna:** multiple survey for birds (53 species) (RAOU 1996 D, 5 visits, and Smith 1985a) and limited survey for reptiles (1 species) (Smith 1985a). Significant populations of Blue-billed, Musk, and Hardhead Ducks and Dusky Moorhen. Major breeding colony of Little Pied Cormorants and rookery for four species of cormorant, Darter and White Ibis (AHC 1998 D). Significant bird species: category 3 (6) and category 4 (2)

**Linkage:** no adjacent bushland; part of Greenway 95 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia, Entered in the Interim List of the Register of the National Estate

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1)

## PINEY LAKE RESERVE, WINTHROP

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 339

**Area (ha):** bushland 31.934 (Site also includes open water.)

**Map no.** 52, 53

**Map sheet series ref. no.** 2033-I NW

**Other names:** Submission Area 14, part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Melville (Winthrop)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### Wetlands (near the Spearwood Bassendean Dune interface)

Holocene Swamp Deposits (Qhw: Msp)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Spearwood Dunes

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

##### Supergroup 2: Seasonal Wetlands

\*5 Mixed shrub damplands

#### WETLANDS

**Wetland Types:** sumpland

##### Natural Wetland Groups

###### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (16ha)

**Swan Coastal Plain Lakes EPP:** 19.8ha

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (LeProvost *et al.* 1985b, Weston 1993); detailed survey (Ecoscape and Landmarc 1992, Rodda 1986)

**Structural Units:** mapping (Ecoscape and Landmarc 1992, LeProvost *et al.* 1985, Rodda 1986)

Uplands: *Eucalyptus calophylla*, *E. marginata*, *Banksia attenuata* Open Woodland; *Eucalyptus calophylla* Low Woodland; *Acacia saligna* Closed Scrub; *Adenanthos cygnorum* Low Shrubland

Wetlands: *Banksia littoralis* and *Melaleuca preissiana* Open Woodland to Low Forest; *Melaleuca preissiana*, *M. raphiophylla* Low Woodland to Low Open Forest; *Baumea articulata* and *Typha domingensis* Sedgeland with emergent shrubs of *Astartea* aff. *fascicularis*

**Scattered Native Plants:** *Macrozamia riedlei* Open Shrubland

**Vegetation Condition:** >30% Very Good to Excellent, <20% Good, 50% Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** 111 native taxa (Rodda 1986, Ecoscape and Landmarc 1992) (estimated >80% expected flora)

**Significant Flora:** *Aotus cordifolia* (3) (Rodda 1986)

**Fauna:** limited survey for birds (60 species), native mammals (2 species), reptiles (3 species) and amphibians (6 species) (Rodda 1986). Significant bird species: category 1 (1), category 3 (10) and category 4 (4). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenways 82, 90 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, Entered in the Interim List of the Register of the National Estate

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values





**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Beeliar Regional Park is endorsed (see Table 3, Volume 1).

## NORTH LAKE AND BIBRA LAKE, NORTH LAKE/BIBRA LAKE

**Boundary Definition:** protected area/bushland boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 244

**Area (ha):** bushland 128.2 (Site also includes open water.)

**Map no.** 52, 53, 58, 59

**Map sheet series ref. no.** 2033-I NW

**Other Names:** part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Cockburn (North Lake, Bibra Lake)

**System 6 (1983):** Part M93 Part System area bushland, only bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### Wetlands (within the Spearwood/Bassendean Dune interface)

Holocene Swamp Deposits (Qhw: Mps)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Spearwood Dunes

Karrakatta Complex — Central and South

###### Wetlands

Herdsmen Complex

**Floristic Community Types:** \*not sampled, type inferred

##### Supergroup 2: Seasonal Wetlands

11 Wet forests and woodlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

**Wetland Types:** lake, sumpland

##### Natural Wetland Groups

###### Spearwood—Bassendean interface

Bibra (S/B.1)

**Wetland Management Objectives:** Conservation (55.75ha), Resource Enhancement, Multiple Use

Swan Coastal Plain Lakes EPP: 3ha + 6.6ha + 31.4ha = 41ha (total)

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

#### North Lake

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — DEP 1996 (Beel 01–03), EPA and WAWA 1990, Newman 1976, Weston 1993)

**Structural Units:** mapping (EPA and WAWA 1990, Cockburn Wetlands Committee 1976)

Uplands: *Eucalyptus marginata* Open Forest; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest, with emergent *Eucalyptus marginata*

Wetlands: *Eucalyptus rudis*, *Melaleuca preissiana*, *M. raphiophylla* and *Banksia ilicifolia* Forest to Woodland, with *Kunzea glabrescens*, *Acacia saligna* and *Agonis linearifolia*; *Melaleuca teretifolia* Tall Shrubland; *Baumea articulata* and \**Typha orientalis* Sedgeland

**Vegetation Condition:** >60% Very Good to Excellent, >30% Good to Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** not known

**Significant Flora:** Weston 1993 — *Aotus cordifolia* (3); *Jacksonia gracilis*, *Villarsia violifolia*



**Fauna:** multiple surveys for birds (71 species) (RAOU 1996 D, 16 visits) (Newman 1976). Significant populations of Australasian Shoveler, Hardhead, Blue-billed, Musk, and Pink-eared Ducks. Significant bird species: category 1 (1), category 3 (9) and category 4 (4). Important summer refuge for migratory JAMBA/ CAMBA waders (AHC 2000 D). Significant mammal species: Quenda (Friend 1996 D). Only known urban wetland supporting freshwater sponges (AHC 2000 D)

**Linkage:** adjacent bushland to the north (across road); part of Greenways 82, 90 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

### **Bibra Lake**

**Landscape Features:** open water, permanent salt lake, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990, Keighery, BJ, 1996a, Newman 1976, Weston 1993)

**Structural Units:** mapping (EPA and WAWA 1990, Newman 1976)

Uplands: *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest, with *Eucalyptus marginata*

Wetlands: *Eucalyptus rudis*, *Melaleuca preissiana* and *M. raphiophylla* Open Forests; *Melaleuca teretifolia* Low Closed Forest or Closed Tall Scrub; Closed Sedgeland

**Remnant Vegetation:** not assessed

**Vegetation Condition:** >20% Good to Very Good, <80% Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Dodonaea hackettiana* (4)

**Fauna:** multiple survey for birds (112 species) (RAOU 1996 D, 56 visits). Significant populations of Australasian Shoveler, Hardhead, Blue-billed, Musk, and Pink-eared ducks. Significant bird species: category 1 (1), category 2 (4), category 3 (14) and category 4 (8). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** bushland linkage to north (across road), south (Site 254, across road) and west (across road); part of Greenway 90 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** included in Beeliiar Regional Park Proposal (DPUD 1992a)

### ***SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE***

Entered in the Interim List of the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### ***SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS***

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance. General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Beeliiar Regional Park is endorsed (see Table 3, Volume 1).

## **SOUTH LAKE**

**Boundary Definition:** protected area/bushland boundary (at times open water mapped as bushland)

### ***SECTION 1: LOCATION INFORMATION***

**Bush Forever Site no.** 254

**Area (ha):** bushland 34.5 (Site also includes open water.)

**Map no.** 58

**Map sheet series ref. no.** 2033-1 NW

**Other Names:** part of Beeliiar Regional Park

**Local Authorities (Suburb):** City of Cockburn (Bibra Lake)

**System 6 (1983):** Part M93 Part System area bushland, only bushland described

### ***SECTION 2: REGIONAL INFORMATION***

#### **LANDFORMS AND SOILS**

##### **Bassendean Dunes**

Bassendean Sands (Qpb: S8)

##### **Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

##### **Wetlands (within the Spearwood/Bassendean Dune interface)**

Holocene Swamp Deposits (Qhw: Mps)

#### **VEGETATION AND FLORA**

##### **Vegetation Complexes**

**Bassendean Dunes**





Bassendean Complex — Central and South (at interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)

**Spearwood Dunes**

Karrakatta Complex — Central and South (interface)

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*11 Wet forests and woodlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau AND/OR**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Spearwood—Bassendean interface**

Bibra (S/B.1)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 22.2 ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, EPA and WAWA 1990, Keighery, BJ, 1996a, Newman 1976, Weston 1993)

**Structural Units:** mapping (EPA and WAWA 1990, Newman 1976)

Uplands: *Eucalyptus marginata* and *E. calophylla* Open Forest; *Banksia attenuata* and *B. menziesii* Low Open Forest, with *Eucalyptus marginata*

Wetlands: *Eucalyptus rudis* Low Closed Forest; *Eucalyptus rudis* Low Forest over *Melaleuca raphiophylla* Low Forest to Woodland; *Eucalyptus rudis* and *Melaleuca preissiana* Open Forest, with *Acacia saligna* and *Melaleuca teretifolia* Tall Scrub; *Acacia saligna* Low Woodland; Mixed Closed Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >50% Good to Very Good, with areas of severe localised disturbance (mapping, Weston 1993)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the west; part of Greenways 75, 90 (Tingay, Alan & Associates 1998a), part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beelihar Regional Park Proposal (DPUD 1992a)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Interim List of the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Beelihar Regional Park is endorsed (see Table 3, Volume 1).

**YANGEBUP AND LITTLE RUSH LAKES, YANGEBUP**

**Boundary Definition:** protected area/bushland taken to cadastre boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 256

**Area (ha):** bushland 27.7 (Site also includes open water.)

**Map no.** 58, 59

**Map sheet series ref. no.** 2033-I NW, 2033-I SW

**Other Names:** part of the Beelihar Regional Park

**Local Authorities (Suburb):** City of Cockburn (Yangebup, Success)

**System 6 (1983):** Part M93 Part System area bushland, only bushland described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

#### Wetlands (within the Spearwood/Bassendean Dune interface)

Holocene Swamp Deposits (Qhw: Ms5)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — Central and South (at interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)

##### Spearwood Dunes

Karrakatta Complex — Central and South

##### Wetlands

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*11 Wet forests and woodlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau AND/OR

#### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

### WETLANDS

**Wetland Types:** lake, sumpland

#### Natural Wetland Groups

##### Bassendean Dunes

Jandakot (B.3)

##### Spearwood—Bassendean interface

Bibra (S/B.1)

**Wetland Management Objectives:** Conservation (100.3ha)

**Swan Coastal Plain Lakes EPP:** 90.3ha + 8.3ha = 98.6ha (total)

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990, Keighery, BJ, 1996a, Murdoch University 1988, Newman 1976, Weston 1993); part Site — Semeniuk, V&C Research Group 1997a (Reserve 11); detailed survey (Ecoscape 1994b)

**Structural Units:** mapping (Ecoscape 1994b, EPA and WAWA 1990, Murdoch University 1988, Newman 1976)

Uplands: *Eucalyptus gomphocephala*, *E. marginata* and *E. calophylla* Woodland; *Eucalyptus marginata*

Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland with *Eucalyptus marginata*

Wetlands: *Eucalyptus rudis* Open Forest; *Melaleuca raphiophylla* and *Eucalyptus rudis* Woodland; *Melaleuca*

*preissiana* and *Banksia ilicifolia* Low Woodland; *Melaleuca teretifolia* Low Woodland to Tall Open Scrub; *Acacia*

*saligna* Tall Shrubland; Sedgeland to Closed Sedgeland dominated by *Baumea articulata* or \**Typha orientalis*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** <20% Excellent to Very Good, >80% Good to Completely Degraded, with areas of severe localised disturbance (mapping, Ecoscape 1994b, Weston 1993)

**Total Flora:** 140 native taxa, 68 weed taxa (Ecoscape 1994b, part Site — Semeniuk, V&C Research Group 1997a (Reserve 11)) (estimated >80% expected native flora)

**Significant Flora:** Weston 1993 — *Dodonaea hackettiana* (4) (Little Rush Lake)

**Fauna:** multiple survey for birds (93 species) (RAOU 1996 D) and limited survey for native mammals (3 species), reptiles (21 species) and amphibians (6 species) (Murdoch University 1988). Important permanent waterbody for feeding and wetland area for breeding. Counts of Pink-eared Ducks and Blue-billed Ducks represent the second highest numbers of these species for 300 wetlands in south western Australia. Significant bird species: category 1 (1), category 2 (8), category 3 (15) and category 4 (6). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south (Site 391, across road), north (Site 254, across road) and west; part of Greenways 78, 81 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beelihar Regional Park Proposal (DPUD 1992a)





**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Interim List of the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Beeliar Regional Park is endorsed (see Table 3, Volume 1).

**THOMSONS LAKE NATURE RESERVE AND ADJACENT BUSHLAND, BEELIAR**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 391

**Area (ha):** bushland 366.7 (Site also includes open water.)

**Map no.** 58, 59

**Map sheet series ref. no.** 2033-1 SW

**Other Names:** part of Beeliar Regional Park, Part Submission Area 18

**Local Authorities (Suburb):** City of Cockburn (Success)

**Includes CALM Managed Land:** Reserve 15556 (Fauna Conservation and Research and Drainage)

**System 6 (1983):** Part M93 Part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Spearwood/Bassendean Dune interface)**

Holocene Swamp Deposits (Qhw: Cps, Ms5)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South (at or near interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*11 Wet forests and woodlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

24 Northern Spearwood shrublands and woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

**Wetland Types:** lake, dampland, sumpland, creek, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Spearwood—Bassendean interface**

Bibra (S/B.1)

**Wetland Management Objectives:** Conservation (367.4ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 33.0ha + 13.9ha + 237.3ha = 284.2ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed



### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Crook and Evans 1981, EPA and WAWA 1990, Gibson *et al.* 1994 (Thom 01–02), Newman 1976, Weston 1993)

**Structural Units:** mapping (Crook and Evans 1981, EPA and WAWA 1990, Newman 1976)

Uplands: *Eucalyptus marginata* Low Open Forest; *Banksia attenuata* and *B. menziesii* Low Open Forest and Low Woodland with *Eucalyptus marginata* and *E. tottiana*; mixed Low Heath

Wetlands: *Eucalyptus rudis*, *Melaleuca preissiana* and *M. raphiophylla* Open Forests to Low Woodland; *Eucalyptus tottiana* and *Melaleuca preissiana* Low Open Forest to Low Woodland; *Acacia* sp. Closed to Open Tall Scrub; *Melaleuca teretifolia* Low Open Forest; *Baumea articulata* and *Typha* sp. Closed Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >30% Excellent, >50% Very Good to Good, <20% Degraded, with areas of severe localised disturbance

**Total Flora:** 199 native taxa (Crook and Evans 1981) (estimated >80% expected taxa)

**Significant Flora:** *Dodonaea hackettiana* (4); *Lysinema elegans*

**Fauna:** multiple survey for birds (105 species) (RAOU 1996 D, 23 visits). Important feeding area for large assemblage and population levels of trans-equatorial wading birds protected under the JAMBA/CAMBA treaties. Significant populations of Australasian Shoveler, Hardhead, Blue-billed, Musk and Pink-eared Ducks. Significant bird species: category 1 (2), category 2 (10), category 3 (17) and category 4 (7). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 256, across road), south (Site 392, across road), east and west; part of Greenways 76, 78, 120 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Wetlands of International Importance (Ramsar); Directory of Important Wetlands in Australia; Entered in the Interim List of the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Scientific or evolutionary importance. General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site (Reserve 15556) for conservation purposes within Beeliar Regional Park is endorsed (see Table 3, Volume 1).

## HARRY WARING MARSUPIAL RESERVE, WATTLEUP

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 392

**Area (ha):** bushland 271.6 (Site also includes open water.)

**Map no.** 58, 59, 64, 65

**Map sheet series ref. no.** 2033–I SW

**Other Names:** Banganup Lake, part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Cockburn (Wattleup)

**Includes CALM Managed Land:** Nature Reserve 29241 (Research and Conservation of Flora and Fauna)

**System 6 (1983):** Part M93 All System area bushland, total area described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps, Ms5)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South (at interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)





**Spearwood Dunes**

Karrakatta Complex — Central and South

**Wetlands**

Herdsman Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

5 Mixed shrub damplands

11 Wet forests and woodlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

**Wetland Types:** sumpland, dampland

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Spearwood—Bassendean interface**

Bibra (S/B.1)

**Wetland Management Objectives:** Conservation (53.8ha)

**Swan Coastal Plain Lakes EPP:** 34.4ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990, Gibson 1994 (Harry 01–06), Weston 1993); detailed survey (Clay 1980, Weston and Clay 1980)

**Structural Units:** mapping (Clay 1980, EPA and WAWA 1990)

Uplands — Bassendean and Spearwood Dunes not distinguished: *Eucalyptus marginata* Open Woodland; *Banksia attenuata* and *B. menziesii* Low Open Woodland to Low Closed Forest

Wetlands: *Eucalyptus rudis*, *Melaleuca preissiana* and *Banksia littoralis* Low Woodland to Low Closed Forest;

*Banksia attenuata* and *B. ilicifolia* Low Woodland; *Baumea articulata* Sedgeland to Closed Sedgeland

**Scattered Native Plants:** *Melaleuca* Low Woodland (EPA and WAWA 1990)

**Vegetation Condition:** >70% Excellent to Very Good, 30% Good to Degraded (Weston 1993)

**Total Flora:** 282 native species (Weston 1980) (estimated >75% expected flora)

**Significant Flora:** *Aotus cordifolia* (3), *Dodonaea hackettiana* (4); *Boronia crenulata* (Weston and Clay 1980)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 391, across road), south (Site 393), east and west; part of Greenways 76, 78 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beelihar Regional Park Proposal (DPUD 1992a); at interface of Bassendean and Spearwood Dunes

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Interim List of the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site (Reserve 29241) for conservation purposes within Beelihar Regional Park is endorsed (see Table 3, Volume 1).

**WATTLEUP LAKE AND ADJACENT BUSHLAND, WATTLEUP/MANDOGALUP**

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 393

**Area (ha):** bushland 18.9 (Site also includes open water.)

**Map no.** 64

**Map sheet series ref. no.** 2033–I SW



**Other Names:** Sayer Rd Swamp, Mandogalup Swamp, Submission Area 225, part of Beeliar Regional Park  
**Local Authorities (Suburb):** Town of Kwinana (Mandogalup), City of Cockburn (Wattleup)  
**System 6 (1983):** Part M93 Part System area bushland and part scattered native plants (canopy), all vegetation described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7) (at or near interface of Spearwood and Bassendean Dunes)

#### Wetlands (within the Spearwood/Bassendean Dunes interface)

Holocene Swamp Deposits (Qhw: Cps, Ms5)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — Central and South (at interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)

##### Spearwood Dunes

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*11 Wet forests and woodlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrubland uplands

### WETLANDS

**Wetland Types:** sumpland, lake

#### Natural Wetland Groups

##### Spearwood—Bassendean interface

Bibra (S/B.1)

**Wetland Management Objectives:** Conservation (2.3ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 3ha + 9.3ha = 12.3ha (total)

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Cockburn Wetlands Committee 1976, DEP 1998 (fenceline survey), DEP 1999, EPA and WAWA 1990, Weston 1993)

**Structural Units:** mapping (Cockburn Wetlands Committee 1976, EPA and WAWA 1990)

Uplands - Bassendean and Spearwood Dunes not distinguished: *Eucalyptus gomphocephala*, *E. calophylla* and *E. marginata* Open Woodland over mixed *Banksia* species

Wetlands: *Eucalyptus rudis* Low Woodland; *Melaleuca raphiophylla* Low Open Forest to Low Forest; *Melaleuca preissiana* and *M. raphiophylla* Low Closed Forest; *Melaleuca teretifolia* Closed Tall Scrub; *Baumea articulata* Closed Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland; *Melaleuca preissiana* Low Open Woodland; *Eucalyptus rudis* Open Woodland

**Vegetation Condition:** part Site only (adjacent to Wattleup Lake) >25% Good, <75% Degraded to Completely Degraded (Weston 1993)

**Total Flora:** 17 native species (Cockburn Wetlands Committee 1976) (estimated <60% expected flora)

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north (Site 392); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Interim List of the Register of the National Estate

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Local Reserve Mechanism. Part B: Other Government Land. Part C: Rural Complementary Mechanism (see Table 3, Volume 1).



## KEN HURST PARK, LEEMING

**Boundary Definition:** bushland (part taken to zoning) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 245

**Area (ha):** bushland 52.7

**Map no.** 53

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Submission Area 17

**Local Authorities (Suburb):** City of Melville (Leeming), City of Cockburn (Jandakot)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

##### Supergroup 2: Seasonal Wetlands

\*5 Mixed shrub damplands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

23a Central *Banksia attenuata* — *B. menziesii* woodlands

#### WETLANDS

**Wetland Types:** dampland

##### Natural Wetland Groups

###### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Hurst 01–04)); detailed survey (Murdoch Branch, Wildflower Society of WA 1992)

**Structural Units:** mapping (Murdoch Branch, Wildflower Society of WA 1992)

Uplands: *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest to Low Woodland with scattered *Eucalyptus todtiana*; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest to Low Open Woodland with scattered *Nuytsia floribunda* and *Banksia ilicifolia*

Wetlands: *Banksia attenuata* and *B. ilicifolia* Low Open Forest to Low Woodland; *Regelia inops* Open Heath; *Melaleuca preissiana* Low Woodland with *Banksia littoralis* sometimes a co-dominant

**Vegetation Condition:** >90% Excellent to Very Good, <10% Good to Degraded

**Total Flora:** 214 native taxa (Murdoch Branch, Wildflower Society of WA 1992) (estimated >85% expected flora)

**Significant Flora:** *Caladenia huegelii* (R); Murdoch Branch, Wildflower Society of WA (1992) — *Drosera zonaria*, *Lysinema elegans*, *Stylidium preissii* (only known record on Swan Coastal Plain), *Stylidium squamellosum* (unusual in the PMR)

**Fauna:** structured survey for birds (33 species), native mammals (3 species), reptiles (17 species) and amphibians (4 species) (Dell and Cooper 1992). Significant mammal species: Quenda and Western Brush Wallaby. Significant bird species: category 1 (1), category 3 (3) and category 4 (4)

**Linkage:** adjacent bushland to the north and south (Site 388, across road); part of Greenway 92 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Indicative place (AHC 2000 D); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).



## JANDAKOT AIRPORT, JANDAKOT

**Boundary Definition:** bushland taken to cadastre boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 388

**Area (ha):** bushland 410.9

**Map no.** 53, 54, 59

**Map sheet series ref. no.** 2033-I NE, 2033-I NW

**Other Names:** Part Submission Area 13

**Local Authorities (Suburb):** City of Cockburn (Jandakot), City of Canning (Canning Vale)

**System 6 (1983):** M94 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qhw: Cps) (Qrw: Sp1)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

##### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

5 Mixed shrub damplands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21c Low-lying *Banksia attenuata* woodlands or shrublands

22 *Banksia ilicifolia* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

#### WETLANDS

**Wetland Types:** dampland

##### Natural Wetland Groups

###### Bassendean — Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

###### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Jand 01–08)); detailed survey (Dames and Moore, Martinick 1989)

**Structural Units:** mapping (Dames and Moore 1993, Martinick 1989)

Uplands: scattered *Eucalyptus marginata* over *Banksia attenuata*, *B. menziesii*, *Allocasuarina fraseriana* and *Eucalyptus tottiana* Low Woodland; *Banksia attenuata*, *B. menziesii* and *Nuytsia floribunda* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland

Wetlands: *Eucalyptus rudis* Forest to Woodland; *Melaleuca preissiana* Low Woodland; scattered *Melaleuca preissiana* over *Banksia attenuata* and *B. ilicifolia* Low Open Forest; *Pericalymma ellipticum* Open Low Heath

**Vegetation Condition:** >85% Excellent to Very Good, <15 % Very Good to Good

**Total Flora:** 149 native taxa (DEP 1996, Martinick 1989) (estimated <50% expected flora)

**Significant Flora:** *Leucopogon kingianus*, *Lysinema elegans* (significant population), *Astroloma xerophyllum*, *Hensmania turbinata*

**Fauna:** structured survey for birds (56 species), native mammals (5 species), reptiles (19 species) and amphibians (4 species) (How *et al.* 1996 and Dames and Moore 1993). Significant populations of Splendid Fairy-wren, Grey Shrike-thrush. Significant bird species: category 1 (1), category 3 (9) and category 4 (7). Significant mammal species: Honey Possum, Quenda and Western Brush Wallaby. Significant reptile species: skink lizards (*Lerista lineata* and *Acritoscincus trilineatum*) and Black-headed Snake (*Parasuta gouldii*)

**Linkage:** adjacent bushland to the north (Site 245, across road), east (Site 389), south and west: part of Greenway 92 (Tingay, Alan & Associates 1998a); part of fragmented potential bushland/wetland linkage (Part A, Map 7)



**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Interim List of the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; Already Protected. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

**ACOURT ROAD BUSHLAND, BANJUP**

**Boundary Definition:** protected area/bushland taken to cadastre and zoning boundary (Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 389

**Area (ha):** bushland 295.2

**Map no.** 59, 60

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Part Submission Area 13

**Local Authorities (Suburb):** City of Canning (Canning Vale), City of Cockburn (Banjup, Jandakot)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*5 Mixed shrub damplands

\*11 Wet forests and woodlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*22 *Banksia ilicifolia* woodlands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** dampland

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (124.3ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — Trudgen 1990); detailed survey (part Site — Clarke *et al.* 2000, Goble-Garratt 1994)

**Structural Units:** mapping (part Site — Clarke *et al.* 2000, Goble-Garratt 1994); general mapping (Trudgen 1990)

Uplands: *Banksia attenuata*, *B. menziesii* and *B. ilicifolia* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus marginata*, *Allocasuarina fraseriana*, *Banksia attenuata*, *B. menziesii* and *B. ilicifolia* Woodland, Low Open Forest dominated by combinations of *Eucalyptus marginata*, *Allocasuarina fraseriana*, *Banksia attenuata*, *B. menziesii* and *Eucalyptus todtiana*; *Acacia pulchella* and *Calytrix fraseri* Low Shrubland Wetlands; *Eucalyptus rudis* Open Forest; *Eucalyptus rudis* and *Melaleuca preissiana* Woodland; *Melaleuca raphiophylla* and *Kunzea glabrescens* Tall Open Scrub; *Melaleuca teretifolia* Shrubland to Very Open Shrubland; *Pericalymma ellipticum* Open Heath; *Regelia ciliata* and *Melaleuca lateritia* Shrubland; *Pericalymma ellipticum*, *Regelia ciliata* and *Calothamnus lateralis* Closed Low Heath; *Hypocalymma angustifolium* Low Shrubland; mixed Open Low Heath and Open Shrubland; *Lyginia imberbis* Closed Sedgeland; *Lyginia imberbis* and *Hypolaena exsulca* Sedgeland

**Vegetation Condition:** >80% Excellent to Very Good, <20% Good to Completely Degraded (part Site — Clarke *et al.* 2000, Goble-Garratt 1994, Trudgen 1990)

**Total Flora:** 197 native taxa (part Site — Clarke *et al.* 2000, Goble-Garratt 1994) (estimated >75% expected flora)

**Significant Flora:** *Tripterococcus paniculatus* ms (1); Clarke *et al.* 2000 — *Byblis lindleyana* (2), *Anthotium junciforme* (4); *Astroloma xerophyllum*, *Hensmania turbinata*, *Stylidium utricularioides*; Keighery, GJ pers. comm. — *Aristida contorta*, *Dysphania glomulifera* subsp. *glomulifera*, *Gonocarpus paniculatus*, *Melaleuca teretifolia* x *M. lateritia*

**Fauna:** limited survey for native mammals (2 species) (Wood & Grieve 1994). Significant species: Quenda

**Linkage:** adjacent bushland to the north, south (Site 390), east (Site 472, across road) and west (Site 388); part of Greenway 92 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority included in Jandakot Botanic Park Proposal (MfP 1995)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Other Government Land Mechanism. Part C: Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1).

## GOSNELLS GOLF COURSE BUSHLAND, CANNING VALE

**Boundary Definition:** bushland taken to cadastre boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 467

**Area (ha):** bushland 7.3

**Map no.** 60

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Gosnells remnant bushland area 1 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Canning (Canning Vale)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

###### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### WETLANDS

**Wetland Types:** dampland



**Natural Wetland Groups**

Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, Trudgen and Keighery 1995)

**Structural Units:** mapping (Trudgen and Keighery 1995)

Uplands: Low Open Woodlands to Low Open Forest dominated by combinations of *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *Allocasuarina fraseriana* and *Eucalyptus totitiana*

Wetlands: *Melaleuca preissiana*, *Allocasuarina fraseriana* and *Eucalyptus marginata* Low Open Woodland

**Vegetation Condition:** Very Good to Excellent (Trudgen and Keighery 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland

**Other Special Attributes:** majority Site in Middle Canning Catchment Study — ‘hydrological modelling assumes no urban development in this area’ (Evangelisti & Associates *et al.* 1995)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**CANNING VALE PRISON BUSHLAND**

**Boundary Definition:** bushland (part taken to cadastre)/bushland group boundary (Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 472

**Area (ha):** bushland 49.2

**Map no.** 60

**Map sheet series ref. no.** 2033-I NE

**Other Names:** not known

**Local Authorities (Suburb):** City of Canning (Canning Vale)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** dampland

**Natural Wetland Groups** (undefined areas included in boundary)

Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

Bassendean Dunes

Jandakot (B.3)



**Wetland Management Objectives:** Conservation (3.4ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, roadside inspection; Connell 1995)

**Structural Units**

Uplands: Low Open Woodlands to Low Open Forest dominated by combinations of *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *Allocasuarina fraseriana* and *Eucalyptus todtiana*

Wetlands: possibly *Melaleuca preissiana* Low Open Woodland

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** *Caladenia huegelii* (R)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north, east (Site 253, across road) and west (Site 389, across road); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority Site Category Two Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**HARRISDALE SWAMP AND ADJACENT BUSHLAND, FORRESTDALE**

**Boundary Definition:** protected area/bushland (part taken to cadastre boundary)(Boundary adjusted after vegetation survey and negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 253

**Area (ha):** bushland 98.4 (Site also includes open water.)

**Map no.** 60

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Green's Swamp, Submission Area 252, Part Submission Area 13, part of Jandakot Regional Park

**Local Authorities (Suburb):** City of Armadale (Forrestdale)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (Bassendean Dunes)**

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, dampland, artificial channel

**Natural Wetland Groups**

Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

Bassendean Dunes



Jandakot (B.3)

**Wetland Management Objectives:** Conservation (28.5ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 9.2ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Trudgen 1990; part Site — DEP 1998, DEP 1999)

**Structural Units:** general mapping (Trudgen, 1990)

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland to Low Open Forest with scattered *Allocasuarina*

*fraseriana*, *Eucalyptus marginata* and *Nuytsia floribunda*; *Banksia menziesii*, *B. ilicifolia* and *Eucalyptus*

*marginata* Low Open Forest; *Banksia ilicifolia*, *B. attenuata* and *Melaleuca preissiana* Low Open Forest

Wetlands: *Melaleuca preissiana* and *M. raphiophylla* Woodland with scattered *Banksia littoralis* and *Eucalyptus*

*rudis*; *Eucalyptus rudis* and *M. raphiophylla* Woodland with scattered *M. preissiana* and *Banksia littoralis*;

*Melaleuca preissiana* and *Nuytsia floribunda* Woodland; *Melaleuca preissiana* Low Very Open Woodland; *Kunzea*

*glabrescens* Closed Tall Scrub; *Regelia ciliata* Closed Heath to Closed Tall Scrub; *Pericalymma ellipticum*

Closed Heath; *Hypocalymma angustifolium* and *Melaleuca seriata* Low Open Heath; *Baumea* and *Leptocarpus*

species Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Pristine to Very Good, <40% Good to Completely Degraded (Trudgen 1990)

**Total Flora:** not known

**Significant Flora:** *Caladenia huegelii* (R); *Astroloma xerophyllum*, *Blancoa canescens*, *Hensmania turbinata* (poorly conserved south of the river)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south, east and west (Site 472, across road); part of Greenway 91 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority Site included in Jandakot Botanic Park Proposal (MfP 1995); 'wetland of special note' (Payne 1993a), Green's Swamp potential breeding place for the Freckled Duck (Payne 1993a); part Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Urban Negotiated Planning Solution (see Table 3, Volume 1).

**HOLMES STREET BUSHLAND, SOUTHERN RIVER/HUNTINGDALE**

**Boundary Definition:** bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland; Boundary adjusted after vegetation survey and/or negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan.*)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 125

**Area (ha):** bushland 121.3

**Map no.** 54, 55, 60, 61

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Submission Area 215, part Gosnells remnant bushland area 6 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Gosnells (Southern River, Huntingdale)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qrw: Sp1, Sp2)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

S3 Wet sedgelands on sandy clays (most southerly occurrence)

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, dampland

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (91.6ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Clarke and Keighery 2000b, Trudgen and Keighery 1995 (Gosn 2–5, 12–13), part Site — DEP 1998)

**Structural Units:** mapping (Clarke and Keighery 2000b, Trudgen and Keighery 1995 (Gosn 2–5, 12–13))

Uplands: Low Open Woodlands to Low Closed Forests dominated by combinations of *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* and *Allocasuarina fraseriana*; *Eucalyptus calophylla*, *E. marginata* and *Allocasuarina fraseriana* Woodland to Open Forest; *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland to Low Open Forest; *Banksia attenuata*, *B. menziesii* and *Eucalyptus todtiana* Low Woodland to Low Open Forest

Wetlands: Low Open Woodlands to Low Woodlands dominated by combinations of *Melaleuca preissiana*, *Eucalyptus todtiana*, *Allocasuarina fraseriana*, *Banksia attenuata* and *Nuytsia floribunda*; *Melaleuca preissiana* Low Open Woodland to Low Open Forest; *Melaleuca raphiophylla* Low Open Woodland to Low Open Forest; *Melaleuca incana*, *M. viminea* and *M. raphiophylla* Low Open Forest; *Melaleuca raphiophylla* and *M. viminea* Low Open Woodland to Open Woodland; *Regelia ciliata* Closed Heath to Closed Tall Scrub;

*Pericalymma ellipticum* Closed Heath; *Astartea* sp. Brixton Street and *Regelia ciliata* Shrubland to Open Heath; *Hypocalymma angustifolium* and *Melaleuca seriata* Low Open Heath; *Evandra pauciflora* Closed Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >80% Excellent (some areas considered Pristine, Trudgen and Keighery 1995), <20% Very Good to Good, with areas of severe localised disturbance

**Total Flora:** not known (estimated >200 taxa, DEP 1998)

**Significant Flora:** *Diuris purdiei* (R), *Caladenia huegelii* (R); *Acacia lasiocarpa* var. *bracteolata* (1), *Byblis lindleyana* (2), *Schoenus benthamii* (3); *Villarsia violifolia*, *Jacksonia gracilis*, *Blancoa canescens*, *Hensmania turbinata* (Trudgen and Keighery 1995); *Astroloma xerophyllum*, *Levenhookia preissii* (Clarke and Keighery 2000b)

**Fauna:** multiple survey for birds (61 species) (Submission no. 169). Significant bird species: category 1 (1), category 3 (11) and category 4 (2). Good assemblage of ducks and waterbirds, including 15 breeding species. Breeding site for Freckled Duck (Payne 1993b). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north and west; part of Greenway 91 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended to be protected with the purpose of conservation of nature and recreation compatible with the conservation of nature in study of bushland in the City of Gosnells (Trudgen and Keighery 1995), majority Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Urban Negotiated Planning Solution. Part B: Strategic Negotiated Planning Solution. Part C: Proposed Parks and Recreation Reservation. Part D: Local Reserve Mechanism. Part E: Other Government Land Mechanism (see Table 3, Volume 1).





## BALANNUP LAKE AND ADJACENT BUSHLAND, SOUTHERN RIVER/FORRESTDAL

**Boundary Definition:** protected area/bushland part taken to cadastre boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 413 **Area (ha):** bushland 76.6 (Site also includes open water.)  
**Map no.** 60 **Map sheet series ref. no.** 2033-I NE  
**Other Names:** Submission Area 213 and 241, part Gosnells remnant bushland area 17 (Trudgen and Keighery 1995), part of Jandakot Regional Park  
**Local Authorities (Suburb):** City of Gosnells (Southern River), City of Armadale (Forrestdale)  
**Includes CALM Managed Land:** Reserve 1821 (Conservation of Flora and Fauna)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

#### VEGETATION AND FLORA

##### Vegetation Complexes

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*11 Wet forests and woodlands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

#### WETLANDS

**Wetland Types:** sumpland, dampland, artificial channel

##### Natural Wetland Groups

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (32ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 7.1 ha

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 2000, Submission no. 164b, Trudgen and Keighery 1995)

**Structural Units:** mapping (Trudgen and Keighery 1995)

Uplands: *Eucalyptus tottiana* Open Woodland; *Banksia attenuata*, *B. menziesii* and *Nuytsia floribunda* Low Woodland; *Banksia menziesii*, *B. attenuata*, *Allocasuarina fraseriana* and *Eucalyptus tottiana* Low Woodland; *Banksia menziesii*, *B. attenuata*, *Nuytsia floribunda* and *Allocasuarina fraseriana* Low Open Woodland to Low Open Forest; *Banksia menziesii* and *B. ilicifolia* Low Woodland to Low Open Forest; *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* and *Eucalyptus tottiana* Low Open Woodland to Low Woodland; *Eucalyptus tottiana* and *Allocasuarina fraseriana* Low Open Woodland

Wetlands: *Melaleuca raphiophylla* and *Eucalyptus rudis* Closed Forest; *Melaleuca preissiana*, *Allocasuarina fraseriana*, *Nuytsia floribunda*, *Eucalyptus marginata* and *E. tottiana* Low Open Woodland; *Allocasuarina fraseriana*, *Melaleuca preissiana*, *Eucalyptus tottiana* and *Nuytsia floribunda* Low Open Woodland to Low Woodland; *Melaleuca preissiana*, *Allocasuarina fraseriana* and *Nuytsia floribunda* Low Open Woodland; *Melaleuca raphiophylla* Low Forest; *Melaleuca teretifolia* Tall Open Scrub; *Melaleuca preissiana* Low Open Woodland; *Pericalymma ellipticum* Open Heath to Closed Heath; *Regelia ciliata* Open Heath; *Regelia ciliata* Closed Heath with scattered emergent *Melaleuca preissiana*; *Juncus pallidus* and *Phalaris* sp. Sedgeland/Grassland  
**Vegetation Condition:** >80% Excellent to Very Good, <20% Good to Degraded, with areas of severe localised disturbance



**Total Flora:** not known

**Significant Flora:** *Blancoa canescens*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south (Site 342, across road); part of Greenway 97 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** 'wetland of special note' (Payne 1993a&b); important waterbird habitat (Submission no. 164b), Scopewest site; recommended to be protected with the purpose of conservation of nature and recreation compatible with the conservation of nature in study of bushland in the City of Gosnells (Trudgen and Keighery 1995); Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); part Site included in Jandakot Botanic Park Proposal (MfP 1995)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological systems or natural processes, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

### PHOEBE STREET BUSHLAND, SOUTHERN RIVER

**Boundary Definition:** bushland (part taken to cadastre) boundary (Boundary adjusted after vegetation survey in response to a submission to draft *Perth's Bushplan.*)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 340

**Area (ha):** bushland 7.3

**Map no.** 61

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Part Gosnells remnant bushland area 47 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Gosnells (Southern River)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

###### Vegetation Complexes

Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred (Trudgen and Keighery 1995)

###### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### WETLANDS

**Wetland Types:** dampland

###### Natural Wetland Groups

Bassendean — Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

**Wetland Management Objectives:** Conservation (3.5ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Trudgen and Keighery 1995, part Site — DEP 1999)

**Structural Units:** mapping (Trudgen and Keighery 1995)

Uplands: Low Open Woodland dominated by *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* and/or *Allocasuarina fraseriana* with scattered *Eucalyptus todtiana* and *Nuytsia floribunda*; *Xanthorrhoea preissii* and *Eremaea pauciflora* Open Heath; *Adenanthos cygnorum* Tall Open Shrubland to Tall Shrubland



Wetlands: *Melaleuca preissiana* and *Nuytsia floribunda* Low Open Woodland; *Regelia ciliata* Heath; *Verticordia densiflora* Low Heath; *Evandra pauciflora* Sedgeland

**Vegetation Condition:** >70% Very Good to Excellent, <30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Jacksonia gracilis*, *Evandra pauciflora*

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 126 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** bushland recommended to be protected with the purpose of conservation of nature and recreation compatible with the conservation of nature in study of bushland in the City of Gosnells (Trudgen and Keighery 1995); majority Site Category Two Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation,

**Recommendation:** Strategic Negotiated Planning Solution (see Table 3, Volume 1).

## MATISON STREET BUSHLAND, SOUTHERN RIVER

**Boundary Definition:** bushland (part taken to cadastre) boundary (Boundary adjusted after vegetation survey and negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan.*)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 464

**Area (ha):** bushland 28.9

**Map no.** 61

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Submission Area 216; Gosnells remnant bushland area 19 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Gosnells (Southern River)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

##### Vegetation Complexes

Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### WETLANDS

**Wetland Types:** dampland, creek, artificial channel

##### Natural Wetland Groups

Bassendean — Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

**Wetland Management Objectives:** Conservation (27.5ha, 843m)

**Swan Coastal Plain Lakes EPP:** none identified

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, Trudgen and Keighery 1995)



**Structural Units:** mapping (Trudgen and Keighery 1995)

Uplands: Low Open Forest to Low Open Woodland dominated by *Allocasuarina fraseriana*, *Banksia menziesii*, *B. ilicifolia*, *Nuytsia floribunda* and *Eucalyptus todtiana* and combinations of these; *Xanthorrhoea preissii* and *Eremaea pauciflora* Open Heath; *Adenanthos cygnorum* Tall Open Shrubland to Tall Shrubland

Wetlands: *Eucalyptus calophylla* Open Woodland over *Melaleuca preissiana* Low Open Woodland; *Melaleuca preissiana* Low Open Woodland; *Regelia ciliata* and/or *Pericalymma ellipticum* Open Heath to Closed Heath; *Melaleuca raphiophylla* Low Open Forest; *Acacia saligna* Closed Tall Scrub; Closed to Open Heath dominated by *Melaleuca viminea*, *M. incana* or *Hakea varia* and combinations of *Xanthorrhoea preissii*, *Verticordia densiflora*, *Regelia ciliata*, *Jacksonia gracilis* and/or *Melaleuca scabra* with patches of *Kingia australis* and *Viminaria juncea*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Very Good to Excellent, >35% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Blancoa canescens*, *Fimbristylis velata* (uncommon, poorly collected, Trudgen and Keighery 1995)

**Fauna:** not known

**Linkage:** adjacent bushland/canopy to Southern River; part of Greenway 126 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** bushland recommended to be protected with the purpose of conservation of nature and recreation compatible with the conservation of nature in study of bushland in the City of Gosnells (Trudgen and Keighery 1995); Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); one of only two large areas of bushland on the Southern River (Sites 255 and 464)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Strategic Negotiated Planning Solution (see Table 3, Volume 1).

## PASSMORE STREET BUSHLAND, SOUTHERN RIVER

**Boundary Definition:** bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 465

**Area (ha):** bushland 13.7

**Map no.** 61

**Map sheet series ref. no.** 2033-I NE

**Other Names:** Submission Area 216; Gosnells remnant bushland area 46/49 (Trudgen and Keighery 1995)

**Local Authorities (Suburb):** City of Gosnells (Southern River)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qrw: Sp1)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

\*8 Herb-rich shrublands in clay pans

\*15 Forests and woodlands of deep seasonal wetlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*group with which upland *Muchea* Limestone communities have been associated

#### WETLANDS

**Wetland Types:** dampland





**Natural Wetland Groups**

**Bassendean — Pinjarra transition OR Bassendean with fluvial features**

Bennet Brook (B/P.4)

**Wetland Management Objectives:** Conservation (11.8ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (Shrublands and woodlands on Muchea Limestones), Vulnerable (floristic community types 8 and 15)

**SECTION 3: SPECIFIC SITE DETAIL**

**andscape Features:** vegetated wetland, river, creek, vegetated uplands, possible Muchea Limestones

**Vegetation and Flora:** limited survey (DEP 1999, Trudgen and Keighery 1995)

**Structural Units:** mapping (Trudgen and Keighery 1995)

Uplands: *Eucalyptus calophylla* Open to Tall Open Woodland over *Eucalyptus decipiens* and *Banksia littoralis*  
Low Woodland

Wetlands: *Melaleuca preissiana* Low Open Woodland often with the co-dominants *Allocasuarina fraseriana*, *Banksia grandis*, *Nuytsia floribunda*; *Jacksonia furcellata*, *Viminaria juncea*, *Nuytsia floribunda* and *Melaleuca preissiana* Low Open Woodland; *Viminaria juncea* Tall Open Shrubland to Low Woodland *Melaleuca* Shrubland to Tall Shrubland dominated by *Melaleuca viminea*, *M. uncinata* and *M. raphiophylla* and combinations of these; *Melaleuca pauciflora* Open Shrubland to Open Heath; *Kunzea recurva* Low Open Shrubland; *Pericalymma ellipticum* Open Shrubland; Sedgeland dominated by *Gahnia trifida*, *Leptocarpus coangustatus* and *Lepidosperma longitudinale* and combinations of these

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >65% Excellent to Very Good, >30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Rhodanthe pyrethrum* (3); Trudgen and Keighery 1995 — *Acacia benthamii* (2), *Trichocline* sp. Treeton (BJK and NG 564) (2), *Stylidium longitubum* (3), *Anthotium junciforme* (4), *Verticordia lindleyi* subsp. *lindleyi* (4); *Podolepis gracilis* (Swamp Form) (GJK 13126), *Jacksonia gracilis*; DEP 1999 — *Blancoa canescens*; taxa typical of Muchea Limestones *Eucalyptus decipiens*, *Melaleuca* aff. *acerosa*, *Hemiandra ?pungens*

**Fauna:** not known

**Linkage:** adjacent bushland to the south; part of Greenway 126 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** encompasses five floristic community types; bushland recommended to be protected with the purpose of conservation of nature and recreation in study of bushland in the City of Gosnells (Trudgen and Keighery 1995); Site Category Two Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria met for inclusion:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**LYON ROAD BUSHLAND, BANJUP**

**Boundary Definition:** bushland (taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 492

**Area (ha):** bushland 25.0

**Map no.** 59

**Map sheet series ref. no.** 2033-1 SW

**Other Names:** draft *Perth's Bushplan* Submission no.s – 225, 417

**Local Authorities (Suburb):** City of Cockburn (Banjup)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa:S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Ms5) (Qrw: Sp1)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21a Central *Banksia attenuata* – *Eucalyptus marginata* woodlands

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** dampland

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (11.1Ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands (prominent north–south ridge)

**Vegetation and Flora:** limited survey (Keighery, BJ, and Clarke 2000a, Regeneration Technology Pty Ltd 1999, Tingay, Alan & Associates 1994, 1999)

**Structural Units:** mapping (Tingay, Alan & Associates 1994)

Uplands: *Eucalyptus marginata* Open Woodland over *Banksia attenuata* and *B. menziesii* Low Open Woodland to Low Closed Forest; *Eucalyptus tottiana* and *Banksia ilicifolia* Low Open Woodland to Low Closed Forest; *Banksia attenuata* and *B. ilicifolia menziesii* Low Open Woodland to Low Closed Forest

Wetlands: *Eucalyptus rudis* Tall Open Woodland; *Kunzea ericifolia* Closed Tall Scrub; *Melaleuca preissiana* Scattered to Low Woodland over Closed to Closed Low Heaths dominated by *Astartea* aff. *fascicularis*, *Hypocalymma angustifolia*, *Pericalymma ellipticum*, *Euchilopsis linearis* and *Calothamnus lateralis* and combinations of these; *Restio stenostachyus* Sedgeland.

**Vegetation Condition:** Excellent to Very Good (Keighery, BJ, and Clarke 2000a)

**Total Flora:** not known (estimated >200 native taxa, Keighery, BJ, and Clarke 2000a)

**Significant Flora:** *Anthotium junciforme* (4)

**Fauna:** Significant mammal species: Quenda (Keighery, BJ, and Clarke 2000a)

**Linkage:** adjacent bushland to the south, east and west; part of Greenway 120 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia (Regeneration Technology Pty Ltd 1999)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Urban Negotiated Planning Solution (see Table 3, Volume 1).

**FRASER ROAD BUSHLAND, BANJUP**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site (i.) are not accurately mapped (ii.) have been recently cleared; Boundary adjusted after negotiations with the land owner(s) in a response to a submission to draft *Perth's Bushplan.*)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 390

**Area (ha):** bushland 171.7 (Proposed boundary circumscribes 133.0ha bushland.)

**Map no.** 59, 60

**Map sheet series ref. no.** 2033–I NE, 2033–I SE

**Other Names:** Part Submission Area 13, part of Jandakot Regional Park

**Local Authorities (Suburb):** City of Cockburn (Banjup)



## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — Central and South

##### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

### WETLANDS

**Wetland Types:** dampland

#### Natural Wetland Groups

##### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — Bowman Bishaw Gorham 1990, DEP 1999, Meney 1996, Semeniuk, V&C Research Group 1997a, Trudgen 1990)

**Structural Units:** mapping (part Site — Bowman Bishaw Gorham 1990, Trudgen 1990)

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland to Low Open Forest with scattered *Allocasuarina fraseriana*; *Eucalyptus marginata*, *E. tottiana* and *Nuytsia floribunda*; *Banksia menziesii*, *B. ilicifolia* and *Eucalyptus marginata* Low Open Forest; *Eucalyptus gomphocephala*, *E. calophylla* and *E. marginata* Woodland with occasional *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana*

Wetlands: Mixed *Melaleuca raphiophylla*, *Eucalyptus rudis* Woodland with occasional *Melaleuca preissiana* and *Banksia littoralis*; *Melaleuca preissiana*, *M. raphiophylla* Woodland with occasional *Eucalyptus rudis* and *Banksia ilicifolia*; *Hypocalymma angustifolium*, *Pericalymma ellipticum* and *Astartea* aff. *fascicularis* Open Heath to Shrubland; *Baumea* spp. and *Leptocarpus* spp. Sedgeland

**Vegetation Condition:** >75% Excellent, <25% Very Good to Completely Degraded (Trudgen 1990)

**Total Flora:** 106 native taxa (part Site — Reserve 1820 from Meney 1996, Semeniuk, V&C Research Group 1997a) (estimated >50% expected flora of the Site)

**Significant Flora:** *Caladenia huegelii* (R)

**Fauna:** limited survey for birds (26 species), mammals (3 species) and reptiles (5 species) (MJ and AR Bamford in Meney 1996). Significant bird species: category 3 (5) and category 4 (3). Significant mammal species: Quenda (Meney 1996, Friend 1996 D) and Echidna. Significant reptile species: Rosenberg's Monitor (*Varanus rosenbergi*)

**Linkage:** adjacent bushland to the north (Site 389, across road), south (Site 344, across road) and west; part of Greenway 92 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part Site included in Jandakot Botanic Park Proposal (MfP 1995); part Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Rural Complementary Mechanism. Part C: Other Government Land Mechanism. Part D: Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1).

PIARRA NATURE RESERVE, FORRESTDAL

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 262

**Area (ha):** bushland 35.82 (Site also includes open water.)

**Map no.** 60

**Map sheet series ref. no.** 2033-I SE

**Other Names:** Part Submission Area 13, part of Jandakot Regional Park, part of Gibbs Road Wetland System

**Local Authorities (Suburb):** City of Armadale (Forrestdale)

**Includes CALM Managed Land:** Reserve 36594 (Conservation of Flora and Fauna)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

\*11 Wet forests and woodlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

**WETLANDS**

**Wetland Types:** sumpland, dampland

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (14ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 2.3ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Trudgen 1990, DEP 1998)

**Structural Units:** general mapping (Trudgen 1990)

Uplands: *Banksia menziesii*, *B. ilicifolia* and *Eucalyptus marginata* Low Open Forest

Wetlands: *Melaleuca raphiophylla* Low Forest to Woodland; *Melaleuca preissiana* and *M. raphiophylla*

Woodland with scattered *Banksia littoralis* and *Eucalyptus rudis*; *Eucalyptus rudis* and *Melaleuca raphiophylla*

Woodland with scattered *Melaleuca preissiana* and *Banksia littoralis*; Myrtaceous Closed Heaths; *Baumea* and

*Leptocarpus* species Sedgeland

**Vegetation Condition:** >80% Pristine to Very Good, <20% Very Good, with areas of severe localised disturbance (general mapping, Trudgen 1990)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north and south; part of Greenway 97 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** included in Jandakot Botanic Park Proposal (MfP 1995); Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); 'wetland of special note' (Payne 1993a)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed: Indicative place (AHC 2000 D)



**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site (Reserve 36594) for conservation purposes within Jandakot Regional Park is endorsed (see Table 3, Volume 1).

**BANJUP BUSHLAND, BANJUP**

**Boundary Definition:** protected area/bushland taken to zoning/cadastre/boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 263

**Area (ha):** bushland 103.9 (Site also includes open water.)

**Map no.** 59

**Map sheet series ref. no.** 2033-I SE, 2033-I SW

**Other Names:** Part Submission Area 13, includes Buckingham, Bosworth and Emma Treeby Reserves, part of Jandakot Regional Park, part of Gibbs Road Wetland System

**Local Authorities (Suburb):** City of Cockburn (Banjup, Atwell)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Ms5) (Qrw: Sp1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*4 *Melaleuca preissiana* damplands

\*11 Wet forests and woodlands

\*S3 Wet sedgeland on sandy clays

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*22 *Banksia ilicifolia* woodlands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (61.6ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 2ha + 1.2ha + 3.8ha = 7ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, Trudgen 1990, part Site — Semeniuk, V&C Research Group 1997a); detailed survey (Keighery, GJ, 1992b)

**Structural Units:** mapping (Keighery, GJ, 1992b, Trudgen 1990, part Site — Semeniuk, V&C Research Group 1997a)

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland; *Banksia attenuata* Low Woodland with scattered *B. menziesii*, *B. ilicifolia* and *Eucalyptus todtiana*

Wetlands: *Eucalyptus rudis* Tall Open woodland; *Melaleuca preissiana* Low Woodland over mixed Low Open

Heath; *Melaleuca cuticularis* Low Open Woodland; *Melaleuca raphiophylla* Low Forest to Tall Open Scrub;

Tall Scrub dominated by *Melaleuca viminea* and combinations of *M. raphiophylla*, *M. viminea* and

*M. polygaloides*; *Pericalymma ellipticum* and *Calothamnus lateralis* Heath; *Hypocalymma angustifolium* Open



Low Heath; Sedgeland dominated by *Dielsia stenostachya*, *Baumea juncea* or *B. articulata* or *Baumea juncea* and *B. articulata*

**Vegetation Condition:** >80% Excellent, <20% Good to Completely Degraded (Trudgen 1990)

**Total Flora:** 201 native taxa (Keighery, GJ, 1992b) (estimated >75% expected flora)

**Significant Flora:** Keighery, GJ, 1992b— *Tripterococcus paniculatus* ms (1), *Phyllota gracilis* (3), *Macarthuria apetala*, *Dielsia stenostachya* (largest known occurrence in intact bushland), *Gonocarpus pithyoides*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south and east; part of Greenway 81 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority included in Jandakot Botanic Park Proposal (MfP 1995)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed: Indicative place (AHC 2000 D)

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

## ANSTEY/KEANE DAMPLAND AND ADJACENT BUSHLAND, FORRESTDALE

**Boundary Definition:** protected area/bushland (part taken to cadastre) (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Boundary adjusted after vegetation survey and negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan*.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 342

**Area (ha):** bushland 311.6 (Proposed boundary circumscribes 296.4ha bushland.)

**Map no.** 60

**Map sheet series ref. no.** 2033-I NE, 2033-I SE

**Other Names:** Hale Rd Bushland, Part Submission Areas 13 and 246 combined, part of Jandakot Regional Park

**Local Authorities (Suburb):** City of Armadale (Forrestdale)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

##### VEGETATION AND FLORA

###### Vegetation Complexes

Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

###### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

\*8 Herb-rich shrublands in clay pans

\*10a Shrublands on dry clay flats

\*S2 Northern *Pericalymma ellipticum* dense low shrublands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*21c Low-lying *Banksia attenuata* woodlands or shrublands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### WETLANDS

**Wetland Types:** sumpland, dampland, artificial channel

###### Natural Wetland Groups

Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (203.5ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified





**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Endangered (floristic community type 10a), Vulnerable (floristic community type 8)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Trudgen 1990); detailed survey (part Site — Keighery, BJ, and Clarke 2000b, Keighery, GJ, 1992a, Weston 1989a & 1990)

**Structural Units:** mapping (part Site — Keighery, BJ, and Clarke 2000b, Weston 1989a & 1990); general mapping (Trudgen 1990)

Uplands: *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland to Low Open Forest, with scattered *Eucalyptus marginata*, *E. todtiana* and *Nuytsia floribunda*; *Banksia attenuata* Low Woodland; *Banksia ilicifolia* Low Open Forest to Woodland

Wetlands: *Banksia attenuata* and *Melaleuca preissiana* Low Woodland; *Melaleuca preissiana* Low woodland; *Kunzea glabrescens* Tall Open Scrub; Tall Closed Scrub to Tall Open Scrub dominated by *Melaleuca raphiophylla*; *M. viminea* and *M. uncinata* or combinations of these; Closed Heath to Open Heath dominated by *Melaleuca raphiophylla*; *Melaleuca teretifolia*, *M. viminea*, *M. incana*, *M. uncinata*, *M. lateriflora* and *M. lateritia* or combinations of these; *Actinostrobilus pyramidalis* Closed Tall Scrub to Tall Open Shrubland; *Regelia ciliata* Closed to Open Heath; *Verticordia densiflora* Closed to Open Heath; *Pericalymma ellipticum* Closed to Open Heath; mixed Heath; *Evandra pauciflora* Sedgeland; mixed Herbland; Many of the wetland communities are typical of the Pinjarra Plain and occur together in the area as a mosaic.

**Vegetation Condition:** >75% Excellent to Pristine, <25% Very Good to Good, with areas of severe localised disturbance (Trudgen 1990)

**Total Flora:** 381 native taxa (Keighery, GJ, 1992a) (estimated >70% expected flora)

**Significant Flora:** *Diuris purdiei* (R) (Weston 1989a); *Jacksonia sericea* (3), *Tripterococcus paniculatus* ms (1), *Stylidium mimeticum* (3), *Stylidium longitubum* (3) (Keighery, GJ, 1992a), *Villarsia submersa* (4), *Verticordia lindleyi* subsp. *lindleyi* (4), *Drosera occidentalis* (4) (Keighery, GJ, 1992a); *Banksia telmatiaea*, *Dielsia stenostachya*, *Beaufortia squarrosa*, *Stylidium utricularioides*, *Pityrodia uncinata* (most southern population, Keighery, GJ, 1992a), *Dysphania glomulifera* subsp. *glomulifera* (one of two populations on the Swan Coastal Plain, Keighery, GJ, 1992a), *Evandra pauciflora*, *Myriocephalus helichrysoideus* (Weston 1990), *M. isoetes*, *Blancoa canescens* (Weston 1990)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 413, across road) and west; part of Greenway 126 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority included in Jandakot Botanic Park Proposal (MfP 1995); 'wetland of special note' (Payne 1993a); majority Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); one of the most plant species diverse areas on the Swan Coastal Plain in the PMR, currently considered second to Site 387; contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Urban Negotiated Planning Solution. Part C: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**DENIS DE YOUNG RESERVE AND GIBBS ROAD SWAMP BUSHLAND, BANJUP/FORRESTDAL**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 344

**Area (ha):** bushland 289.8 (Site also includes open water.)

**Map no.** 59, 60, 65, 66

**Map sheet series ref. no.** 2033-I SE

**Other Names:** Part Submission Area 13, part of Jandakot Regional Park, part of Gibbs Road Wetland System

**Local Authorities (Suburb):** City of Cockburn (Banjup), City of Armadale (Forrestdale)





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

### VEGETATION AND FLORA

#### Bassendean Dunes

Bassendean Complex — Central and South

#### Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes

Southern River Complex

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*11 Wet forests and woodlands

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21c Low-lying *Banksia attenuata* woodlands or shrublands (Denis De Young Reserve)

22 *Banksia ilicifolia* woodlands (Denis De Young Reserve)

### WETLANDS

**Wetland Types:** sumpland, dampland, artificial channel

#### Natural Wetland Groups

##### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

##### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (195.4ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 7.7ha + 16.2ha + 0.2ha = 24.1ha (total)

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** detailed survey (part Site (Denis De Young Reserve) — Keighery, GJ, 1992b); limited survey (Gibson *et al.* 1994 (Dejong 01–02), part Site — Keighery, GJ, 1994)

**Structural Units:** mapping (Keighery, GJ, 1992b, 1994)

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland; *Banksia attenuata* Low Woodland with scattered *B. menziesii*, *B. ilicifolia* and *Eucalyptus todtiana*

Wetlands: *Melaleuca preissiana* Low Woodland to Forest sometimes over *Baumea juncea* Sedgeland; *Melaleuca raphiophylla* Low Open Forest; *Pericalymma ellipticum*, *Astartea* aff. *fascicularis*, *Aotus intermedia* and *Calothamnus lateralis* Closed Heath; *Pericalymma ellipticum* Closed Heath; *Baumea juncea* and *B. articulata* Sedgelands

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Excellent to Very Good, <40% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 158 native taxa (part Site — Keighery, GJ, 1992b) (estimated >60% expected flora)

**Significant Flora:** Keighery, GJ, 1992b — *Phyllota gracilis* (3), *Verticordia lindleyi* subsp. *lindleyi* (4); *Macarthuria apetala*

**Fauna:** limited survey for birds (37 species) (AHC 2000 D), native mammals (2 species), reptiles (7 species) and amphibians (1 species) (Submission no.s 168g and 261). Important breeding area for at least 18 species including Freckled and Pink-eared Ducks, Black Swan, Little Pied Cormorant, Eurasian Coot and Dusky Moorhen. Significant bird species; Freckled Duck (AHC 2000 D). Important area for trans-equatorial wading birds protected under the JAMBA/ CAMBA treaty (AHC 2000 D). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 390, across road), south and west; part of Greenways 81, 92, 97 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority included in Jandakot Botanic Park Proposal (MfP 1995); 'wetland of special note' (Payne 1993a); part Site Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Indicative place (AHC 2000 D); location for JAMBA/CAMBA species





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**FORRESTDALE LAKE AND ADJACENT BUSHLAND, FORRESTDALE**

**Boundary Definition:** protected area/bushland (part taken to cadastre)/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland; Boundary adjusted after vegetation survey and negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 345

**Area (ha):** bushland 344.5 (Site also includes open water.)

**Map no.** 60, 61, 66

**Map sheet series ref. no.** 2033-I SE

**Other Names:** Submission Area 256

**Local Authorities (Suburb):** City of Armadale (Forrestdale, Brookdale)

**Includes CALM Managed Land:** Reserve 24781 (Conservation of Flora and Fauna)

**System 6 (1983):** M95 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Cs, Sc)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

**Lagoonal and Estuarine Deposits (within the Bassendean Dunes/Pinjarra Plain)**

Lagoonal and Estuarine Deposits (Vasse) (Qhg: LS5)

Lagoonal Deposits in Bassendean Dunes (Qpw: S9)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

8 Herb-rich shrublands in clay pans

10a Shrublands on dry clay flats

12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

21c Low-lying *Banksia attenuata* woodlands or shrublands

**WETLANDS**

**Wetland Types:** lake, dampland, sumpland, palusplain, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Pinjarra Plain**

Keysbrook (P.1)

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (402.5ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 220.5ha + 0.7ha + 2.7ha + 1.8ha + 0.8ha + 1.8ha + 22.7ha = 251ha (total)





**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Endangered (floristic community type 10a), Vulnerable (floristic community type 8)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (CALM 1987, part Site — Clarke and Keighery 2000c, EPA and WAWA 1990, Gibson *et al.* 1994 (FL 01–10), Keighery, GJ, 1992a, Keighery, BJ, and Trudgen 1992)

**Structural Units:** mapping (CALM 1987, Keighery, BJ, and Trudgen 1992)

Uplands: *Eucalyptus calophylla* Open Woodland; *Banksia attenuata* and *B. menziesii* Open Forest to Woodland with *Nuytsia floribunda*; *Banksia littoralis* and *B. menziesii* Open Forest to Woodland with *Nuytsia floribunda*  
Wetlands: *Eucalyptus rudis* Forest; *Melaleuca preissiana* and *M. raphiophylla* Low Open Forest with patches of *Eucalyptus rudis*; *Melaleuca preissiana* Open Woodland; *Melaleuca raphiophylla* Low Closed Forest; *Melaleuca uncinata*, *M. polygaloides* and *M. viminea* Closed Heath; *Regelia ciliata* Closed Heath; *Melaleuca teretifolia* and *M. viminea* Open Heath; mixed Closed Herbland; *Hypolaena exsulca*, *Lyginia barbata* and *Schoenus curvifolius* Closed Sedgeland; *Leptocarpus canus* Sedgeland; mixed Sedgelands; Closed Sedgelands dominated by *Baumea articulata*, *\*Typha orientalis* and *Bolboschoenus caldwellii*

**Scattered Native Plants:** *Melaleuca raphiophylla* Low Closed Forest to Low Open Woodland, *Banksia attenuata* and *B. menziesii* Open Forest to Woodland, scattered native shrubs

**Vegetation Condition** (bushland): >50% Excellent to Very Good, <50% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 312 native taxa (Keighery, GJ, 1992a) (estimated >75% expected flora)

**Significant Flora:** *Diuris purdiei* (R), *Drakaea elastica* (R); *Acacia lasiocarpa* subsp. *bracteolata* (1) (Keighery, GJ, 1992a), *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Stylidium mimeticum* (3) (Keighery, GJ, 1992a), *Villarsia submersa* (4), *Drosera occidentalis* (4), *Verticordia lindleyi* subsp. *lindleyi* (4) (Keighery, GJ, 1992a), *Anthotium junciforme* (4) (Keighery, GJ, 1992a); *Pimelea imbricata* var. *major*, *Villarsia violifolia*, *Burchardia bairdiae*, *Leptocarpus* sp. Forrestdale Lake, *Myriocephalus helichrysoides*

**Fauna:** multiple survey for birds (135 species) (RAOU 1996 D, numerous visits, and CALM 1987), limited survey for native mammals (4 species), reptiles (15 species) and amphibians (7 species) (CALM). Important feeding area for exceptionally wide variety of waterbirds and a large assemblage (21 species) and population level of trans-equatorial wading birds protected under the JAMBA/CAMBA treaties. Significant bird species: category 1 (2), category 2 (21), category 3 (16) and category 4 (9). Significant mammal species: Quenda and Western Brush Wallaby. Significant reptile species: Swamp Skink (*Acritoscincus trilineatum*), Lined Skink (*Lerista lineata*) and Crowned Snake (*Notechis coronatus*)

**Linkage:** adjacent bushland to the north, south and east; part of Greenways 81, 118, 69, 97 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** 'wetland of special note' (Payne 1993a); majority Site Category One and Two Areas, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); National Trust of Australia (WA) Classification; contains plant communities representative of the eastern side of the Swan Coastal Plain

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Wetlands of International Importance (Ramsar); Directory of Important Wetlands in Australia; Entered in the Register of the National Estate (Forrestdale Lake); Indicative place (AHC 2000 D) (Forrestdale Lake Adjacent Wetlands); location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserve 24781 is endorsed. Parts of the Site are already reserved for Parks and Recreation in the Metropolitan Region Scheme, and should be added to Forrestdale Lake Nature Reserve. Part B: Rural Complementary Mechanism. Part C: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

## WANDI NATURE RESERVE AND ANKETELL ROAD BUSHLAND, WANDI/OAKFORD

**Boundary Definition:** protected area/bushland/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 347

**Area (ha):** bushland 412.3 (Site also includes open water.)

**Map no.** 65, 66

**Map sheet series ref. no.** 2033-I SE, 2033-I SW

**Other Names:** Magenup Swamp, Part Submission Area 13, part of Jandakot Regional Park

**Local Authorities (Suburb):** Town of Kwinana (Wandi, Oakford), Shire of Serpentine-Jarrahdale (Oakford)

**Includes CALM Managed Land:** Reserve 36110 (Conservation of Flora and Fauna and Water)





**System 6 (1983):** M97 area of bushland goes beyond System area boundaries, all bushland described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Pinjarra Plain

Guildford Formation (Qpa: Sc)

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qrw: Sp1, Sp2)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Bassendean Dunes

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

\*12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*22 *Banksia ilicifolia* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

### WETLANDS

**Wetland Types:** sumpland, dampland, artificial channel

#### Natural Wetland Groups

##### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (42.4ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 12.4ha + 0.7ha + 3.7ha + 2.2ha = 19ha (total)

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, Gibson *et al.* 1994 (Wand 01), Trudgen 1990); detailed survey (part Site — Keighery, GJ, 1992c, Keighery, GJ, and Keighery 1993b (Wandi NR), Weston 1989b (Lots 106 & 107))

**Structural Units:** mapping (Trudgen 1990, Weston 1989b (Lots 106 & 107))

Uplands: *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *Allocasuarina fraseriana* and *Eucalyptus todtiana* Low Woodland; *Banksia attenuata*, *B. menziesii* and *B. ilicifolia* Low Woodland

Wetlands: *Melaleuca preissiana* Woodland; *Melaleuca raphiophylla* Forest; *Pericalymma ellipticum* Closed Heath; *Astartea* aff. *fascicularis* Closed Heath; Sedgeland of *Dielsia stenostachya* and *Lepidosperma longitudinale*

**Scattered Native Plants:** scattered trees and clumps of *Eucalyptus calophylla* and *Melaleuca preissiana*

**Vegetation Condition:** >75% Excellent to Very Good, <25% Very Good to Degraded (mapping Trudgen 1990)

**Total Flora:** 158 native taxa (part Site — Keighery, GJ, and Keighery 1993b (Wandi Nature Reserve)) (estimated >90% expected flora for *Banksia* Woodland)

**Significant Flora:** Keighery, GJ, and Keighery 1993b — *Eucalyptus todtiana* (southernmost in a reserve), *Brachyloma preissii*; Weston 1989b — *Dielsia stenostachya*, *Cyrtostylis* sp. (an uncommon genus in Bassendean Sands)

**Fauna:** limited survey for birds (AHC 2000 D). Significant bird species: Scarlet Robin, Grey Shrike-thrush, Western Thornbill, Splendid Fairy Wren and Grey Currawong (AHC 2000 D); Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north, south and west; part of Greenway 97 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority of Site included in Jandakot Botanic Park Proposal (MfP 1995)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate (Wandi Nature Reserve)



## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

## MANDOGALUP ROAD BUSHLAND, MANDOGALUP

**Boundary Definition:** bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 268

**Area (ha):** bushland 95.9

**Map no.** 64, 65

**Map sheet series ref. no.** 2033-I SW

**Other names:** not known

**Local Authorities (Suburb):** Town of Kwinana (Mandogalup)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Ms5)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Spearwood Dunes

Karrakatta Complex — Central and South

###### Wetlands

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, roadside observations)

##### Structural Units

Uplands: *Eucalyptus gomphocephala* Low Open woodland over scattered *E. marginata*, *Banksia attenuata* and *B. grandis*; Mixed *Eucalyptus marginata*, *Banksia attenuata*, *B. menziesii*, *B. grandis* Open Forest; *Banksia attenuata*, *B. menziesii* Low Open Forest with scattered emergent trees of *Eucalyptus gomphocephala*

Wetlands: *Eucalyptus rudis* Open Forest over *Melaleuca raphiophylla*, *M. preissiana*, *Banksia littoralis* Low

Open Forest

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland to Woodland

**Vegetation Condition:** >75% Excellent, <20% Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south (Site 269, across road) and west; part of Greenway 78 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**THE SPECTACLES**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 269 **Area (ha):** bushland 349.7 (Site also includes open water.)

**Map no.** 64, 65 **Map sheet series ref. no.** 2033-I SW

**Other Names:** Submission Area 6, part of Beeliar Regional Park

**Local Authorities (Suburb):** Town of Kwinana (The Spectacles)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8) (at interface of Bassendean and Spearwood Dunes)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (QtI: LS1)

**Wetlands (within the Spearwood/Bassendean Dunes interface)**

Holocene Swamp Deposits (Qhw: Ms5)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South (at interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*11 Wet forests and woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

**Wetland Types:** sumpland, dampland, principal channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Spearwood—Bassendean interface**

Bibra (S/B.1)

**Wetland Management Objectives:** Conservation (166.7ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** 62.1ha + 14.1ha = 76.2ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water (fresh), vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990, Glossop 1979, Weston 1993)

**Structural Units:** mapping (EPA and WAWA 1990, Glossop 1979)

Uplands: *Eucalyptus calophylla* and *Banksia attenuata* Low Woodland

Wetlands: *Eucalyptus rudis* Low Woodland to Low Open Forest; *Melaleuca raphiophylla* and *M. teretifolia* Low

Closed Forest; *Melaleuca raphiophylla* Low Open Forest to Low Closed Forest; *Baumea articulata* Closed

Sedgeland; Mixed Sedgeland; *Leptocarpus* Open Sedgeland



**Scattered Native Plants:** *Melaleuca preissiana* Low Woodland; *Eucalyptus calophylla* and *Banksia attenuata* Low Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >60% Excellent to Very Good, <40% Good to Degraded (Weston 1993)

**Total Flora:** 104 native taxa, 8 weed taxa (Glossop 1979) (estimated >75% expected flora)

**Significant Flora:** *Dodonaea hackettiana* (4)

**Fauna:** multiple survey for birds (RAOU 1996 D), limited survey for birds (AHC 2000 D). Equal highest number of breeding waterfowl (12 species) and equal 14th wetland for highest number of species (33) during RAOU wetland survey 1990-92 (Storey *et al.* 1993); Significant mammal species: Western Brush Wallaby and Quenda (AHC 2000 D); Significant reptile species: Lined Skink *Lerista lineata* (AHC 2000 D)

**Linkage:** adjacent bushland to the north (Site 268, across road), south (Site 272, across road), east (across freeway) and west; part of Greenways 78, 97 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Interim List of the Register of the National Estate; Directory of Important Wetlands in Australia

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Beeliar Regional Park is endorsed (see Table 3, Volume 1).

## SANDY LAKE AND ADJACENT BUSHLAND, ANKETELL

**Boundary Definition:** protected area/bushland taken to cadastre/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped; Boundary proposed to be adjusted after vegetation survey and negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan.*)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 270

**Area (ha):** bushland 201.4 (Site also includes open water; Proposed boundary circumscribes 181.3ha bushland.)

**Map no.** 65

**Map sheet series ref. no.** 2033-I SW

**Other Names:** Part Submission Area 13, part of Jandakot Regional Park

**Local Authorities (Suburb):** Town of Kwinana (Anketell)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

###### Wetlands (within the Spearwood/Bassendean Dunes interface and the Bassendean Dunes)

Holocene Swamp Deposits (Qhw: Cps, Ms5)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Spearwood Dunes

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

###### Supergroup 2: Seasonal Wetlands

\*4 *Melaleuca preissiana* damplands

\*5 Mixed shrub damplands

\*11 Wet forests and woodlands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands





- \*21c Low-lying *Banksia attenuata* woodlands or shrublands
- \*22 *Banksia ilicifolia* woodlands
- \*23a Central *Banksia attenuata* — *B. menziesii* woodlands
- Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**
- \*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

## WETLANDS

**Wetland Types:** sumpland, dampland, artificial channel

### Natural Wetland Groups

#### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (127.6ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 5.4ha

## THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Dames and Moore 1988b, DEP 1998 (fenceline survey), Keighery, BJ, and Clarke 1999c, part Site — Bowman Bishaw Pty Ltd 1999, Hart Simpson and Associates 1989, Trudgen 1990)

**Structural Units:** mapping (Dames and Moore 1988b, part Site — Bowman Bishaw Pty Ltd 1999, Hart, Simpson and Associates 1989, Keighery, BJ, and Clarke 1999c, Trudgen 1990)

Uplands — Sands derived from Tamala Limestone: *Banksia attenuata* and *B. menziesii* Low Woodland to Low Open Forest, with scattered emergent *Eucalyptus gomphocephala* or *E. marginata*

Uplands — Bassendean Dunes: *Banksia attenuata* and *B. menziesii* Low Woodland to Low Open Forest, with scattered emergent *Eucalyptus marginata* and scattered *Allocasuarina fraseriana*, *Nuytsia floribunda* and, rarely, *Eucalyptus tottiana*; *Banksia ilicifolia*, *B. attenuata* and *B. menziesii* Low Woodland to Low Open Forest

Wetlands: *Melaleuca raphiophylla* and *Eucalyptus rudis* Low Forest to Woodland occasionally with scattered *Melaleuca preissiana* and *Banksia littoralis*; *Banksia ilicifolia* Low Woodland to Low Open Forest; *Melaleuca raphiophylla* Low Forest to Woodland; *Melaleuca preissiana* and *M. raphiophylla* Woodland with scattered *Banksia littoralis* and *Eucalyptus rudis*; Myrtaceous Closed Heaths dominated by *Pericalymma ellipticum* or *Kunzea glabrescens* and *Melaleuca thymoides*; Closed Sedgeland to Sedgeland dominated by *Baumea articulata* or *Lepidosperma longitudinale*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >80% Excellent to Very Good, <20% Good to Degraded, with areas of severe localised disturbance associated with localised clearing

**Total Flora:** 250 native taxa (estimated, Hart, Simpson and Associates 1989) (estimated <70% expected flora)

**Significant Flora:** *Aotus cordifolia* (3); *Dielsia stenostachya*

**Fauna:** limited survey for birds (29 species), native mammals (2 species), reptiles (7 species) and amphibians (1 species) (Hart, Simpson and Associates 1989). Significant bird species: category 3 (3) and category 4 (3). Significant mammal species: Quenda

**Linkage:** adjacent bushland to the south (across road), east and west (Site 269, across freeway); part of Greenway 97 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part included in Jandakot Botanic Park Proposal (MfP 1995); one of the few bushland areas in the Perth Metropolitan Region spanning the Spearwood/ Bassendean Dune interface as well as including near-pristine wetlands associated with the Bassendean Dunes

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Diversity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Strategic Negotiated Planning Solution. Part C: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

## MODONG NATURE RESERVE AND ADJACENT BUSHLAND, OAKFORD

**Boundary Definition:** protected area/bushland (part taken to cadastre)/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Areas of bushland within the boundaries of the Site have been recently cleared. The boundary has been drawn to include cleared bushland; Boundary adjusted after vegetation survey and negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan*.)





**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 348 **Area (ha):** bushland 242.0  
**Map no.** 65, 66 **Map sheet series ref. no.** 2033-I SE  
**Other Names:** part of Jandakot Regional Park  
**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Oakford)  
**Includes CALM Managed Land:** Reserve 25886 (Conservation of Flora and Fauna)  
**System 6 (1983):** M99 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Sc)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qrw: Sp1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

11 Wet forests and woodlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21c Low-lying *Banksia attenuata* woodlands or shrublands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** dampland, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (111.9ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — Crook 1980 (Modong Nature Reserve, Keighery, GJ, 1996 (Modong Nature Reserve), Gibson *et al.* 1994 (Modo 01-06), DEP 1999)

**Structural Units**

Uplands: *Eucalyptus calophylla* Woodland; *Banksia attenuata* Low Woodland; *Banksia attenuata* and *B. ilicifolia* Low Open Forest

Wetlands: *Melaleuca preissiana* and *Banksia attenuata* Low Woodland; *Eucalyptus rudis* and *Melaleuca preissiana* Low Woodland; *Melaleuca preissiana* Low Open Woodland; *Kunzea glabrescens* Closed Tall Scrub; *Pericalymma ellipticum* and *Hypocalymma angustifolium* Open Heath

**Vegetation Condition:** >90% Excellent to Pristine, <10% Very Good to Good (Gibson *et al.* 1994, Trudgen 1990)

**Total Flora:** 197 native taxa (Keighery, GJ, 1996) (estimated <80% expected flora)

**Significant Flora:** *Stylidium mimeticum* (3); *Macarthuria apetala*, *Evandra pauciflora*, *Hensmania turbinata*, *Burchardia bairdii* (most southern population)

**Fauna:** limited survey for birds (AHC 2000 D), limited survey for mammals (2 species) (J. Dell pers. comm.), structured surveys for reptiles (25 species) and amphibians (3 species) (WA Society of Amateur Herpetologists, unpublished). Significant mammal species: Quenda (Friend 1996 D), Grey Kangaroo and Western Brush Wallaby. Significant reptile species: legless lizards (*Pletholax gracilis* and *Pygopus lepidopodus*), Lined Skink (*Lerista lineata*), Swamp Skink (*Acritoscincus trilineatum*), Black Monitor (*Varanus tristis*) and Rosenberg's Monitor (*V. rosenbergi*). Good assemblage of insectivorous and nectarivorous birds (J. Dell pers. comm.).





**Linkage:** adjacent bushland to the north and west; part of Greenway 97 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority included in Jandakot Botanic Park Proposal (MFP 1995); 'key site representing the vegetation and habitats typical of the Bassendean Dune System' (Crook 1980)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed, Indicative place (AHC 2000 D)

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site (Reserve 25886) for conservation purposes within Jandakot Regional Park is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

## CASUARINA PRISON BUSHLAND, CASUARINA

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 273

**Area (ha):** bushland 116.9

**Map no.** 65, 71

**Map sheet series ref. no.** 2033-I SE, 2033-I SW

**Other Names:** Part Submission Area 13 and Submission Area 222, part of Jandakot Regional Park

**Local Authorities (Suburb):** Town of Kwinana (Casuarina)

**System 6 (1983):** M98 Part System area bushland, only bushland described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

4 *Melaleuca preissiana* damplands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### WETLANDS

**Wetland Types:** dampland, artificial channel

###### Natural Wetland Groups

###### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (1.3ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Cas 01-04), Trudgen 1990)

**Structural Units:** mapping (Trudgen 1990)

Uplands: *Banksia attenuata*, *B. ilicifolia* and *Eucalyptus marginata* Low Woodland; *Banksia attenuata* and *B. ilicifolia* Low Open Forest

Wetlands: *Melaleuca preissiana* and *Nuytsia floribunda* Low Open Woodland; *Melaleuca preissiana* Woodland over *Banksia littoralis* Low Woodland

**Vegetation Condition:** >90% Excellent to Pristine, <10% Very Good to Good

**Total Flora:** 104 native taxa (plot-generated list only) (>50% expected flora)

**Significant Flora:** *Lysinema elegans* (one of two known significant populations south of Gnangara), *Burchardia bairdiae*, *Drosera gigantea* subsp. *geniculata*, *Hensmania turbinata*



**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south and west; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part Site included in Jandakot Botanic Park Proposal (MfP 1995)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of Site for conservation purposes within Jandakot Regional Park is endorsed. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

### DUCKPOND BUSHLAND, PEEL ESTATE

**Boundary Definition:** bushland (part taken to cadastre) boundary (Boundary adjusted after vegetation survey and negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 70

**Area (ha):** bushland 8.8

**Map no.** 71

**Map sheet series ref. no.** 2033-II NE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Oldbury)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Guildford Complex

###### Bassendean Dunes

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

##### WETLANDS

No wetlands mapped

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated upland

**Vegetation and Flora:** limited survey (Clarke and Keighery 2000d, DEP 1998 roadside survey, Mattiske Consulting Pty Ltd 1997)

**Structural Units:** mapping (Clarke and Keighery 2000d)

Uplands: *Allocasuarina fraseriana* and *Eucalyptus marginata* Woodland; *Banksia menziesii*, *B. attenuata* and *B. ilicifolia* Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >80% Excellent to Very Good, with areas of severe localised disturbance (Clarke and Keighery 2000d)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north and east; part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** mapped within area of the eastern side of the Swan Coastal Plain

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Rural Complementary Mechanism (Conservation Zone) (see Table 3, Volume 1).

**BANKSIA ROAD NATURE RESERVE, PEEL ESTATE**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 353

**Area (ha):** bushland 32.3

**Map no.** 71

**Map sheet series ref. no.** 2033-II NE

**Other Names:** Reserve C28167, Part Submission Area 13, part of Jandakot Regional Park

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Oldbury), Town of Kwinana (Casuarina)

**Includes CALM Managed Land:** Reserve 28167 (Conservation of Flora and Fauna)

**System 6 (1983):** M100 All System area bushland, total area described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qrw: Sp1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

13 Deeper wetlands on heavy soils

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

22 *Banksia ilicifolia* woodlands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** dampland

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (1.9ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Crook 1980, Gibson *et al.* 1994 (Bank 01–04), Trudgen 1990); detailed survey (Keighery, GJ, 1996)

**Structural Units:** mapping (Crook 1980)

Uplands: *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland with scattered emergent *Eucalyptus marginata*; *Banksia attenuata*, *B. menziesii* and *B. ilicifolia* Low Woodland, with scattered *Eucalyptus marginata*, *Melaleuca preissiana* and *Nuytsia floribunda*

Wetlands: *Hypocalymma angustifolium* and *Astartea aff. fascicularis* Open Heath with scattered low *Melaleuca preissiana*

**Vegetation Condition:** >90% Excellent, <10% Very Good (Gibson *et al.* 1994, Trudgen 1990)

**Total Flora:** 150 (Keighery, GJ, 1996) (estimated >75% expected flora)

**Significant Flora:** *Boronia crenulata*, *Gyrostemon subnudus* (southernmost population on Swan Coastal Plain, Keighery, GJ, 1996)

**Fauna:** limited survey for birds (25 species) and mammals (1) (Crook 1980). Significant bird species: category 3 (3) and category 4 (2)

**Linkage:** adjacent bushland to the north, east and west

**Other Special Attributes:** included in Jandakot Botanic Park Proposal (MfP 1995)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site (Reserve 28167) for conservation purposes within Jandakot Regional Park is endorsed (see Table 3, Volume 1).

**LOWLANDS BUSHLAND — EASTERN BLOCK, PEEL ESTATE**

**Boundary Definition:** bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 368

**Area (ha):** bushland 1034.1 (Site also includes open water.)

**Map no.** 72, 76, 77

**Map sheet series ref. no.** 2033-II NE

**Other Names:** Lowlands — eastern block; Lowlands

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Mardella)

**System 6 (1983):** Part M105 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Cs, C2) (Qha: Msc1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Spc)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Guildford Complex

Dardanup Complex (most northern occurrence)

**Bassendean Dunes**

Bassendean Complex — Central and South

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

5 Mixed shrub damplands

11 Wet forests and woodlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

21c Low-lying *Banksia attenuata* woodlands or shrublands

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, palusplain, creek

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Swan Coastal Plain Rivers**

Goegrup (R.4)

**Wetland Management Objectives:** Conservation (16.8ha, 1393m), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 4.9 ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, creek, river, vegetated uplands





**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Rowe 01–02, Low 01, 04, 6a–10b, 12a–14a)); detailed survey (Keighery, BJ, *et al.* 1995)

**Structural Units:** mapping (Keighery, BJ, *et al.* 1995)

Uplands: *Banksia attenuata* and *B. menziesii* Woodlands to Forest with scattered emergent *Eucalyptus marginata* and *E. calophylla* and with *Xylomelum occidentale*, *Allocasuarina fraseriana*, *Banksia grandis* and *B. ilicifolia* being sometimes co-dominants in the *Banksia* layer; *Eucalyptus gomphocephala* Open Forest; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Woodlands to Forests; *Jacksonia sternbergiana* Low Woodland; *Banksia attenuata* and *B. menziesii* Woodland over *Kunzea glabrescens* Closed Tall Scrub

Wetlands: *Melaleuca preissiana*, *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Woodland to Forest; *Melaleuca raphiophylla* Low Woodland to Tall Shrubland; *Eucalyptus rudis* Forest to Woodland; Woodlands over Sedgeland, where the dominants may be *Melaleuca preissiana*, *Eucalyptus calophylla* and *E. rudis*

**Scattered Native Plants:** Areas of *Banksia attenuata* and *B. menziesii*, *Eucalyptus marginata*, *E. rudis* and *E. calophylla* Forest to Woodland occur within areas that have been cleared for pasture — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >80% Excellent to Very Good, <20% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 335 native taxa (Keighery, BJ, *et al.* 1995) (estimated >90% expected flora of Sites 372 and 368)

**Significant Flora:** *Caladenia huegelii* (R), *Drakaea elastica* (R); Keighery, BJ, *et al.* 1995 — *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Stylidium longitubum* (3), *Dillwynia dillwynioides* (3), *Stylidium mimeticum* (3), *Conostephium minus* (4) (southernmost population); *Drosera gigantea* subsp. *geniculata*, *Stylidium utricularioides*, *Stylidium roseo-alatum*, *Boronia crenulata*, *Johnsonia pubescens* subsp. *cygnorum* (most southern location), *Evandra pauciflora*, *Eucalyptus gomphocephala* (unusual record, normally confined to coastal Quindalup and Spearwood Dunes), *Dryandra sessilis* var. *sessilis*

**Fauna:** multiple survey for birds (88 species) (RAOU 1996 D). Good assemblage of insectivorous birds.

Significant bird species: Carnaby's Cockatoo, Golden Whistler, Yellow Robin and Yellow-plumed Honeyeater. Site for Great Egret which is protected under the JAMBA/CAMBA treaties. Significant mammal species: Quenda, Western Brush Wallaby, Brush-tailed Wambenger and Water Rat

**Linkage:** adjacent bushland to the south and east (Site 371, canopy); part of Greenways 65, 129 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes** Farm buildings within the property are entered in the Register of the National Estate; rare example of intact riverine communities (Keighery, BJ, *et al.* 1995); large area of mature *Banksia* Woodland habitat that has not been subject to periodic logging or burning; mature examples of *Eucalyptus marginata*, *Eucalyptus rudis* and *Banksia* species in woodlands; largest privately owned bushland area in the PMR managed for conservation; contains 4820m of regionally significant river (WRC 1996a GIS)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Rural Complementary Mechanism (Conservation Zone) (see Table 3, Volume 1).

## LOWLANDS BUSHLAND — WESTERN BLOCK (HYMUS SWAMP), PEEL ESTATE

**Boundary Definition:** bushland (part taken to cadastre) boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 372

**Area (ha):** bushland 133.6

**Map no.** 76

**Map sheet series ref. no.** 2033–II NW

**Other Names:** White Gum Block; Lowlands — western block; Lowlands, Hymus Swamp

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Hopeland)

**System 6 (1983):** Part M105 Part System area bushland, only bushland described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)





**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Dardanup Complex

**Bassendean Dunes**

Bassendean Complex — Central and South

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

11 Wet forests and woodlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21c Low-lying *Banksia attenuata* woodlands or shrublands

**WETLANDS**

**Wetland Types:** dampland, palusplain, artificial channel

**Natural Wetland Groups**

**Swan Coastal Plain Rivers**

Goegrup (R.4)

**Wetland Management Objectives:** Conservation (114.6ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited (Dames and Moore 1988b, Gibson *et al.* 1994 (Hymus 01–06)); detailed survey (Keighery, BJ, *et al.* 1995)

**Structural Units:** mapping (Keighery, BJ, *et al.* 1995)

Uplands: *Banksia attenuata* and *B. menziesii* Woodland over *Kunzea glabrescens* Closed Tall Scrub; *Banksia attenuata* and *B. menziesii* Woodlands to Forest with scattered emergent *Eucalyptus calophylla*; *Banksia attenuata*, *B. ilicifolia*, *Nuytsia floribunda* Low Open Forest

Wetlands: *Melaleuca preissiana*, *M. raphiophylla* Low Woodland; *Melaleuca raphiophylla* Low Woodland to Forest; mixed Herbland; *Dielsia stenostachya* Sedgeland

**Scattered Native Plants:** areas of *Eucalyptus gomphocephala*, *E. rudis* and *E. calophylla* Forest to Woodland occur within areas that have been cleared for pasture — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >60% Very Good to Excellent, <40% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 335 native taxa (Keighery, BJ, *et al.* 1995) (estimated >90% expected flora of Sites 372 and 368)

**Significant Flora:** Keighery, BJ, *et al.* 1995 — *Stylidium longitubum* (3), *Dillwynia dillwynioides* (3), *Stylidium mimeticum* (3); *Drosera gigantea* subsp. *geniculata* ms, *Stylidium utricularioides*, *Eucalyptus gomphocephala* (unusual record, normally confined to coastal Quindalup and Spearwood Dunes)

**Fauna:** not known

**Linkage:** adjacent bushland to the west; part of Greenway 65 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** mature examples of *Eucalyptus gomphocephala*, *E. rudis*, *Banksia ilicifolia* and *Melaleuca preissiana* in woodlands

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Rural Complementary Mechanism (Conservation Zone) (see Table 3, Volume 1).

**BALDIVIS ROAD BUSHLAND, BALDIVIS**

**Boundary Definition:** protected area/bushland (part taken to cadastre/zoning) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)





### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 376 **Area (ha):** bushland 133.0 (Site also includes open water.)  
**Map no.** 75 **Map sheet series ref. no.** 2033-II SW, 2033-II NW  
**Other Names:** Karnup Nature Reserve included in Site, Part Submission Area 245  
**Local Authorities (Suburb):** City of Rockingham (Baldivis)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: C2, Mc2)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Pinjarra Plain

Serpentine River Complex

###### Spearwood Dunes

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred (partial coverage)

##### Supergroup 2: Seasonal Wetlands

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

\*21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

**Wetland Types:** palusplain

##### Natural Wetland Groups

###### Pinjarra Plain

Keysbrook (P.1)

###### Bassendean Dunes

Gnangara (B.2)

###### Spearwood Dunes

Stakehill (S.4)

###### Swan Coastal Plain Rivers

Goegrup (R.4)

**Wetland Management Objectives:** Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands, vegetated wetlands

**Vegetation and Flora:** limited survey (DEP 1998 part roadside observations, DEP 1999)

##### Structural Units

Uplands: *Eucalyptus marginata*, *Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus gomphocephala* Open Woodland over *Banksia attenuata*, *B. menziesii* and *B. grandis* Low Woodland; Scattered *Eucalyptus marginata* over Mixed Open Forest of *E. calophylla*, *Allocasuarina fraseriana*, *Banksia attenuata*, *B. menziesii*, *B. grandis*; *Eucalyptus calophylla* Low Open Forest over *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana*; scattered *Eucalyptus calophylla* and *E. marginata* over *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest; *Eucalyptus gomphocephala* Open Woodland  
 Wetlands: isolated patches of Low Closed Forest dominated by either *Eucalyptus rudis* or *Melaleuca raphiophylla*

Note: Bassendean and Spearwood Dune vegetation units are not distinguished but the vegetation is predominantly Spearwood Dunes units associated with Sands derived from Tamala Limestone.

**Vegetation Condition:** >20% Excellent, >40% Very Good, >25% Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** not recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the west (canopy, across road); part of Greenway 67, 84 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)



**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Rural Complementary Mechanism. Part C: Other Government Land Mechanism (see Table 3, Volume 1).

**HENDERSON ROAD BUSHLAND, PEEL ESTATE**

**Boundary Definition:** bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site (i.) are not accurately mapped; (ii.) have been recently cleared. The boundary has been drawn to include cleared bushland; Boundary adjusted after vegetation survey and negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 378 **Area (ha):** bushland 116.5 (Site also includes open water.)

**Map no.** 76, 81 **Map sheet series ref. no.** 2033-II SW

**Other Names:** Submission Area 220

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Hopeland)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Bassendean Dunes/Pinjarra Plain)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

4 *Melaleuca preissiana* damplands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

23a Central *Banksia attenuata* — *B. menziesii* woodlands

**WETLANDS**

**Wetland Types:** sumpland, dampland, palusplain, artificial channel

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (41.5ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 3.9ha + 1.3ha = 5.2ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Kailis 01–03), DEP 1999; part Site — Hart Simpson & Associates 1990, Masters and Associates 1992)

**Structural Units**

Uplands: *Banksia attenuata* and *B. menziesii* Low Open Forest to Low Woodland at times with scattered *Eucalyptus marginata*, *Banksia ilicifolia* and/or *Allocasuarina fraseriana*; *Banksia attenuata*, *B. menziesii* and *B. ilicifolia* Low Woodland

Wetlands: *Melaleuca preissiana* Low Open Woodland; *Kunzea glabrescens* Closed Tall Scrub; *Regalia ciliata* Closed Heath

**Scattered Native Plants:** not assessed





**Vegetation Condition:** >50% Excellent to Very Good, <50% Good to Completely Degraded, with areas of severe localised disturbance

**Total Flora:** 89 native taxa (plot-generated list only)

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north, south (across road) and east

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Rural Complementary Mechanism. Part : Proposed Parks and Recreation Reservation. Part C: Other Government Land Mechanism (subject to vegetation assessment and Master Plan; see Table 3, Volume 1).

## YANGEDI SWAMP, KEYSBROOK

**Boundary Definition:** management/bushland (part to cadastre)/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 77

**Area (ha):** bushland 364.954 (Site also includes open water.)

**Map no.** 81, 82

**Map sheet series ref. no.** 2033-II SW, 2033 II SE

**Other Names:** Submission Area 219

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Keysbrook)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qhw: Cps) (Qrw: Sp1, Sp2)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

###### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

15 Forests and woodlands of deep seasonal wetlands

S1 *Astartea* aff. *fascicularis*/Melaleuca species dense shrublands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### WETLANDS

**Wetland Types:** sumpland, dampland, palusplain, artificial channel

###### Natural Wetland Groups

###### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (63.3ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 5.7ha + 5.5ha = 11.2ha (total)

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined, Vulnerable (floristic community type 15)

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Yang 01-03), part Site — Hart Simpson & Associates 1990, Masters and Associates 1992)

###### Structural Units



Uplands: *Banksia attenuata*, *B. menziesii* and *B. ilicifolia* Low Open Forest

Wetlands: *Melaleuca preissiana* Low Open Forest; *Melaleuca uncinata*, *M. viminea* and *M. lateritia* Tall Open Scrub; *Melaleuca raphiophylla* Low Woodland to Tall Shrubland; *Regelia ciliata* Open Heath; mixed Herbland; *Lepidosperma longitudinale* Sedgeland

**Scattered Native Plants:** within bushland mapped, <20% includes *Eucalyptus rudis* Woodland

**Vegetation Condition:** >50% Very Good to Excellent, <30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 110 native taxa (plot-generated list only)

**Significant Flora:** *Stylidium longitubum* (3); *Myriocephalus helichrysoides*, *Stylidium utricularioides*, *Macarthuria apetala* (most southern location)

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 129 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** contains plant communities representative of the eastern side of the Swan Coastal Plain

#### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

#### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).









# Part B

## 2.4 SPEARWOOD DUNES

### 2.4.1 INTRODUCTION

#### Location, Landscape and Soils

The Spearwood Dunes are of aeolian origin, and intermediate in age between the older Bassendean Dunes to the east and the younger Quindalup Dunes to the west. This dune system is characterised by a series of limestone-capped 'peaks' such as Reabold Hill, Shire View Hill and Mount Brown, forming the most prominent hills on the Swan Coastal Plain in the Perth Metropolitan Region. The Tamala Limestones, which outcrop on these hills and in other lower rises and hills, are generally overlaid by yellow to brown sands. Low dunes and swales of shallow pale grey sands over yellow sands are also characteristic of the Spearwood Dunes (Tables 1.4a&b). The wetlands of the Spearwood Dunes (Table 2.4) are associated with peats and carbonate sands and occasionally clays overlaying sands.

#### Remnant Bushland on the Spearwood Dunes

While relatively large areas of the Spearwood Dunes remain as bushland, historically, clearing on this dune system has been more widespread than on the Bassendean Dunes. The soils of the Spearwood Dunes are more fertile than those of the Bassendean Dunes and have a greater ability to hold nutrients. As a consequence the Spearwood Dunes have been cleared for pine plantations and the areas in and around the wetlands have been a focus for horticulture (principally market gardens). The uncleared dunes have been subject to substantial grazing pressure throughout their range. The inhospitable terrain of the areas with outcropping limestone has protected them from grazing. However they are a focus for mining, some hills having been totally removed.

Recent mapping for the Perth Metropolitan Region (Table 3.4) indicates that between 18 per cent and 79 per cent of the vegetation complexes associated with the Spearwood Dunes remain as native vegetation.

#### Plant Communities and their Conservation on the Spearwood Dunes

At the regional level five vegetation complexes (Table 3.4) are confined to the Spearwood Dunes and two others are, at times, associated with the Spearwood Dunes in the Perth Metropolitan Region. Fifteen floristic community types (Table 4.4) are the principal regional floristic groups identified on the Spearwood Dunes and three of these are considered to be confined to the Perth Metropolitan Region.

Two floristic community types, 20a and 26a (Table 5.4), have been determined threatened ecological communities. A faunal wetland ecological community has also been distinguished as threatened (Table 5.4). This wetland community is associated with the caves around Yanchep.

A Bush Forever Site in the Spearwood Dunes was recognised by the EPA as containing 'Threatened or Poorly Reserved Plant Communities' in need of interim protection under the System 6 Part System 1 Update (EPA 1994 GIS). This Site (Bush Forever Site 293) contains an area of floristic community type 26a and was identified by Gibson *et al.* (1994). This floristic community type (26a) has since been determined a threatened ecological community (Table 5.4).

A large variety of vegetation associations has been identified on the Spearwood Dunes. As areas with exposed limestone (Tamala Limestones after Table 1.4a) support a distinctive suite of vegetation associations, the Spearwood Dunes vegetation associations are considered under two headings. The Site descriptions follow this format.

#### Sands derived from Tamala Limestones Uplands

The main upland associations are forests to open woodlands associated with a diverse understorey (Table 4.4) and shrublands. These broad units and associated dominant species are:

##### Open Forests and Woodlands

Eucalypts — *Eucalyptus marginata*, *E. gomphocephala*, *E. decipiens*  
Sheoaks — *Allocasuarina fraseriana*





Banksias — *Banksia attenuata*, *B. menziesii*, *B. prionotes*, *B. grandis*

#### Shrublands

*Daviesia triflora*, *D. nudiflora*, *D. decurrens*, *Leucopogon propinquus*, *Hardenbergia comptoniana*, *Phyllanthus calycinus*, *Conostephium pendulum*, *Gompholobium tomentosum*, *Melaleuca acerosa*, *Hibbertia hypericoides*, *H. racemosa*, *Xanthorrhoea preissii*, *Macrozamia riedlei*

#### Herblands

*Burchardia congesta*, *Lomandra maritima*, *Sowerbaea laxiflora*, *Conostylis aculeata*, *C. setigera*, *Daucus glochidiatus*, *Dianella revoluta*

#### Sedgeland

*Schoenus grandiflorus*, *Mesomelaena pseudostygia*, *Desmocladus flexuosus*, *Lepidosperma angustatum*

#### Grasslands

*Austrostipa flavescens*, *Austrodanthonia occidentalis*

### Wetlands

The main wetland associations are forests to woodlands (Table 4.4) and sedgelands. These broad units and associated dominant species are:

#### Open Forests and Woodlands

Eucalypts — *Eucalyptus calophylla* (wetland margins), *E. rudis*, *E. gomphocephala*  
Banksias — *Banksia littoralis*

#### Sedgeland

*Baumea articulata*, *B. juncea*, *Lepidosperma longitudinale*, *Gahnia trifida*, *Juncus pallidus*

### Tamala Limestones

#### Uplands

The main upland associations are mallees, scrubs, shrublands and heaths dominated by a variety of shrubs interleaved with herbs and sedges. These broad units and associated dominant species are:

#### Mallees

*Eucalyptus argutifolia*, *E. foecunda*, *E. petrensis*

#### Shrublands

*Leucopogon parviflorus*, *Dryandra sessilis* var. *cygnorum*, *D. lindleyana* subsp. *lindleyana*, *Trymalium ledifolium* subsp. *ledifolium*, *Grevillea preissii*, *Hakea trifurcata*, *Templetonia retusa*,

*Gompholobium tomentosum*, *Melaleuca acerosa*, *M. huegelii*, *Hibbertia spicata* subsp. *leptothea*, *Acacia truncata*, *A. lasiocarpa* var. *lasiocarpa*

#### Herblands

*Opercularia vaginata*

#### Sedgeland

*Desmocladus flexuosus*, *Lepidosperma angustatum*

#### Grasslands

*Austrostipa flavescens*, *Austrodanthonia occidentalis*

Wetlands are not typically associated with outcropping limestone. However, a wetland community has been identified on the Tamala Limestone coastal cliffs (Bush Forever Site 346, floristic community type 16).

Forty-five significant taxa are associated with the Spearwood Dunes in the Perth Metropolitan Region (Table 6.4). These include two species of Declared Rare Flora and 15 of Priority Flora. A number of taxa are confined to the Spearwood Dunes, one of these, *Jacksonia sericea*, being endemic to the Perth Metropolitan Region.

Thirteen significant taxa are associated with shallow soils over outcropping Tamala Limestone (Table 6.4, after Keighery, GJ, 1990a and Griffin 1993). Other taxa not listed in Table 6.4 also show the same ecological preferences, for example: *Caladenia longicauda* subsp. *calcigena* ms, *Conostylis pauciflora* subsp. *euryrhipis*, *Rhagodia baccata* subsp. *dioica*, *Grevillea crithmifolia*, *G. preissii*, *Nemcia reticulatum*, *Beyeria cygnorum*, *Trymalium ledifolium* var. *ledifolium*, *Diplopeltis huegelii* var. *huegelii*, *Baeckea robusta*, *Hemiandra pungens*, *Hemigenia barbata*, *Stylidium bulbiferum* and *S. junceum*. Interestingly some of these taxa have closely related taxa or forms of the same taxa on the eastern side of the Plain and the Darling Scarp (see Section 2.2).



# Part B

**Table 1.4a:** Geological and geomorphological systems of the Spearwood Dunes.

The general terms used in Bush Forever for describing the major landform elements are in **bold italics**.

Major Geological Systems (after Playford et al. 1976)	Major Geomorphological Systems (after McArthur and Bettenay 1960)	Detailed Geomorphological Units (after Churchward and McArthur 1980)
<b>Tamala Limestone</b> and <b>Sands derived from Tamala Limestone</b>	<b>Spearwood Dunes</b>	Cottesloe Karrakatta
Wetlands (within the Guildford Formation, Bassendean Sand, Tamala Limestone)	Not applicable	Herdsmen
Lagoonal and estuarine deposits (within the Guildford Formation, Bassendean Sand, Tamala Limestone)	Not applicable	Yoongarillup

# Combined here under Spearwood Dunes for major landform elements, see Part A, Tables 1 and 2; Vasse combined under Pinjarra Plain for major landform elements, see Section 2.2 FOOTHILLS AND PINJARRA PLAIN

**Table 1.4b:** Landform and soils of the Spearwood Dunes showing the relationship between geomorphological systems, units identified in the Environmental Geology Maps and soils described on these maps on the Swan Coastal Plain in the Perth Metropolitan Region.

Column One may be used to cross-reference to groups shown in Table 1a.

Major Geomorphological Systems (after McArthur and Bettenay 1960); *Detailed Geomorphological Units (after Churchward and McArthur 1980)	Major Units in the Environmental Geology Maps (after various authors)	Soils associated with each unit
Spearwood Dunes: *Cottesloe, Karrakatta, #Yoongarillup	Sands derived from Tamala Limestone Tamala Limestone	pale grey to pale yellow sands; limestone and associated light yellowish brown sands; silts, sands and calcareous deposits in various associations
Wetlands – within the Pinjarra Plain, Bassendean Dunes, Spearwood Dunes, Quindalup Dunes: *Herdsmen	Holocene swamp deposits	peats associated with clays, sands and silts in various proportions

# Combined here under Spearwood Dunes for major landform elements, see Part A, Tables 1 and 2





**Table 2.4: Natural Wetland Groups (Consanguineous Suites) on the Spearwood Dunes**  
(after Semeniuk 1996)

Name & locations	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Spearwood Dunes</b>				
<b>Yanchep suite (S1)</b> Between Yanchep to the north & Kingsley to the south in a linear belt about 5km inland from the coast	Spearwood Dunes Unit – area of parallel, coastal dune ridges, up to 40-60m above MSL, & associated segmented depressions	Lakes & sumplands	Thin layer of peat overlying grey to yellow sand	Wetlands occur in depressions between limestone ridges fed by discharge from limestone & groundwater table rise; basins are young karst features
<b>Balcatta suite (S2)</b> In a 5 x 10km area north of the Swan River estuary about 3km inland from the coast	Spearwood Dunes Unit/area of hills & depressions within the limestone dune ridges	Sumplands [& lakes subsequent to clearing of vegetation eg. Carine Swamp]	Variable: peat overlying yellow sand, to peat & clay overlying thick yellow sand	Wetlands occur in depressions between hills; possibly old (mature) karst features
<b>Coogee suite (S3)</b> In a linear belt 1-2km inland from the coast, east of Woodman Point	Spearwood Dunes Unit – inter dune ridge depression overlying limestone	Lakes & sumplands	Carbonate mud overlying limestone	Carbonate mud filled depressions now acting to pond meteoric water
<b>Stakehill suite (S4)</b> Linear belt extending from Wattleup to Mandurah	Spearwood Dunes Unit – ranging from ridges of limestone outcropping to ridges of yellow sand overlying limestone	Lakes & sumplands	Carbonate mud & peat overlying yellow sand	Carbonate mud & peat filled depressions; probably originally karst depressions superimposed on palaeotopographic features
<b>Spearwood – Bassendean Dunes Interface</b>				
<b>Bibra suite (SB1)</b> 1. Linear belt extending south from Bidaminna to Caladenia Cave 2. Linear belt extending from Murdoch to Wellard, in a N/S orientation approximately 5-7km east of the coast	Spearwood Dunes & Bassendean Dunes contact depression. Continuous high dune ridges to the west & a series of discontinuous hollows & hills with lower relief to the east	Lakes & sumplands in a north-south oriented chain	Mud, peat, or peaty sand overlying Bassendean Sand	Contact depressions with groundwater impounded against Spearwood Dune ridge



# Part B

**Table 3.4:** Vegetation complexes (Hedde et al. 1980) and percentage remaining as native vegetation (AGWEST 1998 GIS) on the Spearwood Dunes in the Perth Metropolitan Region

Vegetation Complex	Native Vegetation (%)
<b>Spearwood Dunes</b>	
KARRAKATTA COMPLEX – NORTH: Predominantly low open forest and low woodland of <i>Banksia</i> species <i>Eucalyptus todtiana</i> , less consistently open forest of <i>E. gomphocephala</i> – <i>E. todtiana</i> – <i>Banksia</i> species	20
KARRAKATTA COMPLEX – NORTH – TRANSITION VEGETATION COMPLEX: A transition complex of low open forest and low woodland of <i>Banksia</i> species – <i>Eucalyptus todtiana</i> on the transition zone of a series of high sand dunes between Bassendean-North and Karrakatta-North.	79
KARRAKATTA COMPLEX – CENTRAL AND SOUTH: Predominantly open forest of <i>Eucalyptus gomphocephala</i> – <i>E. marginata</i> – <i>E. calophylla</i> and woodland of <i>E. marginata</i> – <i>Banksia</i> species	18
COTTESLOE COMPLEX – NORTH: Predominantly low open forest and low woodland of <i>Banksia attenuata</i> – <i>B. menziesii</i> – <i>Eucalyptus todtiana</i> ; closed heath on the limestone outcrops.	70
COTTESLOE COMPLEX – CENTRAL AND SOUTH: Mosaic of woodland of <i>Eucalyptus gomphocephala</i> and open forest of <i>E. gomphocephala</i> – <i>E. marginata</i> – <i>E. calophylla</i> ; closed heath on the limestone outcrops.	36
<b>Wetlands</b>	
HERDSMAN COMPLEX: Sedgeland and fringing woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca</i> species	31
<b>Marine (lagoonal and estuarine) Deposits</b>	
YOONGARILLUP COMPLEX: Woodland to tall woodland of <i>Eucalyptus gomphocephala</i> with <i>Agonis flexuosa</i> in the second storey. Less consistently an open forest of <i>E. gomphocephala</i> – <i>E. marginata</i> – <i>E. calophylla</i> .	72

**Table 4.4:** Floristic community types identified on the Spearwood Dunes (after Gibson et al. 1994 and DEP 1996)

## Key

### Column 1: Floristic Community Type Codes

The numbers of the types additional to Gibson et al. (1994) are italicised if they are subsets of an existing group (in types 19, 20, 23 and 30) and italicised and preceded by 'S' if they are supplementary groups.

### Column 2: General Description of Floristic Community Types

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgelands and herblands after Gibson et al. (1994).

### Column 3: Average Species Richness per Floristic Community Type

Average species richness per 10x10m plot less those species only occurring in a single plot. Some community types may have a high proportion of single records. Thus these estimates of average species richness are underestimates in some cases.

<b>Supergroup 2 – Seasonal Wetlands</b>		
11	Wet forests and woodlands	28.0
13	Deeper wetlands on heavy soils	16.9
14	Deeper wetlands on sandy soils	16.5
16	Highly saline seasonal wetlands	11.2
17	<i>Melaleuca raphiophylla</i> – <i>Gahnia trifida</i> seasonal wetlands	13.4
57	Northern woodlands to forests over tall sedgelands alongside permanent wetlands	17.7





Table 4.4 (continued)

<b>Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau</b>		
20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	64.5
21a	Central <i>Banksia attenuata</i> – <i>Eucalyptus marginata</i> woodlands	52.0
S9	<i>Banksia attenuata</i> woodlands over dense low shrublands	38.9
<b>Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes</b>		
24	Northern Spearwood shrublands and woodlands	38.9
25	Southern <i>Eucalyptus gomphocephala</i> – <i>Agonis flexuosa</i> woodlands	48.1
26a	<i>Melaleuca huegelii</i> – <i>M. acerosa</i> shrublands of limestone ridges	49.6
26b	Woodlands and mallees on limestone	49.8
27	Species-poor mallees and shrublands on limestone	37.3
28	Spearwood <i>Banksia attenuata</i> or <i>B. attenuata</i> – <i>Eucalyptus</i> species woodlands	55.1

**Table 5.4: Threatened Ecological Communities on the Spearwood Dunes in the Perth Metropolitan Region** (after English and Blyth 1997 and Blyth pers. comm. 2000)

**Key**

- CR Critically Endangered
- EN Endangered
- VU Vulnerable
- + Listed as 'endangered' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (see Part A, Section 3.6.6)

**A. Floristic Community Types** (as identified in Gibson *et al.* 1994)

<b>Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau</b>		
20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	EN
<b>Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes</b>		
<b>Spearwood Dunes</b>		
26a	<i>Melaleuca huegelii</i> – <i>Melaleuca acerosa</i> shrublands on limestone ridges	EN
<b>B: Restricted floristic community type mosaics (not applicable)</b>		
<b>C: Freshwater communities</b>		
Aquatic root mat community of caves of the Swan Coastal Plain (Jasinska 1997, Jasinska and Knott 1995)		CR+



# Part B

**Table 6.4:** Significant flora of the Spearwood Dunes in the Perth Metropolitan Region

## Key

### Column 1: Taxon

Names follow Gibson *et al.* (1994) and Atkins (1999) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. An 'ms' after the name indicates that this is a manuscript name which is yet to be published.

### Column 2: Major landform element in which the taxon is most likely to be found in the Perth Metropolitan Region

DS	=	Darling Scarp
D	=	Dandaragan Plateau
F	=	Foothills
P	=	Pinjarra Plain
B	=	Bassendean Dunes
S	=	Spearwood Dunes
Q	=	Quindalup Dunes
R	=	Estuaries, Rivers and Creeks
(ML)	=	Muchea Limestones
(TL)	=	Tamala Limestones

### Column 3: Taxa dependent on seasonal ponding, waterlogging or inundation

W	=	depends on waterlogging or inundation
W (aquatic)	=	depends on standing water

### Column 4: Conservation status (Atkins 1999)

R	=	Declared Rare Flora
1	=	Priority 1: Poorly Known Taxa
2	=	Priority 2: Poorly Known Taxa
3	=	Priority 3: Poorly Known Taxa
4	=	Priority 4: Rare Taxa

### Column 5: Geographical variation

r	=	populations at the northern or southern limit of their known geographic range
d	=	populations disjunct from their known geographic range
p	=	considered to be poorly reserved (applies to all Declared Rare Flora and Priority taxa)
s	=	significant populations (applies to all Declared Rare Flora and Priority taxa)
X	=	considered lost in the Perth Metropolitan Region

### Regional ecological preferences

e	=	taxa endemic to the Swan Coastal Plain
E	=	taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region

### Column 6: Species listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (see Part A, Section 3.7.5)

EN	=	Species that are endangered
VU	=	Species that are vulnerable
TD	=	Species that are extinct

Taxon	Major landform element	Wetland taxa	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Acacia alata</i> var. <i>tetrantha</i>	S (TL)			s	
<i>Acacia benthamii</i>	P/S		2	p, s, E	
<i>Acacia littorea</i>	S/Q			s, d	
<i>Alyogyne huegelii</i> var. <i>glabrata</i>	S/Q			s	
<i>Astroloma macrocalyx</i>	D/F/S			s, p	
<i>Astroloma microcalyx</i>	S/Q			s	
<i>Boronia purdieana</i>	B/S			r, s	
<i>Beyeria cygnorum</i>	S (TL)		2	p, s	
<i>Carpobrotus modestus</i>	S/Q			s	
<i>Chorizema varium</i>	S (TL)		R	X	EN
<i>Conospermum triplinervium</i>	P/B/S			s, p	
<i>Conostylis aculeata</i> subsp. <i>cygnorum</i> ,	B/S			e	
<i>Craspedia arenicola</i> ms (GJ Keighery 14449)	S			s	





Table 6.4 (continued)

<i>Crassula colorata</i> subsp. <i>miriamiae</i>	S		2	X	
<i>Cyathochaeta equitans</i> (= <i>clandestina</i> )	P/B/S			r, s	
<i>Diplolaena angustifolium</i>	S/Q			p	
<i>Diuris micrantha</i> ms	S	W	R	p, s	EN
<i>Dodonaea hackettiana</i>	S/R		4	p, s, e	
<i>Eucalyptus argutifolia</i>	S (TL)		R	p, s, e	VU
<i>Eucalyptus foecunda</i>	S (TL)			p, e	
<i>Eucalyptus mundijongensis</i> (hybrid)	F/S		1	p, s	
<i>Eucalyptus petrensis</i>	S			p, s, e	
<i>Glischrocaryon aureum</i>	F/B/S			p	
<i>Grevillea evanescens</i>	P/S	W	1	p, s, e	
<i>Haloragis aculeolata</i>	P (ML)/ S (TL)		2	p, s, d	
<i>Hibbertia cuneiformis</i>	S/Q			r, s	
<i>Hibbertia spicata</i> subsp. <i>leptotheca</i>	S (TL)		3	p, s, e	
<i>Jacksonia sericea</i>	S		3	p, s, E	
<i>Kennedia coccinea</i>	P/S/Q			s	
<i>Lasiopetalum membranaceum</i>	S/Q		2	p, s, e	
<i>Lechenaultia linarioides</i>	P (ML)/S/Q			p	
<i>Lepidium pseudohyssopifolium</i>	S		1	p, s, d	
<i>Lepidium pseudotasmanicum</i>	S		4	p, s	
<i>Melaleuca cardiophylla</i>	S (TL)			r, s	
<i>Melaleuca lanceolata</i>	S/Q			d, s	
<i>Melaleuca</i> sp. Yanchep (GJ Keighery 11242)	S (TL)		2	e	
<i>Petrophile serruriae</i> subsp. nov (GJ Keighery 11421)	S (TL)			p, s, r	
<i>Pimelea calcicola</i>	S (TL)			s	
<i>Pteris vittata</i>	F/S	W		d	
<i>Pterostylis</i> sp. cauline leaves (N Gibson & MN Lyons 1490)	S			d, s	
<i>Sarcocornia bicarinata</i> (= <i>Carpobrotus</i> sp. Hepburn)	S/Q		3	p, s	
<i>Schoenus latitans</i>	B/S			r, p	
<i>Stylidium maritimum</i>	S/Q		3	p, s	
<i>Trachymene coerulea</i>	P/S/Q			s	
<i>Veronica</i> aff. <i>calycina</i> (BJ Keighery and N Gibson 235)	S (TL)			s, p	
<i>Wilsonia humilis</i>	S (TL)			p	

**SPEARWOOD DUNES**

**2.4.2 DESCRIPTIONS**

**KEY**

- Column 1 Bush Forever Site Number**  
Sites listed from north to south within the PMR.
- Column 2 Bush Forever Site(s) Name**
- Column 3 Page Number**  
Refers to the page number of the Bush Forever Site description in Volume 2.
- Column 4 Bush Forever Map Number**  
Refers to the number of the Bush Forever Site map in Volume 1.
- Column 5 System 6**  
Refers to the System 6 Recommendation number where applicable.

Site No.	Site(s) Name	Page No.	Map No.	System 6
284	South-West Link from Wilbinga to Yanchep National Park	301	7	M1
396	East Link from Wilbinga to Yanchep National Park	302	7, 8	
127	State Forest 65 — Yanchep Plantation Bushland, Yanchep	303	8	
128				
288	Yanchep National Park and Adjacent Bushland	303	7, 8, 13	M3
381	Ridges and Adjacent Bushland, Yanchep/Nowergup	306	8, 9, 13, 14	M4
1	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	9, 14	
408				
409				
410				
411				
414				
415				
129	Bernard Road Bushland, Carabooda	308	13	
130	Link between Yanchep and Neerabup National Parks	309	13	
290	Hopkins Road Bushland, Nowergup	310	14, 20	
95	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	15, 20, 21	
134				
135				
136				
137				
139				
140				
417				
425				
428				
444				
446				
451				
455				
457				
383	Neerabup National Park, Lake Gnowergup Nature Reserve and Adjacent Bushland, Neerabup	312	19, 20, 27, 28	M6
384	Neerabup Lake and Adjacent Bushland, Neerabup	314	20	M6
293	Shire View Hill and Adjacent Bushland, Nowergup/Neerabup	315	20, 21	
494	West Flynn Drive Bushland, Carramar	317	21	
295	Flynn Drive Bushland, Neerabup	318	21	M8
443	Little Coogee Flat, Pinjar	319	21	





# Part B DESCRIPTIONS

Site No.	Site(s) Name	Page No.	Map No.	System 6
299	Yellagonga Regional Park, Wanneroo/Woodvale/Kingsley	320	27, 28, 34	M7
164	Conti Road Bushland, Wanneroo	321	28	
469	Caporn Street Bushland, Mariginiup	322	28	
470	Garden Park Bushland, Wanneroo	323	28	
471	High Road Bushland, Wanneroo	324	28	
147	Mariginiup Lake and Adjacent Bushland, Mariginiup	325	28	M8
407	Woodvale Nature Reserve, Woodvale	326	34	M7
303	Whitfords Avenue Bushland, Craigie/Padbury	327	33, 34	
39	Shepherds Bush Reserve, Kingsley	328	34	
327	Badgerup Lake and Adjacent Bushland, Wanneroo	329	28, 29, 34, 35	M8
463	Starlight Grove Bushland, Gnangara/Wangara	330	35	
328	Decourcey Way Bushland, Marangaroo	331	34	M12
199	Landsdale Road Bushland, Landsdale	332	35	
493	Errina Road Bushland, Alexander Heights	333	35	
202	Warwick Open Space Conservation Area	334	34	M11
201	Koondoola Regional Bushland	335	35	
204	Star Swamp Reserve and Adjacent Bushland, North Beach/Waterman	336	33, 39	M35
203	Carine Swamps, Carine	338	34, 40	M37
212	Lake Gwelup Reserve, Gwelup	339	40	M39
385	Reid Highway Bushland, Mirrabooka/Malaga	340	35, 41	
43	Cottonwood Crescent, Dianella	341	41	
281	Herdsmen Lake	342	40, 46	M43
312	Bold Park and Adjacent Bushland, City Beach	343	45, 46	M47
119	Underwood Avenue Bushland, Shenton Park	345	46	
218	Shenton Bushland, Shenton Park	346	46	
317	Kings Park	347	46, 47	M49
220	Lake Claremont, Claremont/Swanbourne	348	45, 46	M48
226	Harry Sandon Park, Attadale	350	52	M63
336	Wireless Hill Park, Ardross	350	52	M64
59	Sir Frederick Samson Park, Samson	351	52	M72
247	Manning Lake and Adjacent Bushland, Hamilton Hill/Spearwood	352	51, 57, 58	M92
429	Market Garden Swamps, Spearwood/Munster	353	58	M92
435				
261	Lake Coogee and Adjacent Bushland, Munster	354	58	M92
346	Brownman Swamp, Mt Brown Lake and Adjacent Bushland, Henderson/Naval Base	356	57, 58, 63, 64	M91 M92
267	Mandogalup Road Bushland, Hope Valley	357	64	
272	Sicklemore Road Bushland, Parmelia/Casuarina	358	64, 65, 71	
67	Parmelia Avenue Bushland, Parmelia	359	70	
349	Leda and Adjacent Bushland, Leda	360	64, 70, 71	M104
495	Baldivis Swamp and Adjacent Bushland	362	75	
275	Stakehill Swamp, Baldivis	363	75	
75	Churcher Swamp, Baldivis	364	75	
278	Cassia Drive Bushland, Karnup	365	75	
379	Anstey Swamp, Karnup	366	75, 80	
395	Paganoni Swamp and Adjacent Bushland, Karnup	367	79, 80	

## SOUTH-WEST LINK FROM WILBINGA TO YANCHEP NATIONAL PARK

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 284

**Area (ha):** bushland 550.6

**Map no.** 7

**Map sheet series ref. no.** 2034-IV NE, 2035-III SE, 2035-III SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Two Rocks)

**System 6 (1983):** Part M1 part System area bushland, only bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS2)

##### Quindalup Dunes (Holocene Dunes)

Safety Bay Sands (Qhs: LS4)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Cottesloe Complex — North

###### Quindalup Dunes

Quindalup Complex

##### Floristic Community Types

###### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

26b Woodlands and mallees on limestone

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

29b *Acacia* shrublands on taller dunes

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** tall dunes, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Tokyu 02-04); Tingay, Alan & Associates 1991c)

##### Structural Units

Uplands — Sands derived from Tamala Limestone: *Banksia attenuata*, *B. menziesii* and *Eucalyptus todtiana* Open Forest; *Eucalyptus gomphocephala* Woodland

Uplands — Tamala Limestone: *Melaleuca systema*, *Calothamnus quadrifidus* and *Gompholobium tomentosum* Open Low Heath

Uplands — Safety Bay Sands (oldest dunes): Mixed Open Low Heath

**Scattered Native Plants:** *Eucalyptus gomphocephala* Woodland to Open Forest

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good

**Total Flora:** not surveyed

**Significant Flora:** *Eucalyptus argutifolia* (R)

**Fauna:** structured survey of a larger area incorporating this site recorded birds (66 species), native mammals (6 species), reptiles (24 species) and amphibians (3 species) (Tingay, Alan & Associates 1991b). Significant bird species in the larger area: category 1 (1), category 3 (10) and category 4 (9). Significant mammal species in the larger area: Coastal Dunnart, Honey Possum and Western Brush Wallaby

**Linkage:** adjacent bushland to the north (Site 406), south, east and west (south and east through bushland to Sites 396 and 288); part of Greenways 2, 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996)





**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Indicative place (AHC 2000 D); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems

**Recommendation:** Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (proposed 'Gnangara Park' – Cabinet 1996; see Table 3, Volume 1).

**EAST LINK FROM WILBINGA TO YANCHEP NATIONAL PARK**

**Boundary Definition:** protected area with bushland/bushland boundary (PMR boundary to the north) (large remnant within pine plantation)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 396

**Area (ha):** bushland 480.5

**Map no.** 7, 8

**Map sheet series ref. no.** 2034–IV NE, 2035–III SE

**Other Names:** Part State Forest 65

**Local Authorities (Suburb):** Shire of Wanneroo (Two Rocks, Yanchep), Shire of Gingin (Wilbinga)

**Includes CALM Managed Land:** State Forest 65

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — North

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** not field-surveyed (aerial photography interpretation only)

**Structural Units:** only broad regional information is generally given for Site descriptions for remnants in pine plantation

**Vegetation Condition:** 90% Excellent, <10% Very Good, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north (Site 406), south (Site 288), east (Site 381), west; part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7); part of Greenway 36 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** majority recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996); included in Gnangara Park proposal (Bailey 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Maintaining ecological processes or natural systems

**Recommendation:** Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (proposed 'Gnangara Park' – Cabinet 1996; see Table 3, Volume 1).

## STATE FOREST 65 — YANCHEP PLANTATION BUSHLAND, YANCHEP

**Boundary Definition:** protected area with bushland boundary (remnants within pine plantation)

### *SECTION 1: LOCATION INFORMATION*

**Bush Forever Site no.** 127, 128

**Area (ha):** bushland total 8.1 (2 remnants, from 1.8 to 6.3 ha)

**Map no.** 8

**Map sheet series ref. no.** 2035–III SE, 2034–IV NE

**Other Names:** part of proposed Gnangara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Yanchep)

**Includes CALM Managed Land:** State Forest 65

### *SECTION 2: REGIONAL INFORMATION*

#### LANDFORMS AND SOILS

##### **Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

#### VEGETATION AND FLORA

##### **Vegetation Complexes**

###### **Spearwood Dunes**

Cottesloe Complex — North

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 4:** Uplands centred on Spearwood and Quindalup Dunes

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### *SECTION 3: SPECIFIC SITE DETAIL*

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995)

**Structural Units:** only broad regional information is generally given for Site descriptions for remnants in pine plantation

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** no adjacent bushland

**Other Special Attributes:** included in Gnangara Park proposal (Bailey 1997)

### *SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE*

Not listed

### *SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS*

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Sites with Some Existing Protection; the existing care, control and management of these Sites is endorsed (proposed 'Gnangara Park' – Cabinet 1996; see Table 3, Volume 1).

## YANCHEP NATIONAL PARK AND ADJACENT BUSHLAND

**Boundary Definition:** protected area/bushland boundary

### *SECTION 1: LOCATION INFORMATION*

**Bush Forever Site no.** 288

**Area (ha):** bushland 2706.7 (Site also includes open water.)

**Map no.** 7, 8, 13

**Map sheet series ref. no.** 2034–IV NE





**Other Names:** Loch McNess System

**Local Authorities (Suburb):** Shire of Wanneroo (Yanchep, Two Rocks, Carabooda, Eglinton)

**CALM Managed Land:** Reserve 9868 (National Park), 29246 (Forest Department Headquarters)

**System 6 (1983):** M3 area of bushland goes beyond System area boundaries, all bushland described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)

#### Quindalup Dunes (Holocene Dunes)

Safety Bay Sands (Qhs: LS4)

#### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Spearwood Dunes

Cottesloe Complex — North (one of two most northern occurrences)

Cottesloe Complex — Central and South

##### Quindalup Dunes

Quindalup Complex

##### Wetlands

Herdsmen Complex (most northern occurrence)

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*19b Woodlands over sedgeland in Holocene dune swales

(equivalent to 19 Gibson *et al.* 1994, English and Blyth 1997)

S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

#### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

23c North-eastern *Banksia attenuata* — *B. menziesii* woodlands

#### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

26a *Melaleuca huegelii* — *M. acerosa* shrublands on limestone ridges

26b Woodlands and mallees on limestone

\*27 Species - poor mallees and shrublands on limestone

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

30b Quindalup *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands (outlier, most occurrences Bunbury and south)

### WETLANDS

**Wetland Types:** lake, sumpland, river, artificial channel

#### Natural Wetland Groups

##### Spearwood Dunes

Yanchep (S.1)

**Wetland Management Objectives:** Conservation (272.8ha, 829.6m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 267.2ha

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined, Critically Endangered (floristic community type 19, as defined by Gibson *et al.* 1994;

Aquatic root mat community of caves of the Swan Coastal Plain), Endangered (floristic community type 26a)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, tall dune, open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — CALM 1989, Ecologia 1997, EPA and WAWA 1990,

Gibson *et al.* 1994 (Yan 01–03), Griffin 1994 (Yan 2, 4–6), Keighery, GJ, 1996 D (Pip 01), McComb and

McComb 1967, Smith 1989, Weston and Gibson 1997 (R1), WAWA 1995); detailed survey (Keighery, GJ, 1993b)

**Structural Units:** mapping (CALM 1989, Ecologia 1997, EPA and WAWA 1990, McComb and McComb 1967, Smith 1989)

##### Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Forest to Woodland;

*Eucalyptus marginata* Open Forest to Woodland — both generally over or mixed with *Banksia* Low Open Forest and Low Woodland and often with *Eucalyptus calophylla* or *Allocasuarina fraseriana*; *Banksia attenuata* and



*B. menziesii* Low Open Forest to Low Woodland, often with *Allocasuarina fraseriana*, *Eucalyptus marginata*, *E. todtiana*, *B. grandis* or *Nuytsia floribunda*

Uplands — Tamala Limestone: *Dryandra sessilis* var. *cygnorum*, *Hakea trifurcata* and *Calothamnus quadrifidus*  
 Closed Tall Scrub to Open Heath; *Melaleuca systena* Closed to Open Heath; *Melaleuca* sp. Yanchep (GJK 11242), *M. huegelii* and *Dodonaea aptera* Closed Tall to Open Heath

Quindalup Dunes

Uplands — Safety Bay Sands (oldest dunes): Mixed Open Low Heath

Wetlands from Quindalup and Spearwood Dunes: *Eucalyptus rudis* Open Forest to Low Woodland; *Banksia littoralis* Low Open Forest to Low Woodland; *Melaleuca raphiophylla* Closed Forest to Low Woodland; *Typha domingensis/orientalis* Closed Sedgeland; mixed Low Shrubland; Closed to Open Sedgeland which is mixed or is dominated by *Schoenoplectus validus*, *Baumea articulata*, *Lepidosperma drummondii*, *L. gladiatum*, *B. laxa* or *B. juncea*; mixed Open Low Heath

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >90% Very Good to Excellent, <10% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 462 native taxa, 131 weed taxa (more than Site (Site 288 and part Site 381 after area of CALM 1989) — Keighery, GJ, 1993b plus 22 part Site records, including McComb and McComb 1967; estimated <10% not in Site) (estimated >90% expected flora)

**Significant Flora:** *Melaleuca* sp. Yanchep (GJK 11242) (2), *Stylidium maritimum* (3), *Conostylis pauciflora* subsp. *euryrhipis* (3), *Hibbertia spicata* subsp. *leptotheca* (3); *Eucalyptus petrensis*, *Melaleuca cardiophylla*, *Alyogyne huegelii* var. *glabrata*, *Pimelea calcicola*, *Trachymene coerulea*, *Astroloma microcalyx*, *Ricinocarpus glaucus*, *Lechenaultia linarioides*, *Acacia alata* var. *tetrantha*, *Diplopeltis huegelii* var. *huegelii*, *Senecio ramosissimus*, *Veronica* aff. *calycina* (BJK and NG 235), *Conostylis aculeata* subsp. *cygnorum*; rare or uncommon on coastal plain in PMR — *Craspedia arenicola*, *Senecio ramosissimus* (most northern population known), *Actinodium leucocephalus* (particularly rare on western side of Plain), and the ferns *Adiantum aethiopicum*, *Anogramma leptophylla*, *Cheilanthes austrotenuifolia*, *Pteris vittata*; species typical of Tamala Limestone taxa — *Melaleuca* sp. Yanchep (GJK 11242), *Melaleuca huegelii*, *Grevillea preissii*, *Diplopeltis huegelii* var. *huegelii*, *Eucalyptus foecunda*, *Pimelea calcicola*, *Trymalium ledifolium* var. *ledifolium*, *Stylidium junceum* (limestone variant), *Astroloma microcalyx*, *Caladenia longicauda* subsp. *calcigena* ms, *Petrophile serruriae* subsp. nov. (GJK 11421), *Hibbertia spicata* subsp. *leptotheca*

**Fauna:** (area described also includes Site 381) multiple surveys for birds (134 species) (Storr and Johnstone 1988; RAOU 1996 D, 8 visits), structured surveys for native mammals (15 species) (Burbidge *et al.* in prep.), reptiles (47 species) (How and Dell 1994) and fish (2 species) (Sarti and Allen 1978). Significant populations of Splendid Fairy-wren, Southern Emu-wren, Broad-tailed, Western and Yellow-rumped thornbills, Weebill, White-browed Scrubwren, Scarlet Robin, Golden Whistler, Grey Shrike-thrush and several honeyeater species. Significant bird species: category 1 (1), category 3 (13) and category 4 (8). Significant mammal species: Quenda (Friend, 1996 D), Western Brush Wallaby, Ash Grey Mouse and Echidna

**Linkage:** adjacent bushland to the north (Site 396), south, east (Site 381) and west (through bushland to Site 289); part of Greenways 37, 2, 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in the study of City of Wanneroo (Trudgen 1996); contains at least eight regional floristic groups; Koala Caves contain an abundance of terrestrial fossils and could provide information for the period between 6,000 and 80,000–1,000,000 years ago from which there are no outcropping marine deposits (Lemmon *et al.* 1979)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing purpose, care, control and management of Reserves 9868 and 29246 is endorsed (see Table 3, Volume 1).





## RIDGES AND ADJACENT BUSHLAND, YANCHEP/NOWERGUP

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 381

**Area (ha):** bushland 3004.9

**Map no.** 8, 9, 13, 14

**Map sheet series ref. no.** 2034-I NW, 2034-IV NE, 2035-III SE

**Other Names:** part of proposed Gngangara Park, Ridges Management Priority Area

**Local Authorities (Suburb):** Shire of Wanneroo (Yanchep, Nowergup)

**Includes CALM Managed Land:** State Forest 65, Reserve 9868 (National Park)

**System 6 (1983):** part M3, M4 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

##### Wetlands (within the Spearwood/Bassendean Dunes)

Holocene Swamp Deposits (Qhw: Cps)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — North

Cottesloe Complex — North (one of two most northern occurrences)

Cottesloe Complex — Central and South (most northern occurrence)

##### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

14 Deeper wetlands on sandy soils

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

22 *Banksia ilicifolia* woodlands

23b Northern *Banksia attenuata* — *Banksia menziesii* woodlands

###### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

26a *Melaleuca huegelii* — *M. acerosa* shrublands on limestone ridges

26b Woodlands and mallees on limestone

27 Species-poor mallees and shrublands on limestone

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

**Wetland Types:** creek; sumpland and dampland (includes wetlands not previously described, CALM 1989, Gibson *et al.* 1994)

**Natural Wetland Groups:** not defined

**Wetland Management Objectives:** not defined; Conservation (area not determined, these wetlands not previously described)

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed; Endangered (floristic community type 26a)

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (CALM 1989, Gibson *et al.* 1994 (Yan 4–6, 8–22), Griffin 1994 (Par 01)); detailed survey (Keighery, GJ, 1993b)

**Structural Units:** mapping (CALM 1989)

Bassendean Dunes

Uplands: *Banksia attenuata* and *Nuytsia floribunda* Low Open Woodland

Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Woodland; *Eucalyptus marginata* Open Forest to Open Woodland; Low Open Woodlands to Low Woodlands dominated by *Banksia attenuata*,



*B. menziesii*, *B. ilicifolia*, *B. grandis*, *Allocasuarina fraseriana* and *Nuytsia floribunda* and combinations of these: *Conospermum stoechadis* Open Heath; mixed Open Heath  
 Uplands — Tamala Limestone: Closed to Open Heath dominated by *Melaleuca huegelii*, *Melaleuca* sp. Yanchep (GJK 11242), *Thomasia cognata*, *Dryandra sessilis* var. *cygnorum* and *Hakea trifurcata*; *Eucalyptus petrensis* Shrub Mallee; *Eucalyptus foecunda* Shrub Mallee; *Eucalyptus decipiens* Tree Mallee  
 Wetlands: *Eucalyptus rudis* Woodland; *Melaleuca preissiana* Low Open Forest  
**Vegetation Condition:** >90% Excellent to Pristine, <10% Very Good  
**Total Flora:** 294 native taxa, 32 weed taxa (plot-generated list only, Gibson *et al.* 1994 and Griffin 1994; see Site 288 for total for Site 288 and part Site 381)  
**Significant Flora:** *Eucalyptus argutifolia* (R), *Melaleuca* sp. Yanchep (GJK 11242) (2), *Sarcozona bicarinata* (3), *Conostylis pauciflora* subsp. *euryrhipis* (3), *Stylidium maritimum* (3), *Conostephium minus* (4); *Diplolaena angustifolia*, *Verticordia nitens*, *Stylidium crossocephalum*, *Eucalyptus foecunda*; species typical of Tamala Limestones — *Grevillea preissii*, *Eucalyptus argutifolia*, *E. petrensis*, *E. foecunda*, *Diplopeltis huegelii* var. *huegelii*, *Trymalium ledifolium* var. *ledifolium*, *Stylidium maritimum*, *S. junceum* (limestone variant), *Astroloma microcalyx*

**Fauna:** (area described also includes Site 288) multiple surveys for birds (134 species) (Storr and Johnstone 1978; RAOU 1996 D, 8 visits), structured survey for native mammals (15 species) (Burbidge *et al.* in prep.) and reptiles (47 species) (How and Dell 1994). Significant populations of Splendid Fairy-wren, Southern Emu-wren, Broad-tailed, Western and Yellow-rumped Thornbills, Weebill, White-browed Scrubwren, Scarlet Robin, Golden Whistler, Grey Shrike-thrush and several honeyeater species. Significant bird species: category 1 (1), category 3 (13) and category 4 (8). Significant mammal species: Quenda (Friend, 1996 D) and Western Brush Wallaby  
**Linkage:** adjacent bushland to the south and west (Sites 288 and 396); part of Greenway 36 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)  
**Other Special Attributes:** transition area between vegetation of Spearwood and Bassendean Dunes systems; majority of Site included in boundaries considered in the Yanchep National Park Management Plan (CALM 1989); proposed to become National Park in Forest Management Plan 1994–2003 (CALM 1994); recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996); part Site recommended to be declared as an A-class Nature Reserve for the protection of flora and fauna in Gibson *et al.* 1994; contains seven regional floristic groups; included in Gngangara Park proposal (Bailey 1997)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Indicative place (AHC 2000 D); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (proposed 'Gngangara Park' – Cabinet 1996; see Table 3, Volume 1).

## STATE FOREST 65 — PINJAR PLANTATION CENTRAL BUSHLAND, YANCHEP

**Boundary Definition:** protected area with bushland boundary (remnants in pine plantation)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 1, 408–411, 414, 415    **Area (ha):** bushland 456.3 (7 remnants, from 3.7 - 218.8 ha)  
**Map no.** 9, 14    **Map sheet series ref. no.** 2034–I NW, 2034–IV NE

**Other Names:** part of proposed Gngangara Park

**Local Authorities (Suburb):** Shire of Wanneroo (Yanchep)

**Includes CALM Managed Land:** State Forest 65, Reserve 39414 (Quarry — limestone)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)





**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South (most northern occurrence)

Cottesloe Complex — North

Cottesloe Complex — Central and South

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995, McArthur and Mattiske 1985)

**Structural Units:** mapping (McArthur and Mattiske 1985)

Uplands — Tamala Limestone: Open to Closed Heath dominated by *Dryandra sessilis* var. *cygnorum*, *Melaleuca huegelii* and *Grevillea* species

Uplands — Sands derived from Tamala Limestone: *Banksia* species Woodland with scattered emergent *Eucalyptus gomphocephala* and *E. marginata*; *Banksia* spp. Woodland with scattered *Eucalyptus todtiana* and *E. marginata*

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** no adjacent bushland

**Other Special Attributes:** included in Gnangara Park proposal (Bailey 1997); majority recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Sites with Some Existing Protection; the existing care, control and management of these Sites is endorsed (proposed 'Gnangara Park' – Cabinet 1996; see Table 3, Volume 1).

**BERNARD ROAD BUSHLAND, CARABOODA**

**Boundary Definition:** bushland (part taken to cadastre) boundary (Boundary adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 129

**Area (ha):** bushland 102.2

**Map no.** 13

**Map sheet series ref. no.** 2034-IV NE

**Other Names:** Submission Area 290

**Local Authorities (Suburb):** Shire of Wanneroo (Carabooda)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred



**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

- \*24 Northern Spearwood shrublands and woodlands
- \*26b Woodlands and mallees on limestone
- \*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** limestone ridge, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, WAWA 1995)

**Structural Units**

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Woodland to Forest over *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland

Uplands — Tamala Limestone: Shrublands to Closed Heaths dominated by one or more combinations of *Melaleuca huegelii*, *M. systema* and *Dryandra sessilis* var. *cygnorum*

**Vegetation Condition:** >70% Very Good to Excellent, <30% Good to Completely Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Sarcozona bicarinata* (3); typical Tamala Limestone taxa — *Melaleuca huegelii*, *Grevillea preissii*, *Trymalium ledifolium* var. *ledifolium*, *Petrophile serruriae* subsp. nov. (GJK 11421)

**Fauna:** not known

**Linkage:** adjacent bushland to the north (canopy cover), east and south-west (Site 130, across road); part of Greenway 2 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** adjacent to Coogee Swamp and Springs (*Melaleuca raphiophylla* Low Woodland to Low Open Forest; *Baumea articulata* Sedgeland) which have a significant aquatic invertebrate fauna and are a significant bird breeding area (WAWA 1995); contains historical cave (important fossils) and other karst features (Bastian, 1998; Submission no. 176d); recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996); consolidates the linkage between Yanchep and Neerabup National Parks

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity

**Recommendation:** Part A: Basic Raw Materials Negotiated Planning Solution. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**LINK BETWEEN YANCHEP AND NEERABUP NATIONAL PARKS**

**Boundary Definition:** protected area/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 130

**Area (ha):** bushland: 94.3

**Map no.** 13

**Map sheet series ref. no.** 2034–IV NE

**Other Names:** Part Submission Area 291 reserves between Yanchep and Neerabup National Parks

**Local Authorities (Suburb):** Shire of Wanneroo (Carabooda, Alkimos)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South



**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, vegetated uplands

**Vegetation and Flora:** limited survey (Submission No. 176e); detailed survey (part Site — *ecologia* 1997)

**Structural Units:** mapping (part Site — *ecologia* 1997)

Uplands — Sands derived from Tamala Limestone: Woodlands dominated by *Eucalyptus gomphocephala* and *E. marginata*; *Banksia attenuata* Low Woodlands

Uplands — Tamala Limestone: Heaths to Low Shrublands dominated by *Dryandra sessilis* var. *cygnorum*, *Xanthorrhoea preissii*, *Scaevola thesioides* and *Trymalium ledifolium* var. *ledifolium*

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good, with areas of severe localised disturbance associated with track development

**Total Flora:** not known

**Significant Flora:** typical Tamala Limestone taxa — *Trymalium ledifolium* var. *ledifolium*

**Fauna:** limited survey for birds (41 species), native mammals (4 species), reptiles (17 species) and amphibians (3 species) (*ecologia* 1997). Significant bird species: category 1 (2), category 3 (16) and category 4 (13). Significant mammal species: Quenda (Friend 1996 D). Significant reptile species: a dragon (*Tympanocryptis adelaidensis*), Clawless Gecko (*Crenadactylus ocellatus*) and Black Monitor (*Varanus tristis*)

**Linkage:** adjacent bushland to the north-east (Site 129, across road) and west; part of Greenway 2 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems

**Recommendation:** Site with Some Existing Protection; Existing Parks and Recreation Reserve, the purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

## HOPKINS ROAD BUSHLAND, NOWERGUP

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 290

**Area (ha):** bushland 406.9

**Map no.** 14, 20

**Map sheet series ref. no.** 2034-I NW, 2034-I SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Yanchep)

**Includes CALM Managed Land:** State Forest 65

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (QtI: LS1)

#### VEGETATION AND FLORA

##### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*26b Woodlands and mallees on limestone

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999 (edge inspection), Mattiske Consulting Pty Ltd 1997, WAWA 1995)

**Structural Units:** limited mapping (WAWA 1995)

Uplands — Sands derived from Tamala Limestone: Woodlands dominated by *Eucalyptus marginata*, *Banksia attenuata* and *B. grandis*; *Banksia* species Woodland with emergent *Eucalyptus gomphocephala*; *Banksia* species Woodland with scattered *Eucalyptus tottiana* and *E. marginata*

Uplands — Tamala Limestone: Closed Heath dominated by *Xanthorrhoea preissii*, *Dryandra sessilis* var. *cygnorum*, *Melaleuca huegelii* and *M. systema*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Excellent (Mattiske Consulting Pty Ltd 1997)

**Total Flora:** not known

**Significant Flora:** *Eucalyptus argutifolia* (R); typical Tamala Limestone taxa — *Melaleuca huegelii*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south (to Site 293) and west

**Other Special Attributes:** included in Gnaragar Park proposal (Bailey 1997); recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity

**Recommendation:** Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (proposed 'Gnaragar Park' – Cabinet 1996; see Table 3, Volume 1).

## STATE FOREST 65 — PINJAR PLANTATION SOUTH BUSHLAND, NOWERGUP/YANCHEP/NEERABUP

**Boundary Definition:** protected area with bushland (Sites 95, 134–137, 139, 140, 417, 444, 446, 451, 455); protected area with bushland group (425, 428), protected area with bushland (part taken to cadastre)/ bushland group (444); protected area with bushland (part taken to cadastre)/bushland (457) boundaries (134 — Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include the unmapped bushland; remnants in pine plantation.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 95, 134–137, 139, 140, 417, 425, 428, 444, 446, 451, 455, 457

**Area (ha):** bushland 61.5 (15 remnants, from 1.3 to 7.5 ha)

**Map no.** 15, 20, 21

**Map sheet series ref. no.** 2034–I NW, 2034–I SW

**Other Names:** part of proposed Gnaragar Park

**Local Authorities (Suburb):** Shire of Wanneroo (Nowergup, Yanchep, Neerabup)

**Includes CALM Managed Land:** State Forest 65

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

##### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: S4)





## VEGETATION AND FLORA

### Vegetation Complexes

#### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

#### Wetlands

Pinjar Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

## WETLANDS

**Wetland Types:** dampland, sumpland

### Natural Wetland Groups

#### Bassendean Dunes

Pinjar (B.1)

Gnangara (B.2)

**Wetland Management Objectives:** Conservation (Site 425 2.7ha, Site 451 1.5ha), Resource Enhancement (Site 136)

**Swan Coastal Plain Lakes EPP:** none identified

## THREATENED ECOLOGICAL COMMUNITIES

Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995)

**Structural Units:** generally only broad regional information is given for Site descriptions for remnants in pine plantation

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** generally no adjacent bushland except for south of Site 135 (Site 293), north and south of Site 428 (Site 444, area outside Site), south of Site 444 (Site 428), south of Site 455 (Site 457 across road), north of Site 457 (Site 455)

**Other Special Attributes:** part Site subject to Gnangara Mound Crown Land EPP; included in Gnangara Park proposal (Bailey 1997)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Sites with Some Existing Protection; the existing care, control and management of these Sites is endorsed (proposed 'Gnangara Park' – Cabinet 1996; see Table 3, Volume 1).

## NEERABUP NATIONAL PARK, LAKE NOWERGUP NATURE RESERVE AND ADJACENT BUSHLAND, NEERABUP

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

## SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 383

**Area (ha):** bushland 1736.1 (Site also includes open water.)

**Map no.** 19, 20, 27, 28

**Map sheet series ref. no.** 2034–I SW, 2034–IV NE, 2034–IV SE

**Other Names:** not known



**Local Authorities (Suburb):** Shire of Wanneroo (Neerabup, Carabooda, Nowergup, Clarkson, Tamala Park), City of Joondalup (Kinross, Neerabup)

**Includes CALM Managed Land:** Reserve 27575 (National Park), Reserve 24581 (Conservation of Flora and Fauna)

**System 6 (1983):** M6 area of bushland goes beyond System area boundaries, all bushland described

## SECTION 2: REGIONAL INFORMATION

### LANDFORM AND SOIL

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)

#### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

##### Wetlands

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

#### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

24 Northern Spearwood shrublands and woodlands

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

\*26a *Melaleuca huegelii* — *M. acerosa* shrublands on limestone ridges

\*27 Species-poor mallees and shrublands on limestone

### WETLANDS

**Wetland Types:** lake, sumpland

#### Natural Wetland Groups

##### Spearwood Dunes

Yanchep (S.1)

**Wetland Management Objectives:** Conservation (66.7ha)

**Swan Coastal Plain Lakes EPP:** <53.1ha + 1.8ha + 0.8ha + <10.9ha = 57.5ha (total)

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined, Endangered (floristic community type 26a)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — DEP 1999, EPA and WAWA 1990 (Lake Nowergup NR), Gibson *et al.* 1994 (Neer 11) (Lake Nowergup NR), Gibson *et al.* 1994 (Neer 1–10, 20–23) (Neerabup NP), Semeniuk, V&C Research Group 1991a (Neerabup NP)); detailed survey (part Site — Keighery, BJ, *et al.* 1997b (Neerabup NP))

**Structural Units:** mapping (EPA and WAWA 1990, Keighery, BJ, *et al.* 1997b, Semeniuk, V&C Research Group 1991a)

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Woodland to Open Forest; *Eucalyptus marginata* Woodland to Forest generally over *Banksia* woodland; Woodlands dominated by *Banksia attenuata*, *B. menziesii*, *Allocasuarina fraseriana* and *Nuytsia floribunda* and combinations of these; *Jacksonia sternbergiana* Low Forest

Uplands — Tamala Limestone: Shrublands to Open Low Heath dominated by *Xanthorrhoea preissii*, *Hakea trifurcata*, *Calothamnus quadrifidus*, *Melaleuca systema*, *Dryandra sessilis* var. *cygnorum*, *Melaleuca huegelii* and *Acacia lasiocarpa* and combinations of these

Wetlands: *Eucalyptus rudis* Open Forest; *Eucalyptus rudis* and *Banksia littoralis* Forest; *Melaleuca rhapsiophylla* Low Closed Forest to Low Woodland; *Acacia saligna* Low Open Forest; *Typha* Closed Sedgeland; *Baumea articulata* Closed Sedgeland; mixed Closed Sedgeland to Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >85% Very Good to Excellent, <15% Good to Degraded, with areas of severe localised disturbance





**Total Flora:** 315 native taxa, 66 weed taxa (Keighery, BJ, *et al.* 1997b plus four records from EPA and WAWA 1990) (estimated >85% expected flora)

**Significant Flora:** *Lepidium pseudohyssopifolium* (1), *Jacksonia sericea* (3), *Stylidium maritimum* (3), *Hibbertia spicata* subsp. *leptotheca* (3, endemic to Tamala Limestone); *Conostylis candicans* subsp. *calcicola*, *Ricinocarpus glaucus*, *Hemiandra pungens* (dune form), *Alyogyne huegelii* var. *glabrata*, *Baeckea robusta* subsp. nov. (perhaps a local variant of a widespread species), *Nemcia reticulatum* (coastal form), *Grevillea crithmifolia*, *Hakea lissocarpa*, *Persoonia comata* (at southern end of range), *Petrophile serruriae* subsp. nov., *Leptomeria empetriformis*, *Glischrocaryon aureum*, *Lechenaultia linarioides*; typical Tamala Limestone Taxa: Keighery, BJ, *et al.* 1997 — *Grevillea preissii*, *Diplopeltis huegelii* var. *huegelii*, *Eucalyptus foecunda*, *Pimelea calcicola*, *Trymalium ledifolium* var. *ledifolium*, *Stylidium junceum* (limestone variant), *Astroloma microcalyx*, *Caladenia longicauda* subsp. *calcigena* ms, *Schoenus lanatus*, *Petrophile serruriae* subsp. nov (GJK 11421), *Leptomeria empetriformis*

**Fauna:** multiple surveys for birds (56 species) (RAOU 1996 D, 9 visits; Dell *et al.* 1998), native mammals (4 species) (CALM 1993), reptiles (19 species) and amphibians (2 species) (B. Maryan and D. Robinson pers. comm.). Significant populations of insectivorous passerine birds including Splendid Fairy-wren, Broad-tailed, Western and Yellow-rumped Thornbills, Weebill, White-browed Scrubwren, Scarlet Robin, Golden Whistler and Grey Shrike-thrush. Lake Nowergup has large numbers of waterfowl (D. Lamont pers. comm. IN: EPA 1990). Significant bird species: category 1 (1), category 3 (12) and category 4 (7). Significant mammal species: Honey Possum and Western Brush Wallaby. Significant reptile species: Carpet Python (*Morelia spilota*)

**Linkage:** adjacent bushland to the north, south (Site 299, across road), east and west (Site 323, through bushland to Site 397); part of Greenways 35, 2, 5 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** contains five regional floristic groups; recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996); includes core of areas recommended for conservation by Semeniuk, V&C Research Group (1991a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate (Neerabup National Park and Nowergup Lake Fauna Reserve); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserves 27575 and 24581 is endorsed. Part B: Proposed Parks and Recreation Reservation. Part C: Other Government Lands Mechanism (see Table 3, Volume 1).

## NEERABUP LAKE AND ADJACENT BUSHLAND, NEERABUP

**Boundary Definition:** protected area boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 384

**Area (ha):** bushland 242.4 (Site also includes open water.)

**Map no.** 20

**Map sheet series ref. no.** 2034-I SW, 2034-IV SE

**Other Names:** Submission Area 293

**Local Authorities (Suburb):** Shire of Wanneroo (Neerabup)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)

###### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Spearwood Dunes

Cottesloe Complex — Central and South

###### Wetlands



Herdsman Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

## WETLANDS

**Wetland Types:** sumpland, creek

**Natural Wetland Groups**

**Spearwood Dunes**

Yanchep (S.1)

**Wetland Management Objectives:** Conservation (1153.8m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 91.2ha

## THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, open water, vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, DEP 1999, EPA and WAWA 1990, McArthur and Mattiske 1985, WAWA 1995)

**Structural Units:** mapping (EPA and WAWA 1990, McArthur and Mattiske 1985)

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Forest to Open Woodland

Uplands — Tamala Limestone: mixed Closed Heath to Closed Low Heath; *Dryandra sessilis* var. *cygnorum* Heath

Wetlands: *Eucalyptus rudis* Closed Forest to Open Woodland; *Melaleuca raphiophylla* Low Closed Forest to Low Open Forest; *Acacia saligna* Low Open Forest to Woodland, *Typha* species Open to Closed Sedgeland;

*Baumea articulata* Closed Sedgeland to Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* and *E. marginata*

**Vegetation Condition:** <50% Very Good, >% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north, south, east (Site 293) and west; part of Greenway 2 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part Site recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996); contains karst features including Orchestra Shell Cave (Submission No. 176g; Bastian, 1998); aboriginal heritage place (Submission No. 176g)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; it is already reserved for Parks and Recreation in the MRS – should be made a reserve with a conservation purpose (see Table 3, Volume 1).

## SHIRE VIEW HILL AND ADJACENT BUSHLAND, NOWERGUP/NEERABUP

**Boundary Definition:** protected area/management/bushland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

## SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 293

**Area (ha):** bushland 268.1

**Map no.** 20, 21

**Map sheet series ref. no.** 2034-I SW

**Other Names:** part of proposed Gngangara Park, Submission Area 292

**Local Authorities (Suburb):** Shire of Wanneroo (Nowergup, Neerabup)

**Includes CALM Managed Land:** State Forest 65





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

#### Supergroup 2: Seasonal Wetlands

\*5 Mixed shrub damplands

#### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*24 Northern Spearwood shrublands and woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

26a *Melaleuca huegelii* — *M. acerosa* shrublands on limestone ridges

27 Species-poor mallees and shrublands on limestone

### WETLANDS

**Wetland Types:** dampland

**Natural Wetland Groups:**

#### Bassendean Dunes

Pinjar (B.1)

**Wetland Management Objectives:** Conservation (25.5ha) (DEP 1996)

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Endangered (floristic community type 26a)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, vegetated uplands, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1996, DEP 1999, Gibson *et al.* 1994 (SVH 01–02))

#### Structural Units

Uplands — Sands derived from Tamala Limestone: *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus marginata*, *E. gomphocephala* and *E. todtiana*; mixed Open Heath

Uplands — Tamala Limestone: *Melaleuca systema* and *M. huegelii* Closed Heath; *Eucalyptus petrensis* Shrub

Mallee; *Dryandra sessilis* var. *cygnorum* Closed Heath

Wetland: *Melaleuca preissiana* Low Open Woodland

**Scattered Native Plants:** not applicable

**Vegetation Condition:** >75% Excellent, <25% Very Good to Good, with areas of severe localised disturbance associated with tracks, pine plots and quarries

**Total Flora:** 73 native taxa, 18 weed taxa (part Site, plot-generated list only plus several dominants)

**Significant Flora:** possibly *Eucalyptus argutifolia* (R) (recorded from north of Shire View Hill); *Stylidium maritimum* (3); *Podolepis canescens* (unusual form with white flowers, only record on the Swan Coastal Plain in the PMR), *Acacia alata* var. *tetrantha*; Typical Tamala Limestone Taxa — *Melaleuca huegelii*, *Eucalyptus petrensis*, *Grevillea preissii*, *Stylidium maritimum*, *Acacia alata* var. *tetrantha*

**Fauna:** Significant reptile species: Carpet Python (*Morelia spilota*) (Submission no. 176f)

**Linkage:** adjacent bushland to the north (Site 135); south and west (Site 384); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in the study of City of Wanneroo (Trudgen 1996); part Site Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); contains five regional floristic groups; Shire View Hill is one of the tallest limestone peaks on the Plain; part Site included in Gnaragara Park proposal (Bailey 1997)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*



**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (proposed 'Gnangara Park' – Cabinet 1996). Part B: Strategic Negotiated Planning Solution. Part C: Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1).

**WEST FLYNN DRIVE BUSHLAND, CARRAMAR**

**Boundary Definition:** bushland (taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 494

**Area (ha):** bushland 7.0

**Map no.** 21

**Map sheet series ref. no.** 2034-I SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Carramar)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Keighery, BJ, 1999)

**Structural Units**

Uplands — Sands derived from Tamala Limestone: Low Woodland to Low Open Forest dominated by *Banksia attenuata* and *Allocasuarina fraseriana* with scattered to co-dominant *Eucalyptus marginata*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Excellent to Very Good (Keighery, BJ, 1999)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** no known information

**Linkage:** adjacent bushland to the north (Site 295, across road), south and west; part of Greenway 41 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Volume 2A, Map 7)

**Other Special Attributes:** recommended for protection in the study of City of Wanneroo bushland (Trudgen, 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Strategic Negotiated Planning Solution (see Table 3, Volume 1).





## FLYNN DRIVE BUSHLAND, NEERABUP

**Boundary Definition:** bushland (part taken to zoning)/management boundary (Part Site, part Lots 1, 2001 Flynn Dr, subject to Ministerial Condition No. 280, 21 August 1992.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 295

**Area (ha):** bushland 112.6

**Map no.** 21

**Map sheet series ref. no.** 2034-I SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Neerabup, Carramar, Cockman)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### Lagoonal and Estuarine Deposits (within the Spearwood Dunes)

Lagoonal and Estuarine Deposits (Vasse) (Qhg: S4)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

###### Wetlands

Pinjar Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

22 *Banksia ilicifolia* woodlands

\*23a Central *Banksia attenuata* — *B. menziesii* woodlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

**Wetland Types:** sumpland

##### Natural Wetland Groups

###### Bassendean Dunes

Pinjar (B.1)

Gnangara (B.2)

**Wetland Management Objectives:** Conservation (2ha)

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands, vegetated wetlands

**Vegetation and Flora:** limited survey (DEP 1996 (Pinj 12), DEP 1998, DEP 1999, part Site — Bowman Bishaw Gorham 1992b, WAWA 1995)

**Structural Units:** mapping (part Site — Bowman Bishaw Gorham 1992b, WAWA 1995)

Uplands — Sands derived from Tamala Limestone: Low Woodland to Low Open Forest dominated by *Banksia attenuata* and *B. menziesii* with scattered to co-dominant *Eucalyptus todtiana*, *E. marginata*, *Nuytsia floribunda* and *Allocasuarina fraseriana*; *Adenanthos cygnorum* Tall Closed Scrub to Tall Shrubland; *Hibbertia hypericoides*, *Daviesia triflora* and *Leucopogon conostephioides* Open to Closed Low Heath

Wetlands: not known

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Conostephium minus* (4); *Boronia purdieana*



**Fauna:** Location for rare native bee (*Hylaeus globuliferus*) (Pawluk, Richard and Associates 1995)

**Linkage:** adjacent bushland to the north (Site 382, across road); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Strategic Negotiated Planning Solution. Part C: Other Government Land Mechanism. Part D: Urban Negotiated Planning Solution (see Table 3, Volume 1).

**LITTLE COOGEE FLAT, PINJAR**

**Boundary Definition:** bushland boundary (remnant in pine plantation)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 443

**Area (ha):** bushland 5.6

**Map no.** 21

**Map sheet series ref. no.** 2034-I SW

**Other Names:** not known, part of Wanneroo Wetlands Eastern Chain

**Local Authorities (Suburb):** Shire of Wanneroo (Pinjar)

**System 6 (1983):** Part M8 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Wetlands**

Pinjar Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

**WETLANDS**

**Wetland Types:** dampland

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

**Wetland Management Objectives:** Conservation (3.9ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** not field-surveyed (aerial photography interpretation only)

**Structural Units:** generally only broad regional information is given for Site descriptions for remnants in pine plantation

**Vegetation Condition:** Very Good

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of contiguous fragmented potential bushland/wetland linkage (Part A, Map 7)



**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed; Indicative place (AHC 2000 D)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; protected – State Forest. Part B: Other Government Land Mechanism (see Table 3, Volume 1).

**YELLAGONGA REGIONAL PARK, WANNEROO/WOODVALE/KINGSLEY**

**Boundary Definition:** protected area/bushland/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 299 **Area (ha):** bushland 380.9 (Site also includes open water.)

**Map no.** 27, 28, 34 **Map sheet series ref. no.** 2034–I SW, 2034–II NW

**Other Names:** Contains Lake Joondalup and Lake Goollelal

**Local Authorities (Suburb):** City of Joondalup (Woodvale, Edgewater, Joondalup, Wanneroo, Kingsley)

**Includes CALM Managed Land:** Reserve 31048 (Recreation and Conservation of Flora and Fauna), 21708 (Protection of Flora and Fauna), 43290 (Conservation Park), 21176 (Forestry Purposes Pine Seedling Orchard)

**System 6 (1983):** M7 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qrw: Sp1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

S7 Northern woodlands to forests over tall sedgelands alongside permanent wetlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

**Wetland Types:** lake, sumpland, river

**Natural Wetland Groups**

**Spearwood Dunes**

Yanchep (S.1)

**Wetland Management Objectives:** Conservation (779.7ha), not assessed

**Swan Coastal Plain Lakes EPP:** 638.1ha + 63.7ha + 8.2ha = 710ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Yela 01–03), DPUD 1992b, EPA and WAWA 1990, Tauss 1996)

**Structural Units:** mapping (DPUD 1996, EPA and WAWA 1990)



Uplands: *Eucalyptus gomphocephala* Closed Forest to Woodland; *Eucalyptus gomphocephala* Tall Open Forest over *Banksia grandis* Low Open Forest; *Eucalyptus calophylla* Closed to Open Forest; *Banksia attenuata* and *Eucalyptus marginata* Woodland; Mixed *Eucalyptus marginata*, *E. calophylla* and *Banksia attenuata* Open Forest  
 Wetlands: *Eucalyptus rudis* Scattered Open Forest to Low Woodland; *Melaleuca raphiophylla* Low Open to Low Closed Forest; *Melaleuca raphiophylla* and *Banksia littoralis* Open Forest; Closed to Open Sedgeland dominated by *Schoenoplectus validus*, *Baumea articulata*; *B. juncea*, \**Typha orientalis*, *Juncus pallidus* and *Lepidosperma longitudinale* or combinations of *Schoenoplectus validus* and *Baumea articulata*; Mixed Herbland (on dry lake bed)

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 217 native taxa, 103 weed taxa (compiled from DEP 1996, Tauss 1996)

**Significant Flora:** *Jacksonia sericea* (3), *Conostylis bracteata* (3); *Persicaria lapathifolia* (in Herblands on dry lake bed only record in the PMR), *Hibbertia cuneiformis* (most likely a weed, not known to occur naturally north of Site 377), *Amyema miquelii* (uncommon on the Plain), *Lechenaultia linarioides*, *Ricinocarpus glaucus*

**Fauna:** multiple surveys for birds (122 species) (Bamford and Bamford 1990; RAOU 1996 D, 86 visits).

Significant populations of Blue-billed Duck, Musk Duck, Hardhead, Splendid and Variegated fairy-wrens, Broad-tailed, Western and Yellow-rumped Thornbills, Weebill, Scarlet Robin, Golden Whistler and Grey Shrike-thrush.

Significant bird species: category 1 (3), category 2 (5), category 3 (17) and category 4 (8). Limited survey for native mammals (6), reptiles and amphibians (6) (DPUD 1991). Significant mammal species: Western Brush Wallaby and Echidna; Quenda (Friend 1996 D). Significant native fish species: Native Goby (*Pseudogobius olorum*) and Pygmy Perch (*Edelia vittata*) (WAWA 1995)

**Linkage:** adjacent bushland to the north (Site 383, across road), east (Site 164, across road) and west; part of Greenways 4, 2, 5 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo (Trudgen 1996); included within Yellagonga Regional Park (DPUD 1992b)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Yellagonga Regional Park is endorsed (see Table 3, Volume 1).

## CONTI ROAD BUSHLAND, WANNEROO

**Boundary Definition:** bushland (part taken to cadastre)/management boundary (Boundary adjusted after vegetation survey and negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan*.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 164

**Area (ha):** bushland 27.2

**Map no.** 28

**Map sheet series ref. no.** 2034-I SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Ashby)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### VEGETATION AND FLORA

##### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

##### Floristic Community Types



**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, Gibson *et al.* 1994 (Depot 01); Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Uplands: Mixed *Banksia attenuata*, *B. menziesii* and *Eucalyptus marginata* Woodland; *Eucalyptus calophylla* Woodland; *Eucalyptus gomphocephala* Woodland

**Scattered Native Plants:** *Eucalyptus marginata* Woodland

**Vegetation Condition:** >60% Very Good (Excellent) to Good, <10% Good to Degraded, with areas of severe localised disturbance (DEP 1999, Mattiske Consulting Pty Ltd 1997)

**Total Flora:** 38 native taxa (Gibson *et al.* 1994 (Depot 01); Mattiske Consulting Pty Ltd 1997) (estimated >20% expected flora)

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland/canopy to the north and west (Site 299, across road); part of Greenway 2 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Part A: Proposed Parks and Recreation Reservation. Part B: Strategic Negotiated Planning Solution (see Table 3, Volume 1).

**CAPORN STREET BUSHLAND, MARIGINIUP**

**Boundary Definition:** bushland (part taken to cadastre and zoning) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 469

**Area (ha):** bushland 10.6

**Map no.** 28

**Map sheet series ref. no.** 2034-I SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Mariginiup)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed



### SECTION 3: SPECIFIC SITE DETAIL

#### Landscape Features

**Vegetation and Flora:** limited survey (DEP 1998)

##### Structural Units

Uplands: *Banksia attenuata*, *B. menziesii* and *B. illicifolia* Low Open Forest to Low Woodland with emergent *Eucalyptus marginata*; *Eucalyptus marginata*, *Banksia attenuata*, *B. menziesii* Low Open Forest to Woodland; *Eucalyptus calophylla* Open Forest to Woodland; *Banksia attenuata*, *B. menziesii*, *B. illicifolia* and *Allocasuarina fraseriana* Low Open Forest to Low Woodland with emergent *Eucalyptus marginata*

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland

**Vegetation Condition:** >60% Excellent to Very Good, <10% Degraded to Completely Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland/canopy to the south and east

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

## GARDEN PARK BUSHLAND, WANNEROO

**Boundary Definition:** bushland taken to cadastre and zoning boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 470

**Area (ha):** bushland 5.1

**Map no.** 28

**Map sheet series ref. no.** 2034-I SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Wanneroo)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

#### VEGETATION AND FLORA

##### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

#### Landscape Features

**Vegetation and Flora:** limited survey (DEP 1998, fenceline survey)

##### Structural Units

Uplands: *Banksia attenuata*, *B. menziesii* and *B. illicifolia* Low Open Forest to Low Woodland with emergent *Eucalyptus marginata*; *Eucalyptus marginata*, *Banksia attenuata*, *B. menziesii* Low Open Forest to Woodland; *Eucalyptus calophylla* Open Forest to Woodland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland

**Vegetation Condition:** >90% Excellent to Very Good, with areas of severe localised disturbance





**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north and east

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**HIGH ROAD BUSHLAND, WANNEROO**

**Boundary Definition:** bushland (part taken to cadastre and zoning)/bushland group boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 471

**Area (ha):** bushland 41.8

**Map no.** 28

**Map sheet series ref. no.** 2034-II NW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Wanneroo)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps) (not mapped under Wetlands or vegetation observed)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, surveyed from roadside)

**Structural Units**

Uplands: *Banksia illicifolia*, *B. attenuata* Low Open Woodland; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland to Open Low Forest sometimes with scattered emergent trees of *Eucalyptus marginata*; *Banksia attenuata* Low Open Woodland with emergent trees of *Eucalyptus gomphocephala*

**Vegetation Condition:** >80% Excellent to Very Good, <15% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north, south, east and west

**Other Special Attributes:** majority recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed



**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Other Government Land Mechanism. Part B: Rural Complementary Mechanism. Part C: Local Reserve Mechanism (see Table 3, Volume 1).

**MARIGINIUP LAKE AND ADJACENT BUSHLAND, MARIGINIUP**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 147 **Area (ha):** bushland 53.5 (Site also includes open water.)

**Map no.** 28 **Map sheet series ref. no.** 2034-I SW

**Other Names:** Mariginiup Lake, part Submission Area 233, part of Wanneroo Wetlands Eastern Chain

**Local Authorities (Suburb):** Shire of Wanneroo (Mariginiup)

**System 6 (1983):** Part M8 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Wetlands**

Pinjar Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**WETLANDS**

**Wetland Types:** lake, sumpland, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

**Wetland Management Objectives:** Conservation (162.5ha)

**Swan Coastal Plain Lakes EPP:** 138.4ha + 21.5ha = 159.9ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990, McArthur and Mattiske 1985, Trudgen 1993a, WAWA 1995)

**Structural Units:** mapping (EPA and WAWA 1990, McArthur and Mattiske 1985, Trudgen 1993a)

Uplands: *Eucalyptus marginata* Open Woodland to Open Forest; *Banksia attenuata* and *B. menziesii* Low Open Woodland to Low Open Forest; *Acacia saligna* Low Shrubland

Wetlands: *Eucalyptus calophylla* and *E. rudis* Closed Forest; *Melaleuca rhapsiophylla* Low Woodland to Low Closed Forest; *Baumea articulata* Closed Sedgeland

**Scattered Native Plants:** *Eucalyptus marginata* Open Woodland

**Vegetation Condition:** >40% Very Good to Excellent, <60% Degraded to Completely Degraded, with areas of severe localised disturbance (Trudgen 1993a)

**Total Flora:** not known

**Significant flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland/canopy to the north, south and west; part of Greenways 16, 15 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)





**Other Special Attributes:** recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed; Indicative place (AHC 2000 D)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Site with Some Existing Protection; existing Parks and Recreation Reserve (see Table 3, Volume 1).

**WOODVALE NATURE RESERVE, WOODVALE**

**Boundary Definition:** protected area boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 407

**Area (ha):** bushland 35.6

**Map no.** 34

**Map sheet series ref. no.** 2034-II NW

**Other Names:** CALM Woodvale

**Local Authorities (Suburb):** City of Joondalup (Woodvale)

**Includes CALM Managed Land:** Reserve 30809 (Research and Conservation of Flora and Fauna)

**System 6 (1983):** Part M7 all System area bushland, total area described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** detailed survey (Keighery, GJ, and Langley 1994); limited survey (Gibson *et al.* 1994 (Woodv 01-02))

**Structural Units**

Uplands: Low Woodland dominated by *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* which is at times dominated by *Eucalyptus gomphocephala* Open Woodland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland

**Vegetation Condition:** >80% Very Good, <20% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 170 native taxa, 37 weed taxa (Keighery, GJ, and Langley 1994) (estimated >80% expected flora)

**Significant Flora:** *Jacksonia sericea* (3); *Ricinocarpus glaucus*

**Fauna:** structured survey for reptiles (18 species) and amphibians (4 species) (How and Dell 1994). Significant reptile species: a gecko (*Diplodactylus polyophthalmus*), Black Monitor (*Varanus tristis*) and Carpet Python (*Morelia spilota*). Good assemblage of insectivorous and nectarivorous birds (J. Dell pers. comm.). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the west (Site 303, across freeway); part of Greenways 5, 9 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Site with Some Existing Protection; the existing purpose, care, control and management of Reserve 30809 is endorsed (see Table 3, Volume 1).

**WHITFORDS AVENUE BUSHLAND, CRAIGIE/PADBURY**

**Boundary Definition:** protected area/bushland (part taken to cadastre and zoning) boundary (Areas of bushland within the boundaries of the Site have been recently cleared. Boundary proposed to be adjusted after vegetation survey and negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 303

**Area (ha):** bushland 215.1 (Proposed boundary circumscribes 139.5ha bushland.)

**Map no.** 33, 34

**Map sheet series ref. no.** 2034-II NW

**Other Names:** Submission Areas 146 and 159 Pinnaroo, Beenyup, Hepburn Conservation Reserve and Submission Area 160 Craigie bushland; Hepburn Heights; Pinnaroo Cemetery; Craigie Open Space

**Local Authorities (Suburb):** City of Joondalup (Craigie, Padbury)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Quindalup Dunes (Holocene Dunes)**

Safety Bay Sands (Qhs: S2, LS4)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

24 Northern Spearwood shrublands and woodlands

26b Woodlands and mallees on limestone

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

29a Coastal shrublands on shallow sands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** limestone ridge, tall dune, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Hepb 01–03, Pinn 01–03), Semeniuk, V&C Research Group 1991a, part Site — Foulds 1987 (Pinnaroo Cemetery), Keighery, BJ, and Clarke 1999 (Pinnaroo Cemetery)); detailed survey (part Site — Allen *et al.* 1994 (Craigie Open Space), Keighery, GJ, 1991b (Hepburn Heights), Tingay, Alan & Associates 1991a (Hepburn Heights))

**Structural Units:** mapping (Semeniuk, V&C Research Group 1991a, part Site — Keighery, BJ, and Clarke 1999 (Pinnaroo Cemetery), Tingay, Alan & Associates 1991a (Hepburn Heights), Allen *et al.* 1994 (Craigie Open Space))

Quindalup Dunes

Uplands: *Melaleuca systema* and *Acacia lasiocarpa* Open Low Heath; *Eucalyptus gomphocephala* Woodland;

*Banksia prionotes* Woodland

Spearwood Dunes





Uplands — Sands derived from Tamala Limestone: Open Forest to Woodland dominated by *Eucalyptus marginata*, *E. calophylla* or *E. gomphocephala*; Low Woodland to Open Low Woodland dominated by *Banksia attenuata*, *B. menziesii*, *B. prionotes* or *Allocasuarina fraseriana* and combinations of these (these areas may contain scattered emergent *Eucalyptus marginata* or *E. gomphocephala*); *Acacia saligna* Shrubland; *Acacia rostellifera* Shrubland

Uplands — Tamala Limestone: *Eucalyptus decipiens* Low Woodland; *Acacia rostellifera* Shrubland; *Acacia truncata* Shrubland; *Dryandra sessilis* var. *cygnorum* Closed Heath; *Lepidosperma gladiatum* Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Woodland

**Vegetation Condition:** >70% Very Good to Excellent, <30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 235 native taxa, 66 weed taxa (compiled from Allen *et al.* 1994, Foulds 1987, Keighery, GJ, 1991b, Tingay, Alan & Associates 1991a) (estimated >85% of expected flora)

**Significant Flora:** *Sarcosoma bicarinata* (3), *Jacksonia sericea* (3); *Lechenaultia linarioides*, *Ricinocarpus glaucus*, *Callitris preissii* (most northern population on the Plain); typical Tamala Limestone taxa: *Grevillea preissii*, *Diplopeltis huegelii* var. *huegelii*, *Trymalium ledifolium* var. *ledifolium*

**Fauna:** structured surveys for birds (36 species), native mammals (3 species), reptiles (19 species) and amphibians (2 species) (Allen *et al.* 1994, How *et al.* 1996). Significant bird species: category 3 (6) including Grey Shrike-thrush, Weebill, Yellow-rumped and Western Thornbills and Splendid Fairy-wren, and category 4 (2). Significant mammal species: Western Brush Wallaby; Quenda (Friend 1996 D). Significant reptile species: Two-striped Snake (*Simoselaps bimaculatus*) and Half-ringed Snake (*S. semifasciatus*)

**Linkage:** adjacent bushland to the east (Site 407, across freeway); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7); part of Greenways 9, 10 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996); contains Quindalup/Spearwood Dunes System interface; Quindalup Dunes at 9kms from the coast; part Site recommended for conservation by Semeniuk, V&C Research Group (1991a)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Interim List of the Register of the National Estate

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Cemeteries Mechanism; cemetery – subject to boundary review. Part C: Other Government Land Mechanism (see Table 3, Volume 1).

### SHEPHERDS BUSH RESERVE, KINGSLEY

**Boundary Definition:** bushland (part taken to cadastre) boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 39

**Area (ha):** bushland 15.2

**Map no.** 34

**Map sheet series ref. no.** 2034-II NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Joondalup (Kingsley)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### VEGETATION AND FLORA

##### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*24 Northern Spearwood shrublands and woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** limestone ridge, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996, Tingay, Alan & Associates 1991a)

**Structural Units**

Uplands: *Eucalyptus marginata* Open Forest to Woodland; *Eucalyptus gomphocephala* Woodland; *Eucalyptus gomphocephala* Woodland over *Dryandra sessilis* var. *cygnorum* or *Jacksonia furcellata* Shrubland; *Banksia attenuata* and *B. menziesii* Woodland with scattered emergent *Eucalyptus marginata* and *E. gomphocephala*

**Scattered Native Plants:** *Eucalyptus gomphocephala* Woodland

**Vegetation Condition:** >75% Very Good to Good, <25% Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** not known

**Fauna:** not known

**Linkage:** no adjacent bushland

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**BADGERUP LAKE AND ADJACENT BUSHLAND, WANNEROO**

**Boundary Definition:** protected area/bushland (part taken to cadastre)/bushland group boundary (part taken to cadastre) (Areas of bushland within the boundaries of the Site are not accurately mapped.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 327

**Area (ha):** bushland 92.6 (Site also includes open water.)

**Map no.** 28, 29, 34, 35

**Map sheet series ref. no.** 2034-II NW

**Other Names:** not known, part of Wanneroo Wetlands Eastern Chain

**Local Authorities (Suburb):** Shire of Wanneroo (Wanneroo)

**System 6 (1983):** Part M8 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**Spearwood Dunes** (near interface of Bassendean and Spearwood Dunes)

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South (near interface of Bassendean Complex — Central and South and Karrakatta Complex — Central and South)

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands





**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

**Wetland Management Objectives:** Conservation (28.5ha)

**Swan Coastal Plain Lakes EPP:** 8.7ha + 17.6ha = 26.3ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998 (part surveyed from roadside), DEP 1999, EPA and WAWA 1990, Trudgen 1993a)

**Structural Units:** mapping (EPA and WAWA 1990, Trudgen 1993a)

Uplands: *Eucalyptus marginata* Open Forest to Closed Forest; *Banksia attenuata* and *B. menziesii* Low Open Forest; *Banksia attenuata*, *B. menziesii*, *Eucalyptus tottiana* and *Nuytsia floribunda* Low Open Woodland to Low Woodland; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest; *Banksia menziesii* and *Allocasuarina fraseriana* Low Open Woodland to Low Open Forest; *Banksia attenuata*, *B. menziesii* and *B. illicifolia* Low Open Woodland to Low Open Forest; *Stirlingia latifolia*, *Allocasuarina humilis*, *Gompholobium tomentosa* Low Shrubland; *Stirlingia latifolia*, *Hibbertia hypericoides* and *Xanthorrhoea preissii* Shrubland; *Hibbertia racemosa* and *Hakea prostrata* Low Shrubland

Wetlands: *Eucalyptus rudis* Closed Forest; *Melaleuca raphiophylla* Low Closed Forest; *Banksia attenuata*, *B. menziesii*, *Melaleuca preissiana*, *Eucalyptus tottiana* and *Nuytsia floribunda* Low Open Woodland to Low Woodland; *Isolepis nodosa* Closed Sedgeland; *Baumea juncea* Closed Sedgeland; mixed Closed Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** <60% Very Good, >40% Good with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Jacksonia sericea* (3)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south, east and west; part of Greenway 14 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed, Indicative place (AHC 2000 D)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Proposed Parks and Recreation Reservation. Part C: Other Government Land Mechanism. Part D: Rural Complementary Mechanism (see Table 3, Volume 1).

**STARLIGHT GROVE BUSHLAND, GNANGARA/WANGARA**

**Boundary Definition:** bushland (part taken to cadastre)/bushland group boundary (Boundary adjusted after vegetation survey and negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 463

**Area (ha):** bushland 17.9

**Map no.** 35

**Map sheet series ref. no.** 2034-II NW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Wangara, Gnangara)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)



**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes AND/OR**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

**Wetland Management Objectives:** Conservation (0.2ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, from adjacent land holding, DEP 1999)

**Structural Units**

Uplands: *Eucalyptus marginata* Open Forest to Closed Forest; *Banksia attenuata* and *B. menziesii* Low Open Forest

Wetlands: not known

**Vegetation Condition:** Excellent (area greater than Site, Mattiske Consulting Pty Ltd 1997)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north, south, east and west

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Basic Raw Materials Negotiated Planning Solution (see Table 3, Volume 1).

**DECOURCEY WAY BUSHLAND, MARANGAROO**

**Boundary Definition:** protected area/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 328

**Area (ha):** bushland 32.8

**Map no.** 34

**Map sheet series ref. no.** 2034-II NW

**Other Names:** Marangaroo Golf Course

**Local Authorities (Suburb):** Shire of Wanneroo (Marangaroo, Madeley)

**System 6 (1983):** M12 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South



**Floristic Community Types**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20a *Banksia attenuata* woodlands over species-rich dense shrublands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Golf 01))

**Structural Units**

Uplands: *Banksia attenuata* Low Woodland with scattered emergent *Eucalyptus marginata* over species-rich Mixed Low Open Heath

**Vegetation Condition:** >75% Very Good, <25% Good, with areas of severe localised disturbance

**Total Flora:** 56 native taxa, 7 weed taxa (plot-generated list only) (estimated >50% expected flora)

**Significant Flora:** none recorded

**Fauna:** structured survey for birds (28 species), native mammals (1 species), reptiles (13 species) and amphibians (1 species) (How *et al.* 1996). Significant bird species: category 1 (1), category 3 (1) and category 4 (1)

**Linkage:** adjacent bushland/canopy to the east; part of Greenway 10 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** recommended to be declared as an A-class Nature Reserve for the protection of flora and fauna in Gibson *et al.* 1994; recommended for protection in study of City of Wanneroo (Trudgen 1996); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**LANDSDALE ROAD BUSHLAND, LANDSDALE**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 199

**Area (ha):** bushland 15.78

**Map no.** 35

**Map sheet series ref. no.** 2034-II NW

**Other Names:** Landsdale Road Conservation Park

**Local Authorities (Suburb):** Shire of Wanneroo (Darch)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

20a *Banksia attenuata* woodlands over species-rich dense shrublands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)



**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Land01), Landsdale Farm School 1995)

**Structural Units**

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus marginata* over species-rich Mixed Low Open Heath

**Vegetation Condition:** >90% Excellent, <10% Very Good

**Total Flora:** 95 native taxa, 4 weed taxa (compiled from Gibson *et al.* 1994 D, Landsdale Farm School 1995) (estimated >50% expected flora)

**Significant Flora:** *Cyathochaeta equitans* (uncommon on west of the Plain in the PMR)

**Fauna:** structured survey for birds (25 species), native mammals (2 species), reptiles (19 species) and amphibians (2 species) (How *et al.* 1996). Significant bird species: category 1 (1) and category 4 (1). Significant mammal species: Quenda and Western Brush Wallaby. Significant reptile species: Black-striped Snake (*Simoselaps calonotos*). Rich reptile assemblage including Western Blue Tongue (*Tiliqua occipitalis*), Black Monitor (*Varanus tristis*) and a skink (*Morethia lineocellata*)

**Linkage:** adjacent bushland to the north and south; part of Greenway 10 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** recommended to be declared as an A-class Nature Reserve for the protection of flora and fauna in Gibson *et al.* 1994; recommended for protection in study of City of Wanneroo bushland (Trudgen 1996); National Trust of Australia (WA) Classification

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**ERRINA ROAD BUSHLAND, ALEXANDER HEIGHTS**

**Boundary Definition:** bushland (taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 493

**Area (ha):** bushland 8.5

**Map no.** 35

**Map sheet series ref. no.** 2034-II NW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Wanneroo (Alexander Heights)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*20a *Banksia attenuata* woodlands over species-rich dense shrublands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** dune crest, vegetated uplands

**Vegetation and Flora:** limited survey (Clarke and Keighery 1999)





**Structural Units:** mapping (Clarke and Keighery 1999)

Uplands: *Banksia attenuata* and *B. menziesii* Low Woodland with scattered *Eucalyptus marginata* and *Banksia ilicifolia*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** mapping (Clarke and Keighery 1999)

>85% Excellent to Very Good, <15% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 97 native taxa, 7 weed taxa (>70% expected flora, Clarke and Keighery 1999)

**Significant Flora:** *Jacksonia sericea* (3)

**Fauna:** no known information

**Linkage:** adjacent bushland to the south-east (through to Site 201, across road) and north-west (through to Site 199); adjacent to Greenways 10 and 12 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo (Trudgen 1996)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

### WARWICK OPEN SPACE CONSERVATION AREA

**Boundary Definition:** protected area/bushland taken to cadastre boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 202

**Area (ha):** bushland 58.1

**Map no.** 34

**Map sheet series ref. no.** 2034-II NW

**Other Names:** Warwick Open Space, Warwick Bushland

**Local Authorities (Suburb):** City of Joondalup (Warwick)

**System 6 (1983):** M11 part System area bushland, only bushland described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### VEGETATION AND FLORA

##### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

##### Floristic Community Types

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

##### WETLANDS

No wetlands mapped

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Brundrett and Clarke 2000, City of Wanneroo 1995a, Gibson *et al.* 1994 (Wari 01–02))

##### Structural Units

Uplands: *Eucalyptus gomphocephala* Woodland over *Banksia attenuata* Low Open Woodland; *Eucalyptus marginata* and *Banksia attenuata* Woodland to Open Woodland; *Eucalyptus marginata* Open Woodland; *Banksia attenuata* and *Eucalyptus marginata* Low Open Woodland; *Xanthorrhoea preissii*, *Grevillea vestita* and *Acacia pulchella* Shrubland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Mapping (Brundrett and Clarke 2000)

>85% Very Good to Excellent, <15% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 181 native taxa, 94 weed taxa (compiled from Brundrett and Clarke 2000, Gibson *et al.* 1994 D and City of Wanneroo 1995a) (estimated >90% expected flora)

**Significant Flora:** *Jacksonia sericea* (3); Brundrett and Clarke 2000 — *Diplolaena dampieri*, *Glischrocaryon aureum*

**Fauna:** structured survey for birds (23 species) and reptiles (12 species) (How *et al.* 1996). Significant bird species: category 1 (1), category 3 (2), category 4 (1). Breeding site for Brown Goshawk, Rainbow Bee-eater, Grey Butcherbird and several hollow-nesting species. The gecko *Diplodactylus polyophthalmus* is rare elsewhere on the Swan Coastal Plain. Important site for Western Jewel Butterfly and Sciron Skipper (Williams *et al.* pers. comm.)

**Linkage:** no adjacent bushland; part of Greenways 33, 2 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

## KOONDOOLA REGIONAL BUSHLAND

**Boundary Definition:** protected area boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 201

**Area (ha):** bushland 123.5

**Map no.** 35

**Map sheet series ref. no.** 2034-II NE, 2034-II NW

**Other Names:** Koondoola Open Space

**Local Authorities (Suburb):** Shire of Wanneroo (Koondoola)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

###### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

###### Supergroup 2: Seasonal Wetlands

\*11 Wet forests and woodlands

###### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

20a *Banksia attenuata* woodlands over species-rich dense shrublands

##### WETLANDS

**Wetland Types:** sumpland

###### Natural Wetland Groups

###### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

###### Bassendean Dunes

Jandakot (B.3)

**Wetland Management Objectives:** Conservation (2.3ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified





**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Endangered (floristic community type 20a)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** tall dune, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (City of Wanneroo 1995b, Coalition for Wanneroo's Environment 1993, Gibson *et al.* 1994 (Koon 01–02), Wake 1995)

**Structural Units:** mapping (City of Wanneroo 1995b)

Uplands: *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland to Low Open Woodland with scattered emergent *Eucalyptus marginata*; *Eremaea pauciflora*, *Melaleuca scabra* and *Leocopogon conostephioides* Shrubland

Wetlands: *Eucalyptus rudis* and *Melaleuca preissiana* Woodland; *Astartea* aff. *fascicularis* Heath over *Baumea articulata* and *Juncus pallidus* Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** mapping (City of Wanneroo 1995b)

>75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 175 native taxa, 17 weed taxa (Wake 1995) (estimated >70% expected flora)

**Significant Flora:** *Jacksonia sericea* (3); *Verticordia drummondii* (poorly conserved in the PMR, E. George pers. comm.), *Verticordia nitens* (most western occurrence in the PMR)

**Fauna:** structured survey for birds (34 species), native mammals (2 species), reptiles (21 species) and amphibians (Crypto Environmental Surveyors 1996). Significant bird species: category 1 (1) i.e. Carnaby's Cockatoo, category 3 (2) i.e. Western Thornbill and Splendid Fairy-wren, and category 4 (6). Significant mammal species: Quenda and Western Brush Wallaby. Important site for Western Jewel Butterfly and Sciron Skipper (Williams *et al.* pers. comm. 1996).

**Linkage:** adjacent bushland to the south (Site 385, across road) and west; part of Greenways 12, 13 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** recommended to be declared as an A-class Nature Reserve for the protection of flora and fauna in Gibson *et al.* (1994); recommended for protection in study of City of Wanneroo (Trudgen 1996); Threatened or Poorly Reserved Plant Community (EPA 1994 GIS); National Trust of Australia (WA) Classification

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed; Indicative place (AHC 2000 D); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**STAR SWAMP RESERVE AND ADJACENT BUSHLAND, NORTH BEACH/WATERMAN**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 204

**Area (ha):** bushland 94.4 (Site also includes open water.)

**Map no.** 33, 39

**Map sheet series ref. no.** 2034–II NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Stirling (Waterman, North Beach)

**System 6 (1983):** M35 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (QtI: LS1)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)



**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

24 Northern Spearwood shrublands and woodlands

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Spearwood Dunes**

Balcatta (S.2)

**Wetland Management Objectives:** Conservation (3.1ha)

**Swan Coastal Plain Lakes EPP:** 3.1ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** limestone ridge, open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (part Site — DEP 1996 (Star 01–03), EPA and WAWA 1990); detailed survey (Bell *et al.* 1979, Loneragan *et al.* 1984, Loneragan 1987, Pigott 1994, part Site — Watson and Bell 1981)

**Structural Units:** mapping (Bell *et al.* 1979, Loneragan 1987, EPA and WAWA 1990, DEP 1996 (Star 01–03))

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Tall Open Forest to Open Woodland; *Eucalyptus marginata* and *E. gomphocephala* Open Forest to Woodland (in NW corner); *Banksia attenuata*, *B. menziesii*, *Allocasuarina fraseriana* Low Open Forest to Low Open Woodland

Uplands — Tamala Limestone: *Melaleuca huegelii* and *Dryandra sessilis* var. *cygnorum* Open Heath to Low Open Heath

Wetlands: *Melaleuca raphiophylla* Low Closed Forest

**Scattered Native Plants:** (canopy only) not assessed (probably <10%)

**Vegetation Condition:** >50% Very Good to Good, <50% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 247 native taxa, 105 weed taxa (Loneragan 1987, plus P. Pigott and D. Pike pers. comm. and part Site records DEP 1996 D (Star 01–03)) (estimated >90% expected flora)

**Significant Flora:** *Jacksonia sericea* (3), *Conostephium minus* (4); *Glischrocaryon aureum*, *Pimelea calcicola*, *Ricinocarpos glaucus*, *Lechenaultia linarioides*, *Astroloma microcalyx*, *Trachymene coerulea*, *Trichocline spathulata*; typical Tamala Limestone taxa — *Grevillea preissii*, *Trymalium ledifolium* var. *ledifolium*, *Melaleuca huegelii*, *Petrophile serruriae* subsp. nov. (GJK 11421), *Pimelea calcicola* (pink)

**Fauna:** multiple surveys for birds (66 species), reptiles (11 species) and amphibians (4 species) (Loneragan 1987; RAOU 1996 D, 21 visits). Good assemblage of small insectivores including Splendid Fairy-wren, White-winged Fairy-wren, Weebill, Broad-tailed, Western and Yellow-rumped Thornbills. Significant bird species: category 1 (1), category 3 (9) and category 4 (4). Significant reptile species: Bardick (*Echiopsis curtus*), Carpet Python (*Morelia spilota*). High number of Jewel Beetles (Buprestidae) (Loneragan 1987)

**Linkage:** adjacent bushland to the south (across road); part of Greenways 3, 9, 33 (Tingay, Alan & Associates 1998a); part of fragmented and potential bushland/wetland linkages (Part A, Map 7)

**Other Special Attributes:** The National Trust of Australia (WA) Classification; noted as ‘a valuable ecological remnant of...the Spearwood Dune Systems...also an important link in a series of wetland Nature Reserves’ (Loneragan 1987)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate (Star Swamp Reserve); subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values  
**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**CARINE SWAMPS, CARINE**

**Boundary Definition:** protected area/bushland/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 203 **Area (ha):** bushland 33.1 (Site also includes open water.)  
**Map no.** 34, 40 **Map sheet series ref. no.** 2034-II NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Stirling (Carine)

**System 6 (1983):** M37 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)  
 Tamala Limestone (Qtl: LS1)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

**WETLANDS**

**Wetland Types:** sumpland, river, artificial channel

**Natural Wetland Groups**

**Spearwood Dunes**

Balcatta (S.2)

**Wetland Management Objectives:** Conservation (29.55ha, 235.8m)

**Swan Coastal Plain Lakes EPP:** 22.4ha + 4.8ha = 27.2ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (Dames and Moore 1988a, EPA and WAWA 1990)

**Structural Units:** mapping (Dames and Moore 1988a, EPA and WAWA 1990)

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Forest

Wetlands: *Melaleuca* sp. Low Closed Forest to Low Woodland; *Baumea* sp. Closed Sedgeland; mixed Closed Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >75% Good to Very Good, <25% Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded



**Fauna:** multiple survey for birds (90 species) (RAOU 1996 D, 25 visits) and amphibians (6 species) (Dames and Moore 1988a). Good assemblage of ducks including Hardhead, Australasian Shoveler, Blue-billed and Musk, and small insectivores including Splendid and White-winged Fairy-wrens, Weebill, Broad-tailed, Western and Yellow-rumped Thornbills. Significant bird species: category 1 (2), category 2 (2), category 3 (12) and category 4 (4). Long-necked Tortoise (*Chelodina oblonga*) (Dames and Moore 1988a)

**Linkage:** adjacent bushland/canopy to the north; part of Greenways 33, 38, 8 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

#### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

### **LAKE GWELUP RESERVE, GWELUP**

**Boundary Definition:** protected area boundary

#### **SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 212

**Area (ha):** bushland 19.9 (Site also includes open water.)

**Map no.** 40

**Map sheet series ref. no.** 2034-II NW, 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Stirling (Gwelup, Karrinyup)

**System 6 (1983):** M39 part System area bushland and part scattered native plants (canopy), all vegetation described

#### **SECTION 2: REGIONAL INFORMATION**

##### **LANDFORMS AND SOILS**

##### **Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qt: LS1)

##### **Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

##### **VEGETATION AND FLORA**

##### **Vegetation Complexes**

##### **Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

##### **Wetlands**

Herdsmen Complex

**Floristic Community Types:** not sampled, types not inferred

##### **Supergroup 2: Seasonal Wetlands**

##### **Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

##### **WETLANDS**

**Wetland Types:** sumpland, dampland, lake, artificial channel

##### **Natural Wetland Groups**

##### **Spearwood Dunes**

Balcatta (S.2)

**Wetland Management Objectives:** Conservation (37.9ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 30.8ha

##### **THREATENED ECOLOGICAL COMMUNITIES**

Not determined





### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990); detailed survey (Halpern Glick Maunsell 1992)

**Structural Units:** mapping (EPA and WAWA 1990, Halpern Glick Maunsell 1992)

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Low Woodland to Open Forest; *Eucalyptus calophylla* Open Woodland; *Eucalyptus gomphocephala* and *E. calophylla* Open Woodland; *Acacia saligna* Tall Open Shrubland to Open Tall Scrub

Wetlands: *Eucalyptus rudis* Woodland to Open Forest, associated with *Eucalyptus calophylla* and *Acacia saligna*; *Melaleuca raphiophylla* Low Woodland

**Scattered Native Plants:** *Eucalyptus calophylla*, *E. rudis* and *Melaleuca raphiophylla* Low Open Woodland; *Eucalyptus gomphocephala* and *E. calophylla* Open Woodland

**Vegetation Condition:** >20% Excellent to Very Good, <45% Good to Degraded, >35% Completely Degraded, with areas of severe localised disturbance (Halpern Glick Maunsell 1992)

**Total Flora:** 77 native taxa (Halpern Glick Maunsell 1992) (>50% expected flora)

**Significant Flora:** none recorded

**Fauna:** multiple surveys for birds (111 species) (RAOU 1996 D, 16 visits; Shannon 1992 in Halpern Glick Maunsell 1992). Good assemblage of ducks including Hardhead, Australasian Shoveler, Blue-billed, Pink-eared and Musk. Significant bird species: category 1 (1), category 3 (12) and category 4 (6)

**Linkage:** adjacent bushland to the north; part of Greenways 7, 8 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

## REID HIGHWAY BUSHLAND, MIRRABOOKA/MALAGA

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 385

**Area (ha):** bushland 96.1

**Map no.** 35, 41

**Map sheet series ref. no.** 2034-II NE, 2034-II NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Stirling (Mirrabooka, Malaga), Shire of Swan (Malaga)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Spearwood Dunes

Karrakatta Complex — Central and South



**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2:** Seasonal Wetlands

**Supergroup 3:** Uplands centred on Bassendean Dunes and Dandaragan Plateau AND/OR

**Supergroup 4:** Uplands centred on Spearwood and Quindalup Dunes

#### WETLANDS

**Wetland Types:** sumpland, dampland

#### Natural Wetland Groups

**Bassendean Dunes**

Jandakot (B.3)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995; part Site — DEP 1996)

#### Structural Units

Uplands: Low Woodland dominated by *Banksia attenuata* and *B. menziesii* with scattered *Eucalyptus totidiana*

Wetlands: not known

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** *Gyrostemon ramulosus* (uncommon in the PMR)

**Fauna:** not known

**Linkage:** adjacent bushland to the north (Site 201, across road) and south (across road); part of Greenways 13, 38 (Tingay, Alan & Associates 1998a); part of fragmented and potential bushland/wetland linkages (Part A, Map 7)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

## COTTONWOOD CRESCENT, DIANELLA

**Boundary Definition:** bushland (part taken to cadastre) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 43

**Area (ha):** bushland 11.3

**Map no.** 41

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Stirling (Dianella)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — Central and South

##### Floristic Community Types

**Supergroup 3:** Uplands centred on Bassendean Dunes and Dandaragan Plateau

23a Central *Banksia attenuata* — *B. menziesii* woodlands





**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Tele 01))

**Structural Units**

Uplands: *Banksia menziesii* and *B. attenuata* Low Open Woodland to Woodland with scattered *Banksia ilicifolia*, *Allocasuarina fraseriana* and *Nuytsia floribunda*; *Allocasuarina humilis*, *Jacksonia densiflora* and *Eremaea pauciflora* Open Heath

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 73 native taxa, 7 weed taxa (plot-generated list only and adjacent records, estimated >50% expected flora)

**Significant Flora:** *Cyathochaeta equitans* (most western population in the PMR)

**Fauna:** structured survey for birds (27 species), native mammals (1 species), reptiles (15 species) and amphibians (2 species) (How *et al.* 1996). Significant bird species: category 1 (1) and category 4 (1). Significant mammal species: Western Grey Kangaroo. Significant reptile species: a skink (*Morethia lineoocellata*)

**Linkage:** adjacent bushland to the south

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Diversity, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve. Part B: Other Government Lands Mechanism. Part C: Urban Negotiated Planning Solution (see Table 3, Volume 1).

**HERDSMAN LAKE**

**Boundary Definition:** protected area/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 281

**Area (ha):** bushland 22.6 (Site also includes open water.)

**Map no.** 40, 46

**Map sheet series ref. no.** 2034-II SW

**Other Names:** part of Herdsman Regional Park

**Local Authorities (Suburb):** City of Stirling (Herdsman, Churchlands, Glendalough)

**Includes CALM Managed Land:** Reserve 31906 (Environmental Education and Conservation of Flora and Fauna)

**System 6 (1983):** M43 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Wetlands**

Herdsman Complex

**Floristic Community Types:** not sampled, insufficient vegetation

**WETLANDS**

**Wetland Types:** lake, artificial channel

**Natural Wetland Groups**

**Spearwood Dunes**

Balcatta (S.2)



**Wetland Management Objectives:** Conservation (307.5ha)

**Swan Coastal Plain Lakes EPP:** 252.3ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora**

**Structural Units:** mapping (EPA and WAWA 1990)

Wetlands: *Eucalyptus rudis* Woodland; *Melaleuca* sp. Low Woodland; *Melaleuca raphiophylla* Low Open Forest, *Baumea articulata* Sedgeland

**Scattered Native Plants:** *Eucalyptus rudis* Woodland and *Melaleuca* sp. Low Woodland — regionally significant vegetation recognised as being in the area of Site in need of protection

**Vegetation Condition:** <10% Good, >90% Degraded to Completely Degraded

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** multiple survey for birds (107 species) (RAOU 1996 D, 51 visits), limited survey for reptiles (7 species) (J. Dell pers. comm.). Good assemblage of ducks and other waterfowl including Hardhead, Australasian Shoveler, Blue-billed, Pink-eared and Musk Ducks, and Dusky Moorhen. Important feeding site for birds of prey, including Swamp Harrier, and aerial insectivores, including Tree Martin and Welcome Swallow (J. Dell pers. comm.).

Significant bird species: category 1 (2), category 2 (6), category 3 (9), and category 4 (4). Significant reptile species: Mourning Skink (*Egernia luctuosa*). Important research and teaching site

**Linkage:** no adjacent bushland; part of Greenways 23, 30 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** to become the 'Herdsman Lake Regional Park' (State Government Cabinet Minute 5 May 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; The care, control and management of this area for conservation purposes within Herdsman Lake Regional Park is endorsed (see Table 3, Volume 1).

**BOLD PARK AND ADJACENT BUSHLAND, CITY BEACH**

**Boundary Definition:** protected area/management/bushland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Boundary adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 312

**Area (ha):** bushland 361.7 (Site also includes open water.)

**Map no.** 45, 46

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** Town of Cambridge (City Beach, Floreat), City of Nedlands (Mt Claremont)

**System 6 (1983):** M47 part System area bushland and part scattered native plants (canopy), all vegetation described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (QtI: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S2)





**Wetlands (within the Quindalup/Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes** (near the interface with the Quindalup Complex)

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

S7 Northern woodlands to forests over tall sedgeland along side permanent wetlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

24 Northern Spearwood shrublands and woodlands

25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

27 Species-poor mallees and shrublands on limestone

29b *Acacia* shrublands on taller dunes

30a2 Woodlands and shrublands on Holocene dunes

S11 Northern *Acacia rostellifera* — *Melaleuca acerosa* shrublands

**WETLANDS**

**Wetland Types:** lake, sumpland

**Natural Wetland Groups**

**Spearwood Dunes**

Balcatta (S.2)

**Wetland Management Objectives:** Conservation (12ha)

**Swan Coastal Plain Lakes EPP:** 18.2ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** coastal dunes, inland dunes, limestone ridge, open water, vegetated wetlands

**Vegetation and Flora:** limited survey (ECOS Consulting Pty Ltd 1999, part Site — Clarke and Keighery 2000e, Dames and Moore 1986, Gibson *et al.* 1994 (plots Bold 01–04), Griffin 1993, Griffin 1994 (plots SW 01–11), Keighery, GJ, 1996 D (plots M46 01–02)); detailed survey (part Site — Keighery, GJ, *et al.* 1990, Keighery, GJ, and Keighery 1993c, Kinhill Engineers Pty Ltd 1987, Mitchell McCotter and Ecoscape 1993)

**Structural Units:** mapping (ECOS Consulting Pty Ltd 1999, Keighery, GJ, *et al.* 1990, Mitchell McCotter and Ecoscape 1993, Kinhill Engineers Pty Ltd 1987)

Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Forest to Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus decipiens* Low Woodland; *Eucalyptus gomphocephala* and *E. marginata* Woodland; *Eucalyptus marginata* and *E. calophylla* Woodland; Closed Low Heaths and Closed to Open Heaths dominated by *Acacia truncata*, *Melaleuca systema*, *Calothamnus quadrifidus*, *Allocasuarina humilis* and combinations of these

Uplands — Tamala Limestone: Closed Low Heaths, Closed to Open Heaths and Tall Scrub dominated by *Acacia truncata*, *Melaleuca systema*, *Calothamnus quadrifidus*, *Dryandra sessilis* var. *cygnorum*, *Grevillea crithmifolia*, *Acacia lasiocarpa*, *A. xanthina* and combinations of these; *Eucalyptus foecunda* Closed Shrub Mallee

Wetlands: *Eucalyptus rudis* Woodland; *Bolboschoenus caldwellii* Sedgeland; Mixed Herblands (on dry lake bed)

Quindalup Dunes

Uplands — Safety Bay Sands: Oldest dunes — Open Heaths dominated by *Melaleuca systema*, *Acacia rostellifera*, *Chamelaucium uncinatum*, *Calothamnus quadrifidus*, *Olearia axillaris*, *Acacia xanthina* and combinations of these over Herblands dominated by *Lomandra* sp.; *Agonis flexuosa* Low Closed Forest

**Scattered Native Plants:** *Eucalyptus gomphocephala* Woodland; *Eucalyptus marginata* and *E. calophylla* Woodland — regionally significant vegetation recognised as being in the area of Site in need of protection

**Vegetation Condition:** >60% Very Good to Excellent, <40% Good to Degraded

**Total Flora:** 268 native taxa, 134 weed taxa (compilation by Gibson *et al.* 1994 D, Keighery, GJ, *et al.* 1990, Keighery, GJ, and Keighery 1993c, Mitchell McCotter and Ecoscape, 1993) (estimated 90% expected flora)

**Significant Flora:** *Beyeria cygnorum* (2), *Jacksonia sericea* (3), *Hibbertia spicata* subsp. *leptotheca* (3), *Stylidium maritimum* (3); Keighery, GJ, *et al.* 1990 — most southern populations of *Chamelaucium uncinatum*, *Melaleuca cardiophylla*, *Allocasuarina lehmanniana*, *Gyrostemon ramulosus* (uncommon on the



Plain, poorly reserved), most northern population of *Agonis flexuosa*; *Fimbristylis vittata* (uncommon on the Plain, a species of the dry lake bed community); typical Tamala Limestone taxa — *Astroloma microcalyx*, *Grevillea crithmifolia*, *Grevillea preissii*, *Beyeria cygnorum*, *Melaleuca cardiophylla*, *Trymalium ledifolium* var. *ledifolium*, *Diplopeltis huegelii* var. *huegelii*, *Stylidium junceum* (limestone variant), *Pimelea calcicola*

**Fauna:** structured surveys for birds (106 species), native mammals (1 species), reptiles (33 species) and amphibians (3 species) (How and Dell 1990, How *et al.* 1996). Significant populations of Blue-billed Duck, Musk Duck, Hardhead, Splendid and Variegated Fairy-wrens and a large assemblage of honeyeaters. Significant bird species: category 1 (1), category 2 (6), category 3 (13) and category 4 (8). Many burrowing and fossorial reptiles including five species of snake

**Linkage:** adjacent bushland to the south (Site 315, part across road); part of Greenways 18, 19, 20 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Quindalup/Spearwood Dune System interface, significant fauna habitat, rich in reptiles and birds; National Trust of Australia (WA) Classification

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Indicative place (AHC 2000 D); Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing purpose, care, control and management of this Site is endorsed (see Table 3, Volume 1).

## UNDERWOOD AVENUE BUSHLAND, SHENTON PARK

**Boundary Definition:** bushland (part taken to cadastre) boundary (Boundary proposed to be adjusted after vegetation survey and negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 119

**Area (ha):** bushland 31.5 (Proposed boundary circumscribes 8.2ha bushland.)

**Map no.** 46

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Nedlands (Shenton Park)

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

##### VEGETATION AND FLORA

##### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

##### WETLANDS

No wetlands mapped

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** tall dune, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, Tingay, Alan & Associates 1999)





**Structural Units**

Uplands: Woodland dominated by *Eucalyptus marginata* or *E. gomphocephala* over *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland; Woodland dominated by *Eucalyptus marginata* or *E. calophylla* over *Banksia prionotes* Low Woodland; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland generally with scattered emergent *Eucalyptus marginata* or *E. gomphocephala* or, rarely, *Eucalyptus calophylla*

**Vegetation Condition:** >50% Very Good, <50% Good to Degraded, with areas of severe localised disturbance

**Significant Flora:** *Jacksonia sericea* (3) (Tingay, Alan & Associates 1999)

**Fauna:** structured survey for birds (37 species), reptiles (16 species) and amphibians (3 species) (P. Berry pers. comm.). Significant bird species: category 1 (1), category 3 (3) and category 4 (3)

**Linkage:** adjacent bushland/canopy to the south; part of Greenway 19 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Urban Negotiated Planning Solution (see Table 3, Volume 1).

**SHENTON BUSHLAND, SHENTON PARK**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 218

**Area (ha):** bushland 19.7

**Map no.** 46

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Nedlands (Karrakatta)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, Gibson *et al.* 1994 (Shent 01)); detailed survey (Ecoscape 1994a)

**Structural Units**

Uplands: *Eucalyptus marginata* Woodland over *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland with scattered emergent *Eucalyptus marginata* and with occasional emergent *E. gomphocephala*

**Scattered Native Plants:** from above communities — regionally significant vegetation recognised as being in the area of Site in need of protection

**Vegetation Condition:** >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance



**Total Flora:** 109 native taxa, 40 weed taxa (estimated >90% expected flora, Wildflower Society and CALM in Ecoscape 1994a)

**Significant Flora:** *Jacksonia sericea* (3)

**Fauna:** structured survey for birds (43 species), reptiles (17 species) and amphibians (3 species) (O. Berry and P. Berry pers. comm.). Significant bird species: category 1 (1), category 3 (3) and category 4 (3). Rich reptile assemblage for the size of reserve. Significant reptile species: Gould's Goanna (*Varanus gouldii*)

**Linkage:** adjacent bushland/canopy to the north, south, east and west; part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** National Trust of Australia (WA) Classification

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

## KINGS PARK

**Boundary Definition:** protected area boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 317

**Area (ha):** bushland 320.8

**Map no.** 46, 47

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Perth (West Perth)

**System 6 (1983):** M49 part System area bushland and part scattered native plants (canopy), all vegetation described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qha: S14) (not naturally vegetated)

###### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — Central and South

###### Marine (Lagoonal and Estuarine) Deposits

Vasse Complex (not vegetated)

**Floristic Community Types:** \*not sampled, type inferred

###### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*27 Species-poor mallees and shrublands on limestone (scarp)

28 Spearwood *Banksia attenuata* or *B. attenuata*—*Eucalyptus* woodlands

##### WETLANDS

**Wetland Types:** artificial lake

**Swan Coastal Plain Lakes EPP:** none identified

##### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

#### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** river — limestone cliff, vegetated uplands





**Vegetation and Flora:** limited survey (Anon. 1993, Beard 1967, Kings Park and Botanic Garden 1995, part Site — Gibson *et al.* 1994 (King 01–02), Main and Serventy 1957, Mattiske EM & Associates 1987); detailed survey (part Site — Baird 1977, Bennett 1988, 1995)

**Structural Units:** mapping (Anon. 1993, Bennett 1988, Mattiske EM and Associates 1987)

Uplands — Sands derived from Tamala Limestone: *Eucalyptus marginata* Open Forest to Woodland with *Banksia menziesii* and *Xanthorrhoea preissii*; *Eucalyptus gomphocephala*, *E. marginata*, *E. calophylla* Woodland with *Banksia grandis* and *Hibbertia hypericoides*; *Eucalyptus marginata*, *Banksia ilicifolia* Open Forest to Woodland with *Xanthorrhoea preissii*, *Mesomelaena pseudostygia*; *Eucalyptus gomphocephala* Open Woodland; all of these structural units have eucalypts with *Allocasuarina fraseriana*, *Banksia attenuata* and at least one other *Banksia* species

Uplands — Tamala Limestone: *Melaleuca huegelii* Mixed Closed Heath with *Grevillea preissii* and *Templetonia retusa*

**Scattered Native Plants:** *Eucalyptus gomphocephala*, *E. calophylla*, *E. marginata* Open Forest to Woodland; 10 — 20% of Park

**Vegetation Condition:** >15% Excellent, <85% Very Good to Good, with small areas of severe localised disturbance

**Total Flora:** 293 native taxa, 172 weed taxa (estimated >95% expected flora) (Bennett 1995)

**Significant Flora:** *Acacia benthamii* (2), *Lasiopetalum membranaceum* (2), *Jacksonia sericea* (3), *Dodonaea hackettiana* (4); *Callitris preissii*, *Conospermum triplinervium*, *Gnephosis angianthoides* (= *Calocephalus angianthoides*, not recently recorded, probably associated with sandy flats beside the river, see Site 368), *Acacia alata* var. *tetrantha*, *Trachymene coerulea*, *Astroloma macrocalyx*, *Ricinocarpos glaucus*, *Lechenaultia linarioides*, *Grevillea preissii*, *Trymalium ledifolium* var. *ledifolium*, *Glischrocaryon aureum*; rare or uncommon on coastal plain in PMR — *Pterostylis picta* (only occurrence in PMR), *Caladenia attingens* subsp. *attingens*, *Amyema miquelii* (uncommon on the Plain), *Cartonema philydroides* and the fern *Anogramma leptophylla*; typical Tamala Limestone taxa — *Melaleuca huegelii*, *Grevillea preissii*, *Trymalium ledifolium* var. *ledifolium*, *Caladenia longicauda* subsp. *calcigena* ms, *Petrophile serruriae* subsp. nov. (GJK 11421)

**Fauna:** structured surveys for birds (61 species) (Western Australian Museum 1996 D and others (e.g. Recher and Serventy 1991)), native mammals (1 species) (How *et al.* 1993), and reptiles (25 species) and amphibians (4 species) (How and Dell 1994). Significant birds: Carnaby's Cockatoo, Weebill, Broad-tailed, Western and Yellow-rumped Thornbills and Australian Sittella. Good assemblage of nectar feeders. Significant bird species: category 1 (1), category 3 (8) and category 4 (8). Significant reptile species: a skink (*Cyclodomorphus celatus*). Important research and teaching site for assessment of faunal changes

**Linkage:** no adjacent bushland; part of Greenways 19, 24 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

### LAKE CLAREMONT, CLAREMONT/SWANBOURNE

**Boundary Definition:** protected area boundary (native vegetation after EPA and WAWA 1990; Lantzke *et al.* 1989)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 220

**Area (ha):** bushland 0 (Site also includes open water; note comment under Boundary Definition.)

**Map no.** 45, 46

**Map sheet series ref. no.** 2034-II SW

**Other Names:** Butlers Swamp

**Local Authorities (Suburb):** Town of Claremont (Claremont, Swanbourne)



**System 6 (1983):** M48 part System area bushland and part scattered native plants (canopy), all vegetation described

## **SECTION 2: REGIONAL INFORMATION**

### **LANDFORMS AND SOILS**

#### **Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qt: LS1)

#### **Quindalup Dunes (Holocene Dunes)**

Safety Bay Sands (Qhs: S2)

#### **Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

### **VEGETATION AND FLORA**

#### **Vegetation Complexes**

##### **Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** not sampled, insufficient vegetation

### **WETLANDS**

**Wetland Types:** sumpland

#### **Natural Wetland Groups**

##### **Spearwood Dunes**

Balcatta (S.2)

**Wetland Management Objectives:** Conservation (16.3ha)

**Swan Coastal Plain Lakes EPP:** 15.8ha

### **THREATENED ECOLOGICAL COMMUNITIES**

Not determined

## **SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora:** limited survey (EPA and WAWA 1990)

**Structural Units:** mapping (EPA and WAWA 1990, Lantzke *et al.* 1989)

Wetlands: *Melaleuca raphiophylla* Low Closed Forest

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland to Open Forest; *Eucalyptus gomphocephala* and *Agonis flexuosa* Open Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >25% Good, <75% Degraded to Completely Degraded (Lantzke *et al.* 1989)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** multiple surveys for birds (57 species) (Lantzke *et al.* 1989; RAOU 1996 D, 6 visits). Good assemblage of ducks including Hardhead, Australasian Shoveler, Blue-billed, Pink-eared and Musk and several JAMBA/CAMBA species. Significant bird species: category 1 (1), category 2 (4) category 3 (6) and category 4 (2)

**Linkage:** no adjacent bushland

## **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).



## HARRY SANDON PARK, ATTADALE

**Boundary Definition:** bushland (part taken to cadastre and zoning) boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 226

**Area (ha):** bushland 4.2

**Map no.** 52

**Map sheet series ref. no.** 2033-I NW

**Other names:** not known

**Local Authorities (Suburb):** City of Melville (Attadale)

**System 6 (1983):** M63 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qha: Sm1)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — Central and South

##### Floristic Community Types

###### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Sand 01))

##### Structural Units

Uplands: *Banksia menziesii* and *B. attenuata* Low Open Forest with scattered *Eucalyptus calophylla*

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 58 native taxa (plot-generated list only) (estimated <50% expected flora)

**Significant Flora:** *Conospermum triplinervium*

**Fauna:** limited survey for birds (15 species) (S. Cavicchiolo pers. comm.). Significant bird species: category 1 (1) and category 4 (1)

**Linkage:** no adjacent bushland

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of Reserve NO 30697 is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

## WIRELESS HILL PARK, ARDROSS

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 336

**Area (ha):** bushland 35.2

**Map no.** 52

**Map sheet series ref. no.** 2033-I NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Melville (Ardross, Alfred Cove)

**System 6 (1983):** M64 Part System area bushland, only bushland described



**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Wire 01–02)); detailed survey (Smith, V, 1985b, Wildflower Society of WA (Inc.) Murdoch Branch 1995 D)

**Structural Units:** mapping (Smith, V, 1985b)

Uplands: *Eucalyptus calophylla* Woodland over *E. marginata*, *Banksia attenuata* and *B. menziesii* Low Woodland; *Xanthorrhoea preissii*, *Macrozamia riedlei* and *Stirlingia latifolia* Open Heath to Shrubland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >70% Very Good to Good, <30% Degraded, with areas of severe localised disturbance

**Total Flora:** 180 native taxa, 21 weed taxa (Wildflower Society of WA (Inc.) Murdoch Branch 1995 D) (estimated >90% expected flora)

**Significant Flora:** *Jacksonia sericea* (3); *Conospermum triplinervium*, *Astroloma macrocalyx*

**Fauna:** limited survey for reptiles (10 species) (Smith, V, 1985b). Significant reptile species: gecko (*Diplodactylus alboguttatus*)

**Linkage:** no adjacent bushland; part of Greenway 24, 82 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** National Trust of Australia (WA) Classification

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management of this Site is endorsed (see Table 3, Volume 1).

**SIR FREDERICK SAMSON PARK, SAMSON**

**Boundary Definition:** bushland taken to cadastre and zoning boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 59

**Area (ha):** bushland 12.6

**Map no.** 52

**Map sheet series ref. no.** 2033–I NW

**Other Names:** Submission Area 174

**Local Authorities (Suburb):** City of Fremantle (Samson)

**System 6 (1983):** M72 Part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**



**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (City of Fremantle 1989, 1995, DEP 1996 (Sams 01), Submission No. 174)

**Structural Units:** mapping (City of Fremantle 1995)

Uplands: Open Forest to Woodland dominated by *Eucalyptus calophylla*, *E. marginata* and *E. gomphocephala* and combinations of these generally over *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland; *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Macrozamia riedlei* Low Shrubland; *Anigozanthos manglesii* and *Thysanotus* species Very Open Herbland

**Scattered Native Plants:** Open Forest to Woodland dominated by *Eucalyptus calophylla*, *E. marginata* and *E. gomphocephala* and combinations of these — regionally significant vegetation recognised as being included in the area of the Site in need of protection

**Vegetation Condition:** 80% Very Good, 20% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 100 native taxa, 55 weed taxa (Appleby 1997 from City of Fremantle 1989, M. O'Byrne pers. comm., M. Appleby and DEP 1996) (estimated >80% expected flora)

**Significant Flora:** none recorded

**Fauna:** limited surveys for birds (39 species), native mammals (1 species) and reptiles (8 species) (City of Fremantle 1989, T. Baird pers. comm.). Significant bird species: category 1 (2), category 3 (3) and category 4 (3)

**Linkage:** no adjacent bushland

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**MANNING LAKE AND ADJACENT BUSHLAND, HAMILTON HILL/SPEARWOOD**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 247

**Area (ha):** bushland 50.6 (Site also includes open water.)

**Map no.** 51, 57, 58

**Map sheet series ref. no.** 2033-I NW

**Other Names:** Part Submission Area 336, part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Cockburn (Spearwood, Hamilton Hill)

**System 6 (1983):** Part M92 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Lagoonal and Estuarine Deposits (within the Spearwood Dunes)**

Lagoonal and Estuarine Deposits (Vasse) (Qhg: Sm2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**



\*17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands (effectively most northern occurrence)

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

**WETLANDS**

**Wetland Types:** lake

**Natural Wetland Groups**

**Spearwood Dunes**

Coogee (S.3)

**Wetland Management Objectives:** Conservation (10.8ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 10.1ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands, limestone ridge

**Vegetation and Flora:** limited survey (DEP 1999, EPA AND WAWA 1990, Keighery, BJ, 1996a, Semeniuk, V&C Research Group 1997a, Weston 1993)

**Structural Units:** mapping (EPA AND WAWA 1990, Semeniuk, V&C Research Group 1997a)

Uplands — Tamala Limestone: *Acacia rostellifera* Closed Scrub; *Melaleuca huegelii* Shrubland; Closed Heaths dominated by *Dryandra sessilis* var. *cygnorum* or *Melaleuca systena*; Mixed Low Shrubland; *Alyogyne huegelii* var. *glabrescens* Shrubland

Wetlands: *Melaleuca raphiophylla* Low Open Forest; *Acacia saligna* Low Open Forest to Low Woodland;

Halophyte Low Shrubland, Closed Sedgeland to Sedgeland dominated by *Gahnia trifida*, *Scirpus* sp. or *Juncus kraussii*

**Scattered Native Plants:** *Eucalyptus decipiens* Tree Mallee; *Eucalyptus gomphocephala* Open Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >50% Good, <50% Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** 36 native taxa, 17 weed taxa (Keighery, BJ, 1996a, Semeniuk, V&C Research Group 1997a) (estimated <50% expected flora)

**Significant Flora:** *Alyogyne huegelii* var. *glabrescens* (one of few populations in the PMR, most southern except for outlying populations in Yalgorup National Park); typical Tamala Limestone taxa — *Melaleuca huegelii*, *Grevillea preissii*, *Pimelea calcicola*

**Fauna:** limited survey for birds (29 species) (RAOU 1996 D, 1 visit). Significant birds species: category 1 (1) and category 3 (3)

**Linkage:** adjacent bushland, native vegetation on the south and west; part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Interim List of the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Beeliar Regional Park is endorsed (see Table 3, Volume 1).

**MARKET GARDEN SWAMPS, SPEARWOOD/MUNSTER**

**Boundary Definition:** bushland (part taken to cadastre)/bushland group boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 429, 435

**Area (ha):** bushland 38.1 (Site also includes open water.)

**Map no.** 58

**Map sheet series ref. no.** 2033–I SW, 2033–I NW

**Other names:** Market Garden Swamps No.s 1, 2 and 3, part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Cockburn (Munster, Spearwood)

**System 6 (1983):** Part M92 Part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)





**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: M6)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*16 Highly saline seasonal wetlands

\*17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands (in area of most northern occurrence)

**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Spearwood Dunes**

Coogee (S.3)

**Wetland Management Objectives:** Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 8.3ha + 7.7ha = 16ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999, EPA and WAWA 1990); detailed survey (Ecoscape 1995b)

**Structural Units:** mapping (Ecoscape 1995b, EPA and WAWA 1990)

Uplands: *Eucalyptus gomphocephala* Open Forest; *Xanthorrhoea preissii* Shrubland

Wetlands: *Melaleuca raphiophylla* Low Open Forest; *Melaleuca cuticularis* Low Woodland to Low Open Forest; *Suaeda australis* Low Open Shrubland; *Juncus kraussii* and *Gahnia trifida* Closed Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland

**Vegetation Condition:** >50% Excellent to Very Good, <50% Good to Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** 21 native taxa (estimated <80% expected flora, Ecoscape, 1995b)

**Significant Flora:** none recorded

**Fauna:** limited survey for birds (32 species), native mammals (1 species), reptiles (7 species) and amphibians (3 species) (Ecoscape 1995b). Significant bird species: category 2 (1), category 3 (1) and category 4 (1). Significant mammal species: Quenda (Friend 1996 D, Ecoscape 1995b)

**Linkage:** adjacent bushland canopy south Site 435 (Site 261, across road); part of Greenway 96 (Tingay Alan & Associates 1998a)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Interim List of the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:**

**BS429:** Strategic Negotiated Planning Solution (see Table 3, Volume 1).

**BS435:** Part A: Local Reserve Mechanism. Part B: Other Government Land Mechanism. Part C: Rural Complementary Mechanism. Part D: Other Government Land Mechanism (see Table 3, Volume 1).

**LAKE COOGEE AND ADJACENT BUSHLAND, MUNSTER**

**Boundary Definition:** protected area/bushland taken to cadastre boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 261

**Area (ha):** bushland 5.4 (Site also includes open water.)

**Map no.** 58

**Map sheet series ref. no.** 2033-I SW

**Other names:** part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Cockburn (Munster)

**System 6 (1983):** Part M92 area of bushland goes beyond System area boundaries, all bushland described



## SECTION 2: REGIONAL INFORMATION

### LANDFORM AND SOIL

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

#### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: M6)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Spearwood Dunes

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*16 Highly saline seasonal wetlands

\*17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

### WETLANDS

**Wetland Types:** lake, sumpland

#### Natural Wetland Groups

##### Spearwood Dunes

Coogee (S.3)

**Wetland Management Objectives:** Conservation (53ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** 55.5ha

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water (salt), vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (EPA and WAWA 1990, Weston 1993)

**Structural Units:** mapping (EPA and WAWA 1990)

Uplands: Sands derived from Tamala Limestones: *Eucalyptus gomphocephala* Woodland; *Eucalyptus marginata* Woodland; *Eucalyptus decipiens* Open Tree Mallee; *Melaleuca systema* and *Phyllanthus calycinus* Open Heath; *Xanthorrhoea preissii* Tall open Shrubland

Wetlands: *Melaleuca raphiophylla* Open Forest; *Melaleuca cuticularis* Low Woodland to Low Closed Forest; Mixed Closed Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Low Open Woodland

**Vegetation Condition:** >10% Good, <90% Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** 71 native taxa (estimated >50% expected flora)

**Significant Flora:** none recorded

**Fauna:** multiple survey for birds (71) (RAOU 1996 D, 5 visits). Significant birds species: category 1 (1), category 3 (9) and category 4 (7). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 435, across road); part of Greenway 96 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a); largest area of non-estuarine *Melaleuca cuticularis* Low Woodland to Low Closed Forest in the PMR

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Interim List of the Register of the National Estate, subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site for conservation purposes within Beeliar Regional Park is endorsed. Part B: Other Government Land Mechanism (see Table 3, Volume 1).



## BROWMAN SWAMP, MT BROWN LAKE AND ADJACENT BUSHLAND, HENDERSON/NAVAL BASE

**Boundary Definition:** protected area/bushland (part taken to cadastre)/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 346

**Area (ha):** bushland 558.3 (Site also includes open water.)

**Map no.** 57, 58, 63, 64

**Map sheet series ref. no.** 2033-I SW

**Other Names:** Henderson Regional Open Space, Lake Mt Brown and Brownman Swamp part of Beeliar Regional Park

**Local Authorities (Suburb):** City of Cockburn (Henderson), Town of Kwinana (Naval Base)

**System 6 (1983):** M91 and part M92 Part System area bushland and part scattered native plants (canopy), all vegetation described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

##### Quindalup Dunes (Holocene dunes)

Safety Bay Sands (Qhs: S13)

##### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: M6)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Cottesloe Complex — Central and South

###### Quindalup Dunes

Becher (Qu.2)

##### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

16 Highly saline seasonal wetlands (Open Low Heath dominated by *Grevillea vestita*, *Frankenia pauciflora* or *Acanthocarpus preissii* on Coastal Limestone Cliff)

17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands (in area of most northerly occurrence)

###### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

24 Northern Spearwood shrublands and woodlands

29a Coastal shrublands on shallow sands

#### WETLANDS

**Wetland Types:** sumpland

##### Natural Wetland Groups

###### Spearwood Dunes

Coogee (S.3)

Stakehill (S.4)

**Wetland Management Objectives:** Conservation (95ha)

**Swan Coastal Plain Lakes EPP:** 26.6ha + 17.5ha + 17.4ha = 61.5 (total)

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, tall dune, open water, vegetated wetland, vegetated uplands, ocean — limestone cliff

**Vegetation and Flora:** limited survey (part Site — Cockburn Wetlands Committee 1976, EPA and WAWA 1990, Gibson *et al.* 1994 (MTB 01–05) (Navb 01–04), Semeniuk, V&C Research Group 1997b); detailed survey (part Site — Keighery, GJ, and Keighery 1993c (M91))

**Structural Units:** mapping (part Site — EPA and WAWA 1990, Semeniuk, V&C Research Group 1997b)

Uplands — Sands derived from Tamala Limestone: Mixed Open Woodland of *Eucalyptus gomphocephala*, *E. marginata* and *E. calophylla*; *E. marginata* Low Woodland over *Banksia attenuata* Low Open Woodland; *Banksia attenuata*, *B. menziesii* and *B. grandis* Low Woodland to Low Open Forest; *Acacia pulchella* and *Jacksonia furcellata* Open Shrubland to Tall Open Scrub

Uplands — Tamala Limestone: Tree Mallee dominated by *Eucalyptus foecunda* or *E. decipiens*; Shrublands dominated by *Acacia rostellifera* or *A. cyclops*; Tall Open Scrub to Closed Tall Scrub dominated by *Melaleuca*





*huegelii* and/or *Dryandra sessilis* var. *cygnorum*; *Melaleuca systema*, *Hibbertia hypericoides* and *Acacia cochlearis* Open Heath; Mixed Closed Low Heath; Open Low Heath dominated by *Grevillea vestita*, *Frankenia pauciflora* or *Acanthocarpus preissii*; *Lepidosperma gladiatum* Sedgeland

Wetlands: *Melaleuca rhapsiophylla* Low Woodland to Low Closed Forest; *Melaleuca teretifolia* Low Open Forest; *Frankenia pauciflora* and *Sarcocornia quinqueflora* Closed Low Heath; Sedgelands dominated by *Gahnia trifida* or *Baumea juncea*

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland

**Vegetation Condition:** >80% Very Good, <20% Good to Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** 145 native taxa, 74 weed taxa (compiled Keighery, GJ, and Keighery 1993c, Semeniuk, V&C Research Group 1997b) (estimated >75% of expected flora)

**Significant Flora:** Keighery, GJ and Keighery 1993c— *Wilsonia backhousei* and *Lawrencina spicata* (normally associated with saline wetlands), *Lavatera plebeia* var. *tomentosa* and *Wilsonia humilis* (normally confined to offshore islands; *Lavatera plebeia* var. *tomentosa* is the only mainland record), *Kennedia coccinea* (becoming increasingly uncommon on the western margins of the Plain), *Hemigenia barbata* (uncommon on the Plain, associated with Tamala Limestones, most southern population known); typical Tamala Limestone taxa — *Melaleuca huegelii*, *Grevillea preissii*, *Eucalyptus foecunda*, *Pimelea calcicola*, *Trymalium ledifolium* subsp. *ledifolium*, *Hibbertia spicata* subsp. *leptothea*

**Fauna:** limited survey for birds (AHC 2000 D) including species of trans-equatorial wading birds protected under JAMBA/ CAMBA treaties. Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south, east (across road) and west; part of Greenways 74, 87 (Tingay Alan & Associates, 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** majority included in Beeliar Regional Park Proposal (DPUD 1992a); BJ Keighery (1996) in an assessment of the Beeliar Wetlands recognised the importance of the Site in containing landscape, vegetation, flora and wetlands typical of the Spearwood Dunes in a contiguous sequence from the coast inland to the wetlands, the presence of vegetated limestone cliffs in this sequence being unique in the PMR; V&C Semeniuk Research Group (1997b) in a study of 22 bushland reserves in the City of Cockburn found in relation to this Site that the value of the four reserves (Coastal Reserve M91, Henderson Regional Open Space, Brownman Swamps, Lake Mt Brown) outweighed the value of the other separate reserves. Together the four reserves stand as an uncommon example of diversity of landforms and vegetation in the Spearwood Dunes — they illustrate the graduation of habitats in the Spearwood System from swale to ridge crest and from hinterland to coast, they provide a viable fauna refuge, the upland areas provide a buffer to the wetlands, and the two wetlands remain hydrologically linked; Brownman Swamp and Mt Brown Lake contain significant invertebrate fauna, Mt Brown Lake being the best example of its type (J. Davis pers. comm.)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Interim List of the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site for conservation purposes within Beeliar Regional Park is endorsed. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

## MANDOGALUP ROAD BUSHLAND, HOPE VALLEY

**Boundary Definition:** bushland taken to cadastre boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 267

**Area (ha):** bushland 15.7

**Map no.** 64

**Map sheet series ref. no.** 2033-I SW

**Other Names:** not known

**Local Authorities (Suburb):** Town of Kwinana (Hope Valley)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

#### VEGETATION AND FLORA

##### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South



**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, roadside observations)

**Structural Units**

Uplands: *Eucalyptus marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* Low Open Forest with scattered emergent trees of *Eucalyptus gomphocephala*; *Jacksonia sternbergiana* Tall Open Scrub

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >50% Very Good, >40% Excellent, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the east

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**SICKLEMORE ROAD BUSHLAND, PARMELIA/CASUARINA**

**Boundary Definition:** protected area/bushland part taken to cadastre/bushland group boundary (Boundary adjusted in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 272

**Area (ha):** bushland 84.6

**Map no.** 64, 65, 71

**Map sheet series ref. no.** 2033-I SW, 2033-II NW

**Other Names:** Bushland between Barney Swamp and Freeway, part of Beeliar Regional Park

**Local Authorities (Suburb):** Town of Kwinana (Casuarina, Orelia, Parmelia)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Ms5)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*5 Mixed shrub damplands

\*11 Wet forests and woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands



**WETLANDS**

**Wetland Types:** sumpland, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Spearwood—Bassendean interface**

Bibra (S/B.1)

**Wetland Management Objectives:** Conservation (2.4ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998 survey from roadside, DEP 1999)

**Structural Units**

Uplands: Mixed *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Woodland with emergent *Eucalyptus marginata*

Wetlands: *Eucalyptus rudis* Woodland; *Melaleuca raphiophylla* Low Open Forest; *Melaleuca preissiana* Low Woodland to Low Open Forest over *Agonis linearifolia* Closed Tall Scrub; *Banksia ilicifolia*, *B. attenuata*, *B. menziesii* Low Woodland over patches of *Kunzea ericifolia*; *Melaleuca viminea* Tall Open Scrub; *Lepidosperma longitudinale* Closed Sedgeland

**Vegetation Condition:** <40% Excellent, >30% Very Good, >30% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Diuris micrantha* (R), *Caladenia huegelii* (R); *Aponogeton hexatepalus* (4)

**Fauna:** not known

**Linkage:** adjacent bushland to the north (Site 269, across road) and east (across road); part of Greenways 78, 97 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** part Site to be included in Beelihar Regional Park (State Government Cabinet Minute 5 May 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, Entered in the Interim List of the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this portion of this Site for conservation purposes within Beelihar Regional Park is endorsed. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**PARMELIA AVENUE BUSHLAND, PARMELIA**

**Boundary Definition:** bushland taken to cadastre and zoning boundary (Boundary adjusted in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 67

**Area (ha):** bushland 6.8

**Map no.** 70

**Map sheet series ref. no.** 2033-I SW, 2033-II NW

**Other Names:** part of Beelihar Regional Park

**Local Authorities (Suburb):** Town of Kwinana (Parmelia)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Tamala Limestone (Qtl: LS1)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

Spearwood Dunes



Karrakatta Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** tall dune, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, survey from fenceline, EPA and WAWA 1990)

**Structural Units:** mapping (EPA and WAWA 1990)

Uplands: Mixed *Eucalyptus gomphocephala*, *E. calophylla* Open Woodland; *Banksia attenuata*, *B. grandis* Low Open Woodland; Mixed Low Shrubland dominated by *Macrozamia riedlei* and *Acacia pulchella* with scattered *Acacia saligna* and *Jacksonia furcellata*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >90% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the north, south and east; part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** included in Beeliar Regional Park Proposal (DPUD 1992a)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Interim List of the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Urban Negotiated Planning Solution (see Table 3, Volume 1).

**LEDA AND ADJACENT BUSHLAND, LEDA**

**Boundary Definition:** protected area/bushland (part taken to cadastre and zoning) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped; Boundary adjusted after vegetation survey and negotiations with the land owner(s) in response to submissions to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 349

**Area (ha):** bushland 959.8 (Site also includes open water.)

**Map no.** 64, 70, 71

**Map sheet series ref. no.** 2033-I SW, 2033-II NW

**Other Names:** Submission Area 224

**Local Authorities (Suburb):** Town of Kwinana (Baldivis, Kwinana Beach, Postans, Medina, Calista, Leda, Wellard, East Rockingham), City of Rockingham (Baldivis, East Rockingham)

**Includes CALM Managed Land:** Nature Reserve 33581 (Conservation of Flora and Fauna)

**System 6 (1983):** M104 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S13)

**Wetlands (within the Spearwood and Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**



**Pinjarra Plain**

Serpentine River Complex

**Bassendean Dunes**

Bassendean Complex — Central and South

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 2: Seasonal Wetlands**

\*19b Woodlands over sedgeland in Holocene dune swales (DEP 1996, equivalent to 19 in Gibson *et al.* 1994)

17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands (most southern occurrence sampled)

**WETLANDS**

**Wetland Types:** sumpland, artificial channel

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Muchea (B/P.3)

**Bassendean Dunes**

Jandakot (B.3)

**Spearwood—Bassendean interface**

Bibra (S/B.1)

**Spearwood Dunes**

Stakehill (S.4)

**Quindalup**

Becher (Qu.2)

**Wetland Management Objectives:** Conservation (109.9ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** 11.7ha + 4.4ha + 6.4ha + 0.5ha + 3.3ha + 3.6ha = 29.9ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Critically Endangered (floristic community type 19 as defined by Gibson *et al.* 1994)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, vegetated uplands, dune crest

**Vegetation and Flora:** limited survey (DEP 1996 (Leda 01–04), DEP 1999, DEP 2000, EPA and WAWA 1990, Gibson *et al.* 1994 (Well 01–02), Weston 1993)

**Structural Units:** mapping (EPA and WAWA 1990)

Uplands: *Eucalyptus marginata*, *E. gomphocephala* and *Allocasuarina fraseriana* Woodland; *Banksia menziesii*, *Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata* and *B. grandis* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus gomphocephala*; *Eucalyptus gomphocephala* Open Forest; *Acacia saligna* Low Open Forest; *Eucalyptus calophylla* Open Forest

Wetlands: *Eucalyptus rudis* Low Open Forest to Low Forest; *Melaleuca raphiophylla* Low Open Forest to Low Closed Forest; Mixed Closed Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Open Woodland

**Vegetation Condition:** >70% Excellent to Very Good, <20% Good, 10% Degraded, with areas of severe localised disturbance (Weston 1993)

**Total Flora:** 129 native species and 31 weed taxa (estimated >60% expected flora) (plot-generated list compiled from DEP 1996 (Leda 01–04), Gibson *et al.* 1994 (Well 01–02))

**Significant Flora:** *Glischrocaryon aureum* (uncommon in the PMR)

**Fauna:** limited survey for birds (60 species) (AHC 2000 D). Significant mammal species: Western Brush Wallaby (Halpern Glick Maunsell Pty Ltd and Tingay, Alan & Associates 1991), Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north, south (Site 356, across road), east and west; part of Greenways 85, 86, 87 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)



**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed, Indicative place (AHC 2000 D), subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserve 33581 is endorsed. Part B: Other Government Land Mechanism. Part C: Urban Negotiated Planning Solution (see Table 3, Volume 1).

**BALDIVIS SWAMP AND ADJACENT BUSHLAND, BALDIVIS**

**Boundary Definition:** bushland/conservation wetland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 495

**Area (ha):** bushland 4.4 (Site also includes open water.)

**Map no.** 75

**Map sheet series ref. no.** 2033-II NW

**Other Names:** Blue Heeler Swamp, draft *Perth's Bushplan* Submission no.s – 386, 1993

**Local Authorities (Suburb):** Shire of Rockingham (Baldivis)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Wetlands (within the Spearwood/Bassendean Dunes)**

Holocene Swamp Deposits (Qhw: Cps, Cs1)

**Lagoonal and Estuarine Deposits (within the Spearwood/Bassendean Dunes)**

Lagoonal and Estuarine Deposits (Vasse) (Qhg: M5)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands (most southerly occurrence)

**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Spearwood Dunes**

Stakehill (S.4)

**Wetland Management Objectives:** Conservation (6.5 ha) (DEP 1999)

**Swan Coastal Plain Lakes EPP:** 6.5 ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetlands, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1999)

**Structural Units:** mapping (DEP 1999)

Uplands: *Eucalyptus gomphocephala* Open Forest

Wetlands: *Melaleuca raphiophylla* Open Forest over *Melaleuca teretifolia* Tall Open Shrubland; Closed

Sedgeland dominated by *Baumea articulata*, *Baumea juncea* or *Gahnia trifida* and combinations of these

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Very Good (DEP 1999)

**Total Flora:** not known

**Significant Flora:** none recorded



**Fauna:** Significant mammal species: Quenda (DEP 1999)

**Linkage:** adjacent bushland to the north (Site 356, across road), east (canopy cover) and west; part of Greenway 122 (Tingay, Alan & Associates 1998)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Indicative place (AHC 2000 D) (Baldivis Swamp)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**STAKEHILL SWAMP, BALDIVIS**

**Boundary Definition:** bushland/conservation wetland boundary (Areas of bushland within the boundaries of the Site are not accurately mapped; Boundary adjusted after negotiations with the land owner(s) in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 275

**Area (ha):** bushland 171.2 (Site also includes open water.)

**Map no.** 75

**Map sheet series ref. no.** 2033-II NW, 2033-II SW

**Other Names:** Submission Area 262

**Local Authorities (Suburb):** City of Rockingham (Baldivis)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Cs1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 2: Seasonal Wetlands**

\*17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

**WETLANDS**

**Wetland Types:** sumpland, dampland

**Natural Wetland Groups**

**Spearwood Dunes**

Stakehill (S.4)

**Wetland Management Objectives:** Conservation (166.1ha)

**Swan Coastal Plain Lakes EPP:** 89ha + 1.9ha + 2.1ha + 30.4ha = 123.4ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1998 roadside observations, EPA and WAWA 1990, Semeniuk, V&C Research Group 1991b)

**Structural Units:** mapping (EPA and WAWA 1990, Semeniuk, V&C Research Group 1991b)

Wetlands: *Melaleuca raphiophylla* Open to Closed Forest sometimes over *Juncus kraussii* Sedgeland; *Melaleuca teretifolia* Closed Heath; Sedgeland of either *Baumea articulata* or *B. juncea*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** wetland — >90% Excellent to Very Good, <10% Good to Degraded, with areas of severe localised disturbance (Semeniuk, V&C Research Group 1991b)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenways 84, 85 (Tingay, Alan & Associates 1998a)





**Other Special Attributes:** Wetland of 'regional significance' (Semenuk, V&C Research Group 1991b, 1991e)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Indicative place (AHC 2000 D)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**CHURCHER SWAMP, BALDIVIS**

**Boundary Definition:** bushland (part taken to cadastre)/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 75

**Area (ha):** bushland 24.3 (Site also includes open water.)

**Map no.** 75

**Map sheet series ref. no.** 2033-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Rockingham (Baldivis)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Scp)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

**WETLANDS**

**Wetland Types:** sumpland

**Natural Wetland Groups**

**Spearwood Dunes**

Stakehill (S.4)

**Wetland Management Objectives:** Conservation (16.7ha)

**Swan Coastal Plain Lakes EPP:** 11.3ha

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1998 roadside observations, Semenuk, V&C Research Group 1991b)

**Structural Units:** mapping (Semenuk, V&C Research Group 1991b)

Uplands: *Eucalyptus gomphocephala* Very Open Woodland; Mixed *Banksia menziesii*, *B. attenuata*, *B. ilicifolia* and *Allocasuarina fraseriana* Low Woodlands

Wetlands: *Melaleuca raphiophylla* Low Woodland to Low Closed Forest occasionally with emergent *Eucalyptus rudis*; Mixed Sedgeland

**Vegetation Condition:** >60% Excellent, >25% Very Good to Good, <15% Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** not surveyed

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland/canopy to the north and west (Areas of bushland to the north are incorrectly mapped.); part of Greenway 84 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** Wetland of 'regional significance' (Semenuk, V&C Research Group 1991b, 1991e)



**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Indicative place (AHC 2000 D)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities. Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Rural Complementary Mechanism (see Table 3, Volume 1).

**CASSIA DRIVE BUSHLAND, KARNUP**

**Boundary Definition:** bushland (part taken to cadastre)/management boundary (Boundary adjusted in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 278

**Area (ha):** bushland 53.6

**Map no.** 75

**Map sheet series ref. no.** 2033-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Rockingham (Karnup)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

\*21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** dune crest, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998 roadside observations, DEP 1999, Mattiske Consulting Pty Ltd 1997)

**Structural Units**

Uplands: *Eucalyptus gomphocephala* Woodland; *Eucalyptus gomphocephala* and *E. marginata* Open Woodland to Closed Forest; *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Low Open Woodland to Low Woodland

**Scattered Native Plants:** *Eucalyptus gomphocephala* and *E. marginata* Low Open Woodland

**Vegetation Condition:** Very Good, with areas of severe localised disturbance (Mattiske Consulting Pty Ltd 1997)

**Total Flora:** not known

**Significant Flora:** not surveyed

**Fauna:** not known

**Linkage:** adjacent bushland canopy to the north, south, east and west; part of Greenway 85 (Tingay, Alan & Associates 1998a)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities

**Recommendation:** Part A: Rural Complementary Mechanism. Part B: Strategic Negotiated Planning Solution (see Table 3, Volume 1).



## ANSTEY SWAMP, KARNUP

**Boundary Definition:** protected area boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 379

**Area (ha):** bushland 270.2 (Site also includes open water.)

**Map no.** 75, 80

**Map sheet series ref. no.** 2033-II SW

**Other Names:** Submission Area 10; part of Rockingham Lakes Regional Park

**Local Authorities (Suburb):** City of Rockingham (Karnup)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

##### Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Scp)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

###### Wetlands

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*24 Northern Spearwood shrublands and woodlands

\*25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

#### WETLANDS

**Wetland Types:** sumpland, dampland

##### Natural Wetland Groups

###### Spearwood Dunes

Stakehill (S.4)

**Wetland Management Objectives:** Conservation (216.6ha)

**Swan Coastal Plain Lakes EPP:** 1.1ha + 45.6ha = 46.7ha (total)

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone area, open water, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1998, EPA and WAWA 1990, Keighery, GJ, 1996, Semeniuk, V&C Research Group 1991b)

**Structural Units:** mapping (EPA and WAWA 1990, Semeniuk, V&C Research Group 1991b)

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Forest to Woodland; Woodlands dominated by *Banksia attenuata* with scattered emergent *Eucalyptus marginata* and *E. gomphocephala* mixed with varying proportions of *Banksia ilicifolia*, *B. grandis*, *B. menziesii* and *Allocasuarina fraseriana*

Uplands — Tamala Limestone (possibly outside Site boundary): *Eucalyptus decipiens* Open Tree Mallee; Low Heath dominated by *Melaleuca systema*, *Acacia rostellifera*, *A. cyclops* and *Allocasuarina humilis*

Wetlands: Woodlands to Forests dominated by *Eucalyptus rudis* or *E. gomphocephala*; *Melaleuca preissiana*, *Banksia littoralis* and *Acacia saligna* Low Woodland; *Melaleuca raphiophylla* Low Forest dominated by *Melaleuca teretifolia* or *M. viminea*; Sedgeland dominated by *Lepidosperma longitudinale*, *Typha domingensis*, *Baumea articulata*, *B. juncea* or *Gahnia trifida*

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded, with areas of severe localised disturbance (GJ Keighery pers. comm.)

**Total Flora:** 200 native taxa (Keighery, GJ 1996) (estimated >60% expected flora)

**Significant Flora:** not surveyed

**Fauna:** not known

**Linkage:** adjacent bushland to the south (Site 395, across road) and west (across road); part of Greenways 85, 89 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** wetland of 'regional significance' (Semeniuk, V&C Research Group 1991b); majority of Site included in Port Kennedy and Rockingham Parks proposal (Tingay, Alan & Associates 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed: Indicative place (AHC 2000 D)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Rockingham Lakes Regional Park is endorsed (see Table 3, Volume 1).

**PAGANONI SWAMP AND ADJACENT BUSHLAND, KARNUP**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Boundary adjusted after vegetation survey and negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 395

**Area (ha):** bushland 705.5 (Site also includes open water.)

**Map no.** 79, 80

**Map sheet series ref. no.** 2033-II SW

**Other Names:** part of Rockingham Lakes Regional Park, Submission Area 266 and Submission Area 151, Lot 1 cnr Paganoni and Mandurah Rds

**Local Authorities (Suburb):** City of Rockingham (Karnup)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qha: Cp) (associated with Serpentine River)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Wetlands (within the Spearwood Dunes)**

Holocene Swamp Deposits (Qhw: Sep, Cps)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

**Wetlands**

Herdsmen Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

**WETLANDS**

**Wetland Types:** sumpland, dampland

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

**Spearwood Dunes**

Stakehill (S.4)

**Coastal Plain Rivers**

Goegrup (R.4)

**Wetland Management Objectives:** Conservation (107.8ha)

Swan Coastal Plain Lakes EPP: 4.5ha + 9.6ha + 4.1ha + 0.3ha = 18.5ha (total)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed



### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated uplands, dune crest, limestone ridge

**Vegetation and Flora:** limited survey (DEP roadside survey 1998, DEP 1999, Gibson *et al.* 1994 (Paga 01–08)); detailed survey (Keighery, GJ, 1996, Semeniuk, V&C Research Group 1991d, part Site — Tingay 1999c)

**Structural Units:** mapping (Semeniuk, V&C Research Group 1991d)

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Forest to Woodland; Woodlands dominated by *Banksia attenuata* with scattered emergent *Eucalyptus marginata* and *E. gomphocephala* mixed with varying proportions of *Banksia ilicifolia*, *B. grandis*, *B. menziesii*, *Allocasuarina fraseriana* and *Xylomelum occidentale*; *Eucalyptus decipiens* Shrub Mallee; Mixed Low Heaths with a variety of dominants such as *Melaleuca huegelii*, *Grevillea preissii* and *Hakea trifurcata*

Uplands — Tamala Limestone: Low heath dominated by *Olearia axillaris*, *Melaleuca systema*, *Acacia truncata*, *A. cyclops* and *A. saligna*

Wetlands: Woodlands to Forests dominated by *Eucalyptus rudis*, *E. calophylla* or *E. gomphocephala*; *Melaleuca preissiana*, *Banksia littoralis* and *Acacia saligna* Low Woodland; *Melaleuca raphiophylla* Low Forest; Closed Scrub to Open Scrub dominated by *Melaleuca teretifolia* or *M. viminea*; Closed to Open Heath dominated by *Pericalymma ellipticum* alone or in combination with *Hakea varia*, *Calothamnus lateralis* and *Aotus* species; *Astartea* aff. *fascicularis* Heath; Sedgelands dominated by *Lepidosperma longitundinale*, *Baumea articulata*, *B. juncea* or *Gahnia trifida*

**Vegetation Condition:** >75% Excellent to Very Good, <25% Good to Degraded

**Total Flora:** 305 native taxa, 45 weed taxa (Keighery, GJ, 1996, Semeniuk, V&C Research Group 1991d) (estimated >80% expected flora)

**Significant Flora:** *Lasiopetalum membranaceum* (2) (Tingay 1999), *Hibbertia spicata* subsp. *leptotheca* (3), *Acacia benthamii* (3) (Keighery, GJ, 1999), *Dillwynia dillwynioides* (3); *Jacksonia calcicola* (most southern population), *Trachymene coerulea*, *Mesomelaena tetragona* (most western record, generally associated with eastern side of the Swan Coastal Plain), *Senecio ramosissimus* (one of two populations known in the PMR, Keighery, GJ, 1996), *Pterostylis* sp. cauline leaves (NG & ML 1490), *Pterostylis* sp. crinkled leaf (GJK 13426); typical Tamala Limestone taxa (DEP 1999 and Tingay 1999) — *Melaleuca huegelii*, *Grevillea preissii*, *Trymalium ledifolium* subsp. *ledifolium*, *Diplopeltis huegelii* subsp. *huegelii*, *Eucalyptus foecunda*, *Jacksonia calcicola*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 379, across road), east (to Serpentine River) and west; part of Greenways 89, 123 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Paganoni wetland is the largest in the Stakehill Suite; wetland of 'regional to international significance' (Semeniuk, V&C Research Group 1991e); majority of Site included in Port Kennedy and Rockingham Parks proposal (Tingay, Alan & Associates 1997b)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Interim List of the Register of the National Estate

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Rockingham Lakes Regional Park is endorsed. Part B: Urban Negotiated Planning Solution (see Table 3, Volume 1).



# Part B



## 2.5 QUINDALUP DUNES

### 2.5.1 INTRODUCTION

#### Location, Landscape and Soils

The Quindalup Dunes are of aeolian origin, and are the youngest of the dune systems on the Swan Coastal Plain. This system is characterised by a series of dunes — from the low sequence of ridges typical of the beach ridge plains of the Rockingham area to the large parabolic dunes found north of the Swan River. Broad to narrow swales and sand sheets can occur between the dunes. The dunes, swales and sheets are typically white sands (Tables 1.5a&b). The wetlands of the Quindalup Dunes (Table 2.5) are characterised by carbonate mud, humic sand, peats and muddy sands over sands.

#### Remnant Bushland on the Quindalup Dunes

Relatively large areas of the Quindalup Dunes remain as bushland. The soils of the Quindalup Dunes have very low fertility and, until recently, have remained vegetated. However, similarly to the Spearwood Dunes, the uncleared dunes have been subject to substantial grazing pressure. While this has had low impact on the slopes of the dunes, the protected swales have been favoured as stock watering and shelter points and the vegetation in the swales has been degraded.

Recent mapping for the Perth Metropolitan Region (Table 3.5) indicates that 48 per cent of the vegetation complexes associated with the Quindalup Dunes remain as native vegetation.

#### Plant Communities and their Conservation on the Quindalup Dunes

At the regional level one vegetation complex (Table 3.5) has been identified as being confined to the Quindalup Dunes. A wetland complex is also associated with the Quindalup Dunes. Eleven floristic community types, three wetland types and eight upland types are the principal regional floristic groups identified on the Quindalup Dunes in the Perth Metropolitan Region (Table 4.5).

Two floristic community types, 19 and 30a (Table 5.5 after Gibson *et al.* 1994, not as redefined by additional survey and analysis for the Project, see Part A, Section 3.4.2: Floristic Community Types), have been determined threatened ecological

communities. An additional threatened ecological community is found at Lake Richmond (Bush Forever Site 358).

A variety of vegetation associations has been identified on the Quindalup Dunes. The different associations are related to the age of the dunes on which they occur, the degree of protection from prevailing winds and the relationship between the Quindalup sands and the adjacent Tamala Limestone surfaces. These broad units and associated dominant species are:

#### Uplands

The main upland associations are grasslands, shrublands and, less commonly, woodlands to open woodlands. These broad units and associated dominant species are:

##### Woodlands

Eucalypts — *Eucalyptus gomphocephala*  
Melaleucas — *Melaleuca lanceolata* (uncommon in the Perth Metropolitan Region)  
Rottnest Island Cypress — *Callitris preissii*

##### Shrublands

*Jacksonia furcellata*, *Olearia axillaris*, *Melaleuca acerosa*, *Phyllanthus calycinus*, *Rhagodia baccata*, *Nemcia reticulata*, *Eremophila glabra* subsp. *albicans*, *Scaevola crassifolia*, *S. nitida*, *Spyridium globulosum*, *Acacia lasiocarpa* var. *lasiocarpa*, *A. rostellifera*, *A. cyclops*

##### Herblands

*Lomandra maritima*, *Conostylis candicans*, *Opercularia vaginata*, *Senecio lautus*, *Acanthocarpus preissii*

##### Sedgeland

*Desmodcladus flexuosus*, *Isolepis nodosus*, *Lepidosperma gladiatum*, *L. angustatum*, *Schoenus grandiflorus*

##### Grasslands

*Spinifex hirsutus*, *S. longifolius*, *Austrostipa flavescens*, *Austrodanthonia occidentalis*, *Poa porphyrodados*

#### Wetlands

The main wetland associations are sedgeland, shrublands and, less commonly, low woodlands to forests. These broad units and associated dominant species are:





### Woodlands

Eucalypts — *Eucalyptus gomphocephala*  
Melaleucas — *Melaleuca raphiophylla*, *M. cuticularis*  
Others — *Acacia saligna*

### Herblands

*Lobelia alata*

### Sedgelands

*Baumea juncea*, *B. articulata*, *Isolepis nodosus*,  
*Lepidosperma gladiatum*, *Gahnia trifida*

Twenty-eight significant taxa are associated with the Quindalup Dunes in the Perth Metropolitan Region (Table 6.5). Seven of these are Priority Flora.

### Conservation of Plant Communities of the Coastal Reserves — Quindalup and Spearwood Dunes

The coastal margin of the Swan Coastal Plain is formed by the Quindalup Dunes System and Tamala Limestone surfaces which are overlaid to varying degrees by the Quindalup sands and sands derived from Tamala Limestones (Spearwood Sands). Over the past 30 years a number of regional studies of the coastal margin have been undertaken. The studies have detailed aspects of the coastal geomorphology (for example, McArthur and Bartle 1980, Searle *et al.* 1988, Semeniuk *et al.* 1989), flora and vegetation (for example, Griffin 1993, Griffin and Trudgen 1994) and fauna (How and Dell 1993). As a consequence specific criteria have been identified which should be taken into account in selecting conservation areas in the region along the coast in the metropolitan area which primarily encompasses the Quindalup Dunes. In summary these are listed under six categories as indicated below:

- (i) Quindalup Dune types: inclusion of a series of Quindalup Dune types related to distance from the coastline, age and formation process
- (ii) Continuing natural processes: sufficient size to allow for natural processes to continue
- (iii) Shoreline: soft (i.e. sandy shore of Quindalup Dunes) and/or hard (i.e. limestone platform of Tamala Limestone)

- (iv) Linkage: include Quindalup, Spearwood and Bassendean Dunes
- (v) Vegetation: variety of typical associations in good condition which encompasses the north—south variation found predominantly in the vegetation of the older Quindalup Dunes and the Tamala Limestones
- (vi) Habitats: a variety of adjacent habitats of sufficient area to provide for the diverse reptilian and bird fauna of the coastal dunes.

While there is a considerable area of the Quindalup Dunes within the Perth Metropolitan Region with some protection, much of it is within 500 metres of the coastline. These long, narrow reserves meet few of the six criteria described above, specifically:

- (i) Quindalup Dune types: reserves only contain the youngest dunes (most coastal)
- (ii) Continuing natural processes: boundaries generally truncate youngest dunes and consequently natural processes
- (iii) Shorelines: only portions are present in narrow bands backed by an alienated landscape
- (iv) Linkage: reserves rarely link Quindalup and Spearwood Dunes; never Bassendean Dunes
- (v) Vegetation: is limited to near-coastal association; also, due to incursions of car parks, tracks for beach access and large edge-to-area ratio, is very prone to weed invasion resulting in degrading of vegetation.
- (vi) Habitats: there is a limited variety of adjacent habitats which are insufficient in area for many species.



# Part B

**Table 1.5a:** Geological and geomorphological systems of the Quindalup Dunes.

The general terms used in Bush Forever for describing the major landform elements are in **bold italics**.

Major Geological Systems (after Playford et al. 1976)	Major Geomorphological Systems (after McArthur and Bettenay 1960)	Detailed Geomorphological Units (after Churchward and McArthur 1980)
Safety Bay Sands	<b>Quindalup Dunes</b>	Quindalup
Wetlands (within the Guildford Formation, Bassendean Sand, Tamala Limestone)	Not applicable	Herdsmen

**Table 1.5b:** Landform and soils of the Quindalup Dunes showing the relationship between geomorphological units, units identified in the Environmental Geology Maps and soils described on these maps on the Swan Coastal Plain in the Perth Metropolitan Region.

Column One may be used to cross-reference to groups shown in Table 1a.

Major Geomorphological Systems (after McArthur and Bettenay 1960); *Detailed Geomorphological Units (after Churchward and McArthur 1980)	Major Units in the Environmental Geology Maps (after various authors)	Soils associated with each unit
Quindalup Dunes: *Quindalup	Safety Bay Sands	white calcareous sands, sometimes limestone deposits
Wetlands – Quindalup Dunes (not applicable)	Holocene lagoonal/swamp deposits	dark grey and brown silts with shells and shell fragments and limestone (marl)

**Table 2.5:** Natural Wetland Groups (Consanguineous Suites) on the Quindalup Dunes  
(after Semeniuk 1996)

Name & locations	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Cooloongup suite (Q1)</b> Rockingham area Shoalwater Bay & Baldivis	Quindalup Dunes/Spearwood Unit beachridge plain	Lakes	Carbonate mud overlying Becher sand or for Lake Richmond unfilled with sediment	Wetlands originated as barred oceanic basins as part of the prograding shoreline; now freshwater recharged
<b>Becher suite (Q2)</b> Between Safety Bay & Peelhurst, in the coastal dune area; locally at Preston	Quindalup Dunes – specifically the small scale plain of parallel beachridges	Sumplands & damplands	Humic sand or peat & thin carbonate mud overlying Safety Bay sand	Wetlands are a series of primary inter-ridge depressions which intersect or lie close to the water table in a prograding coastal beachridge plain
<b>Peelhurst suite (Q3)</b> Narrow strip, 3km long along the coast south of Becher Point; locally along the west short of Lake Walyungup & in isolated areas such as Whitfords cusp	Quindalup Dunes – specifically area of semi-mobile dunes & blowout depressions	Sumplands & damplands	Safety Bay Sand overlain by (carbonate) muddy sand	Wetlands are basins deflated to the level of the water table by prevailing onshore winds





**Table 3.5:** Vegetation complexes (Heddl et al. 1980) and percentage remaining as native vegetation (AGWEST 1998 GIS) on the Quindalup Dunes in the Perth Metropolitan Region

Vegetation Complex	Native Vegetation (%)
<b>Quindalup Dunes</b>	
QUINDALUP COMPLEX: Coastal dune complex consisting mainly of two alliances – the strand and foredune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of <i>Melaleuca lanceolata</i> – <i>Callitris preissii</i> and the closed scrub of <i>Acacia rostellifera</i> .	48
<b>Wetlands</b>	
HERDSMAN COMPLEX: Sedgeland and fringing woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca</i> species	31

**Table 4.5:** Floristic community types identified on the Quindalup Dunes (after Gibson et al. 1994 and DEP 1996)

### Key

#### Column 1: Floristic Community Type Codes

The numbers of the types additional to Gibson et al. (1994) are italicised if they are subsets of an existing group (in types 19, 20, 23 and 30) and italicised and preceded by 'S' if they are supplementary groups.

#### Column 2: General Description of Floristic Community Types

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgelands and herblands after Gibson et al. (1994).

#### Column 3: Average Species Richness per Floristic Community Type

Average species richness per 10x10m plot less those species only occurring in a single plot. Some community types may have a high proportion of single records. Thus these estimates of average species richness are underestimates in some cases.

<b>Supergroup 2 – Seasonal Wetlands</b>		
17	<i>Melaleuca raphiophylla</i> – <i>Gahnia trifida</i> seasonal wetlands	13.4
19a	Sedgeland in Holocene dune swales	25.0
19b	Woodlands over sedgeland in Holocene dune swales	26.3
<b>Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes</b>		
<b>Quindalup Dunes</b>		
29a	Coastal shrublands on shallow sands	33.7
29b	<i>Acacia</i> shrublands on taller dunes	34.2
30a2	<i>Callitris preissii</i> and/or <i>Melaleuca lanceolata</i> forests & woodlands	17.5
30c2	Woodlands and shrublands on Holocene dunes	23.9
30b	Quindalup <i>Eucalyptus gomphocephala</i> and/or <i>Agonis flexuosa</i> woodlands	35.0
S11	Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands	21.0
S13	Northern <i>Olearia axillaris</i> – <i>Scaevola crassifolia</i> shrublands	18.8
S14	<i>Spinifex longifolius</i> grassland and low shrublands	8.6

# Part B



**Table 5.5:** Threatened Ecological Communities on the Quindalup Dunes in the Perth Metropolitan Region (after English and Blyth 1997)

**Key**

CR Critically Endangered

EN Endangered

VU Vulnerable

+ Listed as 'endangered' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (see Part A, Section 3.6.6)

**A. Floristic Community Types** (as identified in Gibson *et al.* 1994)

**Supergroup 2 – Seasonal Wetlands**

19	Sedgeland in Holocene dune swales	CR+
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**Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes**

Quindalup Dunes

30a	<i>Callitris preissii</i> and/or <i>Melaleuca lanceolata</i> forests and woodlands	VU
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**B: Restricted floristic community type mosaics (not applicable)**

**C: Freshwater communities**

	Stromatolite-like microbialite community of coastal freshwater lakes (Lake Richmond, Moore 1993)	CR+
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**Table 6.5: Significant flora of the Quindalup Dunes in the Perth Metropolitan Region**

**Key**

**Column 1: Taxon**

Names follow Gibson *et al.* (1994) and Atkins (1999) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. An 'ms' after the name indicates that this is a manuscript name which is yet to be published.

**Column 2: Major landform element in which the taxon is most likely to be found in the Perth Metropolitan Region**

- DS = Darling Scarp
- D = Dandaragan Plateau
- F = Foothills
- P = Pinjarra Plain
- B = Bassendean Dunes
- S = Spearwood Dunes
- Q = Quindalup Dunes
- R = Estuaries, Rivers and Creeks
- (ML) = Muchea Limestones
- (TL) = Tamala Limestones

**Column 3: Taxa dependent on seasonal ponding, waterlogging or inundation**

- W = depends on waterlogging or inundation
- W (aquatic) = depends on standing water

**Column 4: Conservation status (Atkins 1999)**

- R = Declared Rare Flora
- 1 = Priority 1: Poorly Known Taxa
- 2 = Priority 2: Poorly Known Taxa
- 3 = Priority 3: Poorly Known Taxa
- 4 = Priority 4: Rare Taxa

**Column 5: Geographical variation**

- r = populations at the northern or southern limit of their known geographic range
- d = populations disjunct from their known geographic range
- p = considered to be poorly reserved (applies to all Declared Rare Flora and Priority taxa)
- s = significant populations (applies to all Declared Rare Flora and Priority taxa)
- X = considered lost in the Perth Metropolitan Region

**Regional ecological preferences**

- e = taxa endemic to the Swan Coastal Plain
- E = taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region

**Column 6: Species listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (see Part A, Section 3.7.5)**

- EN = Species that are endangered
- VU = Species that are vulnerable
- TD = Species that are extinct

Taxon	Major landform element	Wetland taxa	DRF/ Priority Code	Significance Code	EPBC Act Listed
<i>Acacia littorea</i>	S/Q			s, d	
<i>Agonis flexuosa</i>	Q			r, s	
<i>Allocasuarina lehmanniana</i>	Q			s	
<i>Alyogyne huegelii</i> var. <i>glabrata</i>	S/Q			s	
<i>Amyema melaleuca</i>	Q			s, d	
<i>Astroloma microcalyx</i>	S/Q			s	
<i>Atriplex suberecta</i>	Q			s, d	
<i>Boronia alata</i>	R/Q			s, d	
<i>Callitris preissii</i>	Q			s, E	
<i>Carpobrotus modestus</i>	S/Q			s	
<i>Chamelaucium uncinatum</i>	Q			r, s	
<i>Conostylis bracteata</i>	Q		3	r, p, s, E	
<i>Conostylis pauciflora</i> subsp. <i>pauciflora</i>	Q		4	p, s, e	
<i>Conostylis pauciflora</i> subsp. <i>euryrhipis</i>	Q		3	p, s	
<i>Cynoglossum australe</i>	Q			s, d	

# Part B

Table 6.5 (continued)

<i>Diplolaena dampieri</i>	Q		r, s
<i>Diplolaena angustifolium</i>	S/Q		p
<i>Hibbertia cuneiformis</i>	S/Q		r, s
<i>Kennedia coccinea</i>	P/S/Q		s
<i>Lasiopetalum angustifolium</i>	Q		s, d
<i>Lasiopetalum membranaceum</i>	S/Q	2	p, s, e
<i>Lechenaultia linarioides</i>	P (ML)/S/Q		p
<i>Lepidium puberulum</i>	Q	4	p, s
<i>Melaleuca lanceolata</i>	S/Q		d, s
<i>Myosotis australis</i>	Q		s, d
<i>Pimelea villifera</i>	Q		r, s
<i>Sarcocornia bicarinata</i> (= <i>Carpobrotus</i> sp. Hepburn)	S/Q	3	p, s
<i>Stylidium maritimum</i>	S/Q	3	p, s
<i>Trachymene coerulea</i>	P/S/Q		s





**QUINDALUP DUNES**

**2.5.2 DESCRIPTIONS**

**KEY**

**Column 1 Bush Forever Site Number**

Sites listed from north to south within the PMR.

**Column 2 Bush Forever Site(s) Name**

**Column 3 Page Number**

Refers to the page number of the Bush Forever Site description in Volume 2.

**Column 4 Bush Forever Map Number**

Refers to the number of the Bush Forever Site map in Volume 1.

**Column 5 System 6**

Refers to the System 6 Recommendation number where applicable.

Site No.	Site Name	Page No.	Map No.	System 6
406	Wilbinga-Caraban Bushland	378	1, 2, 3, 4, 5, 6, 7, 8	
397	Coastal Strip from Wilbinga to Mindarie	379	6, 7, 12, 13, 19	M1 M2
289	Ningana Bushland, Yanchep/Eglington	381	12, 13	
322	Burns Beach Bushland	382	26, 27	M2
323	Link from Burns Beach Bushland to Neerabup National Park	384	27	M6
325	Coastal Strip from Burns Beach to Hillarys	385	27, 33	M8
308	Trigg Bushland and Adjacent Coastal Reserve, Trigg/Scarborough	387	39, 40	M36
310	Floreat Beach Bushland, City Beach/Scarborough	388	39, 45	
315	Swanbourne Bushland, Swanbourne/City Beach	389	45	M46
341	Woodman Point, Coogee/Munster	391	57	M90
473	Carnac Island	392	56	C46
63	Garden Island	393	56, 62, 68	M96
355	Point Peron and Adjacent Bushland, Peron/Shoalwater Bay	395	68, 69	
358	Lake Richmond, Rockingham	396	69	M102
367	Penguin, Seal, Bird and Gull Islands and Shag Rock	398	68	M101
356	Lake Cooloongup, Lake Walyungup and Adjacent Bushland, Hillman to Port Kennedy	400	69, 70, 74, 75	M103
377	Port Kennedy	402	74, 79	M106



## WILBINGA-CARABAN BUSHLAND

**Boundary Definition:** protected area/bushland taken to cadastre boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 406

**Area (ha):** bushland 9158.3

**Map no.** 1, 2, 3, 4, 5, 6, 7, 8

**Map sheet series ref. no.** 2035-III SE, 2035-III SW

**Other Names:** Submission Area 217

**Local Authorities (Suburb):** Shire of Gingin (Two Rocks, Wilbinga, Caraban), Shire of Wanneroo (Yanchep)

**Includes CALM Managed Land:** Reserve 39412 (Quarry (limestone)), State Forest 65

**System 6 (1983):** Part M1, C12 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl)

##### Quindalup Dunes: (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2, S13, LS4)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Cottesloe Complex — North

###### Quindalup Dunes

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

26a *Melaleuca huegelii* — *M. acerosa* shrublands on limestone ridges

26b Woodlands and mallees on limestone

27 Species-poor mallees and shrublands on limestone

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

29a Coastal shrublands on shallow sands

29b *Acacia* shrublands on taller dunes

\*S11 Northern *Acacia rostelifera* — *Melaleuca acerosa* shrublands

S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

\*S14 *Spinifex longifolius* grassland and low shrubland

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Endangered (floristic community type 26a)

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone sheets overlaid by Quindalup and Spearwood sands, limestone ridges, younger to older Quindalup Dunes, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Wilb 01-10), Gibson *et al.* 1994 (She 01-06; Nwil 01, 03)); detailed survey (part Site — Trudgen *et al.* 1990)

**Structural Units:** mapping (Trudgen *et al.* 1990)

##### Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Forest to Woodland;

*Eucalyptus totitiana*, *Banksia attenuata* and *B. menziesii* Low Open Forest; *Banksia attenuata* and *B. menziesii*

Low Woodland; *Eucalyptus decipiens* Low Open Forest; *Banksia ilicifolia* Low Woodland

Uplands — Tamala Limestone: Closed Low Heaths, Closed to Open Heaths and Tall Scrub dominated by

*Melaleuca cardiophylla*, *M. huegelii* and *Westringia dampieri* (uncommon near the coast), and by *Melaleuca*

*systema*, *Baeckea robusta*, *Calothamnus quadrifidus* and *C. sanguineus* distant from the coast; *Dryandra sessilis*

var. *cygnorum*, *Acacia truncata*, *A. lasiocarpa*, *Hibbertia hypericoides*, *Scaevola repens*, *Rhagodia baccata*,

*Hardenbergia comptoniana* and combinations of these; occasional patches of *Eucalyptus foecunda* Closed Mallee

Heath

##### Quindalup Dunes

Uplands — Older dunes and plains: Open Low Heaths dominated by *Melaleuca systema*, *Acacia rostelifera*,

*Hibbertia racemosa* over Herblands dominated by *Lomandra maritima*, *Conostylis candidans*, *Opercularia*

*vaginata*, *Acanthocarpus preissii* and combinations of these; occasional *Eucalyptus gomphocephala* trees

Uplands — Younger dunes: Open Low Heaths to Shrubland dominated by *Myoporum insulare*, *Scaevola*

*crassifolia*, *Spyridium globulosum*, *Acacia rostelifera* and *Olearia axillaris*

Strand: *Spinifex longifolius* and *S. hirsutus* Grasslands

**Scattered Native Plants:** not assessed





**Vegetation Condition:** >70% Excellent to Pristine, <30% Very Good to Good, with areas of localised disturbance associated with previous grazing pressure (mapping — Trudgen *et al.* 1990)

**Total Flora:** 219 native taxa, 21 weed taxa (Trudgen *et al.* 1990); estimated >75% expected flora

**Significant Flora:** *Eucalyptus argutifolia* (R, also Submission no. 146); *Acacia benthamii* (2), *Hibbertia spicata* subsp. *leptothea* (3), *Stylidium maritimum* (3); *Conostylis pauciflora* subsp. *euryrhipis* (3), (Trudgen *et al.* 1990); *Pimelea calcicola*, *Trachymene coerulea*, *Stylidium crossocephalum*, *Lechenaultia linarioides*, *Melaleuca cardiophylla*, *Conospermum triplinervium*, *Alyogyne huegelii* var. *glabrata*, *Alyogyne huegelii* var. *huegelii* ms (only known co-occurrence of these two taxa and of hybrids), *Allocasuarina lehmanniana*, *Hydrocotyle diantha* (most northerly population, Griffin and Trudgen 1994), *Leucopogon tenuis* (atypical form, possibly new taxon, Submission no. 146), *Petrophile serruriae* subsp. nov. (GJK 11421), *Astroloma microcalyx*; typical Tamala Limestone taxa — *Schoenus latitans*, *Acacia alata* var. *tetrantha*, *Grevillea preissii*, *Petrophile* aff. *brevifolia* (pink flowered form), *Petrophile serruriae* subsp. nov. (GJK 11421), *Trymalium ledifolium* subsp. *ledifolium*, *Astroloma microcalyx*

**Fauna:** limited survey for birds (45 species), native mammals (2 species) and reptiles (18 species) (Ninox Wildlife Consulting 1991, Submission no. 146). Significant bird species: category 1 (1), category 3 (7) and category 4 (8). Good assemblage of insectivorous and nectarivorous birds. Significant mammal species: Western Brush Wallaby. Significant reptile species: Carpet Python (*Morelia spilota*) and Barking Gecko (*Underwoodisaurus milii*)

**Linkage:** adjacent bushland to the north and south (Sites 397, 284 and 396); part of Greenway 36 (Tingay, Alan & Associates 1997); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Meets all six specific coastal reserve criteria —

- (i) Quindalup Dune types: low, well separated dunes perched on gently undulating Spearwood (Tamala) Limestone surface, younger dunes on coast steeper with little plain between them; ages of dunes range from blowouts to Q1, most being Q2 or Q3 (Griffin and Trudgen 1994)
- (ii) Continuing natural processes: Quindalup Dunes extending to 5.8kms inland
- (iii) Shoreline: soft (sandy)
- (iv) Linkage: contains Quindalup/Spearwood Dunes interface (and connects to area of Spearwood/Bassendean Dunes interface)
- (v) Vegetation: contains nine regional floristic groups, the ‘most important feature of the Wilbinga site is its diversity of vegetation in good [that is, Very Good] condition’ (Trudgen *et al.* 1990)
- (vi) Habitats: see Fauna section above;

Contains at least nine regional floristic groups; part Site proposed to become Conservation Park and 5g CALM Act Reserve in Forest Management Plan 1994–2003 (CALM 1994); ‘Locations 9755, 9756 and 9767 should be reserved for the conservation of Flora and Fauna and added to the Caraban Management Priority Area’ (Griffin and Trudgen 1994); part Site included in Gngangara Park proposal (Bailey 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendations:** Part A: Site with Some Existing Protection; State Forest proposed Conservation Park and Section 5j CALM Act Reserve (in accordance with Forest Management Plan 1994–2003) (Proposed ‘Gngangara Park’ – Cabinet 1996). Part B: Other Government Land Mechanism; Proposed Conservation Park (Proposed ‘Gngangara Park’ – Cabinet 1996) (see Table 3, Volume 1).

**COASTAL STRIP FROM WILBINGA TO MINDARIE**

**Boundary Definition:** protected area boundary (Boundary adjusted from that in draft *Perth’s Bushplan.*)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 397 **Area (ha):** bushland 404.7 (Site includes open water.)

**Map no.** 6, 7, 12, 13, 19

**Map sheet series ref. no.** 2034–IV NE, 2034–IV NW, 2034–IV SE, 2035–III SW

**Other Names:** Submission Area 238, Karli Spring

**Local Authorities (Suburb):** Shire of Wanneroo (Alkimos, Yanchep, Eglinton, Jindalee, Quinns Rocks, Two Rocks, Mindarie)

**System 6 (1983):** Part M1, M2 area of bushland goes beyond System area boundaries, all bushland described





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS3)

#### Quindalup Dunes (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2, S3)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Spearwood Dunes

Cottesloe Complex — Central and South

##### Quindalup Dunes

Quindalup Complex

#### Floristic Community Types: \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands** (additional wetland, Karli Spring, type not inferred)

\*16 Highly saline seasonal wetlands (*Frankenia pauciflora* Low Shrubland on Tamala Limestone Cliffs)

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*29a Coastal shrublands on shallow sands

\*29b *Acacia* shrublands on taller dunes

\*S11 Northern *Acacia rostellifera* — *Melaleuca acerosa* shrublands

\*S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

\*S14 *Spinifex longifolius* grasslands and low shrublands

### WETLANDS

**Wetland Types:** sumpland (not previously described (DEP 1999, Robinson 1997)) (wetland identified under floristic community types is the *Frankenia pauciflora* Low Shrubland on Tamala Limestone Cliffs)

#### Natural Wetland Groups

**Quindalup** (not further allocated)

**Wetland Management Objectives:** Conservation (<1ha) (DEP 1999)

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** ocean — limestone cliff, tall dune

**Vegetation and Flora:** detailed survey (part Site — Robinson 1995, Trudgen and Keighery 1990a&b); limited survey (DEP 1999, Hames Sharley Australia 1992, Robinson 1997; part Site — LeProvost *et al.* 1984, Semeniuk, V&C Research Group 1991b)

**Structural Units:** mapping (Hames Sharley Australia 1992; part Site — Robinson 1995, Trudgen and Keighery 1990a&b, LeProvost *et al.* 1984)

Spearwood Dunes

Uplands — Tamala Limestone: Closed to Open Low Heaths and Closed to Open Heaths dominated by *Melaleuca cardiophylla* (uncommon), *M. huegelii* (uncommon), *Dryandra sessilis* var. *cygnorum* or *Acacia truncata*; *Frankenia pauciflora* Low Shrubland (uncommon)

Quindalup Dunes

Uplands — Older dunes and plains (limited area, atypical so close to coast): Open Low Heaths to Shrublands dominated by *Melaleuca systema*, *Acacia rostellifera* or *Olearia axillaris* often over *Lomandra maritima* Herbland; *Melaleuca systema* and *Acacia lasiocarpa*

Uplands — Younger dunes: Open Low Heaths to Shrubland dominated by *Myoporum insulare*, *Scaevola crassifolia*, *Spyridium globulosum*, *Acacia truncata*, *A. rostellifera* and *Olearia axillaris*

Uplands — Strand: *Spinifex longifolius* and *S. hirsutus* Grasslands

Wetlands — *Lepidosperma gladiatum* Closed Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** ranges from near-Pristine to Degraded, with areas of severe localised disturbance; see comments in Other Special Attributes (below)

**Total Flora:** 83 native taxa, 27 weed taxa (part Site — Robinson 1995) (estimated >60% expected flora)

**Significant Flora:** *Conostylis pauciflora* subsp. *euryrhypis* (3), *Stylidium maritimum* (3); *Melaleuca cardiophylla*, *Lechenaultia linarioides*; typical of Tamala Limestone taxa — *Grevillea preissii*, *Diplopeltis huegelii* subsp. *huegelii*, *Trymalium ledifolium* subsp. *ledifolium*

**Fauna:** limited survey for birds (30 species), native mammals (1 species) and reptiles (8 species) (LeProvost Environmental Consultants 1990). Significant bird species: category 1 (1), category 3 (6) and category 4 (9)

**Linkage:** adjacent bushland to the north (Site 406) and east (Site 289); part of Greenways 1, 35, 37 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)



**Other Special Attributes**

Site constrained in meeting the specific coastal reserve criteria; four met to a limited extent —

- (i) Quindalup Dune types: predominantly younger dunes
- (ii) Continuing natural processes: 406.6ha (302.3ha of bushland) Quindalup Dunes extending to maximum of 0.8km inland but generally less, dunes truncated
- (iii) Shoreline: soft (sandy) and hard (vegetated rocky areas south of Quinns and south of Burns Beach)
- (iv) Linkage: part of semi-contiguous north-south vegetated coastal strip;

Large proportion recommended for protection in study of City of Wanneroo bushland (Trudgen 1996). Only wetland in the Quindalup Dunes north of Perth in the Perth Metropolitan Region.

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve — subject to review. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

**NINGANA BUSHLAND, YANCHEP/EGLINTON**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 289

**Area (ha):** bushland 551.5

**Map no.** 12, 13

**Map sheet series ref. no.** 2034-IV NE

**Other Names:** Part Eglinton, part Submission Area 289

**Local Authorities (Suburb):** Shire of Wanneroo (Yanchep, Eglinton)

**System 6 (1983):** Part M2 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qt: LS1, LS2)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2, LS4)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — North

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** coastal dune, parabolic dune, blowouts

**Vegetation and Flora:** detailed survey (part Site — Tingay, Alan & Associates 1991c, Tingay, Alan & Associates 1992, Trudgen and Keighery 1990b), limited survey (part Site — LeProvost Environmental Consultants 1990, Robinson 1997)

**Structural units:** mapping (Tingay, Alan & Associates 1991c & 1992)

**Spearwood Dunes**

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Woodland to Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland

Uplands — Tamala Limestone surfaces (come close to the coast): Open to Closed Low Heaths dominated by *Dryandra sessilis* var. *cygnorum*, *Hakea trifurcata*, *Calothamnus quadrifidus*, *Scaevola nitida*, *Acacia truncata* and *Allocasuarina humilis*; *Xanthorrhoea preissii* Shrubland





Quindalup Dunes

Uplands — Older dunes and plains: Open Low Heaths of *Melaleuca systema*, *Acacia rostellifera*, *A. lasiocarpa* and *Hibbertia racemosa* over Herblands dominated by *Lomandra maritima*; *Acacia rostellifera* Closed Tall Scrub to Closed Heath

Uplands — Younger dunes: Open to Closed Low Heaths to Shrubland dominated by *Scaevola crassifolia* and *Olearia axillaris*; *Scaevola nitida*, *Acanthocarpus preissii* and *Hemiandra pungens* or *Acacia rostellifera*

Strand: *Spinifex longifolius* and *S. hirsutus* Grassland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Excellent to Very Good, <40% Very Good to Good, with areas of severe localised disturbance associated with previous grazing pressure (mapping, Trudgen and Keighery 1990b)

**Total Flora:** 147 native taxa, 36 weed taxa (part Site (Ningana) — Trudgen and Keighery 1990b) (estimated >75% expected flora of Site)

**Significant Flora:** Trudgen and Keighery 1990b — *Conostylis pauciflora* subsp. *euryrhipis* (3), *Stylidium maritimum* (3); *Alyogyne huegelii* subsp. *glabrescens*, *Melaleuca cardiophylla*, *Petrophile serruriae* subsp. nov. (GJK 11421); typical of Tamala Limestone taxa — *Grevillea preissii*, *Petrophile serruriae* subsp. nov. (GJK 11421), *Trymalium ledifolium* subsp. *ledifolium*

**Fauna:** limited survey for birds (30 species), native mammals (1 species) and reptiles (8 species) (LeProvost Environmental Consultants 1990). Significant bird species: category 3 (7) and category 4 (4)

**Linkage:** adjacent bushland to the north, south and west (Site 397) and east (bushland to Site 288); part of Greenways 1, 37 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Meets all six specific coastal reserve criteria —

- (i) Quindalup Dune types: moderate, well separated dunes perched on gently undulating Spearwood (Tamala) Limestone surface, dunes mostly Q2 or Q3 in age; Q4 limited in area restricted to coastline, associated blowouts (Griffin and Trudgen 1994)
- (ii) Continuing natural processes: 210ha (196.2ha bushland) of Quindalup Dunes extending to 3.9kms inland
- (iii) Shoreline: soft (sandy)
- (iv) Linkage: contains Quindalup/Spearwood Dunes interface
- (v) Vegetation: typical Quindalup/Spearwood units
- (vi) Habitats: see Fauna section above;

Recommended for protection in study of City of Wanneroo bushland (Trudgen 1996); Alkimos Dune Complex, a system of parabolic beach dunes of Holocene age containing a chronological sequence (Lemmon *et al.* 1979)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; Existing Parks and Recreation Reserve — subject to review (see Table 3, Volume 1).

**BURNS BEACH BUSHLAND**

**Boundary Definition:** protected area/bushland taken to cadastre boundary (Boundary proposed to be adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 322

**Area (ha):** bushland 407.9 (proposed boundary circumscribes 277.1ha bushland)

**Map no.** 26, 27

**Map sheet series ref. no.** 2034–IV SE

**Other Names:** South Mindarie (Semenuk, V&C Research Group 1991a), Submission Areas 296 and 320

**Local Authorities (Suburb):** Shire of Wanneroo (Burns, Mindarie), City of Joondalup (Burns)

**System 6 (1983):** Part M2, part M6 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS3)



**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2, LS4)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

- 24 Northern Spearwood shrublands and woodlands
- 28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* Woodlands
- 29a Coastal shrublands on shallow sands
- 29b *Acacia* shrublands on taller dunes
- S11 Northern *Acacia rostellifera* — *Melaleuca acerosa* shrublands
- S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands
- S14 *Spinifex longifolius* grassland and low shrubland

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** dune landforms include parabolic dunes, sand blowout and cusped foreland

**Vegetation and Flora:** limited survey (DEP 1999, DEP 2000, Griffin 1994 (MI 01–23), part Site — Griffin and Trudgen 1994, Keighery, GJ, 1991c, Kinhill Stearns 1983, LeProvost *et al.* 1984)

**Structural Units:** mapping (part Site — LeProvost *et al.* 1984)

Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Banksia attenuata* and *B. menziesii* Low Woodland, occasional *Eucalyptus gomphocephala* trees

Uplands — Tamala Limestone: Closed to Open Heaths dominated by *Dryandra sessilis* var. *cygnorum*, *Calothamnus quadrifidus*, *Hakea trifurcata*, *Hibbertia hypericoides* and *Melaleuca huegelii*

Quindalup Dunes

Uplands — Older dunes and plains: Closed to Open Low Heaths of *Melaleuca systema*, *Acacia lasiocarpa*, *A. rostellifera*, *Scaevola nitens*, *Nemcia reticulata* and *Hibbertia racemosa* over Herblands dominated by *Lomandra maritima*; *Acacia rostellifera* Scrub; *Melaleuca cardiophylla* Low Forest to Closed Tall Scrub (southernmost area of this association)

Uplands — Younger dunes: Heaths dominated by *Olearia axillaris*, *Scaevola nitida* and *S. crassifolia*; low dunes with Heath dominated by *Scaevola crassifolia*, *Spyridium globulosum* and *Myoporum insulare*; deflated surface poorly vegetated with *Calocephalus brownii* and *Pelargonium capitatum*, the former giving way to *Acacia cyclops* as it ages

Uplands — Strand: *Spinifex longifolius* and *S. hirsutus* Grassland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >70% Excellent to Pristine, <30% Very Good to Good (Griffin and Trudgen 1994), with localised disturbance to north of Burns Beach

**Total Flora:** 168 native taxa, 24 weed taxa (Keighery, GJ, 1991c) (estimated <70% of the expected flora)

**Significant Flora:** *Conostylis pauciflora* subsp. *euryrhypis* (3), *Hibbertia spicata* subsp. *leptotheca* (3), *Stylidium maritimum* (3); *Sonchus megalocarpa* (most northern record, uncommon species); *Melaleuca cardiophylla*, *Allocasuarina lehmanniana*, *Acacia xanthina* (at southern limit in the PMR), *Lechenaultia linarioides*; *Conospermum triplinervium*, *Petrophile serruriae* subsp. nov. (GJK 11421), *Pimelea villifera* (only known population in PMR, Keighery, GJ, 1991c); typical of Tamala Limestone taxa (Keighery, GJ, 1991c) — *Grevillea preissii*, *Diptopeltis huegelii* subsp. *huegelii*, *Petrophile serruriae* subsp. nov. (GJK 11421), *Pimelea calcicola*, *Leptomeria empetriiformis*, *Trymalium ledifolium* subsp. *ledifolium*, *Pimelea villifera*, *Jacksonia calcicola*

**Fauna:** limited survey for birds (54 species), native mammals (3 species), reptiles (23 species) and amphibians (1 species) (Kinhill Stearns 1983). Significant bird species: Scarlet Robin. Significant mammal species: Western Brush Wallaby and Honey Possum

**Linkage:** adjacent bushland to the south and east (Site 323, across road, then through Site 323 to Site 383); part of Greenways 1, 3, 4, 34 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)





**Other Special Attributes**

Meets all six specific coastal reserve criteria

- (i) Quindalup Dune types: ‘South Mindarie now represents the most well defined remaining cusped foreland and its associated range of medium to small scale (Quindalup) dune landforms and vegetated habitats in this coastal sector (Whitfords to Lancelin)’ (Semeniuk, V&C Research Group 1991a); ‘small area of old low dunes perched on gently undulating Spearwood (Tamala) Limestone surface; moderate sized Q3 dunes ramped on coast side; small area of Q4 dunes forming steep sided closed vale; a number of small coastal blowouts with small Q4 dunes surrounding these; a major sandsheet with moderate to tall partially stabilised dune margins; bowl of sand sheet completely deflated near coast; foredune redeveloped in throat of sand sheet’ and ‘small area of old low dunes perched on gently undulating Spearwood (Tamala) Limestone surface with few small plains; large area of old, moderate sized dunes ramped on each other with small (if any) plains between; number of small coastal blowouts with small Q4 dunes surrounding; major sand sheet with partially stabilised dune margins; bowl of sand sheet completely deflated only near coast; foredune redeveloped in throat of sand sheet’ (Griffin and Trudgen 1994)
- (ii) Continuing natural processes: 338.5ha (260.8ha bushland) of Quindalup Dunes extending to 1.4kms inland (2.8kms inland in link to Site 323)
- (iii) Shoreline: soft (sandy)
- (iv) Linkage: contains Quindalup/Spearwood Dunes interface; part of semi-contiguous north–south vegetated coastal strip
- (v) Vegetation: ‘vegetation is variable and typifies the range of habitat types within a cusp (Semeniuk, V&C Research Group 1991a) and interfaces with Tamala Limestone surfaces and Spearwood Dunes
- (vi) Habitats: variable;

Includes core of areas recommended for conservation by Griffin and Trudgen (1994) and Semeniuk, V&C Research Group (1991a); Recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; parts of this Site already reserved for Parks and Recreation in the MRS be made National Park, Conservation Park, Regional Park or Nature Reserve. Part B: Proposed Parks and Recreation Reservation. Part C: Urban Negotiated Planning Solution. Part D: Urban Negotiated Planning Solution (see Table 3, Volume 1).

**LINK FROM BURNS BEACH BUSHLAND TO NEERABUP NATIONAL PARK**

**Boundary Definition:** management/bushland boundary (Boundary adjusted from that in draft *Perth’s Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 323

**Area (ha):** bushland 106.1 (Proposed boundary circumscribes 92.23ha bushland.)

**Map no.** 27

**Map sheet series ref. no.** 2034–IV SE

**Other Names:** Tamala Park

**Local Authorities (Suburb):** Shire of Wanneroo (Clarkson, Tamala Park)

**System 6 (1983):** M6 part System area bushland and part scattered native plants (canopy), all vegetation described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qt: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: LS4)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South



**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

- \*24 Northern Spearwood shrublands and woodlands
- \*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands
- \*29b *Acacia* shrublands on taller dunes

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** limestone ridge, tall dune, vegetated uplands

**Vegetation and Flora:** limited survey (Kinhill Stearns 1983)

**Structural Units:** mapping (Kinhill Stearns 1983)

Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Eucalyptus todtiana*, *Banksia menziesii* and *B. attenuata*

Woodland

Uplands — Tamala Limestone: *Dryandra sessilis* var. *cygnorum* Closed to Open Heaths

Quindalup Dunes

Uplands — Oldest dunes and plains: *Acacia rostellifera* Tall Shrubland

**Scattered Native Plants:** *Eucalyptus todtiana*, *Banksia menziesii* and *B. attenuata* Woodland (Kinhill Stearns 1983)

**Vegetation Condition:** <30% Good to Very Good around area developed for Tamala Tip (Kinhill Stearns 1983)

**Total Flora:** 80 native taxa (Kinhill Stearns 1983) (estimated >50% expected flora)

**Significant Flora:** none recorded

**Fauna:** Likely to include elements of Sites 383 and 322. Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the south, north, east (Site 383, across road) and west (Site 322, across road); part of Greenways 3, 34 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Site constrained in meeting the specific coastal reserve criteria; four met to a limited extent —

- (i) Quindalup Dune types: oldest dunes
- (ii) Continuing natural processes: 30.6ha (22.9ha bushland) of Quindalup Dunes to 2.8kms inland
- (iv) Linkage: contains Quindalup/Spearwood Dunes interface
- (vi) Habitats: see Fauna section above;

Part of area recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance

**Recommendation:** Part A: Other Government Lands Mechanism. Part B: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).

**COASTAL STRIP FROM BURNS BEACH TO HILLARYS**

**Boundary Definition:** protected area/bushland (part taken to zoning) boundary (Boundary adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 325

**Area (ha):** bushland 195.3

**Map no.** 27, 33

**Map sheet series ref. no.** 2034–III NE, 2034–IV SE

**Other Names:** includes Submission Area 29 Ocean Reef Road

**Local Authorities (Suburb):** City of Joondalup (Ocean Reef, Iluka, Hillarys, Mullaloo, Kallaroo)

**System 6 (1983):** Part M2 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)





Tamala Limestone (Qtl: LS1)  
**Quindalup Dunes** (Holocene dunes)  
 Safety Bay Sands (Qhs: S1, S2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*16 Highly saline seasonal wetlands (*Frankenia pauciflora* Low Shrubland on Tamala Limestone Cliffs)

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

27 Species-poor mallees and shrublands on limestone

29a Coastal shrublands on shallow sands

\*29b *Acacia* shrublands on taller dunes

\*S11 Northern *Acacia rostellifera* — *Melaleuca acerosa* shrublands

\*S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

\*S14 *Spinifex longifolius* grasslands and low shrublands

**WETLANDS**

No wetlands mapped (wetland identified above is the *Frankenia pauciflora* Low Shrubland)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** ocean — limestone cliff and coastal dune vegetation

**Vegetation and Flora:** limited survey (part Site — DEP 1999, Gibson *et al.* 1994 (Burn 01–02), Griffin 1994 (BU 01–04), Keighery, GJ, and Keighery 1992a, Semeniuk, V&C Research Group 1991)

**Structural Units**

Spearwood Dunes

Uplands — Tamala Limestone: Closed to Open Low Heaths dominated by *Melaleuca cardiophylla* (southernmost large population), *M. huegelii*, *Dryandra sessilis* var. *cygnorum*, *Scaevola crassifolia*, *Spyridium globulosum* and *Templetonia retusa*; *Frankenia pauciflora* Low Shrubland (cliff-edge community, relatively large area to south of Burns Beach)

Quindalup Dunes

Oldest dunes and plains (limited area, atypical as close to coast): Open Low Heaths to Shrublands dominated by *Melaleuca systema*, *Acacia rostellifera*, *A. xanthina* and *Olearia axillaris*

Youngest dunes: Open Low Heaths to Shrublands dominated by *Myoporum insulare*, *Scaevola crassifolia*, *Acacia rostellifera*, *A. xanthina* and *Olearia axillaris*

Strand: *Spinifex* Grassland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** ranges from Excellent to Degraded, with areas of severe localised disturbance; see comments in Other Special Attributes (below)

**Total Flora:** 38 native taxa, 8 weed taxa (part Site — Keighery, GJ, and Keighery 1992a) (estimated >60% expected flora)

**Significant Flora:** *Hibbertia spicata* subsp. *leptotheca* (3); *Melaleuca cardiophylla*, *Plantago exilis* (only known record in the PMR, uncommon — Keighery 1992), *Alyogyne huegelii* var. *glabrescens* (Keighery 1992), *Kennedia coccinea*

**Fauna:** not known

**Linkage:** adjacent bushland to the east; part of Greenways 4, 1, 10 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Site constrained in meeting the specific coastal reserve criteria; four met to a limited extent —

- (i) Quindalup Dune types: predominantly younger dunes
- (ii) Continuing natural processes: 214.7ha (146.1ha bushland) of Quindalup Dunes extending to maximum of 0.8km inland, dunes truncated
- (iii) Shoreline: soft (sandy) and hard (rocky); vegetated areas south of Burns Beach are the best remaining example of a 'limestone ridge forming cliffs' in the north-west corridor of the PMR (Semeniuk, V&C Research Group 1991)
- (iv) Linkage: part of semi-contiguous North—South vegetated coastal strip;

Includes near-coastal sections of areas recommended for conservation by Semeniuk, V&C Research Group (1991a)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed; Indicative place (AHC 2000 D)



**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body . Part B: Other Government Land Mechanism (see Table 3, Volume 1).

**TRIGG BUSHLAND AND ADJACENT COASTAL RESERVE,  
TRIGG/SCARBOROUGH**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 308

**Area (ha):** bushland 134.6

**Map no.** 39, 40

**Map sheet series ref. no.** 2034-II NW, 2034-II SW

**Other Names:** Karrinyup Bushland

**Local Authorities (Suburb):** City of Stirling (Trigg, Karrinyup)

**System 6 (1983):** M36 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

24 Northern Spearwood shrublands and woodlands

28 Spearwood *Banksia attenuata* or *Banksia attenuata* — *Eucalyptus* woodlands

29a Coastal shrublands on shallow sands

29b *Acacia* shrublands on taller dunes

S11 Northern *Acacia rostellifera* — *Melaleuca acerosa* shrublands

S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

S14 *Spinifex longifolius* grassland and low shrubland

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated coastal dunes

**Vegetation and Flora:** detailed survey (Keighery, BJ, 1996, Meney 1991); limited survey (Gibson *et al.* 1994 (Tr 01–08), Griffin 1994 (Trig 01–06), Keighery, GJ, 1996 D (Trigg 08), LeProvost *et al.* 1988)

**Structural Units:** mapping (LeProvost *et al.* 1988, Meney 1991)

Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Forest to Woodland;

*Banksia attenuata* and *B. menziesii* Low Open Woodland

Uplands — Tamala Limestone: Closed Low Heaths and Closed to Open Heaths dominated by *Melaleuca systena*,

*Calothamnus quadrifidus*, *Dryandra sessilis* var. *cygnorum*, *Acacia lasiocarpa*, *Grevillea preissii* or *Dryandra*

*lindleyana*





**Quindalup Dunes**

Uplands — Oldest dunes and plains: Open Heaths dominated by *Melaleuca systena*, *Acacia rostellifera* or *Allocasuarina lehmanniana* over Herblands dominated by *Lomandra maritima*; *Callitris preissii* Low Closed Forest; *Eucalyptus gomphocephala* Open Forest to Woodland

Uplands — Youngest dunes: *Scaevola crassifolia* and *Olearia axillaris* Open Low Heaths, some scattered *Callitris preissii*

Uplands — Strand: *Spinifex longifolius* Grassland

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 175 native taxa (Keighery, GJ, 1996, Meney 1991) (>75 % expected flora)

**Significant Flora:** *Conostylis pauciflora* subsp. *euryrhipis* (3); *Lechenaultia linarioides*, *Gyrostemon ramulosus* (uncommon in PMR and on Swan Coastal Plain), *Allocasuarina lehmanniana*, *Callitris preissii* (endemic to the PMR and Rottneest Island, most northern significant population, Keighery, BJ, Gibson and Keighery 1997)

**Fauna:** limited survey for birds (30 species) (How *et al.* 1996) and structured survey for reptiles (24 species) and amphibians (1 species) (How *et al.* 1996). Significant birds: White-browed Scrubwren, Broad-tailed Thornbill, Variegated, White-winged and Splendid Fairy-wrens. Significant reptile species: Western Blue Tongue (*Tiliqua occipitalis*), Bardick (*Echiopsis curtus*), Black-striped Snake (*Simoselaps calonotos*) and a dragon (*Tympanocryptis adelaidensis*). Rich assemblage and high number of reptile species

**Linkage:** no adjacent bushland; part of Greenways 7, 6, 1 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Meets all six specific coastal reserve criteria —

- (i) Quindalup Dune types: 'landscape moderate to tall, moderate aged dunes perched on gently undulating Spearwood (Tamala) limestone surface, with plain between; low coastal Q4 dunes (youngest)' (Griffin and Trudgen 1994)
- (ii) Continuing natural processes: 124.8ha (104ha bushland) of Quindalup Dunes extending to 2.2km inland
- (iii) Shoreline: soft (sand) and hard (rocky)
- (iv) Linkage: contains Quindalup/Spearwood Dunes interface; roads and developments fragment Site; part of semi-contiguous North—South vegetated coastal strip
- (v) Vegetation: typical Quindalup/Spearwood units, highly restricted species (*Callitris preissii*)
- (vi) Habitats: rich assemblage and high number of reptile species; National Trust of Australia (WA) Classification

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**FLOREAT BEACH BUSHLAND, CITY BEACH/SCARBOROUGH**

**Boundary Definition:** protected area/bushland taken to cadastre boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 310

**Area (ha):** bushland 51.7

**Map no.** 39, 45

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** Town of Cambridge (City Beach), City of Stirling (Scarborough)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Tamala Limestone (Qtl: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2)



**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

\*29b *Acacia* shrublands on taller dunes

\*S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

\*S14 *Spinifex longifolius* grassland and low shrubland

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995)

**Structural Units**

Quindalup Dunes

Youngest dunes: Open Low Heaths dominated by *Scaevola crassifolia*, *Olearia axillaris*, *Acacia rostellifera*, *A. lasiocarpa* and combinations of these

Strand: *Spinifex longifolius* Grassland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** Very Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the south; part of Greenway 1 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Site constrained in meeting the specific coastal reserve criteria; four met to a limited extent —

(i) Quindalup Dune types: younger dunes

(ii) Continuing natural processes: 107.7ha (49.3ha bushland) of Quindalup Dunes extending to 1km (0.9km bushland) inland, dunes mostly truncated

(iii) Shoreline: soft (sandy)

(iv) Linkage: part of semi-contiguous North—South vegetated coastal strip

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

**SWANBOURNE BUSHLAND, SWANBOURNE/CITY BEACH**

**Boundary Definition:** protected area/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 315

**Area (ha):** bushland 174.9

**Map no.** 45

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Nedlands (Swanbourne, Mt Claremont), Town of Cambridge (City Beach, Mt Claremont)

**System 6 (1983):** M46 area of bushland goes beyond System area boundaries, all bushland described





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Spearwood Dunes

Tamala Limestone (Qtl: LS1)

#### Quindalup Dunes (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

##### Quindalup Dunes

Quindalup Complex

#### Floristic Community Types

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

29b *Acacia* shrublands on taller dunes

S11 Northern *Acacia rostellifera* — *Melaleuca acerosa* shrublands

S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

S14 *Spinifex longifolius* grassland and low shrubland

### WETLANDS

No wetlands mapped

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

## SECTION 3: SPECIFIC SITE DETAIL

### Landscape Features: coastal dunes

**Vegetation and Flora:** detailed survey (part Site — Keighery, GJ, and Keighery 1993; Mitchell McCotter and Ecoscape 1993); limited survey (DEP 1999, Dames and Moore 1986, Griffin and Trudgen 1994 (SW 01–11), Keighery, GJ, 1996 D (M46 01–02))

**Structural Units:** mapping (part Site — Mitchell McCotter and Ecoscape 1993)

Spearwood Dunes

Uplands — Sands derived from Tamala Limestone and Tamala Limestone: limited in area and vegetation; reflects

Quindalup Dunes floristic influence

Quindalup Dunes

Uplands — Oldest dunes and plains (limited area): *Eucalyptus gomphocephala* Woodland; *Callitris preissii* Low Closed Forest to Low Woodland; *Agonis flexuosa* Low Woodland; Open Low Heaths dominated by *Melaleuca systena*, *Acacia rostellifera*, *A. lasiocarpa*, *Calothamnus quadrifidus* over Herblands dominated by *Lomandra maritima*; *Allocasuarina lehmanniana* subsp. *lehmanniana* Closed Tall Scrub; *Acacia rostellifera* Closed Tall Scrub

Uplands — Youngest dunes: Open Low Heaths to Closed Tall Scrub dominated by *Myoporum insulare*,

*Scaevola crassifolia*, *Acacia rostellifera*, *Olearia axillaris*

Uplands — Strand: *Spinifex hirsutus* Grassland

**Vegetation Condition:** >75% Very Good to Good, <25% Good to Degraded

**Total Flora:** 117 native taxa, 58 weed taxa (Keighery, GJ, and Keighery, 1993c) (estimated >75% expected flora)

**Significant Flora:** *Lechenaultia linarioides*, *Allocasuarina lehmanniana* (most southern significant population), *Chamelaucium uncinatum* (with Bold Park most southern population), *Callitris preissii*, *Agonis flexuosa* (with Bold Park most northern population)

**Fauna:** structured survey for birds (57 species), native mammals (1 species) and reptiles (19 species) (How *et al.* 1996). Significant populations of insectivorous passerine birds including Splendid, Variegated and White-winged Fairy-wrens and White-browed Scrubwren. Significant bird species: category 1 (1), category 3 (8) and category 4 (5). Significant reptile species: Bardick (*Echiopsis curtus*)

**Linkage:** adjacent bushland to the north (Site 312, across road); part of Greenways 1, 18, 20 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)



**Other Special Attributes**

Meets all six specific coastal reserve criteria —

- (i) Quindalup Dune types: 'moderate to tall, moderate aged dunes perched on gently undulating Spearwood (Tamala) Limestone surface, with little plain between them; moderate sized coastal Q4 (youngest) dunes' (Griffin and Trudgen 1994)
- (ii) Continuing natural processes: 220.3ha (174.8ha bushland) of Quindalup Dunes extending to 1.6km inland
- (iii) Shoreline: soft (sandy)
- (iv) Linkage: adjacent to area containing Quindalup/Spearwood Dunes interface; part of semi-contiguous North—South vegetated coastal strip
- (v) Vegetation: four regional floristic groups, diversity of structural groups
- (vi) Habitats: see Fauna section above

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Local Reserve Mechanism. Part C: Other Government Land Mechanism (see Table 3, Volume 1).

**WOODMAN POINT, COOGEE/MUNSTER**

**Boundary Definition:** protected area/bushland taken to cadastre boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 341 **Area (ha):** bushland 91.7

**Map no.** 57

**Map sheet series ref. no.** 2033-I NW, 2033-I SW, 2033-IV SE

**Other Names:** not known

**Local Authorities (Suburb):** City of Cockburn (Coogee, Munster)

**Includes CALM Managed Land:** Reserve 42469 (Conservation of Flora and Fauna)

**System 6 (1983):** M90 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Tamala Limestone (Qtl: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S13)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*30a2 *Callitris preissii* and/or *Melaleuca lanceolata* forests and woodlands (DEP 1996, re-allocated from 30a, equivalent to 30a in Gibson *et al.* 1994, English and Blyth 1997)

30c2 Woodlands and shrublands on Holocene dunes

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Vulnerable (floristic community type 30a as defined by Gibson *et al.* 1994)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated coastal peninsula



**Vegetation and Flora:** detailed survey (Fox and Majer 1981, Keighery, GJ, 2000, Powell and Emberson 1981); limited survey (Gibson *et al.* 1994 (Wood 01–02))

**Structural Units:** mapping (Powell and Emberson 1981)

Spearwood Dunes

Uplands — Tamala Limestone : mixed Open Heath

Quindalup Dunes

Uplands — Beach ridge plain: *Eucalyptus gomphocephala* Open Forest; *Callitris preissii* Low Closed Forest; *Spyridium globulosum* and *Acacia rostellifera* Tall Open Scrub

Uplands — Strand: *Spinifex hirsutus* and *S. longifolius* Grassland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >75% Excellent to Good, <25% Degraded to Good, with areas of severe localised disturbance associated with the explosives enclosures

**Total Flora:** 92 native taxa, 40 weed taxa (compiled from Keighery, GJ, 2000 and Powell and Emberson 1981) (estimated >80% expected flora)

**Significant Flora:** *Dodonaea hackettiana* (4); *Callitris preissii* (large population, some mature individuals), Keighery, GJ, 2000 — *Diplolaena dampieri* (most northern population), *Amyema miquelii* (one of few populations on the Swan Coastal Plain)

**Fauna:** structured surveys for birds (92 species) (How *et al.* 1996; RAOU 1996 D, 16 visits), and native mammals (1 species), reptiles (14 species) and amphibians (1 species) (How *et al.* 1996). Significant populations of insectivorous passerine birds including Splendid Fairy-wren, Grey Shrike-thrush, Golden Whistler, and White-browed Scrubwren. Significant bird species: category 1 (1), category 2 (15), category 3 (9) and category 4 (6). Significant mammal species: Quenda (Friend 1996 D). Significant reptile species: Lined Skink (*Lerista lineata*)

**Linkage:** adjacent bushland to the east (across road); part of Greenways 1, 96 (Tingay Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Meets five of the six specific coastal reserve criteria —

(i) Quindalup Dune types: beach ridge plain

(ii) Continuing natural processes: 232.3ha (90.3ha bushland) of Quindalup Dunes extending to 1.3km (1.6km bushland) inland

(iii) Shoreline: soft (sandy)

(v) Vegetation: two regional floristic groups; mature trees of *Eucalyptus gomphocephala*, *Acacia rostellifera*, *Melaleuca huegelii* and *Callitris preissii*; the most intact mature forest of *Eucalyptus gomphocephala* in the PMR, one of two areas with significant *Callitris preissii* Low Closed Forest (Keighery, BJ, Gibson and Keighery 1997)

(vi) Habitats: see Fauna section above;

majority of Site included in Woodman Point Regional Park proposal (State Government Cabinet Minute, 5 May 1997)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site (including Reserve 42469) for conservation purposes within Woodman Point Regional Park is endorsed (see Table 3, Volume 1).

## CARNAC ISLAND

**Boundary Definition:** management taken to coastline boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 473

**Area (ha):** bushland 19.6

**Map no.** 56

**Map sheet series ref. no.** 2033–IV NE, 2033–IV SE

**Other Names:** not known

**Local Authorities (Suburb):** City of Cockburn (Carnac Island)

**Includes CALM Managed Land:** Reserve 26646 (Recreation and Conservation of Fauna)

**System 6 (1983):** C46 part System area bushland, all bushland described



**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*16 Highly saline seasonal wetlands (*Frankenia pauciflora* Open Low Heath on Tamala Limestone Cliffs)

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*29a Coastal shrublands on shallow sands

**WETLANDS**

No wetlands mapped (wetland identified above is the *Frankenia pauciflora* Open Low Heath)

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** ocean — limestone cliff, limestone flats, vegetated uplands

**Vegetation and Flora:** limited survey (McArthur 1957)

**Structural Units:** mapping (McArthur 1957)

Spearwood Dunes

Uplands — Tamala Limestone: *Acacia rostellifera* and *Olearia axillaris* Open Heath; Open to Closed Low Heath dominated by *Olearia axillaris* and *Scaevola crassifolia*; *Rhagodia baccata*, *Olearia axillaris* and *Calocephalus brownii* and *Nitraria billardierei*; *Frankenia pauciflora* Open Low Heath

Quindalup Dunes

Uplands — Strand: *Carpobrotus virescens*, *Tetragonia* sp. and *Suaeda australis* Herbland

**Vegetation Condition:** Very Good to Excellent

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** limited survey for birds (12 species) (Abbott 1977). Significant bird species: category 2 (1)

**Linkage:** no adjacent bushland

**Other Special Attributes:** Specific coastal reserve criteria not applied to small islands

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing purpose, care, control and management of Reserve 26646 is endorsed (see Table 3, Volume 1).

**GARDEN ISLAND**

**Boundary Definition:** management/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 63

**Area (ha):** bushland 956.9

**Map no.** 56, 62, 68

**Map sheet series ref. no.** 2033-IV SE

**Other Names:** not known

**Local Authorities (Suburb):** City of Rockingham (Garden Island)

**System 6 (1983):** M96 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)





**Quindalup Dunes** (Holocene dunes)  
Safety Bay Sands (Qhs: S1, S2, S13)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

29a Coastal shrublands on shallow sands

\*29b *Acacia* shrublands on taller dunes

30a2 *Callitris preissii* and/or *Melaleuca lanceolata* forests and woodlands (DEP 1996, re-allocated from 30a, equivalent to 30a in Gibson *et al.* 1994, English and Blyth 1997)

30c2 Woodlands and shrublands on Holocene dunes

\*S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

\*S14 *Spinifex longifolius* grassland and low shrubland

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined, Vulnerable (floristic community type 30a as defined by English and Blyth 1997)

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** island, ocean — limestone cliff

**Vegetation and Flora:** detailed survey (Keighery, GJ, 1998, McArthur 1957, McArthur 1990, McArthur and Bartle 1981, Marchant and Abbot 1991); limited survey (Gibson *et al.* 1994 (Gard 01–04)); synopsis (Keighery, BJ, Gibson and Keighery 1997)

**Structural Units:** mapping (McArthur 1957, McArthur 1990, McArthur and Bartle 1981)

Spearwood Dunes

Uplands — Tamala Limestone with shallow Quindalup sands: Closed Low Heath dominated by combinations of *Scaevola crassifolia*, *Acrotriche cordata*, *Boronia alata* and *Alyxia buxifolia*

Quindalup Dunes

Uplands — Youngest dunes: Low Forest to Low Open Forest dominated by *Callitris preissii*, *Melaleuca lanceolata*, *Melaleuca huegelii*, *Acacia rostellifera* and combinations of these; Closed Tall Scrub dominated by *Acacia rostellifera*, *Spyridium globulosum*, *Pittosporum phylliraeoides*, *Melaleuca huegelii*, *Beyeria viscosa*, *Diplolaena dampieri* and combinations of these

Uplands — Strand: *Spyridium globulosum*, *Alyxia buxifolia*, *Olearia axillaris* and *Calocephalus brownii* Open Heath; *Sarcocornia blackiana* Low Shrubland; *Cakile maritima*, *Salsola kali* and *Carpobrotus virescens* Open Low Heath; *Lepidosperma gladiatum* and *nodosa* Sedgeland

**Vegetation Condition:** >80% Excellent to Pristine, <20% Very Good to Good, with areas of severe localised disturbance

**Total Flora:** 105 native taxa, 78 weed taxa (Keighery, BJ, Gibson and Keighery 1997, Keighery, GJ, 1998, McArthur 1957, Marchant and Abbott 1981) (estimated >90% expected flora)

**Significant Flora:** Keighery, BJ, Gibson and Keighery 1997 — *Lepidium puberulum* (4) (only record on the Plain south of Lancelin), *Melaleuca lanceolata* (only population in PMR, disjunct from Margaret River), *Callitris preissii* (endemic to the PMR, most extensive populations), *Amyema melaleucae* (a mistletoe growing on *Melaleuca lanceolata*, disjunct south from Dongara and the only record on the Swan Coastal Plain), *Lasiopetalum angustifolium* (previously *L. oppositifolium*, disjunct south from Green Head and the only record on the Swan Coastal Plain), *Boronia alata* (disjunct north from Cape Naturaliste, also recorded from two other locations in the Perth area — Rottnest Island and Minim Cove), *Myosotis australis*, disjunct from Margaret River (only record on the Swan Coastal Plain), *Pittosporum phylliraeoides* (significant populations of a species that is very uncommon on the Swan Coastal Plain), *Cynoglossum australe* (disjunct population from the Abrolhos Islands) and *Trachymene coerulea*

**Fauna:** structured surveys for birds (94 species) (Brooker *et al.* 1995a), native mammals (1 species) (Brooker *et al.* 1995a) and reptiles (14 species) (Brooker *et al.* 1995a, Robinson *et al.* 1987). Significant bird species: category 2 (14), category 3 (5) and category 4 (5). Significant island populations of Tammar Wallaby, Carpet Python (*Morelia spilota*), Lined Skink (*Lerista lineata*), Brush Bronzewing and Golden Whistler

**Linkage:** no adjacent bushland

**Other Special Attributes**

Meets five of the six specific criteria for coastal reserves:

- (i) Quindalup Dune types: deep and shallow dunes and thin sands overlaying Tamala Limestone
- (ii) Continuing natural processes: 1019.9ha (865.5ha bushland) of Quindalup Dunes; almost completely vegetated island
- (iii) Shoreline: soft (sandy) and hard (rocky)
- (v) Vegetation: six regional floristic groupings, one confined to Woodman Point and Garden Island
- (vi) Habitats: see Fauna section above

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Other Government Land Mechanism (see Table 3, Volume 1).

**POINT PERON AND ADJACENT BUSHLAND, PERON/SHOALWATER BAY**

**Boundary Definition:** protected area/management taken to coastline boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 355

**Area (ha):** bushland 107.1

**Map no.** 68, 69

**Map sheet series ref. no.** 2033–III NE

**Other Names:** part of Rockingham Lakes Regional Park

**Local Authorities (Suburb):** City of Rockingham (Peron)

**Includes CALM Managed Land:** Marine Reserve 5 (Marine Park)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Tamala Limestone (Qtl: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2, S13)

**Lagoonal and Estuarine Deposits (within the Quindalup Dunes)**

Lagoonal and Estuarine Deposits (Vasse) (Qhg: M5)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*16 Highly saline seasonal wetlands (*Frankenia pauciflora* and *Sarcocornia blackiana* Low Open Shrubland on Tamala Limestone Cliffs)

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*29a Coastal shrublands on shallow sands

\*29b *Acacia* shrublands on taller dunes

\*S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

\*S14 *Spinifex longifolius* grasslands and low shrublands

**WETLANDS**

**Wetland Types:** artificial channel

**Natural Wetland Groups**

**Quindalup**

Becher (Qu.2)

**Wetland Management Objectives:** not assessed

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined



**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** ocean — limestone cliff, vegetated uplands

**Vegetation and Flora:** detailed survey (Keating and Trudgen 1986)

**Structural Units:** mapping (Keating and Trudgen 1986)

Spearwood Dunes

Uplands — Tamala Limestone: *Frankenia pauciflora* and *Sarcocornia blackiana* Low Open Shrubland; Open Heaths dominated by *Templetonia retusa* and *Melaleuca huegelii*

Quindalup Dunes

Uplands — Youngest dunes: Shrublands dominated by *Acacia rostellifera* and *Jacksonia furcellata* sometimes with *Leucopogon parviflorus* or *A. rostellifera* and *Calothamnus quadrifidus*; Closed Heaths to Shrublands dominated by *Acacia rostellifera*, *Olearia axillaris* or *Alyxia buxifolia* and combinations of these; Closed to Open Scrub dominated by *Acacia rostellifera* and *Melaleuca huegelii* or *A. rostellifera* and *Olearia axillaris*

Uplands — Strand: *Spinifex longifolius* Open Grassland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >50% Very Good to Good, <50% Degraded, with areas of severe localised disturbance

**Total Flora:** 69 native taxa (Keating and Trudgen 1986, excluding obvious wetland taxa of Site 358) (estimated >60% expected flora)

**Significant Flora:** none identified

**Fauna:** limited survey for reptiles (16 species) (WA Naturalists' Club pers. comm.). Significant reptile species: Carpet Python (*Morelia spilota*) and Lined Skink (*Lerista lineata*)

**Linkage:** adjacent bushland to the east (Site 358, across road); part of Greenways 1, 93, 97 (Tingay, Alan & Associates 1998a)

**Other Special Attributes**

Meets six specific coastal reserve criteria —

- (i) Quindalup Dune types: youngest, older and beach ridge plain
- (ii) Continuing natural processes: 174.5ha (106.1ha bushland) of Quindalup Dunes extending to 3.1km inland from the point
- (iii) Shoreline: soft (sandy) and hard (rocky)
- (iv) Linkage: contains Quindalup/Spearwood Dunes (Tamala Limestone) interface; roads and developments fragment Site
- (v) Vegetation: typical Quindalup/Spearwood units
- (vi) Habitats: see Fauna section above;

Isolated rocky headland displaying excellent exposures of the aeolian phase of Tamala Limestone, connected to the mainland by a series of Holocene beach-sand and dune-sand ridges of the Safety Bay Sands. Raised and submerged sea erosional terraces and beach deposits along the foreshore are thought to indicate past still-stands of sea level at 3, 1.5 and 0.6 metres above present sea level during the Holocene and this evidence has been used for world-wide eustatic correlations (Lemmon *et al.* 1979); majority of Site included in Port Kennedy and Rockingham Parks proposal (Tingay, Alan & Associates 1997, WA Cabinet Minute, 5 May 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Rockingham Lakes Regional Park is endorsed. Part: Other Government Land Mechanism (see Table 3, Volume 1).

**LAKE RICHMOND, ROCKINGHAM**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (part eastern boundary subject to Ministerial Condition No. 486, 18 September 1998)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 358

**Area (ha):** bushland 28.7 (Site also includes open water.)

**Map no.** 69

**Map sheet series ref. no.** 2033-III NE

**Other Names:** part of Rockingham Lakes Regional Park

**Local Authorities (Suburb):** City of Rockingham (Rockingham, Peron, Shoalwater)

**System 6 (1983):** M102 part System area bushland, only bushland described



## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S13)

**Lagoonal and Estuarine Deposits (within the Quindalup Dunes)**

Lagoonal and Estuarine Deposits (Vasse) (Qhg: M5)

### VEGETATION AND FLORA

#### Vegetation Complexes

##### Quindalup Dunes

Quindalup Complex

#### Floristic Community Types

##### Supergroup 2: Seasonal Wetlands

19a Sedgeland in Holocene dune swales (DEP 1996, equivalent to 19 in Gibson *et al.* 1994, English and Blyth 1997)

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

29a Coastal shrublands on shallow sands

### WETLANDS

**Wetland Types:** lake, artificial channel, damplands/sumplands

#### Natural Wetland Groups

##### Quindalup

Cooloongup (Qu.1)

Becher (Qu.2)

**Wetland Management Objectives:** Conservation (59.2ha)

**Swan Coastal Plain Lakes EPP:** 53.3ha

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 19 (as defined by Gibson *et al.* 1994), Stromatolite-like microbialite community of coastal freshwater lakes)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetlands

**Vegetation and Flora:** detailed survey (Keating and Trudgen 1986), part Site — Bowman Bishaw Gorham 1997a&b); limited survey (DEP 1996 (Rich 01–02), DEP 1998)

**Structural Units:** mapping (Keating and Trudgen 1986; part Site — Bowman Bishaw Gorham 1997a&b) Quindalup Dunes

Uplands: *Acacia rostellifera*, *Leucopogon parviflorus* and *Jacksonia furcellata* Shrubland; *Olearia axillaris* Shrubland; *Acacia saligna* and *Jacksonia furcellata* Shrubland; *Lomandra maritima* Herbland

Wetlands: *Melaleuca raphiophylla* Low Woodland to Low Forest; Shrubland dominated by *Acacia saligna* or *Xanthorrhoea preissii* and combinations of these; Closed Sedgeland dominated by *Juncus pallidus*, *J. kraussii*, *Isolepis nodosa*, *Lepidosperma gladiatum*, *Typha ?domingensis* and *Baumea juncea* and combinations of these; Sedgeland dominated by *Gahnia trifida* or *Isolepis nodosa*

**Scattered Native Plants:** *Melaleuca* Shrubland; areas with scattered native species

**Vegetation Condition:** >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 61 native taxa, 24 (Bowman Bishaw Gorham 1997a&b, DEP 1996, Keating and Trudgen 1986) (estimated >65% expected flora)

**Significant Flora:** none identified

**Fauna:** limited surveys for birds (100 species) (RAOU 1996 D, 1 visit; WA Naturalists' Club and Tingay, Alan & Associates 1997). Significant bird species: category 2 (1) and category 4 (1). Limited survey for native mammals, reptiles, amphibians (5) and fish (several) (Tingay, Alan & Associates 1997)

**Linkage:** adjacent bushland/scattered native plants to the east and west (Site 355, across road); part of Greenways 93, 97 (Tingay, Alan & Associates 1998a)

#### Other Special Attributes

Meets five of the six specific coastal reserve criteria —

- (i) Quindalup Dune types: beach ridge plain
- (ii) Continuing natural processes: 21.9ha (15.5ha bushland) of Quindalup Dunes extending to 1.7kms inland
- (iv) Linkage: links to coast through Site 355
- (v) Vegetation: wetland and upland units; rare communities
- (vi) Habitats: see Fauna section above;





Wetland of 'regional significance' (Semeniuk, V&C Research Group 1991b); contains examples of microbialites, organo-sedimentary structures formed by microorganisms, the oldest life-form on survey (Tingay, Alan & Associates 1997); majority of Site included in Port Kennedy and Rockingham Parks proposal survey (Tingay, Alan & Associates 1997); '...the deepest lake on the coastal plain, which has marine origins (Fairbridge 1941 in EPA and WAWA 1990)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Rockingham Lakes Regional Park is endorsed (see Table 3, Volume 1).

**PENGUIN, SEAL, BIRD AND GULL ISLANDS AND SHAG ROCK**

**Boundary Definition:** Penguin Island — bushland taken to cadastre boundary; other islands not mapped

**SECTION 1: LOCATION INFORMATION**

(only applies to Penguin Island)

**Bush Forever Site no.** 367

**Area (ha):** bushland 6.1

**Map no.** 68

**Map sheet series ref. no.** 2033-III NE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Rockingham (Penguin Island)

**Includes CALM Managed Land:** Reserve 24204 (Conservation of Flora and Fauna), 17070 (Recreation camping enjoyment by public for holidays thereon and for purposes ancillary thereto)

**System 6 (1983):** M101 part System area bushland, only bushland described

**SECTION 2: REGIONAL INFORMATION**

(only applies to Penguin Island)

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Tamala Limestone (Qtl: LS1)

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S2, S13)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Quindalup Dunes**

Quindalup Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

No wetlands mapped

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** island, vegetated uplands

**Penguin Island**

**Vegetation and Flora:** detailed survey (Abbot and Black 1980, Chape 1984, CALM 1992, Rippey *et al.* 1998, Storr 1961)

**Structural Units:** mapping (Chape 1984, CALM 1992)

Spearwood Dunes

Uplands — Tamala Limestone: Low Open Shrublands dominated by *Carpobrotus virescens* and *Frankenia pauciflora* or *Rhagodia baccata*; *Nitraria billardierei* Shrubland

Quindalup Dunes

Uplands — Youngest Dunes: Shrublands to Closed Heath dominated by *Olearia axillaris* and *Scaevola crassifolia*, by *Alyxia buxifolia* and *Scaevola crassifolia* or by *Acacia rostellifera*

Uplands — Strand: *Spinifex longifolius* and *S. hirsutus* Grassland

**Total Flora:** 51 native taxa, 61 weed taxa (compiled from Abbot and Black 1980, Chape 1984, Rippey *et al.* 1999 and Storr 1961 in Rippey *et al.* 1999) (estimated >95% expected flora)

**Significant Flora:** *Lavatera plebeia* var. *tomentosa* (Chape 1984, not recorded by Rippey *et al.* 1999) (virtually restricted to offshore islands — Keighery, GJ, 1990a)



**Seal Island**

**Vegetation and Flora:** detailed survey (Abbot and Black 1980, Rippey *et al.* 1998, Storr 1961)

**Structural Units**

Spearwood Dunes

Uplands — Tamala Limestone: Low Open Shrublands dominated by *Carpobrotus virescens* and *Frankenia pauciflora* or *Rhagodia baccata*

Quindalup Dunes

Uplands — Strand: *Spinifex longifolius* Grassland

**Total Flora:** 25 native taxa, 22 weed taxa (compiled from Abbot and Black 1980, Rippey *et al.* 1998, Storr 1961 in Rippey *et al.* 1999) (estimated >95% expected flora)

**Significant Flora:** *Lavatera plebeia* var. *tomentosa* (virtually restricted to offshore islands — Keighery, GJ, 1990a)

**Gull Island**

**Vegetation and Flora:** detailed survey (Abbot and Black 1980, Rippey *et al.* 1998, Storr 1961)

**Structural Units**

Spearwood Dunes

Uplands — Tamala Limestone: *Nitraria billardierei* Shrubland

**Total Flora:** 4 native taxa (Storr 1961) (estimated >85% expected flora)

**Significant Flora:** none recorded

**Bird Island**

**Vegetation and Flora:** detailed survey (Abbot and Black 1980, Rippey *et al.* 1998, Storr 1961)

**Structural Units**

Spearwood Dunes

Uplands — Tamala Limestones: *Nitraria billardierei* Shrubland; *Lavatera plebeia* var. *tomentosa* Low Shrubland

**Total Flora:** 18 native taxa, 20 weed taxa (compiled from Abbot and Black 1980, Rippey *et al.* 1998, Storr 1961 in Rippey *et al.* 1999) (estimated >95% expected flora)

**Significant Flora:** *Lavatera plebeia* var. *tomentosa* (virtually restricted to offshore islands — Keighery, GJ, 1990a)

**Shag Rock**

**Vegetation and Flora:** detailed survey (Abbot and Black 1980, Rippey *et al.* 1998, Storr 1961)

**Structural Units**

Spearwood Dunes

Uplands — Tamala Limestones: *Nitraria billardierei* Shrubland; *Lavatera plebeia* var. *tomentosa* Low Shrubland

**Total Flora:** West Shag Rock — 7 native taxa, 5 weed taxa; East Shag Rock — 5 native taxa, 1 weed taxon; Middle Shag Rock — 16 native taxa, 16 weed taxa (compiled from Abbot and Black 1980, Rippey *et al.* 1998, Storr 1961 in Rippey *et al.* 1999) (estimated >95% expected flora)

**Significant Flora:** *Lavatera plebeia* var. *tomentosa* (virtually restricted to offshore islands — Keighery, GJ, 1990a)

**Vegetation Condition:** >75% Very Good, <25% Good to Degraded, with areas of severe localised disturbance

**Fauna:** multiple surveys for birds (50 species) (Abbott 1977; RAOU 1996 D, 4 visits), native mammals (2 species) (CALM 1992a) and reptiles (6 species) (Costa 1977). Important breeding site for 14 bird species including Little Penguin and 11 other seabirds and important habitat for at least five JAMBA/CAMBA species. Significant bird species: category 2 (5) and category 3 (1). Significant breeding population of Bridled Tern. Significant mammal species: Australian Sea-lion

**Linkage:** no adjacent bushland

**Other Special Attributes:** Specific coastal reserve criteria not applied to small islands

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing purpose, care, control and management of Reserves 17070 and 24204 is endorsed (see Table 3, Volume 1).



## LAKE COOLOONGUP, LAKE WALYUNGUP AND ADJACENT BUSHLAND, HILLMAN TO PORT KENNEDY

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 356

**Area (ha):** bushland 1617.5 (Site also includes open water.)

**Map no.** 69, 70, 74, 75

**Map sheet series ref. no.** 2033-II NW, 2033-II SW

**Other Names:** White Lake, Salt Lake, Lark Hill, Tamworth Hill, part of Rockingham Lakes Regional Park

**Local Authorities (Suburb):** Shire of Rockingham (Hillman, Coo loongup, Waikiki, Warnbro, Port Kennedy, Baldivis)

**System 6 (1983):** M103 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

##### Quindalup Dunes (Holocene dunes)

Safety Bay Sands (Qhs: S13, LS4)

##### Wetlands (within the Quindalup/Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps, Cs1)

##### Lagoonal and Estuarine Deposits (at or near interface of Quindalup/Spearwood Dunes)

Lagoonal and Estuarine Deposits (Vasse) (Qhg: M5)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

###### Quindalup Dunes

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

17 *Melaleuca raphiophylla* — *Gahnia trifida* seasonal wetlands

\*19a Sedgeland in Holocene dune swales (DEP 1996, equivalent to 19 in Gibson *et al.* 1994, English and Blyth 1997)

19b Woodlands over sedgeland in Holocene dune swales (DEP 1996, equivalent to 19 in Gibson *et al.* 1994, English and Blyth 1997)

##### Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

21a Central *Banksia attenuata* — *Eucalyptus marginata* woodlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

24 Northern Spearwood shrublands and woodlands (most southern occurrence)

\*29b *Acacia* shrublands on taller dunes

#### WETLANDS

**Wetland Types:** lake, sumpland, dampland, artificial lake

##### Natural Wetland Groups

###### Spearwood Dunes

Stakehill (S.4)

###### Quindalup

Cooloongup (Qu.1)

Becher (Qu.2)

**Wetland Management Objectives:** Conservation (1462.3ha)

**Swan Coastal Plain Lakes EPP:** 312.8ha + 24.2ha + 438.6ha + 48.8ha = 824.4ha (total)

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 19 as defined by Gibson *et al.* 1994)

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetlands, vegetated uplands

**Vegetation and Flora:** detailed survey (part Site — Keighery, BJ, *et al.* 1997c, Tingay and Tingay 1977); limited survey (DEP 1999, EPA and WAWA 1990, Gibson *et al.* 1994 (Tam 01, Cool 01–04, 08–09, 11, Kero 01–02), Keighery, GJ, 1996 D (Cool 14–15))



**Structural Units:** mapping (part Site — EPA and WAWA 1990, Keighery, BJ, *et al.* 1997c, Tingay and Tingay 1977)

Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus gomphocephala*, *E. marginata* and *Banksia attenuata* Open Forest; *Grevillea vestita* Closed Heath; *Hibbertia hypericoides* Open Low Heath

Quindalup Dunes

Uplands — Beach ridge plain: *Eucalyptus gomphocephala* Woodland to Forest; *Acacia rostellifera* Tall Open Scrub; *Jacksonia furcellata* and *Acacia rostellifera* Shrubland; *Acacia saligna* Low Open Woodland to Low Woodland; *Xanthorrhoea preissii* Open Heath

Wetlands (at or near the interface of the Quindalup and Spearwood Dunes): Open to Closed Sedgeland dominated by *Baumea juncea*, *Gahnia trifida*, *Lepidosperma longitudinale*, *Juncus kraussii* or *Baumea vaginalis* or combinations of these; *Banksia littoralis* Low Woodland; *Melaleuca rhapsiophylla* Low Woodland to Forest; *Eucalyptus gomphocephala* Woodland to Forest

Wetlands — Beach ridge plain: *Isolepis nodosa* and *Baumea juncea* Closed to Open Sedgeland, generally with an overstorey of *Xanthorrhoea preissii*

**Scattered Native Plants:** *Eucalyptus gomphocephala* Woodland; *Acacia saligna* Low Woodland;

*Xanthorrhoea preissii* Open Heath

**Vegetation Condition:** >60% Very Good to Pristine, <40% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 174 native taxa, 82 weed taxa (part Site — Keighery, BJ, *et al.* 1997c) (>85% of expected flora)

**Significant Flora:** Keighery, BJ, *et al.* 1997c — *Trachymene coerulea*, *T. pilosa* (distinct form found also at Rottne Island), *Sonchus hydrophilus* (at risk), *Atriplex suberecta* (not previously recorded on the Swan Coastal Plain), *Linum marginale* (rarely recorded on Quindalup dunes), *Acacia pulchella* var. *goadbyi* (only known occurrence on the Swan Coastal Plain), *Eremophila glabra* subsp. *albicans*, *Jacksonia furcellata* (floriferous shrub form), *Kennedia coccinea* (becoming increasingly uncommon on the western margins of the Plain)

**Fauna:** multiple surveys for birds (73 species) (Tingay and Tingay 1977; RAOU 1996 D, 3 visits), limited survey for native mammals (2 species), reptiles (1 species), amphibians (3 species) and fish (1 species) (Tingay and Tingay 1977). Significant bird species: category 2 (6), category 3 (10), category 4 (5). Significant population of Black Swan. Significant mammal species: Western Brush Wallaby and Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north (Site 349, across road), south, east and west (Site 377, across road); part of Greenways 83, 85, 86, 89, 122 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

#### Other Special Attributes

Meets five of the six specific criteria for coastal reserves—

- (i) Quindalup Dune types: beach ridge plain and older dunes
- (ii) Continuing natural processes: 1079.4ha (837.4 bushland) of Quindalup Dunes extending to 8.8km inland (through Site 377 to coast)
- (iv) Linkage: Quindalup/Spearwood Dunes (Tamala Limestone) interface
- (v) Vegetation: five regional floristic groups, one of which is a threatened community
- (vi) Habitats: see Fauna section above;

Part Site (Lake Cooloongup and Lake Walyungup) — wetland of 'national significance'; part Site (Tamworth Lakes) — wetland of 'regional significance' (Semeniuk, V&C Research Group 1991b); contains examples of microbialites, organo-sedimentary structures formed by microorganisms, the oldest life-form on earth (Tingay, Alan & Associates 1997); majority of Site included in Port Kennedy and Rockingham Parks proposal (Tingay, Alan & Associates 1997)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Rockingham Lakes Regional Park is endorsed. Part B: Other Government Land Mechanism. Part C: Proposed Parks and Recreation Reservation (see Table 3, Volume 1).





## PORT KENNEDY

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 377

**Area (ha):** bushland 674.9

**Map no.** 74, 79

**Map sheet series ref. no.** 2033–II SW, 2033–III NE, 2033–III SE

**Other Names:** Becher Point Wetlands, part of Port Kennedy and Rockingham Lakes Regional Parks

**Local Authorities (Suburb):** City of Rockingham (Port Kennedy, Secret Harbour)

**Includes CALM Managed Land:** Nature Reserve 44077 (Conservation of Flora and Fauna), 45041 (Conservation of Flora and Fauna)

**System 6 (1983):** Part M106 area of bushland goes beyond System area boundaries, only bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

**Quindalup Dunes** (Holocene dunes)

Safety Bay Sands (Qhs: S2, S13)

**Wetlands (within the Quindalup Dunes)**

Holocene Swamp Deposits (Qhw: Cps)

#### VEGETATION AND FLORA

##### Vegetation Complexes

##### Quindalup Dunes

Quindalup Complex

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

19a Sedgelands in Holocene dune swales (DEP 1996, equivalent to 19 in Gibson *et al.* 1994, English and Blyth 1997)

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

29b *Acacia* shrublands on taller dunes

\*S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

\*S14 *Spinifex longifolius* grassland and low shrubland

#### WETLANDS

**Wetland Types:** dampland, sumpland

##### Natural Wetland Groups

##### Quindalup

Cooloongup (Qu.1)

Becher (Qu.2)

Peelhurst (Qu.3)

**Wetland Management Objectives:** Conservation (19.5ha)

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 19 as defined by Gibson *et al.* 1994), Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** coastal dunes

**Vegetation and Flora:** detailed survey (Keighery, GJ, and Keighery 1993c; part Site — Trudgen 1989); limited survey (Gibson *et al.* 1994 (PB 01–06))

**Structural Units:** mapping (part Site — Trudgen 1989)

Quindalup Dunes

Uplands — Beach ridge plain: *Olearia axillaris* Open Shrubland to Closed Heath to Closed Tall Scrub; *Scaevola crassifolia* and *Olearia axillaris* Low Open heath to Closed Heath to Open Scrub; Open Heath to Open Low Heaths dominated by *Acacia rostellifera*, *A. lasiocarpa* var. *lasiocarpa*, *Melaleuca systema*, *Olearia axillaris*, *Jacksonia furcellata* and combinations of these over *Austrostipa flavescens* Grassland

Wetlands — Beach ridge plain: *Juncus kraussii* Closed Sedgeland, at times over *Sarcocornia quinqueflora* Closed Herbland; *Isolepis nodosa* and *Baumea juncea* Closed to Open Sedgeland, generally with an overstorey of *Xanthorrhoea preissii*

Strand: *Spinifex longifolius* Grassland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Very Good to Pristine, <40% Good to Degraded, with areas of severe localised disturbance



**Total Flora:** 172 native taxa, 68 weed taxa (Keighery, GJ, and Keighery 1993) (estimated >90% expected flora)

**Significant Flora:** Keighery, GJ, and Keighery 1993 — *Cryptandra mutila* and *Zygophyllum fruticosum* (southern range end), *Hibbertia cuneiformis* (most northern known population); *Jacksonia furcellata* (floriferous shrub form)

**Fauna:** limited surveys for birds (22 species), native mammals (5 species), reptiles (7 species) and amphibians (3 species) (Binnie & Partners 1988, Tingay, Alan & Associates 1997). Significant mammal species: Western Brush Wallaby and Quenda

**Linkage:** adjacent bushland to the north and east (Site 356, across road); part of Greenways 1, 83 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes**

Meets all six of the specific criteria for coastal reserves —

- (i) Quindalup Dune types: beach ridge plain
- (ii) Continuing natural processes: 764.2ha (657.9ha bushland) of Quindalup Dunes extending to 4km inland
- (iii) Shoreline: soft (sandy)
- (iv) Linkage: through adjacent Site 356 to Spearwood Dunes
- (v) Vegetation: two regional floristic groups, one of which is a threatened community, areas of vegetation in apparently Pristine condition
- (vi) Habitats: see Fauna section above;

Part Site recommended to be declared an A-class Nature Reserve for the protection of flora and fauna in Gibson *et al.* (1994); wetlands of 'national and international significance' (Semeniuk, V&C Research Group 1991b); majority of Site included in Port Kennedy and Rockingham Parks proposal (Tingay, Alan & Associates 1997)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the care, control and management of this Site (Reserves 44077, 45041) for conservation purposes within Port Kennedy and Rockingham Lakes Regional Park is endorsed (see Table 3, Volume 1).









# Part B

## 2.6 ESTUARIES, RIVERS AND CREEKS

### 2.6.1 INTRODUCTION

#### Location, Landscape and Soils

A number of Bush Forever Sites have been identified along the estuaries, rivers and creeks of the Swan Coastal Plain in the Perth Metropolitan Region, namely those associated with:

- the Swan and Canning estuaries
- the Swan, Helena, Canning, Serpentine and Southern rivers
- Bennett Brook.

Where a creek is closely aligned with upland regionally significant bushland, sections of the creek, or the entire creek, have been grouped as a Bush Forever Site and the description located with the appropriate major landform element group. Bush Forever Site 2, along the Ellen Brook, is an example.

In some instances the entire course of the estuary, river or creek has not been mapped within the boundaries of a Bush Forever Site as there was no bushland mapped for certain sections of the river or creek. This is a product of the selection process and these unmapped areas should be considered regionally significant as part of important linkages (see Map 7 and Part A, Section 3.5.5).

Collectively, the estuaries, rivers and creeks on the Swan Coastal Plain in the Perth Metropolitan Region cross all of the major landform elements. Associated landforms range through steep Tamala Limestone cliffs of the Swan Estuary, sandy bars and flats, and waterlogged alluvial flats.

The soils associated with these estuaries, rivers and creeks range from mud and sand overlaying quartz sand to sand overlaying Tamala Limestone cliffs, alluvium of quartz sand and clay, quartz sands and, along the Serpentine River, iron-indurated hardpans (Table 2.6). In addition the soils of the estuaries are influenced by saline and/or freshwater inundation and/or waterlogging while the rivers and creeks are predominantly fresh but are increasingly subject to salinity.

#### Remnant Vegetation along Estuaries, Rivers and Creeks

Vegetation associated with estuaries, rivers and creeks is typically highly cleared. The presence of relatively fertile soils and fresh water from the river or creek or shallow wells adjacent to transport corridors made these areas the first focus for agriculture. In addition many of the wet flats have been drained and filled for agriculture, playing fields and roads. Between one per cent and 11 per cent of the native vegetation in the vegetation complexes associated with these areas remains (Table 3.6).

#### Plant Communities and their Conservation along Estuaries, Rivers and Creeks

At the regional level four vegetation complexes (Table 3.6) have been identified as being associated with estuaries, rivers and creeks.

In general, estuarine and riverine vegetation was not systematically sampled in the Gibson *et al.* (1994) study — it was not possible to cover fully this vegetation in the time available and it was considered that these restricted habitat types had been documented elsewhere (Pen 1993, Siemon *et al.* 1993). The System 6 Update work sampled a few locations in these habitats but, again, this was not done systematically. As a consequence, while floristic community types have been identified in specific bushland areas, the units broadly associated with this vegetation have not been determined. Two of the floristic community types associated with the creeks that traverse the Foothills (floristic community types 3a and 3c) and another (floristic community type 30a after Gibson *et al.* 1994) associated with the Swan Estuary are threatened ecological communities (see Part A, Section 3.4.4).

A variety of vegetation associations has been identified on the slopes and wetflats along estuaries, rivers and creeks. These are best dealt with under each of the wetland types.

#### Estuaries

#### Wetflats

The main vegetation associations on the wetflats are forest to woodland, shrublands and sedgelands.





While the estuarine margins are typically saline, freshwater seepages result in the local occurrence of freshwater communities. These broad units and associated dominant species are:

#### Forests and Woodlands

Eucalypts — *Eucalyptus rudis*

Sheoaks — *Casuarina obesa*

Melaleucas — *Melaleuca raphiophylla*, *M. cuticularis*

#### Shrublands

*Melaleuca viminea*, *Halosarcia* species, *Sarcocornia* species

#### Sedgeland

*Baumea juncea*, *Bolboschoenus caldwellii*, *Schoenoplectus validus*, *Gahnia trifida*, *Meeboldinia* species, *Juncus kraussii*, *J. pallidus*

#### Slopes

The main vegetation associations on the slopes are low woodlands and shrublands, dominated by species typical of the Quindalup and/or Spearwood Dunes (Keighery, GJ, and Keighery 1998). The broad units and associated dominant species are:

#### Woodlands

Eucalypts — *Eucalyptus gomphocephala*

Banksias — *Banksia attenuata*, *B. menziesii*

Sheoaks — *Allocasuarina fraseriana*

Others — *Callitris preissii*

#### Shrublands (dominant and other taxa)

*Acacia lasiocarpa* var. *lasiocarpa*, *A. truncata*, *A. xanthina*, *Acanthocarpus preissii*, *Adriana quadripartita*, *Alyxia buxifolia*, *Anthocercis littorea*, *Comesperma integerrima*, *Dodonaea aptera*, *Dryandra sessilis* subsp. *cygnorum*, *Grevillea vestita*, *Melaleuca huegelii*, *Pittosporum phylliraeoides* var. *phylliraeoides*, *Scaevola nitida*, *Spyridium globulosum*, *Templetonia retusa*

#### Herblands

*Conostylis candicans*

Many of these taxa are typical of the Muehea Limestone communities and it is possible that the estuaries formed a corridor for the migration of elements of the Spearwood/Quindalup flora to the eastern side of the Swan Coastal Plain (Keighery, GJ, and Keighery 1998).

#### Rivers

The main vegetation associations on the river banks and flats are forest to woodland, shrublands and sedgelands. These broad units and associated dominant species are:

#### Forests and Woodlands

Eucalypts — *Eucalyptus rudis*

Sheoaks — *Casuarina obesa* (occasional)

Melaleucas — *Melaleuca raphiophylla*

Others — *Acacia saligna*

#### Shrublands

*Melaleuca viminea*, *Astartea* aff. *fascicularis*, *Acacia dentifera*, *Agonis linearifolia*

#### Herblands

*Centella cordifolia*

#### Sedgeland

*Baumea juncea*, *B. articulata*, *Carex fascicularis*, *Lepidosperma tetraquetrum*, *L. effusum*, *Juncus pallidus*.

#### Grasslands

*Hemarthria uncinata*

#### Creeks

The vegetation associated with creeks may be similar to that described for rivers or their adjacent communities when the creek is traversing the Pinjarra Plain or Foothills. Creeks of the Pinjarra Plain and Foothills are generally dominated by *Eucalyptus calophylla* and/or *E. wandoo*.

Typically, vegetation associated with estuaries, rivers and creeks is in narrow bands which are rarely intact, generally being in a degraded condition, usually backed by roads, grazed land and recreation land or housing. Intact estuarine, riverine and creekline vegetation (that is, good or better condition) is a rare occurrence on the Swan Coastal Plain. The small intact patches are all that remain of the complex wetland system that was once associated with the watercourses. Species such as *Parsonia diaphanophleba* (only found at Lowlands – Site 368 – in the Perth Metropolitan Region), *Acacia dentifera* and *A. paradoxa*, which are only known on the Swan Coastal Plain from riverine communities, indicate that other species, and perhaps communities, may once have occurred on the estuaries and watercourses.



# Part B

**Table 2.6:** Natural Wetland Groups (Consanguineous Suites) of Estuaries, Rivers and Creeks (after Semeniuk 1996)

Name & locations	Geomorphic setting	Primary wetlands	Stratigraphy	Origin of wetlands
<b>Creeks</b>				
<b>Ellen Brook suite (R3)</b> Ellen Brook area	Pinjarra Plain	Creek, floodplain river	Clays & sandy clays overlying laterite & sandstones	Fluvial incision; sedimentation; surface runoff
<b>Bennett Brook suite (B/P4)</b> 1. Ballajura: In Bennett Brook area west of West Swan 2. Balannup: In Southern River area north of Forrestdale Lake 3. Yangedi: In Serpentine River area west of Serpentine township	Bassendean Dune – with microscale creeks	Sumplands creeks palusplains floodplains	Quartz sands, or clay overlying quartz sand	Depressions which intersect the water table. Precipitation is ponded by clay lenses in the sub-surface. Palusplains are situated between tributaries
<b>Rivers and Estuaries</b>				
<b>Swan River Estuary suite (E2)</b> Swan River area between Fremantle & Guildford	Traversing 3 dune units: Quindalup, Spearwood & Bassendean. flooded basins extend north & south of Swan River channel along depressions between Spearwood dune ridges & Bassendean Dunes.	Estuary	Mud & sand overlying quartz sand & limestone	Marine-inundated river valley which was receiving basin for Canning, Helena & Swan Rivers
<b>Swan River suite (R2)</b> Swan River, Helena River, Canning River, Serpentine River	Traversing the Swan Coastal Plain; incised channel alternatives with braided shallow channel, terraces & large point bar deposits	River floodplain	Alluvium of quartz sand & clay	Fluvial incision; sedimentation; surface runoff
<b>Goegrup suite (R4)</b> Serpentine River section north of Peel Inlet to Karnup	Contact depression between Spearwood Dunes Unit & Bassendean Dunes Unit – along which Serpentine River meanders	River; floodplains, palusplains, creeks	Quartz sand with iron indurated hardpans	Fluvial incision; sedimentation; river has been impounded & water flow reduced

**Table 3.6:** Vegetation complexes (Heddlé *et al.* 1980) and percentage remaining as native vegetation (AGWEST 1998 GIS) of Estuaries, Rivers and Creeks in the Perth Metropolitan Region

Vegetation Complex	Native Vegetation (%)
SERPENTINE RIVER COMPLEX: Closed scrub of <i>Melaleuca</i> species and fringing woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca raphiophylla</i> along streams.	9
SWAN COMPLEX: Fringing woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca raphiophylla</i> with localised occurrence of low open forest of <i>Casuarina obesa</i> and <i>M. cuticularis</i> .	11
VASSE COMPLEX: Mixture of the closed scrub of <i>Melaleuca</i> species fringing woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca</i> species and open forest of <i>E. gomphocephala</i> – <i>E. marginata</i> – <i>E. calophylla</i>	1
CANNINGTON COMPLEX: Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.	1





## ESTUARIES, RIVERS AND CREEKS

### 2.6.2 DESCRIPTIONS

#### KEY

**Column 1 Bush Forever Site Number**

Sites listed from north to south within the PMR.

**Column 2 Bush Forever Site(s) Name**

**Column 3 Page Number**

Refers to the page number of the Bush Forever Site description in Volume 2.

**Column 4 Bush Forever Map Number**

Refers to the number of the Bush Forever Site map in Volume 1.

**Column 5 System 6**

Refers to the System 6 Recommendation number where applicable.

Site No.	Site(s) Name	Page No.	Map No.	System 6
296	Ellen Brook, Upper Swan	410	24, 31, 32	
302	Swan River and Jane Brook, Ashfield to Upper Swan	411	37, 38, 43	M19 M20
215	Helena River, Helena Valley	412	44, 50	M33
305	Bennett Brook, Eden Hill to West Swan	413	42, 43	M41
491	Swan River Backwater, South Guildford	415	42, 43	M44
214	Ashfield Flats, Bassendean/Ashfield	416	42	
313	Swan River Saltmarshes, Bayswater/Maylands	417	48	M51
314	Swan River Foreshore, Mount Lawley/Maylands	418	47, 48	M50
402	Pelican Point, Crawley	420	46	M62
221	Point Resolution Reserve, Dalkeith	421	46	M59
403	Peppermint Grove Foreshore	422	45	M54
334	Chidley Point and Adjacent Bushland, Mosman Park	423	51, 52	M56 M61
335	Minim Cove, Mosman Park	424	51, 52	M57
490	Cantonment Hill, Fremantle	426	51	M71
331	Blackwall Reach, Point Walter, Alfred Cove and Adjacent Bushland, Bicton to Applecross	427	52	M58
329	Point Heathcote Foreshore, Applecross	429	47	M65
338	Yagan Wetland and Adjacent Bushland, Rossmoyne to Bull Creek	430	53	M74
227	Mount Henry Bushland, Salter Point	431	53	M66
333	Canning River Foreshore, Salter Point to Wilson	433	53, 54	M67
224	Canning River Regional Park and Adjacent Bushland, Riverton to Langford	434	54	M68 M75
246	Canning and Southern Rivers, Beckenham to Martin/Kelmscott	436	54, 55, 61	M75
255	Dallen Road Bushland, Southern River/Gosnells	437	61	M75
260	Southern River and Adjoining Bushland, Westfield	438	61	
266	Wungong Brook, Byford	440	67	
371	Serpentine River, Peel Estate to Serpentine	441	77, 78	M105
394	Lake Amarillo, Serpentine River and Adjacent Bushland, Karnup	442	80	M108





## ELLEN BROOK, UPPER SWAN

**Boundary Definition:** bushland/conservation wetland boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 296

**Area (ha):** bushland 44.1 (Site includes open water.)

**Map no.** 24, 31, 32

**Map sheet series ref. no.** 2134-IV SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Bullsbrook)

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1, S11)

#### VEGETATION AND FLORA

##### Vegetation Complexes

###### Pinjarra Plain

Guildford Complex

Beermullah Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 1:** Foothills/Pinjarra Plain

**Supergroup 2:** Seasonal Wetlands

#### WETLANDS

**Wetland Types:** palusplain, river, creek, artificial channel

**Natural Wetland Groups** (undefined areas included in boundary)

##### Swan Coastal Plain Rivers

Ellen Brook (R.3)

**Wetland Management Objectives:** Conservation (45.4ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, creek

**Vegetation and Flora:** limited survey (Connell 1995, DEP 1996, 1998)

##### Structural Units/Scattered Native Plants

Wetlands (river banks and wetflats): *Eucalyptus rudis* Open Forest to Woodland over/ or *Melaleuca raphiophylla*

Low Open Forest to Low Woodland

**Vegetation Condition:** varies from a few patches in Excellent Condition with an understorey of sedges and shrubs, to Completely Degraded with a pasture/weed understorey

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** bushland canopy linkage to the north (Site 294) and south (Site 301); part of Greenway 44 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; contains a channel (Ellen Brook) recommended for conservation by Semeniuk, V&C Research Group (1992); contains 7706m of regionally significant river (WRC 1996a GIS)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

## SWAN RIVER AND JANE BROOK, ASHFIELD TO UPPER SWAN

**Boundary Definition:** protected area/bushland (part taken to cadastre)/conservation wetland boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 302

**Area (ha):** bushland 227.3 (Site also includes open water.)

**Map no.** 37, 38, 43

**Map sheet series ref. no.** 2034-II NE, 2034-II SE, 2134-III NW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (Herne Hill, Middle Swan, Henley Brook, West Swan, Millendon, Baskerville, Belhus, Upper Swan, Midland, Caversham, Brigadoon, Viveash)

**System 6 (1983):** Part M19 and part M20 part System area bushland and part scattered native plants (canopy), all vegetation described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1) (Qha: Mc1, Cm2)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### VEGETATION AND FLORA

##### Vegetation Complex

###### Pinjarra Plain

Guildford Complex

Swan Complex

**Floristic Community Types:** not sampled, types not inferred

#### WETLANDS

**Wetland Types:** sumpland, floodplain, palusplain, river, creek, artificial channel

##### Natural Wetland Groups

###### Darling Plateau

Walyunga (D.1)

###### Swan Coastal Plain Rivers

Swan River (R.2)

**Wetland Management Objectives:** Conservation (83.3ha, 4818m), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 2.7ha

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Jane Brook** (from junction with Swan River eastward)

**Landscape Features:** open water, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1999, Ecoscape 1995a)

**Structural Units:** mapping (Ecoscape 1995a)

Wetlands (river banks and flats): *Eucalyptus calophylla* and *E. wandoo* occasional *E. marginata* Open Forest to Low Woodland; *Astartea* aff. *fascicularis*, *Trymalium ledifolium* and *Acacia pulchella* Shrubland to Low Shrubland; *Eucalyptus rudis* and *Melaleuca rhapsiophylla* Open Forest to Low Open Forest

**Scattered Native Plants:** Woodlands to Forests dominated by *Eucalyptus calophylla*, *E. rudis* less commonly and other scattered native shrubs

**Vegetation Condition:** Very Good to Good (Ecoscape 1995a)

**Total Flora:** 20 native taxa, 45 weed taxa (Ecoscape 1995a) (estimated >85% expected flora)

**Significant Flora:** none recorded

**Fauna:** limited survey for birds (24 species), native mammals (2 species), reptiles (3 species) and amphibians (1 species) (Ecoscape 1995a). Significant mammal species: Quenda (Friend 1996 D)

**Other Special Attributes:** National Trust of Australia (WA) Classification; naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; contains open space of regional significance (DCE 1983); contains part of the channel (Jane Brook) recommended for conservation by Semeniuk, V&C Research Group (1992)



**Swan River (West Swan Road to Upper Swan) and Susannah Brook (to Railway Parade)**

**Landscape Features:** vegetated wetland

**Vegetation and Flora:** limited survey (Chambers and Pen 1985, Connell 1995)

**Structural Units:** mapping (Chambers and Pen 1985, Connell 1995)

Wetlands (wetflats): *Eucalyptus rudis* and *Melaleuca raphiophylla* Open Forest to Low Woodland over *Juncus pallidus*, *Centella cordifolia*, \**Paspalum distichum*, \**P. dilatatum*, \**Typha orientalis*, \**Aster subulatus* and combinations of these; *Casuarina obesa* and *Melaleuca raphiophylla* Low Open Forest to Low Open Woodland; *Eucalyptus rudis* Woodland; Closed to Very Open Sedgelands containing *Juncus kraussii*, *Bolboschoenus caldwellii*, *Schoenoplectus validus* and combinations of these

**Scattered Native Plants:** *Eucalyptus rudis* Woodland

**Vegetation Condition:** Good (Connell 1995)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Other Special Attributes:** National Trust of Australia (WA) Classification; one of few outcrops of the Guildford Formation, a sequence of conglomerate, grit, sandstone and clay deposited throughout most of the Pleistocene as alluvial fans (Lemmon *et al.* 1979); naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; contains open space of regional significance (DCE 1983); contains part of the channel (Swan River and Susannah Brook) recommended for conservation by Semeniuk, V&C Research Group (1992); contains 8647m of regionally significant river (WRC 1996a GIS)

**Linkage:** (Swan River and Jane Brook) canopy linkage to the north, east and west; bushland to the south (Site 305); part of Greenways 36, 44, 45, 46 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**HELENA RIVER, HELENA VALLEY**

**Boundary Definition:** protected area/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 215

**Area (ha):** bushland 77.7

**Map no.** 44, 50

**Map sheet series ref. no.** 2134-III SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Mundaring (Helena Valley, Darlington), Shire of Kalamunda (Gooseberry Hill, Piesse Brook, Helena Valley)

**System 6 (1983):** Part M33, part M34 part System area bushland and part scattered native plants, all vegetation described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Darling Plateau (Darling Range)/Darling Scarp**

Even-grained Granite (Ae, Aes: M3, GR)

**Foothills**

Colluvial Deposits (Qc: Mgs2)

**Pinjarra Plain**

Guildford Formation (Qpa: Mgs1) (Qha: Cm2)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Scarps**

Darling Scarp Complex



**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**

Swan Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** river, creek

**Natural Wetland Groups** (undefined areas included in boundary)

**Darling Plateau**

Walyunga (D.1)

**Wetland Management Objectives:** Conservation (930m)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek

**Vegetation and Flora:** limited survey (DEP 1998)

**Structural Units**

Uplands (aerial photograph interpretation after Site 217): *Eucalyptus wandoo* Low Open Woodland to Open Woodland; *Eucalyptus calophylla* Open Woodland; *Hakea lissocarpa* and *Acacia pulchella* Open Heath

Wetlands: *Eucalyptus rudis* Tall Open Forest; *Melaleuca raphiophylla* Open Forest; *Eucalyptus calophylla* Open Woodland to Woodland

**Scattered Native Plants:** *Eucalyptus calophylla* Woodland to Open Woodland

**Vegetation Condition:** 30% Very Good, 30% Good, 40% Degraded, with areas of severe localised disturbance

**Total Flora:** not known

**Significant Flora:** *Anthocercis gracilis* (R), *Hakea myrtooides*

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland to the north; part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7); part of Greenways 25 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; contains open space of regional significance (DCE 1983); contains 4860m of regionally significant river (WRC 1996a GIS)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve. Part B: Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**BENNETT BROOK, EDEN HILL TO WEST SWAN**

**Boundary Definition:** protected area/bushland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 305

**Area (ha):** bushland 119.9 (Site also includes open water.)

**Map no.** 42, 43

**Map sheet series ref. no.** 2034-II NE, 2034-II SE

**Other Names:** Contains Success Hill Reserve

**Local Authorities (Suburb):** Shire of Swan (West Swan, Caversham, Guildford, Midland, Beechboro), Town of Bassendean (Eden Hill, Bassendean)

**System 6 (1983):** Part M19, M41 area of bushland goes beyond System area boundaries, all bushland described





## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Pinjarra Plain

Guildford Formation (Qpa: Mgs1) (Qha: Mc1)

#### Bassendean Dunes

Bassendean Sands (Qpb: S8)

#### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

### VEGETATION AND FLORA

#### Vegetation Complex

##### Pinjarra Plain

Guildford Complex

Swan Complex

##### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

#### Floristic Community Types

##### Supergroup 2: Seasonal Wetlands

S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

### REGIONAL WETLANDS

**Wetland Types:** floodplain, dampland, palusplain, river, creek, artificial channel, estuary (waterbody)

#### Natural Wetland Groups

##### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

##### Bassendean Dunes

Jandakot (B.3)

##### Swan Coastal Plain Rivers

Swan River (R.2)

**Wetland Management Objectives:** Conservation (123ha, 293.6m), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 20.4ha

### THREATENED ECOLOGICAL COMMUNITIES

Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, river, creek, estuary, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996 (Benn 01–03), DEP 1999, EPA and WAWA 1990, Keighery, BJ, 1996b)

**Structural Units:** mapping (EPA and WAWA 1990)

Uplands: *Banksia attenuata* and *B. menziesii* Low Open Woodland

Wetlands: *Eucalyptus rudis* Woodland to Closed Forest; *Melaleuca raphiophylla* Low Open Forest to Low Closed Forest; *Casuarina obesa* and *Melaleuca raphiophylla* Low Woodland to Low Open Forest; *Eucalyptus rudis*, *Melaleuca raphiophylla* Low Open Forest; Open Low Heaths of *Halosarcia halocnemoides*, *H. lepidosperma*, *H. pergranulata* and *Sarcocornia quinqueflora*; Sedgeland to Closed Sedgeland dominated by *Bolboschoenus caldwellii* and *\*Typha orientalis*

**Scattered Native Plants:** *Eucalyptus rudis* Woodland

**Vegetation Condition:** >70% Good to Excellent, <30% Degraded, with areas of severe localised disturbance

**Total Flora:** 62 native taxa, 21 weed taxa (Keighery, BJ, 1996b) (estimated >75% expected flora)

**Significant Flora:** the co-occurrence of the four samphire species — *Halosarcia halocnemoides*, *H. lepidosperma*, *H. pergranulata* and *Sarcocornia quinqueflora* — is unusual (L. Pen pers. comm. in Keighery, BJ, 1996b); *Sarcocornia blackiana* (known from one other locality, L. Pen pers. comm. in Keighery, BJ, 1996b)

**Fauna:** structured surveys for birds (73 species) (Cooper *et al.* 1999, RAOU 1996 D) and native mammals (1 species), reptiles (12 species), amphibians (7 species) and native fish (5 species) (Cooper *et al.* 1999). Significant bird species: category 1 (2), category 3 (8) and category 4 (5). Significant mammal species: Quenda (Friend 1996 D, Cooper *et al.* 1999)

**Linkage:** adjacent bushland to the north (Site 304) and east (Site 302); part of Greenways 44, 24 (Tingay, Alan & Associates 1998a); part of contiguous and fragmented bushland/wetland linkages (Part A, Map 7)

**Other Special Attributes:** the largest and most diverse relatively intact lagoonal system on the Swan–Canning River Estuary (L. Pen pers. comm. in Keighery, BJ, 1996b); one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing



habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983); contains part of a channel (Bennett Brook) recommended for conservation by Semeniuk, V&C Research Group (1992); contains 3183m of regionally significant river (WRC 1996a GIS)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Smith, P, existing Parks and Recreation Reserve, should be protected as a reserve with a conservation purpose. Part B: Regional Creepline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**SWAN RIVER BACKWATER, SOUTH GUILDFORD**

**Boundary Definition:** System 6 area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 491

**Area (ha):** <0.6 bushland (Site also includes open water.)

**Map no.** 42, 43

**Map sheet series ref. no.** 2034-II SE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Swan (South Guildford)

**System 6 (1983):** M44 part System area bushland and part scattered native plants (canopy), all vegetation described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qha: Ms4)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complexes**

**Pinjarra Plain**

Swan Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** floodplain, estuary (peripheral)

**Natural Wetland Groups**

**Swan Coastal Plain Rivers**

Swan River (R.2)

**Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (15ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, estuary

**Vegetation and Flora:** limited survey (DEP 1998, DEP 1999, Pen 1983)

**Structural Units:** mapping (Pen 1983)

Wetlands (wetflats): *Eucalyptus rudis* Forest to Woodland; *Melaleuca raphiophylla* Low Open Forest to Low Woodland; *Casuarina obesa* and *Melaleuca raphiophylla* Low Woodland to Low Open Forest; *Sarcocornia quinqueflora* Low Shrubland to Closed Low Heath; Closed Sedgeland to Sedgeland dominated by *Bolboschoenus caldwellii* and *Juncus kraussii*





**Scattered Native Plants:** *Eucalyptus rudis* Forest to Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** Very Good to Degraded

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** canopy/creekline linkage to north and south; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)

#### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia

#### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

## **ASHFIELD FLATS, BASSENDEAN/ASHFIELD**

**Boundary Definition:** protected area/bushland boundary

#### **SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 214

**Area (ha):** bushland 11.1

**Map no.** 42

**Map sheet series ref. no.** 2034-II SE

**Other Names:** Ashfield Flats Submission Area 253

**Local Authorities (Suburb):** Town of Bassendean (Bassendean, Ashfield)

#### **SECTION 2: REGIONAL INFORMATION**

##### **LANDFORMS AND SOILS**

###### **Pinjarra Plain**

Alluvial Colluvial Deposit (Qha/Qc: Ms4)

###### **Bassendean Dunes**

Bassendean Sands (Qpb: S8)

##### **VEGETATION AND FLORA**

###### **Vegetation Complex**

###### **Pinjarra Plain**

Swan Complex

**Floristic Community Types:** not sampled, types not inferred

##### **WETLANDS**

**Wetland Types:** artificial channel, estuary (waterbody), estuary (shoreline and peripheral)

###### **Natural Wetland Groups**

###### **Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (39.6ha)

**Swan Coastal Plain Lakes EPP:** none identified

##### **THREATENED ECOLOGICAL COMMUNITIES**

Not determined

#### **SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, estuary

**Vegetation and Flora:** limited survey (Appropriate Technology Development Group (Inc) 1988, Connell 1995, Pen 1983)

**Structural Units:** mapping (Appropriate Technology Development Group (Inc) 1988, Pen 1983)



Wetlands: *Eucalyptus rudis* Woodland to Open Woodland; *Melaleuca raphiophylla* and *M. viminea* Low Woodland to Low Open Forest; *Casuarina obesa*, *Melaleuca raphiophylla* Low Woodland to Low Open Forest; Samphire Low Shrubland to Closed Low Heath dominated by *Sarcocornia quinqueflora* or *Halosarcia indica* subsp. *bidens* and *H. halocnemoides*; *Schoenoplectus validus* Sedgeland to Closed Sedgeland; *Juncus kraussii* Sedgeland to Closed Sedgeland; Closed Sedgelands dominated by *Bolboschoenus caldwellii* and *\*Typha orientalis*

**Scattered Native Plants:** *Eucalyptus rudis* Woodland to Open Woodland

**Vegetation Condition:** varies from Excellent Condition to Completely Degraded

**Total Flora:** 22 native taxa, 22 weed taxa (Appropriate Technology Development Group (Inc) 1988) (>50% of expected flora)

**Significant Flora:** none recorded

**Fauna:** limited survey for birds (51 species) (Appropriate Technology Development Group (Inc) 1988), also abundant frogs noted. Good assemblage of wide-ranging and transient bird species. Significant bird species: category 3 (1)

**Linkage:** no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia (Swan River)

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; Existing Parks and Recreation Reserve (see Table 3, Volume 1).

## SWAN RIVER SALTMARSHES, BAYSWATER/MAYLANDS

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 313

**Area (ha):** bushland 38.6

**Map no.** 48

**Map sheet series ref. no.** 2034-II SE

**Other Names:** Submission Area 209

**Local Authorities (Suburb):** City of Bayswater (Bayswater), City of Belmont (Ascot)

**System 6 (1983):** M51 area of bushland goes beyond System area boundaries, all bushland described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: Ms2) (Qha: Mc1)

Alluvial Colluvial Deposit (Qha/Qc: Ms4)

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Pinjarra Plain

Guildford Complex

Swan Complex

**Floristic Community Types:** not sampled, types not inferred

##### REGIONAL WETLANDS

**Wetland Types:** artificial channel, creek, estuary (waterbody), estuary (shoreline and peripheral)

##### Natural Wetland Groups

###### Estuaries

Swan River (E.2)

**Wetland Management Objectives:** Conservation (39.6ha, 393.8m)

**Swan Coastal Plain Lakes EPP:** none identified





**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, estuary, vegetated uplands

**Vegetation and Flora:** limited survey (EPA 1985b, Pen 1983); detailed survey (Connell 1995, Regeneration Technology 1994, Smith 1985)

**Structural Units:** mapping (Pen 1983, Regeneration Technology 1994, Smith 1985)

Wetlands: *Eucalyptus rudis* Open Woodland; *Melaleuca raphiophylla* Low Woodland to Low Open Forest with patches of *Juncus pallidus* Sedgeland; *Casuarina obesa* and *Melaleuca raphiophylla* Low Woodland to Low Open Forest; *Sarcocornia quinqueflora* and *Suaeda australia* Low Shrubland to Closed Low Heath; *Halosarcia indica* subsp. *bidens* and *H. halocnemoides* Low Shrubland to Closed Low Heath; *Juncus kraussii* Sedgeland to Closed Sedgeland; Closed Sedgelands dominated by *Bolboschoenus caldwellii* and *\*Typha orientalis*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** varies from Excellent Condition to Completely Degraded

**Total Flora:** 46 native taxa, 39 exotics (Smith 1985) (estimated >50% expected flora)

**Significant Flora:** not surveyed

**Fauna:** structured survey for birds (80 species), native mammals (1 species), reptiles (7 species) and amphibians (6 species) (Siemon 1991). Significant waterbird habitat including breeding, feeding and wading habitats. Significant bird species: category 1 (1), category 3 (7) and category 4 (6). Significant mammal species: Water Rat. Significant reptile species: Mourning Skink (*Egernia luctuosa*)

**Linkage:** no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; contains open space of regional significance (DCE 1983)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve. Part B: Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**SWAN RIVER FORESHORE, MOUNT LAWLEY/MAYLANDS**

**Boundary Definition:** protected area/bushland (part taken to cadastre) boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 314

**Area (ha):** bushland 16.7

**Map no.** 47, 48

**Map sheet series ref. no.** 2034-II SE

**Other Names:** Maylands Foreshore Reserve, Berringa Park

**Local Authorities (Suburb):** City of Bayswater (Maylands, Mount Lawley), Town of Vincent (Mt Lawley)

**System 6 (1983):** Part M50 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Alluvial Colluvial Deposit (Qha/Qc: Mc1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)



## VEGETATION AND FLORA

### Vegetation Complexes

#### Pinjarra Plain

Guildford Complex

Swan Complex

#### Bassendean Dunes

Bassendean Complex — Central and South

#### Spearwood Dunes

Karrakatta Complex — Central and South

#### Marine (Lagoonal and Estuarine) Deposits

Vasse Complex (most northern occurrence)

**Floristic Community Types:** not sampled, types not inferred

## WETLANDS

**Wetland Types:** creek, estuary (waterbody), estuary (shoreline and peripheral)

### Natural Wetland Groups

#### Bassendean Dunes

Jandakot (B.3)

#### Estuaries

Swan River (E.2)

**Wetland Management Objectives:** Conservation (18.5ha), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

## THREATENED ECOLOGICAL COMMUNITIES

Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, estuary

**Vegetation and Flora:** limited survey (Connell 1995, Pen 1983); detailed survey (Meney 1989)

**Structural Units:** mapping (Meney 1989, Pen 1983)

Wetlands: *Melaleuca raphiophylla* Low Woodland to Low Open Forest with patches of *Juncus pallidus*

Sedgeland; *Casuarina obesa* and *Melaleuca raphiophylla* Low Woodland to Low Open Forest; *Sarcocornia*

*quinqueflora* and *Suaeda australia* Low Shrubland to Closed Low Heath; *Halosarcia indica* subsp. *bidens* and *H.*

*halocnemoides* Low Shrubland to Closed Low Heath; *Juncus kraussii* Sedgeland to Closed Sedgeland; Closed

Sedgelands dominated by *Bolboschoenus caldwellii* and *\*Typha orientalis*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** varies from Excellent Condition to Completely Degraded

**Total Flora:** 47 native taxa, 38 weed taxa (Meney 1989) (estimated >80% expected flora)

**Significant Flora:** none recorded

**Fauna:** multiple surveys for birds (68 species) (Smith 1985, Jaensch 1987) and limited surveys for native mammals (3 species), reptiles (8 species) and amphibians (4 species) (Meney 1989). Key site for water-birds feeding and breeding area especially ducks and rails. Significant bird species: category 1 (1), category 2 (3), category 3 (8) and category 4 (2). Significant reptile species: Mourning Skink (*Egernia luctuosa*)

**Linkage:** no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** 'area represents 11 of the 21 communities identified along the Swan and Canning foreshore' (Meney 1989); is one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; contains open space of regional significance (DCE 1983)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Indicative place (AHC 2000 D); location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve. Part B: Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).





## PELICAN POINT, CRAWLEY

**Boundary Definition:** protected area/management boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland/native vegetation.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 402

**Area (ha):** bushland 0 (note comment under Boundary Definition)

**Map no.** 46

**Map sheet series ref. no.** 2034-II SW

**Other Names:** not known

**Local Authorities (Suburb):** City of Subiaco (Crawley)

**Includes CALM Managed Land:** Reserve 17375 (Recreation), Reserve 40891 (Marine Park)

**System 6 (1983):** M62 part System area bushland and part scattered native plants (canopy), all vegetation described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qha: S14)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7) (not naturally vegetated)

#### VEGETATION AND FLORA

##### Vegetation Complex

**Marine (Lagoonal and Estuarine) Deposits**

Vasse Complex

**Floristic Community Types:** not sampled, types not inferred

#### WETLANDS

**Wetland Types:** estuary (waterbody), estuary (shoreline and peripheral)

##### Natural Wetland Groups

###### Estuaries

Swan River (E.2)

**Wetland Management Objectives:** Conservation (17.1ha)

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, vegetated uplands, estuary

**Vegetation and Flora:** limited survey (CALM 1992b); detailed survey (Keighery, GJ, 1990b)

**Structural Units:** mapping (CALM 1992b)

Wetlands: *Eucalyptus rudis* Woodland; *Melaleuca raphiophylla* Open Woodland; *Melaleuca cuticularis* Low Woodland; *Juncus kraussii* Closed Sedgeland; *Bolboschoenus caldwellii*, *Cyperus gymnocaulos* and *C. tenuiflora* Mixed Closed Sedgeland

**Scattered Native Plants:** *Eucalyptus rudis* Woodland; *Acacia saligna* Tall Open Shrubland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >20% Excellent to Very Good, <80% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 27 native taxa (Keighery, GJ, 1990) (estimated >80% expected flora)

**Significant Flora:** none identified

**Fauna:** structured surveys for birds (90 species) (Job 1972; RAOU 1996 D, 13 visits). Large assemblage (17 species) and population levels of trans-equatorial wading birds protected under the JAMBA/CAMBA treaties. Significant bird species: category 1 (1), category 2 (17), category 3 (2) and category 4 (5); Significant amphibian species: Moaning Frog (BJ and GJ Keighery pers. comm.)

**Linkage:** no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** is one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)



**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Entered in the Register of the National Estate; Directory of Important Wetlands in Australia (Swan–Canning Estuary System); location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing purpose, care, control and management of Reserves 17375, 40891 is endorsed (see Table 3, Volume 1).

**POINT RESOLUTION RESERVE, DALKEITH**

**Boundary Definition:** protected area/bushland taken to cadastre boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 221

**Area (ha):** bushland 3.3

**Map no.** 46

**Map sheet series ref. no.** 2033–I NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Nedlands (Dalkeith)

**System 6 (1983):** M59 part System area bushland and part scattered native plants (canopy), all vegetation described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qt: LS1)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** estuary (waterbody)

**Natural Wetland Groups**

**Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (0.3ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands, vegetated wetlands, estuary

**Vegetation and Flora:** limited survey (Ecoscape 1991); detailed survey (Keighery, GJ, and Keighery 1998)

**Structural Units:** mapping (Ecoscape 1991)

Uplands (slopes) — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Woodland; *Agonis flexuosa*, *Banksia* sp. and *Callitris preissii* Low Woodland; *Eucalyptus decipiens* Low Open Woodland

Uplands (slopes) — Tamala Limestone: *Dryandra sessilis* var. *cygnorum* Open Heath

Wetlands (wetflats): *Juncus kraussii* Sedgeland; *Isolepis nodosus* Sedgeland

**Scattered Native Plants:** Mixed *Eucalyptus gomphocephala*, *E. marginata* and *E. calophylla* Tall Open Woodland with a remnant understorey of *Xanthorrhoea preissii* and *Macrozamia riedlei*

**Vegetation Condition:** >20% Very Good, <80% Degraded, with areas of severe localised disturbance

**Total Flora:** 60 native taxa (Ecoscape 1991, Keighery, GJ, and Keighery 1998) (estimated >90% expected flora)

**Significant Flora:** none recorded





**Fauna:** limited survey for birds (43 species), native mammals (2 species) and reptiles (6 species) (Ecoscape 1991). Significant bird species: category 1 (1), category 2 (3), category 3 (2) and category 4 (1)

**Linkage:** no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** naturally vegetated areas on the Swan Estuary have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; one of the few naturally vegetated areas on the Swan Estuary; open space of regional significance (DCE 1983)

#### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia (Swan–Canning Estuaries); location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

### **PEPPERMINT GROVE FORESHORE**

**Boundary Definition:** protected area/bushland (part taken to zoning) boundary

#### **SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 403

**Area (ha):** bushland 1.7

**Map no.** 45

**Map sheet series ref. no.** 2033–I NW, 2034–II SW

**Other Names:** Part Submission Area 190

**Local Authorities (Suburb):** Shire of Peppermint Grove (Peppermint Grove)

**System 6 (1983):** M54 part System area bushland and part scattered native plants (canopy), all vegetation described

#### **SECTION 2: REGIONAL INFORMATION**

##### **LANDFORMS AND SOILS**

###### **Pinjarra Plain**

Guildford Formation (Qha: S14)

###### **Spearwood Dunes**

Tamala Limestone (Qtl: LS1)

##### **VEGETATION AND FLORA**

###### **Vegetation Complexes**

###### **Spearwood Dunes**

Cottesloe Complex — Central and South

###### **Floristic Community Types**

###### **Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

30a2 Woodlands and shrublands on Holocene Dunes (DEP 1996, re-allocated from 30a, equivalent to 30a in Gibson *et al.* 1994, English and Blyth 1997)

##### **WETLANDS**

**Wetland Types:** estuary (waterbody)

###### **Natural Wetland Groups**

###### **Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (0.3ha)

**Swan Coastal Plain Lakes EPP:** none identified

##### **THREATENED ECOLOGICAL COMMUNITIES**

Endangered (floristic community type 30a as defined by Gibson *et al.* 1994)

#### **SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** estuary — limestone cliff, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Pepgrv 01–02)); detailed survey (Keighery, GJ and Keighery 1998)



**Structural Units**

Uplands — Tamala Limestone: *Eucalyptus gomphocephala* Woodland over *Callitris preissii* Low Woodland; *Callitris preissii* Low Woodland

**Scattered Native Plants:** *Eucalyptus gomphocephala* and *Banksia* species Low Open Woodland

**Vegetation Condition:** >40% Very Good to Good, <60% Degraded, with areas of severe localised disturbance

**Total Flora:** 59 native taxa (Keighery, GJ, and Keighery 1998, Gibson *et al.* 1994) (estimated >75% expected flora)

**Significant Flora:** *Dodonaea hackettiana* (4); Keighery, GJ, and Keighery 1998 (taxa of restricted distribution on the Swan Coastal Plain associated with Swan/Canning estuarine bushland remnants) — *Callitris preissii*, *Acacia xanthina*, *Alyxia buxifolia*, *Pittosporum phylliraeoides* var. *phylliraeoides*

**Fauna:** not known

**Linkage:** adjacent bushland to the north; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** National Trust of Australia (WA) Classification; Peppermint Grove Limestone, a Middle Pleistocene emergent shell bed deposited during the Mindel-Riss interglacial period, is the most informative and well preserved natural outcrop in and around the Swan River District (Lemmon *et al.* 1979); one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. Long-term security and support for conservation management of the Site to be enhanced by: amending the purpose of the reserve to include conservation; and applying appropriate mechanisms in consultation with the reserve management body (see Table 3, Volume 1).

**CHIDLEY POINT AND ADJACENT BUSHLAND, MOSMAN PARK**

**Boundary Definition:** protected area/bushland taken to cadastre boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped; Boundary adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 334

**Area (ha):** bushland 3.2

**Map no.** 51, 52

**Map sheet series ref. no.** 2033-I NW

**Other Names:** not known

**Local Authorities (Suburb):** Town of Mosman Park (Mosman Park)

**System 6 (1983):** M56 part System area bushland and part scattered native plants (canopy), all vegetation described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Tamala Limestone (Qtz: LS1)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Floristic Community Types**

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

24 Northern Spearwood shrublands and woodlands





## WETLANDS

**Wetland Types:** estuary (waterbody)

**Natural Wetland Groups**

**Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (0.3ha)

**Swan Coastal Plain Lakes EPP:** none identified

## THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** estuary — limestone cliff, vegetated wetland, vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Chidpt 01), detailed survey (Keighery, GJ, and Keighery 1998)

#### Structural Units

Uplands (slopes) — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* and *Banksia* species

Open Woodland

Uplands — Tamala Limestone: *Dryandra sessilis* var. *cygnorum* and *Acacia xanthina* Tall Open Scrub

Wetlands (wetflats): *Juncus kraussii* Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* and *Banksia* species Open Woodland

**Vegetation Condition:** >30% Very Good to Excellent, <70% Degraded to Good, with areas of severe localised disturbance

**Total Flora:** 69 native species (Keighery, GJ, and Keighery 1998, Gibson *et al.* 1994) (estimated >90% of flora)

**Significant Flora:** (Keighery, GJ, and Keighery 1998) taxa of restricted distribution on the Swan Coastal Plain associated with Swan/Canning estuarine bushland remnants — *Acacia truncata*, *A. xanthina*

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** National Trust of Australia (WA) Classification; Quaternary Site, as exposures of limestone cliffs (Lemmon *et al.* 1979); one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; one of the few naturally vegetated areas on the Swan Estuary; open space of regional significance (DCE 1983)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. Long-term security and support for conservation management of the Site to be enhanced by: amending the purpose of the reserve to include conservation; and applying appropriate mechanisms in consultation with the reserve management body (see Table 3, Volume 1).

## MINIM COVE, MOSMAN PARK

**Boundary Definition:** protected area boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 335

**Area (ha):** bushland 0 (note comment under Boundary Definition)

**Map no.** 51, 52

**Map sheet series ref. no.** 2033-I NW

**Other Names:** not known

**Local Authorities (Suburb):** Town of Mosman Park (Mosman Park)



**System 6 (1983):** M57 part System area bushland and part scattered native plants (canopy), all vegetation described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Spearwood Dunes

Tamala Limestone (Qtl: LS1)

### VEGETATION AND FLORA

#### Vegetation Complex

##### Spearwood Dunes

Cottesloe Complex — Central and South

**Floristic Community Types:** not sampled, types not inferred

### WETLANDS

**Wetland Types:** estuary (waterbody)

#### Natural Wetland Groups

##### Estuaries

Swan River (E.2)

**Wetland Management Objectives:** Conservation (0.01ha)

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** estuary — limestone cliff, vegetated wetland, vegetated uplands

**Vegetation and Flora:** detailed survey (Keighery, GJ, and Keighery 1998)

#### Structural Units

Uplands (slopes) — Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* and *Banksia* species  
Woodland

Uplands (slopes) — Tamala Limestone: *Dryandra sessilis* var. *cygnorum* Open Heath

Wetlands (wetflats): *Juncus kraussii* Closed Sedgeland

**Scattered Native Plants:** *Eucalyptus gomphocephala* and *Banksia* species Open Woodland

**Vegetation Condition:** >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 71 native species (Keighery, GJ, and Keighery 1998) (estimated >80% expected flora)

**Significant Flora:** (Keighery, GJ, and Keighery 1998) taxa of restricted distribution on the Swan Coastal Plain associated with Swan/Canning estuarine bushland remnants — *Boronia alata* (disjunct north from Cape Naturaliste, only population on the mainland in the Perth Region; also recorded from two other locations in the Perth area — Rottneest and Garden Islands), *Acacia xanthina*, *A. truncata*, *Alyxia buxifolia*

**Fauna:** limited survey for reptiles (7 species) (B. Maryan and R. Browne-Cooper pers. comm.)

**Linkage:** no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** National Trust of Australia (WA) Classification; exposed Marine Shell Beds containing fossil fauna which have yet to be completely examined. Overlaid by aeolian limestones of the Tamala Limestone, they are a significant reference point for the study of sea level changes during the Quaternary (Lemmon *et. al.* 1979); is one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; The existing care, control and management intent of the reserve is endorsed. Long-term security and support for conservation management of the Site to be enhanced by: amending the purpose of the reserve to include conservation; and applying appropriate mechanisms in consultation with the reserve management body (see Table 3, Volume 1).



## CANTONMENT HILL, FREMANTLE

**Boundary Definition:** System 6 area boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland/native vegetation.)

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 490

**Area (ha):** bushland 0 (note comment under Boundary Definition)

**Map no.** 51

**Map sheet series ref. no.** 2033-I NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Fremantle (Fremantle)

**System 6 (1983):** M71 part System area bushland and part scattered native plants (canopy), only bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

**Spearwood Dunes**

Tamala Limestone (Qtl: LS1)

#### VEGETATION AND FLORA

**Vegetation Complexes**

**Spearwood Dunes**

Cottesloe Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

#### WETLANDS

No wetlands mapped

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** limestone ridge, vegetated uplands

**Vegetation and Flora:** limited survey (DEP 1996, Ecoscape 1989)

**Structural Units:** mapping (Ecoscape 1989)

Uplands (slopes): *Acacia xanthina* Tall Open Scrub

**Vegetation Condition:** Good to Degraded

**Total Flora:** 20 native taxa, 27 weed taxa (compiled from DEP 1996 and Ecoscape 1989; some of these natives may be planted) (estimated >80% expected flora)

**Significant Flora:** most southern location for *Acacia xanthina*; most southern occurrence of a series of species associated with the Spearwood Dunes (sands and Tamala Limestone) extending inland along the river — *Acacia xanthina*, *Acanthocarpus preissii*, *Dodonaea aptera*, *Spyridium globulosum* and *Templetonia retusa*

**Fauna:** limited survey for birds (16 species) and reptiles (2 species) (Ecoscape 1989)

**Linkage:** no adjacent bushland

**Other Special Attributes:** naturally vegetated areas alongside the Swan Estuary have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; one of the few naturally vegetated areas on the Swan Estuary; open space of regional significance (DCE 1983)

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

## BLACKWALL REACH, POINT WALTER, ALFRED COVE AND ADJACENT BUSHLAND, BICTON TO APPLECROSS

**Boundary Definition:** protected area/bushland (part taken to cadastre)/bushland group boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped.)

### SECTION 1: LOCATION INFORMATION

**Buah Forever Site no.** 331

**Area (ha):** bushland 30.8

**Map no.** 52

**Map sheet series ref. no.** 2033-I NW

**Other Names:** Point Waylen, Submission Area 188

**Local Authorities (Suburb):** City of Melville (Attadale, Alfred Cove)

**Includes CALM Managed Land:** Reserve 35066 (Conservation of Flora and Fauna), 44414 (Conservation and Radio Facilities)

**System 6 (1983):** M58 and part M61 area of bushland goes beyond System area boundaries, all bushland described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qha: S14, Sm1)

##### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (QtI: LS1)

#### VEGETATION AND FLORA

##### Vegetation Complex

###### Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

##### Floristic Community Types

###### Supergroup 2: Seasonal Wetlands

16 Highly saline seasonal wetlands

S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands (most southern occurrence)

###### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

24 Northern Spearwood shrublands and Woodlands

#### WETLANDS

**Wetland Types:** estuary (waterbody), estuary (shoreline and peripheral)

##### Natural Wetland Groups

###### Estuaries

Swan River (E.2)

**Wetland Management Objectives:** Conservation (10.5ha)

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

### SECTION 3: SPECIFIC SITE DETAIL

#### Blackwall Reach and Point Walter

**Landscape Features:** estuary — limestone cliff, vegetated wetland, estuary, vegetated uplands

**Vegetation and Flora:** limited (Gibson *et al.* 1994 (Ptwalt 01), Smith and Smith 1986, Greening WA Pt Walter Group 1994); detailed survey (part Site — Keighery, GJ, 1991a)

##### Structural Units

###### Spearwood Dunes

Uplands — Sands derived from Tamala Limestone: *Agonis flexuosa* Woodland and *Banksia attenuata*, *Banksia grandis* and *B. menziesii* Woodland; *Eucalyptus marginata* and *Eucalyptus calophylla* Tall Woodland





Tamala Limestone: *Olearia axillaris*, *Rhagodia baccata*, *Alyxia buxifolia* and *Clematis microphylla* Shrubland; Open Heath to Open Low Heath dominated by *Acacia rostellifera*, *Dryandra sessilis* var. *cygnorum* and *Melaleuca systena*; *Banksia prionotes* Low Woodland

Wetlands (wetflats): *Casuarina obesa* Low Open Woodland; *Juncus maritimus* and *Lepidosperma gladiatum* Open Sedgeland; *Sporobolus virginicus* Very Open Grassland

**Scattered Native Plants:** *Eucalyptus gomphocephala* Tall Open Woodland; *Acacia cyclops* Tall Open Shrubland

**Vegetation Condition:** >60% Very Good, <40% Good to Degraded, with areas of severe localised disturbance (Greening WA Pt Walter Group 1994)

**Total Flora:** 146 native taxa, 67 weed taxa (compiled from Keighery, GJ, 1991a, Greening WA Pt Walter Group 1994, Smith and Smith 1986) (estimated >80% expected flora)

**Significant Flora:** *Lechenaultia linarioides*, *Caladenia latifolia* (white flowers), *Agonis flexuosa* (possibly most easterly occurrence), *Alyogyne huegelii* var. *glabrescens* (uncommon in PMR), *Alyxia buxifolia* (rarely recorded for the mainland, common on adjacent offshore islands and Yalgorup National Park), *Pittosporum phylliraeoides* var. *phylliraeoides* (common only on adjacent offshore islands and in Yanchep and Yalgorup National Park), *Conospermum triplinervium*; typical Tamala Limestone taxa — *Templetonia retusa* and *Grevillea preissii*; a series of species associated with the Spearwood Dunes (sands and Tamala Limestone) the occurrence of which is extended inland along the river — *Acacia lasiocarpa* var. *lasiocarpa*, *Acacia xanthina*, *Acanthocarpus preissii*, *Alyxia buxifolia*, *Conostylis candicans*, *Conostylis aculeata* subsp. *cygnorum*, *Dryandra sessilis* var. *cygnorum*, *Eucalyptus gomphocephala*, *Grevillea vestita*, *Pittosporum phylliraeoides* var. *phylliraeoides*, *Scaevola nitida* and *Templetonia retusa*

**Fauna:** limited survey for birds (32 species) and reptiles (8 species) (Smith and Smith 1986). Significant bird species: category 4 (1)

**Other Special Attributes:** is one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; part open space of regional significance (DCE 1983)

### Alfred Cove

**Landscape Features:** vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1996 (Alfr 01–02), EPA 1987, Pen 1983); detailed survey (Keighery, GJ, 1990b)

**Structural Units:** mapping (Pen 1983)

Wetlands (wetflats): *Eucalyptus rudis* Forest to Woodland; *Melaleuca raphiophylla* Low Open Forest to Low Woodland; Open Low Heath dominated by *Sarcocornia quinqueflora* or *Halosarcia halocnemoides*; Closed Sedgelands to Sedgelands dominated by *Bolboschoenus caldwellii*, *Schoenus subfascicularis*, *Baumea juncea* and *Juncus kraussii*

**Scattered Native Plants:** *Eucalyptus rudis* Forest to Woodland, *Melaleuca raphiophylla* Low Open Forest to Low Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 84 native taxa, 89 weed taxa (Keighery, GJ, 1990b) (estimated >90% expected flora)

**Significant Flora:** *Angianthus micropodioides* (3); *Burchardia bairdiae*, *Gyrostemon ramulosus* (southernmost record, only one plant remains), *Cyperus laevigatus* (only record on the Plain, possibly a weed), *Tribonanthes* aff. *violacea* (associated with freshwater seepages)

**Fauna:** multiple surveys for birds (132 species) (EPA 1987; RAOU 1996 D, 50 visits). Important feeding area for large assemblage (30 species) and population levels of trans-equatorial wading birds protected under the JAMBA/CAMBA treaties. Important breeding place for 30 species. Significant bird species: category 1 (2), category 2 (30), category 3 (11) and category 4 (6). Significant mammal species: Quenda (Friend 1996 D)

**Other Special Attributes:** National Trust of Australia (WA) Classification; 'last remaining area of shoreline samphire and rush on the lower estuary' (EPA 1987); the 'Middle Holocene beds are, as far as known, the last substantially undisturbed example on the Swan River, all others having been destroyed or buried by shore reclamation' (G.W. Kendrick pers. comm.); the Pt Waylen Shell Bed is the only undisturbed surface outcrop of a marine-gulf deposit of Middle Holocene age within the Swan River Estuary (Lemmon *et al.* 1979); is one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; part open space of regional significance (DCE 1983)

**Alfred Cove to Point Walter**

**Landscape Features:** vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1996)

**Scattered Native Plants:** *Eucalyptus rudis* Forest to Woodland, *Melaleuca raphiophylla* Low Open Forest to Low Open Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Linkage:** (Blackwall Reach, Point Walter, Alfred Cove and adjacent bushland) no adjacent bushland; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** naturally vegetated areas on the Swan Estuary have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; one of the few naturally vegetated areas on the Swan Estuary; open space of regional significance (DCE 1983)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia (Swan–Canning Estuary); Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; the existing purpose, care, control and management of Reserves 35066, 44414 is endorsed. Remainder of the Site — the existing care, control and management intent of the reserve is endorsed (see Table 3, Volume 1).

**POINT HEATHCOTE FORESHORE, APPLECROSS**

**Boundary Definition:** protected area boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 329

**Area (ha):** bushland 0 (note comment under Boundary Definition)

**Map no.** 47

**Map sheet series ref. no.** 2033–I NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Melville (Applecross)

**System 6 (1983):** M65 part System area bushland and part scattered native plants (canopy), all vegetation described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qha: S14)

**Spearwood Dunes**

Tamala Limestone (Qt: LS1)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Spearwood Dunes**

Karrakatta Complex — Central and South

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** estuary (waterbody)

**Natural Wetland Groups**

**Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (0.1ha)

**Swan Coastal Plain Lakes EPP:** none identified





**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** estuary — limestone cliff, vegetated wetland

**Vegetation and Flora:** limited survey (DEP 1999); detailed survey (Keighery, GJ, and Keighery 1998)

**Structural Units**

Wetlands (wetflats): *Juncus kraussii* and *Isolepis nodosus* Sedgeland

**Scattered Native Plants**

Uplands (slopes) – Spearwood Dunes: *Banksia* Low Woodland but generally modified, few scattered native plants and plantings

**Vegetation Condition:** Degraded to Completely Degraded

**Total Flora:** 87 native taxa, 36 weed taxa (Keighery, GJ, and Keighery 1998) (estimated >90% expected flora)

**Significant Flora:** Keighery, GJ, and Keighery 1998 — *Conospermum triplinervium*; a series of species associated with the Spearwood Dunes (sands and Tamala Limestone) the occurrence of which is extended inland along the river — *Conostylis candicans*, *Dryandra sessilis* var. *cygnorum*, *Eucalyptus gomphocephala*, *Scaevola nitida* and *Templetonia retusa*

**Fauna:** not known

**Linkage:** adjacent vegetation surrounding Heathcote Hospital available; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** naturally vegetated areas on the Swan Estuary have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; one of the few naturally vegetated areas on the Swan Estuary; open space of regional significance (DCE 1983)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia (Swan–Canning Estuary)

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

**YAGAN WETLAND AND ADJACENT BUSHLAND, ROSSMOYNE TO BULL CREEK**

**Boundary Definition:** protected area/bushland (part taken to zoning)/bushland group boundary (Boundary adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 338

**Area (ha):** bushland 16.4

**Map no.** 53

**Map sheet series ref. no.** 2033–I NW

**Other Names:** Bull Creek

**Local Authorities (Suburb):** City of Melville (Brentwood, Bull Creek), City of Canning (Rossmoyne, Brentwood)

**System 6 (1983):** M74 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qha: C1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)



**VEGETATION AND FLORA**

**Vegetation Complex**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

**Supergroup 2: Seasonal Wetlands**

\*16 Highly saline seasonal wetlands

\*S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

**WETLANDS**

**Wetland Types:** floodplain, sumpland, artificial channel, estuary (shoreline and peripheral), estuary (waterbody)

**Natural Wetland Groups**

**Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (13.7ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated uplands, vegetated wetlands, estuary

**Vegetation and Flora:** limited survey (DEP 1996); detailed survey (Brooker 1995, Smith 1987)

**Structural Units:** mapping (Brooker 1995, Smith 1987)

Wetlands (wetflats): *Eucalyptus rudis* Forest; *Melaleuca raphiophylla* Low Forest; Closed Sedgeland dominated by *Juncus kraussii*, *Gahnia trifida* and *Baumea articulata*

**Scattered Native Plants:** *Eucalyptus rudis* Open Woodland to Woodland, few scattered native plants and plantings

**Vegetation Condition:** >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 49 native taxa, 48 weed taxa (P. Matthews in Brooker 1995) (estimated >90% expected flora)

**Significant Flora:** none identified

**Fauna:** limited survey for birds (58 species), reptiles (12 species) and amphibians (6 species) (Brooker 1995, Smith 1987). Significant bird species: category 1 (1), category 3 (6) and category 4 (4). Significant reptile species: Swamp Skink (*Acritoscincus trilineatum*) and Mourning Skink (*Egernia luctuosa*)

**Linkage:** no adjacent bushland; part of Greenways 79, 95 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** 'area of considerable conservation and landscape value' (Swan River Trust 1994); is one of a very limited number of bushland areas on the Canning Estuary, naturally vegetated areas on the Canning Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation. Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

**MOUNT HENRY BUSHLAND, SALTER POINT**

**Boundary Definition:** protected area/management boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 227

**Area (ha):** bushland 11.9

**Map no.** 53

**Map sheet series ref. no.** 2033-I NW



**Other Names:** not known

**Local Authorities (Suburb):** City of South Perth (Salter Point, Como)

**System 6 (1983):** M66 area of bushland goes beyond System area boundaries, all bushland described

## SECTION 2: REGIONAL INFORMATION

### LANDFORMS AND SOILS

#### Pinjarra Plain

Guildford Formation (Qha: S14)

#### Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

### VEGETATION AND FLORA

#### Vegetation Complex

##### Bassendean Dunes

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, types inferred

##### Supergroup 2: Seasonal Wetlands

\*16 Highly saline seasonal wetlands

\*S7 Northern woodlands to forests over tall sedgelands alongside permanent wetlands

##### Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

\*28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

30a2 Woodlands and shrublands on Holocene dunes (re-allocated from 30c)

### WETLANDS

**Wetland Types:** estuary (waterbody)

#### Natural Wetland Groups

##### Estuaries

Swan River (E.2)

**Wetland Management Objectives:** Conservation (3.2ha)

**Swan Coastal Plain Lakes EPP:** none identified

### THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** estuary — sandy bluff, vegetated uplands, vegetated wetlands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Mhenry 01-02)); detailed survey (Brooker *et al.* 1993b)

**Structural Units:** mapping (Brooker *et al.* 1993b)

Uplands (Sands derived from Tamala Limestone/Tamala Limestone not distinguished): Scattered *Eucalyptus gomphocephala* over Open Heath to Closed Tall Scrub dominated by *Spyridium globulosum*, *Dryandra sessilis* var. *cygnorum*, *Templetonia retusa* and *Dodonaea hackettiana*; *Banksia attenuata* and *B. menziesii* Low Woodland  
Wetlands: Low Woodland dominated by *Casuarina obesa* and/or *Melaleuca cuticularis*; Low Woodland dominated by *Melaleuca raphiophylla* or *M. preissiana*; *Juncus kraussii* Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >60% Excellent to Very Good, <40% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** 132 native taxa, 60 (Brooker *et al.* 1993b) (estimated >90% expected flora)

**Significant Flora:** *Dodonaea hackettiana* (4); *Astroloma macrocalyx*, *Hovea chorizemifolia* (disjunct distribution, Brooker *et al.* 1993b); a number of species associated with the Spearwood Dunes are generally at their most inland point on the Plain — *Acacia lasiocarpa* var. *lasiocarpa*, *Acanthocarpus preissii*, *Adriana quadripartita*, *Anthocercis littorea*, *Conostylis candicans*, *Dodonaea aptera*, *Dryandra sessilis* var. *cygnorum*, *Eucalyptus gomphocephala*, *Spyridium globulosum* and *Templetonia retusa*

**Fauna:** structured surveys for birds (37 species), native mammals (1 species), reptiles (11 species) and amphibians (2 species) (Brooker *et al.* 1993, How *et al.* 1996). Significant populations of Golden Whistler, a large assemblage of honeyeaters and a feeding area for Carnaby's Cockatoo. Significant bird species: category 1 (1), category 3 (1) and category 4 (3). Significant reptile species: Lined Skink (*Lerista lineata*)

**Linkage:** adjacent bushland canopy to the east (Site 333); part of Greenway 71 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** most inland vegetated knoll and area of Spearwood Dunes on the Swan–Canning Estuary; 'area of considerable conservation and landscape value' (Swan River Trust 1994); one of a very limited number of bushland areas on the Canning Estuary, naturally vegetated areas on the Canning Estuary having

particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

**CANNING RIVER FORESHORE, SALTER POINT TO WILSON**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 333

**Area (ha):** bushland 17.9

**Map no.** 53, 54

**Map sheet series ref. no.** 2033-I NE, 2033-I NW

**Other Names:** Submission Area 177

**Local Authorities (Suburb) :** City of South Perth (Salter Point, Waterford, Manning), City of Canning (Wilson)

**System 6 (1983):** M67 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

**Pinjarra Plain**

Guildford Formation (Qha: S14)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Bassendean Dunes**

Bassendean Complex — Central and South

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 2: Seasonal Wetlands**

16 Highly saline seasonal wetlands

\*S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

**WETLANDS**

**Wetland Types:** estuary (shoreline and peripheral), estuary (waterbody), lake, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Jandakot (B.3)

**Estuaries**

Swan River (E.2)

**Wetland Management Objectives:** Conservation (25.9ha)

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed, Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, river, estuary, vegetated uplands

**Vegetation and Flora:** limited survey (Gibson *et al.* 1994 (Sandon 01), Pen 1983); detailed survey (Brooker *et al.* 1993a & 1994a&b, Orr 1986, 1987)





**Structural Units:** mapping (Brooker *et al.* 1993, 1994a&b, Pen 1983)

Wetlands (wetflats): *Eucalyptus rudis* Woodland to Forest; Open Forest to Low Open Forest dominated by *Casuarina obesa*, *Melaleuca raphiophylla* and/or *M. preissiana*; *Acacia saligna* Low Woodland; *Sarcocornia quinqueflora* Open Low Heath to Low Shrubland; *Juncus kraussii* Sedgeland to Closed Sedgeland; *Baumea juncea* Sedgeland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance

**Total Flora:** approximately 90 native taxa (compiled from Orr 1986, 1987, Brooker *et al.* 1993, 1994a&b) (estimated >75% expected flora)

**Significant Flora:** *Aotus cordifolia* (3) (Orr 1986)

**Fauna:** limited survey for birds (74 species), reptiles (12 species) and amphibians (6 species) (Brooker *et al.* 1993, 1994a&b). Significant bird species: category 1 (1), category 2 (3), category 3 (6) and category 4 (4)

**Linkage:** adjacent bushland canopy to the north and west (Site 227); part of Greenway 79 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** 'area of considerable conservation and landscape value' (Swan River Trust 1994); bushland/naturally vegetated estuarine areas have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; contains open space of regional significance (DCE 1983)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia (Swan-Canning Estuary); Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve. Part B: Local Reserve Mechanism (see Table 3, Volume 1).

## CANNING RIVER REGIONAL PARK AND ADJACENT BUSHLAND, RIVERTON TO LANGFORD

**Boundary Definition:** protected area/bushland taken to zoning and cadastre boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped; Boundary adjusted from that in draft *Perth's Bushplan*.)

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 224

**Area (ha):** bushland 161.2 (Site also includes open water.)

**Map no.** 54

**Map sheet series ref. no.** 2033-I NE

**Other Names:** not known

**Local Authorities (Suburb):** City of Canning (Wilson, Cannington, Langford, Ferndale), City of Gosnells (Beckenham)

**System 6 (1983):** M68, part M75 area of bushland goes beyond System area boundaries, all bushland described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: Cs) (Qha: Msp, Msc1)

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

###### Wetlands (within the Bassendean Dunes)

Holocene Swamp Deposits (Qrw: Sp2)



## VEGETATION AND FLORA

### Vegetation Complex

#### Pinjarra Plain

Guildford Complex

Swan Complex

#### Bassendean Dunes

Bassendean Complex — Central and South

#### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

## WETLANDS

**Wetland Types:** sumpland, floodplain, palusplain, river, creek, artificial channel, estuary (waterbody), estuary (shoreline and peripheral)

### Natural Wetland Groups

#### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

#### Swan Coastal Plain Rivers

Swan River (R.2)

#### Estuaries

Swan River (E.2)

**Wetland Management Objectives:** Conservation (258.6ha, 545m), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 32.1ha

## THREATENED ECOLOGICAL COMMUNITIES

Not determined

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** open water, vegetated wetland, creek, river, estuary, island, vegetated uplands

**Vegetation and Flora:** limited survey (CALM *et al.* 1997, Connell 1995, Pen 1983); detailed survey (Brock and Pen 1984, State Planning Commission 1989)

**Structural Units:** mapping (State Planning Commission 1989, Brock and Pen 1984)

Uplands: Scattered *Banksia menziesii*, *B. attenuata* and *Eucalyptus marginata* Low Woodland over Mixed Shrublands of *Acacia stenoptera*, *A. saligna*, *Jacksonia furcellata* and *J. sternbergiana*

Wetlands (wetflats): *Eucalyptus rudis* and *Melaleuca raphiophylla* Low Woodland to Closed Forest; *Eucalyptus rudis* Woodland to Open Forest; *Casuarina obesa* and *Melaleuca raphiophylla* Woodland; *Melaleuca raphiophylla* Woodland; Open Low Heath to closed Heath dominated by *Sarcocornia quinqueflora* or *Halosarcia* species with occasional sedges of *Bolboschoenus caldwellii*; Sedgeland dominated by *Juncus kraussii*, *Samolus repens*, *Baumea juncea* or *Typha domingensis*

**Scattered Native Plants:** *Eucalyptus rudis* Open Woodland; *Melaleuca raphiophylla* Open Woodland; *Eucalyptus rudis* and *Melaleuca raphiophylla* Open Woodland

**Vegetation Condition:** varies from patches in Excellent Condition to Completely Degraded

**Total Flora:** 96 native taxa, 58 introduced taxa (Brock and Pen 1984) (estimated <50% of expected flora)

**Significant Flora:** none recorded

**Fauna:** multiple surveys for birds (97 species) (Brock and Pen 1984; RAOU 1996 D, several visits) and native fish (33 species) (Brock and Pen 1984). Important feeding area for large assemblage of waterbirds and wading birds. Significant bird species: category 1 (6), category 2 (2), category 3 (5) and category 4 (2). Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenways 71, 72, 79 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** National Trust of Australia (WA) Classification; bushland/naturally vegetated estuarine/riverine areas have particular conservation value in providing habitat for fauna and linkage between larger more intact areas of bushland; contains open space of regional significance (DCE 1983); part Site included in Canning River Regional Park (CALM *et al.* 1997); contains 1181m of regionally significant river (WRC 1996a GIS)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*





**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Canning River Regional Park is endorsed. Part B: Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**CANNING AND SOUTHERN RIVERS, BECKENHAM TO MARTIN/KELMSCOTT**

**Boundary Definition:** protected area boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 246

**Area (ha):** bushland 181.1

**Map no.** 54, 55, 61

**Map sheet series ref. no.** 2033-I NE, 2133-IV NW

**Other Names:** not known

**Local Authorities (Suburb):** City of Gosnells (Gosnells, Southern River, Huntingdale, Thornlie, Maddington, Beckenham, Kenwick, Martin), City of Armadale (Kelmescott)

**System 6 (1983):** Part M75 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Foothills**

Colluvial Deposits (Qc: Csg)

Yoganup Formation (Qpr: S12)

**Pinjarra Plain**

Guildford Formation (Qpa: Cs) (Qha: Cms, Msc1, Ms4)

Alluvial/Colluvial Deposits (Qha/Qc: G1/FS3) (Qa: FS1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Foothills**

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

**Pinjarra Plain**

Guildford Complex

Swan Complex

**Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes**

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** dampland, floodplain, palusplain, river, creek, artificial channel

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennet Brook (B/P.4)

**Swan Coastal Plain Rivers**

Swan River (R.2)

**Wetland Management Objectives:** Conservation (149.2ha, 215m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, river, vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995, Main Roads 1993, Payne 1993b, Pen 1983, 1993)



**Structural Units:** mapping (Pen 1983, 1993)

Uplands: Low Open Forest dominated by *Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *Allocasuarina fraseriana*, *Eucalyptus tottiana* and combinations of these

Wetlands (wetflats): *Eucalyptus rudis* and *Melaleuca raphiophylla* Open to Closed Forest over *Astartea fascicularis* and *Grevillea diversifolia*; *Eucalyptus calophylla* Open to Closed Forest; *Eucalyptus rudis* and *E. calophylla* Open to Closed Forest

**Scattered Native Plants:** *Eucalyptus rudis* Open Woodland to Woodland, *Eucalyptus calophylla* Open Woodland to Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection

**Vegetation Condition:** varies from patches in Excellent Condition to Completely Degraded

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland/canopy to Site 61 in the east and along the Southern River to Sites 464 and 255 in the south; part of Greenways 70, 71, 73, 106 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** National Trust of Australia (WA) Classification: bushland/naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; contains open space of regional significance (DCE 1983); contains 1963m of regionally significant river (WRC 1996a GIS)

#### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

#### SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve, Part B: Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

## DALLEN ROAD BUSHLAND, SOUTHERN RIVER/GOSNELLS

**Boundary Definition:** bushland boundary

#### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 255

**Area (ha):** bushland 26.9

**Map no.** 61

**Map sheet series ref. no.** 2033-I NE

**Other Names:** not known

**Local Authorities (Suburb):** City of Gosnells (Gosnells)

**System 6 (1983):** Part M75 area of bushland goes beyond System area boundaries, all bushland described

#### SECTION 2: REGIONAL INFORMATION

##### LANDFORMS AND SOILS

###### Pinjarra Plain

Guildford Formation (Qpa: Cs)

###### Bassendean Dunes

Bassendean Sands (Qpb: S8)

###### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

##### VEGETATION AND FLORA

###### Vegetation Complexes

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** \*not sampled, type inferred

**Supergroup 1: Foothills/Pinjarra Plain** (communities too disturbed to establish grouping)

**Supergroup 2: Seasonal Wetlands**

\*8 Herb-rich shrublands in clay pans





## WETLANDS

**Wetland Types:** dampland, palusplain (DEP 1999), creek, artificial channel, river

### Natural Wetland Groups

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennett Brook (B/P.4)

**Wetland Management Objectives:** Conservation (17.1ha)

**Swan Coastal Plain Lakes EPP:** none identified

## THREATENED ECOLOGICAL COMMUNITIES

Vulnerable (floristic community type 8)

## SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995, DEP 1999, Mattiske Consulting Pty Ltd 1997, Pen 1993)

**Structural Units:** mapping (part Site — Pen 1993)

Uplands: *Eucalyptus calophylla* Open Forest to Woodland, *Banksia menziesii*, *B. attenuata*, *Allocasuarina fraseriana* and *Eucalyptus todtiana* Low Open Forest to Low Open Woodland

Wetlands: *Melaleuca raphiophylla* Low Open to Closed Forest; *Eucalyptus rudis* and *Melaleuca raphiophylla* Open to Closed Forest over *Astartea fascicularis*; *Eucalyptus calophylla* Woodland; Tall Shrublands to Tall Open Scrub dominated by *Melaleuca viminea*, *Melaleuca incana*, *Melaleuca lateritia* and *Melaleuca raphiophylla* combinations of these; Closed to Open Heath dominated by *Kunzea recurva*, *Regelia ciliata*, *Beaufortia squarrosa*, *Verticordia densiflora* and *Pericalymma ellipticum*; Open Low Heath to Low Shrubland dominated by *Verticordia ?plumosa* var. *pleiobotrya* or *Baeckea tenuifolia*; Herblands dominated by *Borya* species, *Tribonanthes* species, *Stylidium* species and others in combination; Sedgeland dominated by *Leptocarpus aristatus* and *L. canus* or combinations of these; *Lepidosperma longitudinale* Sedgeland; Annual Sedgeland

**Scattered Native Plants:** *Melaleuca preissiana* and *Kunzea ericifolia* Low Woodland, *Eucalyptus rudis* and *E. calophylla* Woodland

**Vegetation Condition:** Wetlands: varies from patches in Excellent to Very Good condition to patches in Degraded to Completely Degraded condition, mostly Very Good to Good; Uplands: Degraded to Completely Degraded

**Total Flora:** not known

**Significant Flora:** *Verticordia ?plumosa* var. *pleiobotrya* (R) (identification needs to be confirmed), *Baeckea tenuifolia* (3), *Trichocline* sp. Treeton (BJK and NG 564) (3)

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** adjacent bushland/canopy along the Southern River to Sites 464 and 246 in the north and south to Site 260; part of Greenways 70, 117 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** Category One Area, Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); one of only two large areas of bushland on the Southern River (Sites 255 and 464); naturally vegetated estuarine/riverine areas have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; contains 864m of regionally significant river (WRC 1996a GIS)

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

## SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve Part B: Strategic Negotiated Planning Solution (see Table 3, Volume 1).

## SOUTHERN RIVER AND ADJOINING BUSHLAND, WESTFIELD

**Boundary Definition:** protected area/bushland boundary

## SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 260

**Area (ha):** bushland 7.2

**Map no.** 61

**Map sheet series ref. no.** 2033-I NE



**Other Names:** not known

**Local Authorities (Suburb):** City of Armadale (Armadale, Westfield)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Cs)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** dampland, river, artificial channel

**Natural Wetland Groups**

**Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Bennet Brook (B/P.4)

**Wetland Management Objectives:** Conservation (5.8ha), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, river, vegetated uplands

**Vegetation and Flora:** aerial photograph interpretation

**Structural Units**

Wetlands: *Eucalyptus rudis* Woodland to Forest; *Eucalyptus calophylla* Woodland; *Melaleuca raphiophylla* Low Forest to Low Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** varies from a few patches in Excellent Condition with an understorey of sedges and shrubs, to Completely Degraded with a pasture/weed understorey

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** no adjacent bushland; part of Greenway 70 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** bushland/naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; contains 937m of regionally significant river (WRC 1996a GIS)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; Existing Parks and Recreation Reserve, the purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body. Part B: Strategic Negotiated Planning Solution (see Table 3, Volume 1).





**WUNGONG BROOK, BYFORD**

**Boundary Definition:** protected area/bushland/conservation wetland boundary

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 256

**Area (ha):** bushland 9.9

**Map no.** 67

**Map sheet series ref. no.** 2033-I SE, 2133-IV SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine-Jarrahdale (Darling Downs, Brookdale)

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: Cs) (Qha: Msc1)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Pinjarra Plain**

Guildford Complex

**Floristic Community Types:** not sampled, types not inferred

**WETLANDS**

**Wetland Types:** palusplain, river, creek, artificial channel

**Natural Wetland Groups**

**Pinjarra Plain**

Keysbrook (P.1)

**Wetland Management Objectives:** Conservation (15.3ha, 64m), Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

**THREATENED ECOLOGICAL COMMUNITIES**

Not determined

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** creek, vegetated wetlands

**Vegetation and Flora:** limited survey (Connell 1995); aerial photograph interpretation

**Structural Units**

Wetlands: *Eucalyptus rudis* Woodland to Forest; *Eucalyptus calophylla* and/or *Eucalyptus wandoo* Woodland;

*Melaleuca raphiophylla* Low Forest to Low Woodland

**Scattered Native Plants:** not assessed

**Vegetation Condition:** varies from patches in Excellent Condition with an understorey of sedges and shrubs, to Completely Degraded with a pasture/weed understorey

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland/canopy to the west, adjacent creekline canopy to the east (across road); part of Greenways 70, 106, 119 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** bushland/naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; contains 1667m of regionally significant river (WRC 1996a GIS)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

**Recommendation:** Part A: Site with Some Existing Protection; existing Parks and Recreation Reserve. Part B: Creekline; Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).



## SERPENTINE RIVER, PEEL ESTATE TO SERPENTINE

**Boundary Definition:** bushland boundary

### SECTION 1: LOCATION INFORMATION

**Bush Forever Site no.** 371

**Area (ha):** bushland 86.4

**Map no.** 77, 78

**Map sheet series ref. no.** 2033-II NE

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Serpentine–Jarrahdale (Serpentine, Mardella)

**System 6 (1983):** Part M105 part System area bushland and part scattered native plants (canopy), all vegetation described

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Foothills

Colluvial Deposits (Qc: Csg)

##### Pinjarra Plain

Guildford Formation (Qpa: Cs) (Qha: Msc1)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### VEGETATION AND FLORA

##### Vegetation Complex

###### Foothills

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

###### Pinjarra Plain

Guildford Complex

###### Bassendean Dunes

Bassendean Complex — Central and South

###### Combinations of Bassendean Dunes/Pinjarra Plain

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

#### WETLANDS

**Wetland Types:** dampland, palusplain, creek, artificial channel, river

##### Natural Wetland Groups

###### Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennet Brook (B/P.4)

###### Swan Coastal Plain Rivers

Goegrup (R.4)

**Wetland Management Objectives:** Conservation (53.1ha, 33m), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, river, vegetated uplands

**Vegetation and Flora:** limited survey (Mattiske Consulting Pty Ltd 1997, Connell 1995); detailed survey (Chambers and Pen 1985, Siemon *et al.* 1993)

**Structural Units:** mapping (Chambers and Pen 1985, Siemon *et al.* 1993)

Wetlands: *Eucalyptus rudis* and *Melaleuca raphiophylla* Woodland; *Eucalyptus rudis* Open Forest; Closed Sedgeland dominated by *Juncus kraussii*, *J. microcephalus* and *Isolepis nodosa*

**Scattered Native Plants:** not assessed

**Vegetation Condition:** varies from patches in Excellent Condition with an understorey of sedges and shrubs, to Completely Degraded with a pasture/weed understorey

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** not known

**Linkage:** adjacent bushland to the south (Site 365) and east (Site 368); part of Greenways 64, 65, 106 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)



**Other Special Attributes:** Contains plant communities representative of the eastern side of the Swan Coastal Plain; National Trust of Australia (WA) Classification; bushland/naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; contains regionally significant river (WRC 1996a GIS)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Creekline; Regional Creekline Mechanism (with mapped vegetation) (see Table 3, Volume 1).

**LAKE AMARILLO, SERPENTINE RIVER AND ADJACENT BUSHLAND, KARNUP**

**Boundary Definition:** bushland/bushland group/conservation wetland boundary (Areas of bushland/native vegetation within the boundaries of the Site are not accurately mapped; Boundary adjusted from that in draft *Perth's Bushplan*.)

**SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no.** 394

**Area (ha):** bushland 168.7 (Site also includes open water.)

**Map no.** 80

**Map sheet series ref. no.** 2033-II SW

**Other Names:** not known

**Local Authorities (Suburb):** Shire of Rockingham (Karnup)

**System 6 (1983):** Part M108 area of bushland goes beyond System area boundaries, all bushland described

**SECTION 2: REGIONAL INFORMATION**

**LANDFORMS AND SOILS**

**Pinjarra Plain**

Guildford Formation (Qpa: C2) (Qha: Cp)

**Bassendean Dunes**

Bassendean Sands (Qpb: S8)

**Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

**VEGETATION AND FLORA**

**Vegetation Complex**

**Pinjarra Plain**

Serpentine River Complex

**Bassendean Dunes**

Bassendean Complex — Central and South

**Wetlands**

Herdsmen Complex

**Marine (Lagoonal and Estuarine) Deposits**

Yoongarillup Complex

**Floristic Community Types**

**Supergroup 2: Seasonal Wetlands**

5 Mixed shrub damplands

13 Deeper wetlands on heavy soils

**WETLANDS**

**Wetland Types:** floodplain, dampland, palusplain, sumpland, river, artificial channel

**Natural Wetland Groups**

**Bassendean Dunes**

Gnangara (B.2)

**Swan Coastal Plain Rivers**

Goegrup (R.4)

**Wetland Management Objectives:** Conservation (228.1ha), Resource Enhancement, Multiple Use

**Swan Coastal Plain Lakes EPP:** 102.6ha + 7.0ha + 1.9ha + 0.2ha = 111.7ha (total)



**THREATENED ECOLOGICAL COMMUNITIES**

Not assessed

**SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** open water, vegetated wetland, river, vegetated uplands

**Vegetation and Flora:** limited survey (Connell 1995, Gibson *et al.* 1994 (Paga 02–03)); detailed survey (Siemon *et al.* 1993)

**Structural Units:** mapping (Siemon *et al.* 1993)

Uplands: *Banksia* species Open Woodland to Closed Woodland

Wetlands: *Eucalyptus rudis* Open Woodland to Open Forest; *Melaleuca* species Tall Open Scrub to Closed Tall Scrub; *Melaleuca raphiophylla* Low Closed Forest; *Eucalyptus rudis* and *E. gomphocephala* Woodland; *Eucalyptus rudis* and *Melaleuca raphiophylla* Low Open Forest to Closed Forest; *Melaleuca raphiophylla* and *M. cuticularis* Low Open Forest to Closed Forest; *Melaleuca cuticularis* Low Open Forest to Closed Forest; *Pericalymma ellipticum* and *Hakea varia* Closed Heath; *Juncus kraussii* Closed Sedgeland

**Vegetation Condition:** Very Good to Good

**Total Flora:** 38 native taxa, 4 weed taxa (plot-generated list only, Gibson *et al.* 1994)

**Significant Flora:** none recorded

**Fauna:** multiple surveys for birds (78 species) (Bowman Bishaw Gorham 1992; RAOU 1996 D, 26 visits).

Significant bird species: category 1 (1), category 2 (11) and category 3 (9)

**Linkage:** adjacent bushland to the south and west; part of Greenways 65, 123, 124 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

**Other Special Attributes:** bushland/naturally vegetated watercourses have particular conservation value in providing habitat for fauna and linkage between larger, more intact areas of bushland; open space of regional significance (DCE 1983); contains 1693m of regionally significant river (WRC 1996a GIS)

**SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Proposed Parks and Recreation Reservation (see Table 3, Volume 1).









# References

Bush Forever uses a variety of information sources such as geographic information systems, databases, aerial photography, Acts, unpublished reports and published reports. For ease of access to all of these original sources each is listed in the References. References authored by a government department are listed under the acronym for that department. References from Volume 2, Part A, Section 5 are included in this list.

References are divided into two sections:

- *Geographic Information Systems (GIS), Databases (D) and Photographs (P)*

Database references are annotated with 'D', geographic information system references with 'GIS' and aerial photographs with 'P'.

- *Reports – Published and Unpublished*

## Geographic Information Systems (GIS) and Databases (D)

**AGWEST** 1998 GIS *Native Vegetation Mapping of the Perth Metropolitan Area*. Spatial Resource Unit, Agriculture Western Australia, South Perth, Western Australia.

**Agriculture Western Australia** — refer to AGWEST.

**AHC** 2000 D *Register of the National Estate Database*. Australian Heritage Commission, Canberra, Australian Capital Territory.

**AUSLIG** 1996 GIS *Locations of Cities, Towns, Stations, Homesteads, etc.* Department of Land Administration, Perth, Western Australia.

**Australian Heritage Commission** — refer to AHC.

**CALM** 1998 GIS *Declared Rare and Priority Flora in the Perth Metropolitan Area*. Department of Conservation and Land Management, Como, Western Australia.

**CALM and ANCA** 1996 GIS *Swan Coastal Plain Boundary*. Department of Conservation and Land Management, Perth, Western Australia; ANCA, Canberra, Australian Capital Territory.

**DCE** 1990 GIS *Vegetation of the Darling System* after Heddle EM, Loneragan OW and Havel JJ 1980. IN: DCE 1980 *Atlas of Natural Resources, Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia; Ministry for Planning, Perth, Western Australia.

**DEP** 1992a GIS *Peel Inlet – Harvey Estuary Policy Area* after Government of Western Australia 1992a. Western Australian Government Gazette, 11 December, 1992, pp 5969–75.

**DEP** 1992b GIS *Swan Coastal Plain Lakes Policy Area — legally defined areas with at least 2000m<sup>2</sup> of surface water as at 1 December 1991* after Government of Western Australia 1992c. Western Australian Government Gazette, 18 December, 1992, pp 100–02.

**DEP** 1995a GIS *Gnangara Mound Crown Land Policy Area* after Government of Western Australia 1992d. Western Australian Government Gazette, 24 December, 1992, pp 6287–93.

**DEP** 1995b GIS *System 6 Recommendation Areas*. Department of Conservation and Environment, Perth, Western Australia.

**DEP** 1996 D *System 6 and Part System 1 Update Programme*. Unpublished bushland plot and area records. Department of Environmental Protection, Perth, Western Australia.

**DEP** 1997 GIS *Swan and Canning Rivers Policy Area* after Government of Western Australia 1998. Western Australian Government Gazette, 10 July, 1998, pp 3679–96.

**DEP** 1998a GIS *Western Swamp Tortoise Habitat Draft Policy Area* after EPA 1998. Environmental Protection Authority, Perth, Western Australia.





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**Department of Conservation and Environment** — refer to DCE.

**Department of Conservation and Land Management** — refer to CALM.

**Department of Environmental Protection** — refer to DEP.

**Department of Land Administration** — refer to DOLA.

**DOLA** 1997 P *Black and White Orthophotographs of the Perth Metropolitan Area*. Department of Land Administration, Midland, Western Australia.

**DOLA** 1998a GIS *Local Government Authorities*. Department of Land Administration, Midland, Western Australia.

**DOLA** 1998b GIS *Suburbs*. Department of Land Administration, Midland, Western Australia.

**DOLA** 1998c P *PanAirama*. Department of Land Administration, Midland, Western Australia.

**DOLA** 1998d GIS *Digital Colour Orthophotographs of the Perth Metropolitan Area*. Department of Land Administration, Midland, Western Australia.

**DOLA** 2000 GIS *Cadastre*. Department of Land Administration, Midland, Western Australia.

**Environment Australia** 1998 D *Wetlands listed under the RAMSAR Convention*. Wetlands Unit, Environment Australia, Department of Environment, Sport and Territories, Canberra, Australian Capital Territory.

**Environment Australia** 2000 D *Species listed under the Environment Protection and Biodiversity Conservation Act*. Environment Australia, Department of Environment, Sport and Territories, Canberra, Australian Capital Territory.

**Environmental Protection Authority** — refer to EPA.

**EPA** 1994 GIS *Threatened or Poorly Reserved Plant Communities Requiring Interim Protection*. Environmental Protection Authority, Perth, Western Australia.

**Friend A** 1996 D *CALM Bandicoot Survey 1991—1996*. Database of Bandicoot sightings reported by the public. Department of Conservation and Land Management, Como, Western Australia.

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**MfP** 1997a GIS *Basic Raw Material Resource Areas and Priority*. Department of Minerals and Energy, Perth, Western Australia.

**MfP** 1997b GIS *Extent of Metropolitan Region Scheme*. Ministry for Planning, Perth, Western Australia.



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**MfP** 1998b GIS *Town Planning Scheme Zonings*. Local Government Authorities.

**MfP and CALM** 1996 GIS *Point Locations of Threatened Ecological Communities* after English and Blyth 1997. Department of Conservation and Land Management, Como, Western Australia.

**Ministry for Planning** — refer to MfP.

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**RAOU** 1996 D *Database of Western Australian Birds Project (RAOU Tracking Database)*.

**Royal Australasian Ornithologists' Union** — refer to RAOU (now Birds Australia).

**Water and Rivers Commission** — refer to WRC.

**Western Australian Herbarium** 1998 D *Florabase – Information on the Western Australian flora*. Department of Conservation and Land Management, <http://www.calm.wa.gov.au/science/florabase.html>

**Western Australian Museum** 1996 D *Vertebrate Fauna Database*.

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**WRC** 1996a GIS *Basin and Channel Wetlands* after Hill *et al.* 1996b. Water & Rivers Commission, Perth, Western Australia.

**WRC** 1996b GIS *Consanguineous suites* after Hill *et al.* 1996b. Water & Rivers Commission, Perth, Western Australia.

**WRC** 1996c GIS *Conservation Category Wetlands* after Hill *et al.* 1996b. Water & Rivers Commission, Perth, Western Australia.

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**Alan Tingay & Associates** — refer to Tingay, Alan & Associates.

**Alford J** 1996a *Nomination to the Register of the National Estate — Bullsbrook*. Unpublished report to Murdoch University for the Australian Heritage Commission.

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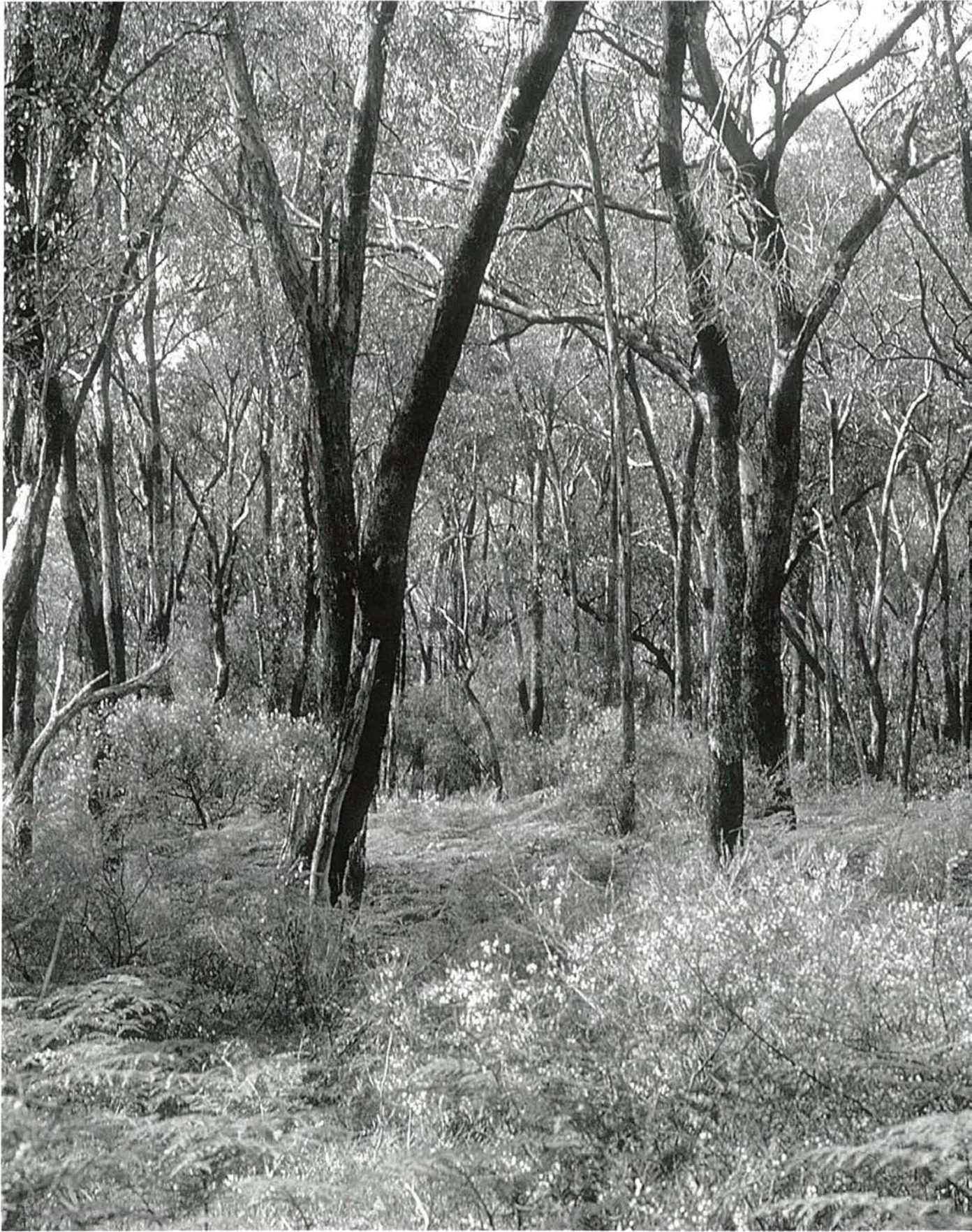
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## APPENDIX 1: TERMS, ACRONYMS AND FREQUENTLY USED ABBREVIATIONS

### Definition of Terms

**Biological diversity** means genetic diversity, species diversity and ecosystem diversity.

**Bush Forever** is the final report of the Perth's Bushplan Project. It supersedes the draft report for the Project, *Perth's Bushplan* (Government of Western Australia 1998) which was released for public comment in November 1998.

**Bush Forever Sites** are areas of regionally significant bushland and associated wetlands. These are described in Part B either individually or in groups. The Sites equate to the Bushplan Sites identified and described in the draft *Perth's Bushplan* (Government of Western Australia 1998).

**Bushland** is land on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation, and provides the necessary habitat for native fauna.

**Bushplan** refers to the Perth's Bushplan Project. Bush Forever is the final report of the Perth's Bushplan Project. It supersedes the draft report for the Project, *Perth's Bushplan* (Government of Western Australia 1998) which was released for public comment in November 1998.

**Bushplan Sites** are areas of regionally significant bushland and associated wetlands identified in the draft *Perth's Bushplan*. They equate to Bush Forever Sites.

**Condition** is a rating given to bushland to categorise disturbance related to human activities. This rating refers to the degree of change in the structure, density and species present in the bushland in relation to undisturbed bushland of the same type. A series of scales of disturbance has been used by different people. Condition ratings used commonly in the Perth Metropolitan Region are described in Section 3.5.3 – Vegetation Condition.

**Conservation category wetlands** are wetlands for which the appropriate management regime has the objective of preserving their natural attributes and functions.

#### Declared Rare Flora

**Extant Taxa:** taxa which have been adequately searched for and are determined to be either rare, in danger of extinction, or otherwise in need of special protection in the wild, and have been declared under Section 23F of the *Wildlife Conservation Act 1950* to be 'rare flora'.

**Presumed Extinct Taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, of which all known wild populations have been destroyed more recently, and which have been declared under Section 23F of the *Wildlife Conservation Act 1950* to be 'rare flora'.

**Ecological communities** are plant communities identified floristically (Gibson *et al.* 1994, DEP 1996) or by vegetation complexes (Heddl *et al.* 1980), or as defined in English and Blyth (1997, 1999).

**Floristic community types** are distinctive floristic assemblages as defined by Gibson *et al.* (1994) and the DEP (1996).

**Greenways** (Tingay, Alan & Associates 1998a) are natural corridors proposed as linkages between declared public open spaces such as local, regional or national parks, stream reserves, wetlands and beaches.

**JAMBA and CAMBA** are the Japan–Australia and China–Australia Migratory Bird Agreements.





**Maintenance** means the continuous protective care of bushland.

**Marine Park** has the meaning assigned to it by the *Conservation and Land Management Act 1984*.

**METROPLAN** (Department of Planning and Urban Development 1990) is a strategy for Metropolitan Perth released by the Government in 1990.

**Metropolitan Region Scheme (MRS)** means the town planning scheme for the Perth Metropolitan Region.

**Multiple Use Wetlands** are wetlands which are most appropriately managed for their use and development in the context of water; town and environmental planning.

**National Park** has the meaning assigned to it by the *Conservation and Land Management Act 1984*.

**Native vegetation** is a category of vegetation adopted by the Perth's Bushplan Project for mapping purposes, based on AGWEST Spatial Resource Information Unit classes:

**Remnant vegetation** – most closely resembles the natural state of vegetation for a given area; most similar to identifiably remnant areas of similar vegetation types; understorey intact; of the greatest structural diversity/complexity in comparison to disturbed vegetation in the region; minimal disturbance by agents of human activity.

**Modified vegetation** – degraded understorey; obvious human disturbance; saline incursions; high perimeter to area ratio; narrow corridors of vegetation along roads, railway lines.

**Perth's Bushplan** refers to the Perth's Bushplan Project, that is, the whole initiative from concept development to implementation. Bush Forever is the final report of the Perth's Bushplan Project. It supersedes the draft report for the Project, *Perth's Bushplan* (Government of Western Australia 1998) which was released for public comment in November 1998.

**Perth Metropolitan Region** is the area covered by the *Perth Metropolitan Region Town Planning Scheme Act 1959*, as amended.

**Planning Control Areas** may, with the consent of the Minister for Planning, be declared by the WAPC, effectively giving the Commission development control over the land in question (Section 35<sup>©</sup> of the *Metropolitan Region Town Planning Scheme Act*).

**Plots** are areas of 10m x10m from which data are recorded on vegetation structure, density and condition; wetland period; topographic position; and total flora.

**Preservation** means maintaining bushland in its existing state and preventing deterioration.

**Priority Flora** are plant taxa, lists of which are maintained by CALM, that are either under consideration as Threatened Flora but are in need of further survey to adequately determine their status, or are adequately known but require monitoring to ensure that their security does not decline.

**Project** refers to the Perth's Bushplan Project, that is, the whole initiative from concept development to implementation. Bush Forever is the final report of the Perth's Bushplan Project. It supersedes the draft report for the Project, *Perth's Bushplan* (Government of Western Australia 1998) which was released for public comment in November 1998.

**Protected** refers to bushland which is under a management regime that provides for its continuing protection.

**Protection** is all of the processes of ensuring the continued existence and viability of bushland, and may include preservation, maintenance, reinstatement, and restoration.

**Regeneration** means the natural or assisted recovery of the natural integrity of bushland.

**Regionally significant bushland** is bushland that meets the criteria of the Perth's Bushplan Project for regional significance.

**Regional Parks** are areas which have notable environmental, tourism and recreational values associated with them and are managed under cooperative arrangements between State government, local government and the community, coordinated by CALM.



# Appendices



**Reinstatement** means to introduce one or more species which are known to have existed naturally in bushland at a previous time.

**Representative** means inclusive of the range of known ecological communities in the region, or their habitats.

**Reservation (reserve and reserved)** refers to reservation under the Metropolitan Region Scheme (MRS) or under the *Land Act 1933* (LA), as indicated.

**Resource Enhancement Wetlands** are wetlands for which the management objective should be restoration through maintenance and enhancement of natural functions and attributes.

**Restoration** means returning bushland to a known past state, or to approximate the original natural condition, by repairing degradation, removing exotic species, reinstatement, or allowing recovery.

**State Forest** has the meaning assigned to it by the *Conservation and Land Management Act 1984*

**Statements of Planning Policy (SPP)** may with the consent of the Minister for Planning, be prepared by the WAPC. An SPP may make provision for any matter which may be the subject of a town planning scheme, but must be directed primarily toward broad general planning and the coordination of planning. It is a higher order policy planning instrument, approved by the Governor and published in the *Government Gazette*, legally enforceable, and must be incorporated into town planning schemes (Section 5AA of the *Town Planning and Development Act 1928*).

**Threatened Ecological Communities** are naturally occurring assemblages of plants and animals listed by CALM as being threatened with extinction by human activity, or in danger of being destroyed or significantly modified by development and other pressures from people (English and Blyth 1997, 1999).

**Threatened Fauna** are animal species likely to become extinct or which are rare, and declared so, under Section 14(2)(ba) of the *Wildlife Conservation Act 1950*.

**Threatened Flora** are plant species which 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 (see Declared Rare Flora).

**Town Planning Scheme** means a set of provisions which show how land in the scheme areas is to be used and developed. A Scheme usually comprises one or more scheme maps, a text and an explanatory report.

**Urban Bushland** is bushland within or adjoining urban area.

**Vegetation complexes** are as defined by Heddle *et al.* (1980).

**Wetlands** means areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres (Government of Western Australia 1997). Wetlands may be classified, according to management objectives (Hill *et al.* 1996), into categories of Conservation, Resource, Enhancement and Multiple Use.

**Zones** refers to the classification of land in planning schemes for use and development, excluding land in reserves.





## Acronyms and Frequently Used Abbreviations

<b>AGWEST</b>	Agriculture Western Australia
<b>AHC</b>	Australian Heritage Commission
<b>ANCA</b>	Australian Nature Conservation Agency
<b>ANZECC</b>	Australian and New Zealand Environment and Conservation Council
<b>CALM</b>	Department of Conservation and Land Management
<b>CAMBA</b>	China Australia Migratory Birds Agreement
<b>CER</b>	Consultative Environmental Review
<b>DCE</b>	Department of Conservation and Environment
<b>DEP</b>	Department of Environmental Protection
<b>DOLA</b>	Department of Land Administration
<b>EIA</b>	Environmental Impact Assessment
<b>EPA</b>	Environmental Protection Authority
<b>EPP</b>	Environmental Protection Policy
<b>ERMP</b>	Environmental Review and Management Plan
<b>GIS</b>	Geographic Information System
<b>IBRA</b>	Interim Biogeographic Regionalisation for Australia
<b>JAMBA</b>	Japan Australia Migratory Birds Agreement
<b>MfP</b>	Ministry for Planning
<b>MRS</b>	Metropolitan Region Scheme
<b>NPNCA</b>	National Parks and Nature Conservation Authority
<b>PCA</b>	Planning Control Area
<b>PEP</b>	Perth Environment Project
<b>PER</b>	Public Environmental Review
<b>PMR</b>	Perth Metropolitan Region
<b>RAOU</b>	Royal Australasian Ornithologists' Union
<b>SCP</b>	Swan Coastal Plain
<b>SF</b>	State Forest
<b>SPP</b>	Statement of Planning Policy
<b>TPS</b>	Town Planning Scheme
<b>UNESCO</b>	United Nations Environment and Science Conservation Organisation
<b>WAPC</b>	Western Australian Planning Commission
<b>WATSCU</b>	WA Threatened Species and Communities Unit
<b>WAWA</b>	Western Australia Water Authority
<b>WRC</b>	Water and Rivers Commission

# Appendices

## APPENDIX 2: INTRODUCTORY GUIDE TO THE BUSH FOREVER SITE DESCRIPTIONS AND MAPS

This introductory guide has been prepared for use with information on individual Bush Forever Sites and explains both the Bush Forever Site description and the Bush Forever Site map. This guide summarises the categories of information used in the Site descriptions. All sources of information used are listed in the References. Only major references are listed in this guide.

### Bush Forever Site Description

A general proforma was developed to present the information collated on each Bush Forever Site. This introductory guide presents sections of this proforma along with a brief explanation of the category of information. All text from the proforma is shown in a shaded box in **'bold Times'** typeface.

#### NAME

Each Bush Forever Site name is a well used name of the area or is derived from a boundary road. The suburb in which it is located follows the name. A named Bush Forever Site may contain a series of Site numbers.

#### DIRECTORY DESCRIPTORS

**Boundary Definition:** protected area boundary management boundary management/bushland boundary bushland boundary bushland group boundary conservation wetland boundary vegetation complex boundary

The boundary of the Bush Forever Site delineates the area of regionally significant bushland (or habitat for native fauna) which has been recognised in Bush Forever. Generally only the bushland within the Site boundary is recognised and proposed for protection.

The type of boundary may be of one or more of seven categories allocated to Bush Forever Sites:

- protected area boundary — boundary matches current Parks and Recreation, CALM- managed lands or Crown Reserves with a conservation purpose
- management boundary — boundary selected for ease or viability of management
- management/bushland boundary — combination of management boundary and mapped bushland boundary
- bushland boundary — boundary fully encompasses mapped bushland areas
- bushland group boundary — boundary encompasses several mapped bushland areas
- conservation wetland boundary — boundary matches verified conservation category wetland boundary or boundary adjusted to include all of a conservation category wetland
- vegetation complex boundary — boundary follows boundary of the area of a single complex.

While the boundaries of the Bush Forever Sites are as accurate as possible using aerial photograph interpretation and some ground checking, the final determination of the boundaries of the area to be identified and managed for conservation involves consideration of:

- individual area ground checking of bushland boundaries
- management design criteria such as
  - reduction of the bushland edge-to-area ratio
  - establishment of a foreshore reserve or management buffer area
  - connectivity with other sites and natural areas
- cadastral boundaries
- existing planning constraints.





Where there are discrepancies between:

- a dataset and a cadastral or zoning boundary – the boundary has been matched to the later datasets;
- the mapped native vegetation and survey records of bushland in the Bush Forever Site – the 'boundary category' has been annotated with the following statement: 'Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.'
- the draft *Perth's Bushplan* boundary and the boundary depicted in Bush Forever – the 'boundary category' has been annotated with the following statement: 'Boundary adjusted after vegetation survey and/or negotiations with land owner(s) in response to a submission to draft *Perth's Bushplan*.'

## SECTION 1: LOCATION INFORMATION

### DIRECTORY DESCRIPTORS

<b>Bush Forever Site no.</b>	<b>Area (ha):</b> bushland X (Site also includes open water.)
<b>Map no.</b>	<b>Map sheet series ref. no.</b>
<b>Other Names</b>	
<b>Local Authorities (Suburb)</b>	
<b>Includes CALM Managed Lands:</b> Reserve numbers (Purpose)	
<b>System 6 (1983):</b> All System area bushland, total area described Part System area bushland, only bushland described Area of bushland goes beyond System area boundaries, all bushland described Part System area bushland and part scattered native plants (canopy), all vegetation described	

#### Bush Forever Site number

The arbitrary number assigned to each Bush Forever Site, for example, Kings Park is Bush Forever Site 317. Some descriptions refer to a series of Site numbers.

#### Area (hectares)

The area of bushland (native vegetation mapped) defined by the Bush Forever Site boundary, and the presence of open water:

#### Map number

The map page in Volume 1 on which the Bush Forever Site is located.

#### Map sheet series reference number

The Australian 1:25 000 Topographic Survey Map Sheet Series from which the map pages are derived, for example 2034 IV SW.

#### Other Names

Any other known names or reference codes.

#### Local Authorities (Suburb)

For example, City of Nedlands (Shenton Park).

#### Includes CALM Managed Lands

Reserve numbers (with the Reserve purpose in brackets).

# Appendices



## System 6 (1983)

The System 6 reference number, then the portion of the System 6 area included within the Bush Forever Site (see Appendix 3).

## SECTION 2: REGIONAL INFORMATION

### DIRECTORY DESCRIPTORS

#### LANDFORMS AND SOILS

##### **Dandaragan Plateau/Gingin Scarp**

Colluvial Sand (Qs: S6)

Laterite (Ql: G2, LA1)

Leederville Formation (Klb: ST1)

Osborne Formation (Ko: ST2)

##### **Darling Plateau (Darling Range)/Darling Scarp**

Laterite (Ql: G2, LA1)

Darling Scarp – gravels and laterite (Czl: for example G2, LA1)

Even-grained Granite (Ae, Aes: M3, GR) (Am: GN)

##### **Foothills**

Colluvial deposits (Qc: for example Msg, Csg, Ms3, Smg, S5)

Colluvial sand (Qs: for example S6)

Yoganup Formation (Qpr: for example S12)

Ridge Hill Sandstone (Qph: SS)

Armadale Shale (Pa: SH)

##### **Pinjarra Plain**

Guildford Formation (Qpa: for example FS, Ms2, Mgs1, Cs, Sc) (Qha: for example Cp, S14, Msc1)

Alluvial/colluvial deposit (Qha/Qc: for example G1)

Alluvial/colluvial deposit (Pinjarra Plain / Ridge Hill) (Qha/Qc: for example FS3)

Muchea Limestone (Qpm: for example LS5)

##### **Bassendean Dunes**

Bassendean sands (Qpb: S8)

##### **Bassendean Dunes/Pinjarra Plain**

Bassendean sands over Guildford Formation (Qpb/Qpa: S10)

##### **Spearwood Dunes**

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: for example LS1, LS2)

##### **Quindalup Dunes (Holocene dunes)**

Safety Bay Sands (Qhs: for example S1, S2, S13, LS4)

##### **Wetlands (within the Quindalup, Spearwood, Bassendean Dunes or Pinjarra Plain)**

Holocene swamp deposits (Qhw: for example Cps, Scp, Spc, Spm, Ms5) (Qrw: for example Sp1, Sp2)

##### **Lagoonal and Estuarine Deposits (within the Quindalup, Spearwood, Bassendean Dunes or Pinjarra Plain)**

Lagoonal and estuarine deposits (Vasse) (Qhg: for example M5, Sm2)

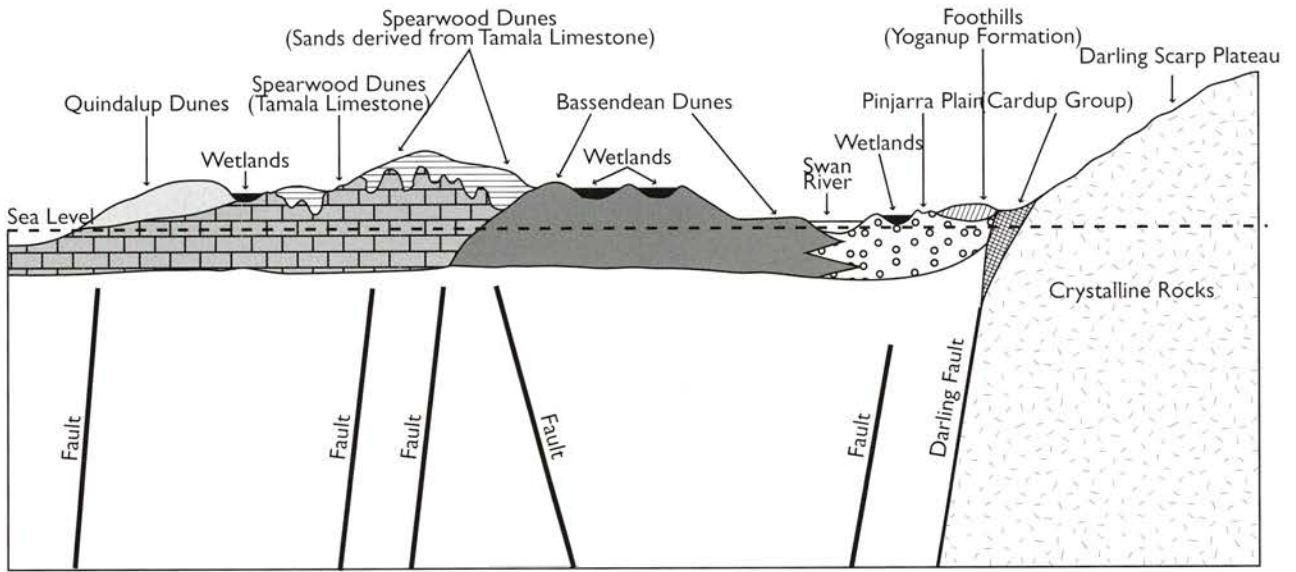
Lagoonal deposits in Bassendean Dunes (Qpw: for example S9)






The major landform units of the Swan Coastal Plain are illustrated on the transect of the Plain below. The Dandaragan Plateau is not shown in this transect. It occurs in the north of the area covered by the Project between the Plain and the Darling Plateau.

The soils are listed under the major landform elements distinguished in the transect from west to east of the Swan Coastal Plain. A key to the symbols used to describe the geology units and soils is given on the following page.



**Foothills (Ridge Hill Shelf)**

 Yoganup Formation

 Cardup Group


**Bassendean Dunes**


 Bassendean Sand

**Pinjarra Plain**


 Guildford Formation

**Spearwood Dunes**

 Tamala Limestones

 Sands Derived from Tamala Limestones

**Quindalup Dunes**

 Safety Bay Sands

Adapted with permission from Fact Sheet 15. The Geology of Perth.  
Department of Minerals and Energy, Western Australia.



## Key to symbols in the previous diagram (Environmental Geology Series Symbols)

### Geology Units

Ae and Aes	Even-grained granite
Am	Migmatite
Czl	Laterite
Klb	Leederville Formation
Ko	Osborne Formation
Pa	Armada Shale
Qc	Colluvium
Qha	Alluvium – Holocene
Qhg	Lagoonal and estuarine deposits
Qhs	Safety Bay Sands
Qpa	Alluvium – Pleistocene
Qpb	Bassendean Sand
Qph	Ridge Hill Sandstone
Qpm	Muchea Limestone
Qpr	Yoganup Formation
Qpw	Lagoonal deposits in Bassendean Sand
Qrw	Swamp deposits
Qtl	Tamala Limestone
Qs	Colluvial Sand
Qts	Sand derived from Tamala Limestone

### Soil Units

#### • Letters

The main 'soil fraction' is given first in capitals, followed by fractions in decreasing importance in lower case

#### • Numbers

indicate mappable units of a similar character

C	clay
M	silt
G	gravel
P	organic material
S	sand
ST	siltstone
SH	shale

### Rocks

#### Double capitals

DO	dolerite
FS	ironstone
GN	gneiss
GR	granite
LA	laterite
LS	limestone





#### Source of Information

Environmental Geology Series maps of the Perth Metropolitan Region, published by Geological Survey of Western Australia, Department of Minerals and Energy, Perth, Western Australia.

## VEGETATION AND FLORA

### DIRECTORY DESCRIPTORS

#### Vegetation Complexes

##### Plateaus

Mogumber Complex – South (Dandaragan Plateau)

##### Scarps

Reagan Complex (Gingin Scarp, Dandaragan Plateau)

##### Foothills

Coonambidgee Complex (Dandaragan Plateau)

Forrestfield Complex (Ridge Hill Shelf, Darling Plateau)

##### Pinjarra Plain

Guildford Complex

Swan Complex

Dardanup Complex

Serpentine River Complex

Beermullah Complex

Yanga Complex

##### Bassendean Dunes

Bassendean Complex – North

Bassendean Complex – Central and South

Bassendean Complex – North Transition

Bassendean Complex – Central and South Transition

##### Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes

Southern River Complex

Cannington Complex

##### Spearwood Dunes

Karrakatta Complex – North

Karrakatta Complex – North Transition

Karrakatta Complex – Central and South

Cottesloe Complex – North

Cottesloe Complex – Central and South

##### Quindalup Dunes

Quindalup Complex

##### Wetlands

Herdsmen Complex

Pinjar Complex

##### Marine (Lagoonal and Estuarine) Deposits

Yoongarillup Complex

Vasse Complex



The vegetation complexes found in each Bush Forever Site are listed. Vegetation complexes were described and mapped in 1980 (Hedde *et al.* 1980) for the Darling System (the area between Moore River and Capel and east to Toodyay and Bridgetown). Vegetation complexes are groupings of vegetation types, developed on units characterised by particular soil, geomorphic and climatic characteristics.

## Description of Vegetation Complexes

### Dandaragan Plateau

MOGUMBER COMPLEX — SOUTH: Open woodland of *Eucalyptus calophylla*, with some admixture of *E. marginata* and a second storey of *E. tottiana* — *Banksia attenuata* — *B. menziesii* — *B. ilicifolia*.

### Gingin Scarp

REAGAN COMPLEX: Vegetation ranges from low open woodland of *Banksia* species — *E. tottiana* to closed heath depending on the depth of soil.

### Foothills (Ridge Hill Shelf)

COONAMBIDGEE COMPLEX: Vegetation ranges from a low open forest and low woodland of *E. tottiana* — *B. attenuata* — *B. menziesii* — *B. ilicifolia* with localised admixtures of *B. prionotes* to an open woodland of *E. calophylla* — *Banksia* species

FORRESTFIELD COMPLEX: Vegetation ranges from open forest of *E. calophylla* — *E. wandoo* — *E. marginata* to open forest of *E. marginata* — *E. calophylla* — *Allocasuarina fraseriana* — *Banksia* species. Fringing woodland of *E. rudis* in the gullies that dissect this landform.

### Pinjarra Plain

GUILDFORD COMPLEX: A mixture of open forest to tall open forest of *E. calophylla* — *E. wandoo* — *E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei*). Minor components include *E. rudis* — *M. raphiophylla*.

SWAN COMPLEX: Fringing woodland of *E. rudis* — *M. raphiophylla* with localised occurrence of low open forest of *Casuarina obesa* and *M. cuticularis*.

DARDANUP COMPLEX: Mosaic of vegetation types characteristic of adjacent vegetation complexes such as Serpentine River, Southern River and Guildford.

SERPENTINE RIVER COMPLEX: Closed scrub of *Melaleuca* species and fringing woodland of *E. rudis* — *M. raphiophylla* along streams.

BEERMULLAH COMPLEX: Mixture of low open forest of *C. obesa* and open woodland of *E. calophylla* — *E. wandoo* — *E. marginata*. Minor components include closed scrub of *Melaleuca* species and occurrence of *Actinostrobos pyramidalis*.

YANGA COMPLEX: Predominantly a closed scrub of *Melaleuca* species and low open forest of *C. obesa* on the flats subject to inundation. On drier sites the vegetation reflects the adjacent vegetation complexes of Bassendean and Coonambidgee.

### Bassendean Complex

BASSENDEAN COMPLEX — NORTH: Vegetation ranges from a low open forest and low open woodland of *Banksia* species — *E. tottiana* to low woodland of *Melaleuca* species and sedgelands which occupy the moister sites.





**BASSENDEAN COMPLEX — CENTRAL AND SOUTH:**Vegetation ranges from woodland of *E. marginata* — *C. fraseriana* — *Banksia* spp. to low woodland of *Melaleuca* species, and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth.

**BASSENDEAN COMPLEX — NORTH — TRANSITION VEGETATION COMPLEX:** A transition complex of low open forest and low woodland of *Banksia* species — *E. todtiana* on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean—North and Karrakatta—North vegetation complexes.

**BASSENDEAN COMPLEX — CENTRAL AND SOUTH — TRANSITION VEGETATION COMPLEX:**Woodland of *E. marginata* — *E. calophylla* with well defined second storey of *Allocasuarina fraseriana* and *B. grandis* on the deeper soils and a closed scrub on the moister sites. The understorey species reflect similarities with the adjacent vegetation complexes.

### **Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes**

**SOUTHERN RIVER COMPLEX:** Open woodland of *E. calophylla* — *E. marginata* — *Banksia* species with fringing woodland of *E. rudis* — *M. raphiophylla* along creek beds.

**CANNINGTON COMPLEX:** Mosaic of vegetation from adjacent vegetation complexes of Bassendean, Karrakatta, Southern River and Vasse.

### **Spearwood Dunes**

**KARRAKATTA COMPLEX — NORTH:** Predominantly low open forest and low woodland of *Banksia* spp. *E. todtiana*, less consistently open forest of *E. gomphocephala* — *E. todtiana* — *Banksia* species.

**KARRAKATTA COMPLEX — NORTH — TRANSITION VEGETATION COMPLEX:** A transition complex of low open forest and low woodland of *Banksia* species — *E. todtiana* on the transition zone of a series of high sand dunes between Bassendean—North and Karrakatta—North.

**KARRAKATTA COMPLEX — CENTRAL AND SOUTH:** Predominantly open forest of *E. gomphocephala* — *E. marginata* — *E. calophylla* and woodland of *E. marginata* — *Banksia* species.

**COTTESLOE COMPLEX — NORTH:** Predominantly low open forest and low woodland of *B. attenuata* — *B. menziesii* — *E. todtiana*; closed heath on the limestone outcrops.

**COTTESLOE COMPLEX — CENTRAL AND SOUTH:** Mosaic of woodland of *E. gomphocephala* and open forest of *E. gomphocephala* — *E. marginata* — *E. calophylla*; closed heath on the limestone outcrops.

### **Quindalup Dunes**

**QUINDALUP COMPLEX:** Coastal dune complex consisting mainly of two alliances — the strand and fore-dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *M. lanceolata* — *Callitris preissii* and the closed scrub of *Acacia rostellifera*.

### **Wetlands**

**HERDSMAN COMPLEX:** Sedgelands and fringing woodland of *E. rudis* — *Melaleuca* species.

**PINJAR COMPLEX:**Vegetation ranges from woodland of *E. marginata* — *Banksia* species to a fringing woodland of *E. rudis* — *M. preissiana* and sedgelands.

### **Marine (Lagoonal and Estuarine) Deposits**

**YOONGARILLUP COMPLEX:**Woodland to tall woodland of *E. gomphocephala* with *Agonis flexuosa* in the second storey. Less consistently an open forest of *E. gomphocephala* — *E. marginata* — *E. calophylla*.





VASSE COMPLEX: Mixture of the closed scrub of *Melaleuca* species fringing woodland of *E. rudis* — *Melaleuca* species and open forest of *E. gomphocephala* — *E. marginata* — *E. calophylla*.

Note: *E.* = *Eucalyptus*, *M.* = *Melaleuca*, *C.* = *Casuarina*, *B.* = *Banksia*, *A.* = *Allocasuarina*

#### Source of Information

Hedde EM, Loneragan OW & Havel JJ 1980 Vegetation of the Darling System. IN: Department of Conservation and Environment 1980 *Atlas of Natural Resources, Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia.

### DIRECTORY DESCRIPTORS

#### Floristic Community Types

\* not sampled, types inferred, not sampled insufficient vegetation, not sampled, types not inferred

##### Supergroup 1 – Foothills/Pinjarra Plain

- 1a *Eucalyptus haematoxylon* – *E. marginata* woodlands on Whicher foothills
- 1b Southern *Eucalyptus calophylla* woodlands on heavy soils
- 2 Southern wet shrublands
- 3a *Eucalyptus calophylla* – *Kingia australis* woodlands on heavy soils
- 3b *Eucalyptus calophylla* – *E. marginata* woodlands on sandy clay soils
- 3c *Eucalyptus calophylla* – *Xanthorrhoea preissii* woodlands and shrublands
- S8 *Eucalyptus wandoo* Woodlands (Scarp)

##### Supergroup 2 – Seasonal Wetlands

- 4 *Melaleuca preissiana* damplands
- 5 Mixed shrub damplands
- 6 Weed dominated wetlands on heavy soils
- 7 Herb rich saline shrublands in clay pans
- 8 Herb rich shrublands in clay pans
- 9 Dense shrublands on clay flats
- 10a Shrublands on dry clay flats
- 10b Shrublands on southern ironstones
- 11 Wet forests and woodlands
- 12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands
- 13 Deeper wetlands on heavy soils
- 14 Deeper wetlands on sandy soils
- 15 Forests and woodlands of deep seasonal wetlands
- 16 Highly saline seasonal wetlands
- 17 *Melaleuca raphiophylla* – *Gahnia trifida* seasonal wetlands
- 18 Shrublands on calcareous silts
- 19a Sedgeland in Holocene dune swales
- 19b Woodlands over sedgeland in Holocene dune swales
- S1 *Astartea* aff. *fascicularis* – *Melaleuca* species dense shrublands
- S2 Northern *Pericalymma ellipticum* dense low shrublands
- S3 Wet sedgeland on sandy clays
- S4 *Regelia ciliata* Dandaragan Plateau wetlands
- S5 *Acacia saligna* wetlands
- S6 Northern dense low shrublands





- S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands
- S17 *Eucalyptus rudis* – *Agonis linearifolia* wetlands in Bassendean Dunes
- S19 Dense tall shrublands
- S20 Northern shrublands on sandy clays

### **Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau**

- 20a *Banksia attenuata* woodlands over species rich dense shrublands
- 20b Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands
- 20c Eastern shrublands and woodlands
- 20d Dandaragan Plateau shrublands and woodlands
- 21a Central *Banksia attenuata* – *Eucalyptus marginata* woodlands
- 21b Southern *Banksia attenuata* woodlands
- 21c Low-lying *Banksia attenuata* woodlands or shrublands
- 22 *Banksia ilicifolia* woodlands
- 23a Central *Banksia attenuata* – *B. menziesii* woodlands
- 23b Northern *Banksia attenuata* – *B. menziesii* woodlands
- 23c North-eastern *Banksia attenuata* – *B. menziesii* woodlands
- S9 *Banksia attenuata* woodlands over dense low shrublands
- S10 *Calothamnus sanguineus* dense low shrublands on sandy laterites
- S16 Mixed dense shrublands on yellow brown sands
- S18 *Eucalyptus marginata* – *E. calophylla* Woodlands on laterites

### **Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes**

- 24 Northern Spearwood shrublands and woodlands
- 25 Southern *Eucalyptus gomphocephala* – *Agonis flexuosa* woodlands
- 26a *Melaleuca huegelii* – *M. acerosa* shrublands of limestone ridges
- 26b Woodlands and mallees on limestone
- 27 Species-poor mallees and shrublands on limestone
- 28 Spearwood *Banksia attenuata* or *B. attenuata* – *Eucalyptus* woodlands
- 29a Coastal shrublands on shallow sands
- 29b *Acacia* shrublands on taller dunes
- 30a2 *Callitris preissii* and/or *Melaleuca lanceolata* forests and woodlands
- 30b Quindalup *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands
- 30c2 Woodlands and shrublands on Holocene dunes (re-allocated from 30c)
- S11 Northern *Acacia rostelifera* – *Melaleuca acerosa* shrublands
- S12 Rottnest Island *Melaleuca lanceolata* and/or *Callitris preissii* forests and woodlands
- S13 Northern *Olearia axillaris* – *Scaevola crassifolia* shrublands
- S14 *Spinifex longifolius* grassland and low shrubland

Floristic community types are regional groups related to the combination of different plant species in communities. These were identified in 1994 (Gibson et al. 1994) and 1996 (DEP 1996) using a series of studies of the flora of the Swan Coastal Plain. Floristic community types were distinguished by comparing the species present in over 1,100 10 x 10 metre plots located on the Swan Coastal Plain south of the Moore River. The 1994 study identified 43 floristic community types and the 1996 study a further 23 types (indicated as new subgroups or supplementary groups).



# Appendices



Floristic community types have been identified in Bush Forever Sites in two ways:

- (i) plots were located in the area of the Bush Forever Site and the floristic community type was determined by analysis
- (ii) the floristic community types were inferred from information on the floristics of the area and the area's geographic location. An asterisk indicates an inferred floristic community type (i.e. not sampled, types inferred).

Floristic community types could not be determined when the remaining vegetation was too disturbed to sample or not enough was known about the vegetation (i.e. not sampled, insufficient vegetation).

## Sources of Information

Department of Environmental Protection 1996 *System 6 and Part System 1 Update Program*. Unpublished bushland plot and area records and analysis.

Gibson N, Keighery BJ, Keighery GJ, Burbidge AH & Lyons MN 1994 *A Floristic Survey of the Southern Swan Coastal Plain*. Unpublished Report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc).

## DIRECTORY DESCRIPTORS

### WETLANDS

No wetlands mapped

## DIRECTORY DESCRIPTORS

**Wetland Types:** Lake, sumpland, dampland, artificial lake, floodplain, palusplain, paluslope, river, creek, artificial channel, estuary (waterbody), estuary (peripheral), includes wetlands not previously described (survey reference)

Wetland types on the Swan Coastal Plain have been identified and mapped. These are defined in the table below.

### Wetland types

Water Longevity	Landform				
	Basin	Channel*	Flat	Slope	Highland
Permanent inundation	lake*	river	-	-	-
Seasonal inundation	sumpland	creek	floodplain	-	-
Seasonal waterlogging	dampland	trough#	palusplain	paluslope	palusmont#

# Not used on Swan Coastal Plain in the Perth Metropolitan Region

\*Artificial Channels and Artificial Lakes are man-made channels and lakes

### Estuaries

ESTUARY (waterbody)	that part of an estuary which is permanently or seasonally inundated
ESTUARY (peripheral)	that part of an estuary subject to seasonal waterlogging





### Sources of Information

Separate chapters by various authors and maps in Hill, Semeniuk, Semeniuk & Del Marco 1996 *Wetlands of the Swan Coastal Plain*. Volumes 1 & 2. Prepared for the Water and Rivers Commission and the Department of Environmental Protection, Western Australia.

## DIRECTORY DESCRIPTORS

### Natural Wetland Groups

#### **Darling Plateau**

Walyunga (D.1)  
Little Dardanup (D.2)  
Nalyerin (D.4)  
Brockman (D.6)

#### **Dandaragan Plateau – Darling Plateau interface**

Wannamal (Dp/D)

#### **Dandaragan Plateau**

Red Gully (Dp.1)  
Coorang (Dp.2)  
Clewley (Dp.3)  
Mogumber (Dp.4)

#### **Pinjarra Plain**

Keysbrook (P.1)

#### **Bassendean – Pinjarra transition OR Bassendean with fluvial features**

Beermullah (B/P.1)  
Mungala (B/P.2)  
Mucheia (B/P.3)  
Bennett Brook (B/P.4)

#### **Bassendean Dunes**

Pinjar (B.1)  
Gnangara (B.2)  
Jandakot (B.3)  
Riverdale (B.4)

#### **Spearwood – Bassendean interface**

Bibra (S/B.1)

#### **Spearwood Dunes**

Yanchep (S.1)  
Balcatta (S.2)  
Coogee (S.3)  
Stakehill (S.4)

#### **Quindalup Dunes**

Cooloongup (Qu.1)  
Becher (Qu.2)  
Peelhurst (Qu.3)

#### **Swan Coastal Plain Rivers**

Moore River (R.1)  
Swan River (R.2)  
Ellen Brook (R.3)  
Goergrub (R.4)

#### **Estuaries**

Moore River (E.1)  
Swan River (E.2)



Twenty-one natural wetland groups have been identified in the Perth Metropolitan Region. These regional wetland groups have been defined by comparing geomorphic setting, wetland origin and water maintenance.

## DIRECTORY DESCRIPTORS

### **Wetland Management Objectives:** Conservation, Resource Enhancement, Multiple Use

All wetlands are placed in management categories. The area or length of each conservation category wetland is given.

The management categories described by the Water and Rivers Commission are outlined below:

- Conservation: 'Wetlands recognised at the international, national or regional level, "High Conservation" and "Conservation" wetlands identified using Bulletin 374 (EPA 1990) [or Bulletin 686 (EPA 1993)] assessment; wetlands 95–100% vegetated, sections of extensive wetlands' (Hill and Del Marco 1996 p. 102). Conservation Category Wetlands are wetlands for which the appropriate management regime has the objective of preserving their natural attributes and functions.
- Resource Enhancement: 'Wetlands 10–94% vegetated and Bulletin 374 (EPA 1990) [or Bulletin 686 (EPA 1993)] "Resource enhancement" and "Open Space" wetlands not identified above' (Hill and Del Marco 1996 p. 102). Resource Enhancement Category Wetlands are wetlands for which the appropriate management objective should be restoration through maintenance and enhancement of natural attributes and functions.
- Multiple Use: 'Wetlands 0–9% vegetated, Bulletin 374 "Multiple Use" (EPA 1990) [or Bulletin 686 (EPA 1993)] wetlands not identified above' (Hill and Del Marco 1996 p. 102). Multiple Use Category Wetlands are wetlands most appropriately managed for their use and development in the context of water, town and environmental planning.

\* In the Project channel wetlands which are 75–100% vegetated have Conservation Category Wetland status.

### Sources of Information

ATA Environmental 2000 *Evaluation of non EPP Conservation Category Wetlands*. Unpublished report for Water and Rivers Commission, Perth, Western Australia.

Ecologia 2000 *Wetland Evaluation Conservation Category Wetlands*. Report to Water and Rivers Commission, Perth, Western Australia

Environmental Protection Authority 1990 *A Guide to Wetland Management in Perth* (Bulletin 374). Environmental Protection Authority, Perth, Western Australia.

Environmental Protection Authority 1993 *A Guide to Wetland Management in the Perth and Near Perth Swan Coastal Plain Area*. (Bulletin 686). Environmental Protection Authority, Perth, Western Australia.

Hill AL & Del Marco A 1996 Wetland evaluation. IN: Hill et al. 1996a *Wetlands of the Swan Coastal Plain. Volume 1: Wetland mapping, classification and evaluation, Main Report*. Prepared for the Water and Rivers Commission and the Department of Environmental Protection, Western Australia.

Semeniuk, V&C Research Group 1997a *Verification of the Conservation Category Wetlands in the Perth Metropolitan Region*. Unpublished report to the Water and Rivers Commission, Perth, Western Australia.

WRC 2000 *GIS Geomorphic Wetlands*. Water & Rivers Commission, Perth, Western Australia.

## DIRECTORY DESCRIPTORS

### **Swan Coastal Plain Lakes EPP:** ha none identified

The Environmental Protection (Swan Coastal Plain Lakes) Policy (referred to as the Swan Coastal Plain Lakes EPP) was gazetted in December 1992 (Government of Western Australia 1992) to protect 'Swan Coastal Plain Lakes', a selection of permanently and seasonally inundated wetlands on the Swan Coastal Plain.





The following two categories were used in describing lakes as distinguished under the Swan Coastal Plain Lakes Environmental Protection Policy (EPP):

- (i) Xha + Yha etc = ZHa (total) – the area of each lake and the total area of lake defined by the EPP within the Site
- (ii) none identified – no area of EPP lake in the Site.

#### Source of Information

Government of Western Australia 1992 *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.  
Government Gazette, WA, 11 December, 1992, pp5969–75.

### DIRECTORY DESCRIPTORS

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

Not assessed, Critically Endangered (floristic community type 3a, 3c, 19, 20c, Communities of tumulus springs, Shrublands and woodlands on Muchea Limestones, Stromatolite-like community of coastal freshwater lakes, Aquatic root mat community of caves of the Swan Coastal Plain), Endangered (floristic community type 2, 10a, 20a, 20b, 26a), Vulnerable (floristic community type 3b, 7, 8, 9, 15, 18, 30a)

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 following six categories of ecological communities are distinguished as described below. The first four are threatened ecological communities.

#### Presumed Totally Destroyed

An ecological community which has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

#### Critically Endangered (CR)

An ecological community which has been adequately surveyed and found to have been subject to a major contraction in area and/or which was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

#### Endangered (EN)

An ecological community which has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

#### Vulnerable (VU)

An ecological community which has been adequately surveyed and found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not been assured and/or a community which is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.



# Appendices



## Data Deficient

An ecological community for which there is inadequate data to assign it to one of the above categories and/or which is not yet evaluated with respect to status of threat. (Usually an ecological community with poorly known distribution or biology that is suspected of belonging to any of the above categories. These ecological communities have a high priority for survey and/or research.)

## Lower Risk

A community which has been adequately surveyed and evaluated and for which available information suggests that it does not qualify for one of the above categories of threat.

The 20 threatened ecological communities found in the Perth Metropolitan Region are listed below.

## Floristic Community Types

### Supergroup 1 – Foothills/Pinjara Plain

2	Southern wet shrublands	EN
3a	<i>Eucalyptus calophylla</i> – <i>Kingia australis</i> woodlands on heavy soils	CR
3b	<i>Eucalyptus calophylla</i> – <i>Eucalyptus marginata</i> woodlands on sandy clay soils	VU
3c	<i>Eucalyptus calophylla</i> – <i>Xanthorrhoea preissii</i> woodlands and shrublands	CR

### Supergroup 2 – Seasonal Wetlands

7	Herb rich saline shrublands in clay pans	VU
8	Herb rich shrublands in clay pans	VU
9	Dense shrublands on clay flats	VU
10a	Shrublands on dry clay flats	EN
15	Forests and woodlands of deep seasonal wetlands	VU
18	Shrublands on calcareous silts	VU
19	Sedgeland in Holocene dune swales	CR

### Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau

20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	EN
20b	Eastern <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands	EN
20c	Eastern shrublands and woodlands	CR

### Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes

Spearwood Dunes		
26a	<i>Melaleuca huegelii</i> – <i>Melaleuca acerosa</i> shrublands on limestone ridges	EN
Quindalup Dunes		
30a	<i>Callitris preissii</i> and/or <i>Melaleuca lanceolata</i> forests and woodlands	VU

## Restricted floristic community type mosaics

Shrublands and woodlands on Muchea Limestones (Keighery, GJ, and Keighery 1995)		EN
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## Freshwater communities

Communities of Tumulus Springs (Jasinska and Knott 1994, Ahmat 1993)		CR
Stromatolite-like microbialite community of coastal freshwater lakes (Lake Richmond, Moore 1993)		CR
Aquatic root mat community of caves of the Swan Coastal Plain (Jasinska 1997, Jasinska and Knott 1995)		CR





#### Source of Information

English VJ & Blyth J 1997 *Identifying and Conserving Threatened Ecological Communities in the South West Botanical Province*. Project Number N702, Final Report to Environment Australia. Department of Conservation and Land Management, Como, Western Australia.

### **SECTION 3: SPECIFIC SITE DETAIL**

#### **DIRECTORY DESCRIPTORS**

**Landscape Features:** river – limestone cliff, ocean – limestone cliff, limestone ridge, Muchea Limestone, ironstone, tall dune, open water, vegetated wetland, creek, river, estuary, island, vegetated uplands

The appropriate features are listed.

#### **DIRECTORY DESCRIPTORS**

**Vegetation and Flora:** not known, limited survey, detailed survey, not field surveyed (aerial photography interpretation only)

Vegetation and flora information has been collated from survey and many published and unpublished studies. For ease of reference these are listed at the beginning of 'Vegetation and Flora' and repeated as necessary under each of the other headings.

The surveys and published and unpublished studies are categorised under the following headings to give an estimate of the completeness of the survey information:

- not known — area not visited, studies not known
- limited survey — area visited on a limited basis (generally once or twice); principal vegetation units described. (The majority of the survey work to locate floristic study plots falls into this category; all plots are listed by code and study source, see Floristic Community Types)
- detailed survey — multiple visits, the entire area traversed, vegetation generally mapped, flora list prepared
- not field-surveyed (aerial photography interpretation only) — area not visited within the time of the project.

#### Sources of Information

These are too numerous to list. Refer to References.

#### **DIRECTORY DESCRIPTORS**

**Structural Units:** mapping

Descriptions under this section refer to the dominant layer and the dominant species in this layer. If a vegetation map is available for the Site or part of the Site this is referenced. The table below lists the descriptions available for each layer.

# Appendices



## Vegetation Layers

Life Form/ Height Class	Canopy Cover (percentage)			
	100 – 70%	70 – 30%	30 – 10%	10 – 2%
Trees over 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland
Trees 10 — 30m	Closed Forest	Open Forest	Woodland	Open Woodland
Trees under 10m	Low Closed Forest	Low Open Forest	Low Woodland	Low Open Woodland
Tree Mallee Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs over 2m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1 — 2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs under 1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland

## Sources of Information

These are too numerous to list. Refer to References. Diagram and Scale — Keighery BJ 1994 *Bushland Plant Survey. A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc), Nedlands, Western Australia.

## DIRECTORY DESCRIPTORS

### Scattered Native Plants

In some areas of the Bush Forever Site bushland was not present but there were areas of native plants that could provide habitat.

## DIRECTORY DESCRIPTORS

**Vegetation Condition:** % Pristine, Excellent, Very Good, Degraded, Completely Degraded with % Pristine, Excellent, Very Good, Good, Degraded, Completely Degraded with areas of severe localised disturbance.

The degree of change in the vegetation due to land uses is described according to the scale in the table below.

Wherever possible vegetation condition is given as an estimate of the percentage of the bushland area in a range of conditions (Table 12) selected from two categories, for example:

'>75% Excellent to Very Good with <25% Good to Degraded'.

In many bushland areas there are pockets of completely degraded vegetation and these are referred to as 'areas of severe localised disturbance'.

At times there was not sufficient information available from which to determine a range and a single condition has been given.





## Condition Scale

### Pristine

Pristine or nearly so, no obvious signs of disturbance.

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### Excellent

Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.

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### Very Good

Vegetation structure altered, obvious signs of disturbance.

For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

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### Good

Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it.

For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

---

### Degraded

Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.

For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

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### Completely Degraded

The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

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## Sources of Information

These are too numerous to list. Refer to References.

Scale — Keighery BJ 1994 *Bushland Plant Survey. A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc), Nedlands, Western Australia.

## DIRECTORY DESCRIPTORS

**Total Flora:** not known, (estimated), (site generated list only), (estimated % expected flora)

A measure of the native vascular plant flora has been collated from many published and unpublished studies. Survey information additional to the regional surveys is referenced in each case. The sources are categorised according to the level of detail of survey to give an indication of the percentage of the flora the survey recorded.

Categories were:

- not known — area not visited, studies not known to exist
- plot-generated list only — a list extracted from amalgamated floristic study plots
- estimate % — quoted as a percentage of the expected flora, the following ranges were used in most cases: >50%, >75% and >90% expected flora
- estimate — estimate of expected total flora based on knowledge of plant communities in the Site.



## DIRECTORY DESCRIPTORS

**Significant Flora:** none recorded

Significant flora known to occur in each area are listed by name. These names are annotated with codes related to the conservation status of the taxa (plant species, subspecies and varieties). These are:

- R = Declared Rare Flora
- 1 = Priority 1: Poorly Known Taxa
- 2 = Priority 2: Poorly Known Taxa
- 3 = Priority 3: Poorly Known Taxa
- 4 = Priority 4: Rare Taxa

Other taxa with special features are also listed. A list of these significant taxa and the features that distinguish them is found in this Volume. The sources of this information, other than CALM database and regional surveys, are referenced individually.

### Sources of Information

These are too numerous to list. Refer to References.

## DIRECTORY DESCRIPTORS

**Fauna:** no known information Significant mammal species: Quenda (Friend 1996)

Information on the fauna of particular Bush Forever Sites has been collated from Western Australian Museum fauna surveys, Quenda sightings by the public reported to CALM's Quenda Database, bird survey data collected by Birds Australia (previously RAOU) and published and unpublished studies. These studies are referenced in each instance.

The sources are categorised to indicate the scope of the survey, that is, the faunal groups surveyed, the comprehensiveness of the survey and the significance of the particular species recorded for the Site. As survey techniques and the best times for survey vary between faunal groups, the comprehensiveness is related to the group surveyed. The categories are:

### Survey Information

- no known information — compilers of the Directory were not aware of any fauna information on the Site
- scope of survey — birds, mammals, reptiles, amphibians and/or invertebrates

### Comprehensiveness of survey

- single visit — sight records from one visit
- multiple visit — repeated visits, may involve sight records and trapping over several days in one or several years
- structured survey — longer-term study involving multiple visits and permanent traplines; generally involves collection of data on birds, mammals, reptiles, amphibians and/or invertebrates all seasons

### Significant species

- birds — refers to species of conservation significance (Table 15). Four categories:
  - 1 species listed under the *Wildlife Conservation Act 1950*
  - 2 species listed on the JAMBA/CAMBA agreements
  - 3 habitat specialists with a reduced distribution on the Swan Coastal Plain
  - 4 wide-ranging species with reduced populations on the Swan Coastal Plain
- mammals — species that are listed as threatened under the *Wildlife Conservation Act 1950* or those that have few populations on the Swan Coastal Plain





- reptiles and amphibians — species that have reduced ranges or few recent records on the Swan Coastal Plain
- invertebrates — species listed as 'Specially Protected' or 'Priority' fauna are described where locations are known. Most records are allocated to a suburb and not a specific bushland area and so are not included in the Bush Forever Site descriptions.

#### Source of Information

These are generally too numerous to list. Refer to References.

Friend A 1996 CALM Bandicoot survey 1991–1996. Database of Bandicoot sightings reported by the public. Department of Conservation and Land Management, Como, Western Australia.

RAOU (now Birds Australia) 1996 *Database of Western Australian Birds Project (RAOU Tracking Database)*.

Western Australian Museum 1996 *Specimen Records of Mammals, Birds, Reptiles and Amphibians* from specimen Database.

#### DIRECTORY DESCRIPTORS

**Linkage:** no adjacent bushland; bushland canopy creekline linkage to north, south, east, west (Site number/s); part of Greenway [Greenway number(s)] eg 37 (Tingay, Alan & Associates 1998a); part of regionally significant contiguous fragmented potential bushland/wetland linkage (Map 7)

The following standard descriptions are used to describe each Site in relation to the surrounding area:

- no adjacent bushland
- bushland/canopy/creekline linkage to north, south, east, west (Site number(s))
- part of Greenway [Greenway number(s)] e.g. 37 (Tingay, Alan & Associates 1998a)
- part of regionally significant contiguous or regionally significant fragmented or regionally significant potential bushland/wetland linkage (see Map 7).

#### Source of Information

Tingay, Alan & Associates 1998a *A Strategic Plan for Perth's Greenways – Final Report*. Prepared for a series of government agencies and community groups.

#### DIRECTORY DESCRIPTORS

##### Other Special Attributes:

In many cases some section of, or all of, a Bush Forever Site has been recognised as having significance at a regional level by previous studies or identification processes. When known and accessible these are listed in this section. Examples of such studies/processes are:

- Regional and Local Government studies;
- Classification by the National Trust of natural areas or landscapes that meet a series of heritage values. Classified Landscapes are entered onto the Register of the National Trust of Western Australia;
- Natural Areas identified by the interim 'Environmental and Landscape Audits' prepared for the Department of Planning and Urban Development in the early 1990s;
- 'Threatened and Poorly Reserved Plant Communities' identified by the Environmental Protection Authority (1994). This series of bushland areas on the Swan Coastal Plain was considered to be in need of interim protection under the System 6 Update.

# Appendices

## Sources of Information

These are too numerous to list. Refer to References.

## SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

### DIRECTORY DESCRIPTORS

Not listed, Wetlands of International Importance (RAMSAR); Directory of Important Wetlands in Australia; Listed on the Register of the National Estate; Indicative Place of the Register of the National Estate; Interim List of the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

Some Bush Forever Sites are covered by national and/or international policies and agreements. These policies and agreements are listed and described below.

#### Wetlands of International Importance (Ramsar Wetlands)

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat, known as the Ramsar Convention (after the Iranian town of Ramsar where it was adopted in 1971) provides a framework for international cooperation in the conservation and wise use of wetlands. One of the nine RAMSAR sites in WA (Forrestdale and Thomsons Lakes) is in the Perth Metropolitan Region.

#### Source of Information

Environment Australia 1998 *Wetlands listed under the RAMSAR Convention*. Wetlands Unit Ramsar Database, Environment Australia, Canberra, Australian Capital Territory.

#### Directory of Important Wetlands in Australia

The Directory of Important Wetlands in Australia provides the most complete compilation available presently of Australia's nationally important wetlands. The Directory is the result of cooperative work between Federal, State and Territory nature conservation agencies and was compiled to assist in the conservation and wise management of wetlands.

#### Source of Information

Australian Nature Conservation Agency 1996 *A Directory of Important Wetlands in Australia* (Second Edition). ANCA, Canberra, Australian Capital Territory.

#### Register of the National Estate

The Heritage Commission was established by the Commonwealth Government in 1975 with the aim of helping Australians identify and appreciate the National Estate and of promoting the conservation of Aboriginal and Torres Strait Islander places, natural environment places and historical places considered part of the National Estate. The Commission compiles the Register of the National Estate.

#### Source of Information

Australian Heritage Commission 1994.

#### JAMBA and CAMBA Bird Species

Some of the Bush Forever Sites are visited by birds that migrate between the northern and southern hemispheres each year. Conservation of these birds is supported by two international agreements covering these birds and their habitats. These agreements are between the Government of Australia and the governments of Japan and the People's Republic of China, the former being the Japan–Australia Migratory Bird Agreement (JAMBA, signed on 6 February 1974) and the latter the China–Australia Migratory Bird Agreement (CAMBA, signed on 20 October 1986).





#### Sources of Information

See Fauna references.

#### **Commonwealth *Environment Protection and Biodiversity Conservation Act 1999***

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) came into effect on 16 July 2000. The EPBC Act provides protection for matters of National Environmental Significance, these being World Heritage properties, Ramsar wetlands of international importance, nationally threatened animal and plant species and ecological communities, internationally protected migratory species, Commonwealth marine areas and nuclear actions (including uranium mining).

#### Source of Information

Environment Australia (2000)

### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

#### **DIRECTORY DESCRIPTORS**

**Criteria:** Representation of ecological communities, Diversity, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

The criteria used for determining the significance of bushland areas are outlined below:

**REPRESENTATION OF ECOLOGICAL COMMUNITIES:** A number of areas selected to represent the range of ecological communities and the places in which these communities merge.

**DIVERSITY:** Areas with a high diversity of flora and/or fauna species or communities in close association.

**RARITY:** Areas containing rare or threatened communities or species, or species of restricted distribution.

**MAINTAINING ECOLOGICAL PROCESSES OR NATURAL SYSTEMS:** Maintenance of ecological processes or natural systems at a regional or national scale.

**SCIENTIFIC OR EVOLUTIONARY IMPORTANCE:** Areas containing evidence of evolutionary processes either as fossilised material or as relict species and areas containing unusual or important geomorphological or geological sites; Areas of recognised scientific and educational interest as reference sites or as examples of the important environmental processes at work.

**GENERAL CRITERIA FOR THE PROTECTION OF WETLAND, STREAMLINE AND ESTUARINE FRINGING VEGETATION AND COASTAL VEGETATION:** Conservation category wetland areas including fringing vegetation and associated upland vegetation; Coastal vegetation within the accepted coastal management zone.

**CRITERIA NOT RELEVANT TO DETERMINATION OF REGIONAL SIGNIFICANCE, BUT WHICH MAY BE APPLIED WHEN EVALUATING AREAS HAVING SIMILAR VALUES:** Attributes which taken alone do not establish regional significance, but which can add to the value of bushland and enhance its contribution to Bush Forever.



## DIRECTORY DESCRIPTORS

### Recommendation

It is proposed that the protection of bushland and associated wetlands within the Site be addressed through a combination of the following approaches: Proposed Parks and Recreation Reservation; Urban/ Urban Deferred/ Industrial/ Strategic/ Basic Raw Materials Negotiated Planning Solution(s); Rural Complementary/ Cemetery/ Other Government Land/ Local Reserve/ Major Road and Rail Reserve/ Creekline Mechanism(s); and Sites with Some Existing Protection (see Table 3, Volume 1).

Bush Forever Site-specific recommendations are restricted to a limited set of options framed to reflect the circumstances of the Site. Eleven categories (or types) of recommendation are recognised. When several categories apply to an individual Site each area is labelled 'A', 'B' etc.

### Sources of Information

Combination of all previous sources; see Volume 1, Table 3.





## **Bush Forever Site Map (see Map 2)**

Each Bush Forever Site is shown on a map in Bush Forever, Volume 1, Bush Forever Site maps 1– 83. Each map indicates:

### **Bush Forever Site — Boundary and Features**

The Bush Forever Site boundary is drawn to encompass the areas of regionally significant bushland. In a few cases the boundary includes non-bushland areas that are regionally significant habitat for fauna or areas vital to the management of the bushland.

#### **Bush Forever Site Number**

#### **Bush Forever Site Lot Boundaries and No.**

#### **Native Vegetation**

Areas of native vegetation mapped by AGWEST from 1998 aerial photography corrected to account for the curvature of the earth (called orthophotographs). Not all areas of native vegetation are encompassed in Bush Forever Sites.

#### **Regionally Significant Bushland and Implementation Category**

The mapped native vegetation in each Bush Forever Site is coloured according to the relevant implementation category being: Proposed Parks and Recreation Reservation; Urban/ Urban Deferred/ Industrial/ Strategic/ Basic Raw Materials Negotiated Planning Solution(s); Rural Complementary/ Cemetery/ Other Government Land/ Local Reserve/ Major Road and Rail Reserve/ Creekline Mechanism(s); and Sites with Some Existing Protection. See Volume 1, Table 3 for the detail of these approaches. When several categories apply to an individual Site each area is labelled 'A', 'B', etc.

#### **Conservation Category Wetlands**

Areas of wetland in need of recognition and protection because of their natural values.

### **Bush Forever Site — Location Details**

#### **Boundary of Map Sheet**

Maps are drawn at a scale slightly smaller than the Metropolitan Street Directory.

#### **Street Names**

Selected Streets/Roads/Places etc. are named.



## APPENDIX 3: IMPLEMENTATION STATUS OF SYSTEM 6 RECOMMENDATION AREAS WITHIN BUSH FOREVER AND MAP OF SYSTEM 6 AREAS

### KEY TO TABLE

#### System 6 Implementation Status:

**Implemented** – action has been taken that completely achieves each of the part recommendations.

**Intent Being Met** – action has been taken (or is ongoing) which, though it may vary from the specific recommendations, meets the intention of the recommendations.

**Partially Implemented** – refers to a situation where a recommendation has several parts actioned, or refers to several areas of which only some of the areas or actions have been implemented.

**Largely Implemented** – applies where the main objectives and the majority of part recommendations have been achieved.

**Unresolved Issues/Not Implemented** – applies to recommendations where one or more substantive issues remain to be resolved before the recommendations can proceed.

**No Longer Appropriate (N/A)** – situations where the intention of the recommendation is judged to be no longer appropriate. Other actions may have been taken that preclude the recommendation from being implemented, the area may no longer be considered significant, or it may have been specifically exchanged for an equivalent alternative area.

#### Inclusion in Bush Forever:

**Whole** – Whole or most of System 6 area included in Bush Forever.

**Part** – Part area included in Bush Forever.

**Excluded** – Not included in Bush Forever.

**Outside** – Outside the scope of study of Bush Forever (i.e. marine areas or in the Darling Scarp or Plateau).

System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• M1 Two Rocks Open Space</b>					
N/A	1/2	No Regional Park proposal for this area.	Part	284, 397	The majority of M1 is being exchanged for Wilbinga (Part Site 406). Improved conservation outcome.
<b>• M2 Coastal Strip From Two Rocks To Burns Beach</b>					
N/A	0/1	Regional Park no longer proposed.	Part	397, 322, 325	Boundaries extended to include coastal reserves.
<b>• M3 Yanchep National Park</b>					
Largely Implemented	4/5	Realignment of freeway extension.	Whole	288	Boundary altered in region of freeway extension.
<b>• M4 Ridges MPA</b>					
Largely Implemented	2/3	Mining leases need to be resolved before vesting can be changed to National Park.	Whole	381	Boundaries extended to include adjacent State Forest bushland.





System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• M5 Yeal Nature Reserve</b>					
Largely Implemented	4/5	Ongoing liaison between State & Commonwealth in relation to maintenance of bushland on Commonwealth land.	Part	380	Part not included is outside the study area.
<b>• M6 Neerabup National Park</b>					
Partially Implemented	0/3	Land exchanges progressing; No longer recommended for Regional Park.	Whole	383, 323	Boundary altered to exclude Mindarie tip.
<b>• M7 Lakes Joondalup and Goollelal</b>					
Implemented	2/2	Funding for the management of Yellagonga Regional Park made available to CALM for 1997/1998.	Whole	299	Slight adjustments to boundary.
<b>• M8 Wanneroo Wetlands Eastern Chain</b>					
Partially Implemented	1/3	Regional Park not yet established; Parks and Recreation reservation still to be amended for some parts.	Part	382, 147, 324, 295, 193, 327, 448	Some largely cleared lakes not protected in Bush Forever as no longer considered regionally significant; Boundaries altered to exclude developed areas.
<b>• M9 Melaleuca MPA</b>					
Partially Implemented	0/2	CALM management plan required; proposed to become a Nature Reserve.	Whole	399	Boundaries extended to include adjacent bushland.
<b>• M11 Warwick Woodland</b>					
Implemented	1/1		Whole	202	
<b>• M12 Reserve A20091 Marangaroo</b>					
Implemented	1/1	Part of area has been developed for golf course.	Part	328	Boundary altered to exclude golf course.
<b>• M13 Whiteman Park (Mussel Pool)</b>					
Implemented	2/2	Managed by Ministry for Planning as Regional Park.	Whole	304	Slight change to boundaries to reflect Whiteman Regional Park boundary.
<b>• M14 Reserve C1654</b>					
Implemented	2/2	Bullsbrook Nature Reserve.	Whole	292	Boundaries extended to include adjacent bushland.
<b>• M15 Pearce Aerodrome</b>					
Partially Implemented	1/2	Ongoing liaison between State & Commonwealth in relation to maintenance of bushland on Commonwealth land.	Whole	294	Boundaries extended to include adjacent bushland.
<b>• M17 Ellen Brook &amp; Twin Swamps Wildlife Sanctuaries, Upper Swan</b>					
Partially Implemented	0/1	Need for perimeter buffer progressing through the preparation of the Environmental Protection (Western Swamp Tortoise Habitat) Policy.	Whole	400, 301	Boundaries extended to include adjacent bushland.

# Appendices



System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• M19 Swan River – Guildford to Walyunga National Park</b>					
Partially Implemented	0/1	Darling Range portion included in Darling Range Regional Park, funding for management made available to CALM 1999/2000. Remaining areas protected through Swan Canning EPP.	Part	302	Part not included is outside the study area.
<b>• M20 Jane Brook</b>					
Implemented	2/2	Protected through Swan Canning EPP.	Part	302	Fringing vegetation remnants of a lesser condition are not included. These will be protected under the general recommendation for protection of vegetation complexes with less than 10% remaining (see Volume 2, Figure 2).
<b>• M33 Helena River, Guildford to Darlington</b>					
Largely Implemented	1/2	Not planned for inclusion in Regional Park. Protected through Swan Canning EPP.	Whole	215	Not all boundary mapped. Area included for protection includes parks and recreation area.
<b>• M35 Star Swamp, North Beach</b>					
Implemented	3/3		Whole	204	Boundaries extended to include adjacent bushland.
<b>• M36 Reserve near Karrinyup</b>					
Implemented	3/3		Whole	308	Boundaries extended to include adjacent coastal dune bushland.
<b>• M37 Carine Swamps</b>					
Implemented	1/1		Whole	203	
<b>• M38 Careniup Swamp, Gwelup</b>					
N/A	0/2	Degraded, no longer considered regionally significant.	Excluded		
<b>• M39 Lake Gwelup</b>					
Implemented	1/1		Whole	212	
<b>• M40 Dianella Open Space</b>					
Implemented	1/1		Whole	280	
<b>• M41 Bennett Brook</b>					
Largely Implemented	1/2	No longer plans for Regional Park. Protected through Swan Canning EPP.	Whole	305	Boundaries extended to include adjacent bushland.





System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• M42 Jackadder Lake, Woodlands</b>					
Implemented	1/1		Excluded		No longer considered regionally significant.
<b>• M43 Herdsman Lake</b>					
Implemented	2/2	Funding for management of Herdsman Lake Regional Park made available to CALM 1997/1998.	Whole	281	Boundaries altered to follow park boundary
<b>• M44 Swan River, Backwater, South Guildford</b>					
Partially Implemented	1/3	No current plans for Regional Park. Protected through Swan Canning EPP. Management plan being progressed.	Whole	491	
<b>• M45 Hazelmere Lakes</b>					
N/A	0/1	No longer considered regionally significant bushland.	Excluded		No longer considered regionally significant.
<b>• M46 Swanbourne Beach and Rifle Range</b>					
Unresolved Issues	0/5	Small part included in Bold Park Regional Park being managed by the Kings Park & Botanic Garden; Draft management plans completed.	Whole	315	Boundaries extended to include adjacent bushland.
<b>• M47 Bold Park, City Beach</b>					
Implemented	2/2	Largely included in Bold Park Regional Park being managed by the Kings Park & Botanic Garden.	Whole	312	Boundaries extended to include adjacent parkland.
<b>• M48 Lake Claremont</b>					
Implemented	1/1		Whole	220	Boundaries extended to include adjacent parkland.
<b>• M49 Kings Park</b>					
Implemented	1/1		Whole	317	
<b>• M50 Swan Foreshore, Maylands</b>					
Unresolved Issues	0/3	No current plans for Regional Park. Largely reserved for Parks and Recreation. Protected through Swan Canning EPP. Update of management plan still required.	Whole	314	
<b>• M51 Swan River Saltmarshes, Belmont and Maylands</b>					
Unresolved Issues	1/2	No current plans for Regional Park. Protected through Swan Canning EPP.	Whole	313	
<b>• M52 Perth Airport</b>					
Partially Implemented	0/1	MOU signed between Westralia Airports Corporation & State Government. Master plan identifies some bushland for conservation.	Part	386	Excluded areas are proposed for development in airport extensions and commercial developments.

# Appendices



System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• M53 Reserve C29880, Forrestfield</b>					
Partially Implemented	0/2	Part-cleared and developed. MRS amendment progressing.	Part	319,440	Boundaries adjusted to include bushland only.
<b>• M54 Foreshore Reserve, Peppermint Grove</b>					
Unresolved Issues	0/2	Management plan for conservation of threatened community required; No current plans for Regional Park.	Whole	403	
<b>• M55 Buckland Hill, Mosman Park</b>					
Partially Implemented	0/1	Undeveloped portion of the site has been set aside for Public Open Space and is included in proposed Vlamingh Parklands.	Excluded		The area is not considered to be regionally significant bushland.
<b>• M56 Foreshore Reserves, Mosman Park</b>					
Partially Implemented	1/3	Part included in proposed Vlamingh Parklands. Management plan required.	Whole	334	Boundaries extended to exclude cleared areas.
<b>• M57 Minim Cove Foreshore, Mosman Park</b>					
Partially Implemented	1/3	Included in proposed Vlamingh Parklands. Management plan for protection of shell deposits required.	Whole	335	
<b>• M58 Blackwall Reach Foreshore, Bicton</b>					
Largely Implemented	2/3	No current plans for Regional Park.	Whole	331	Boundaries have been adjusted to include surrounding bushland in Parks and Recreation.
<b>• M59 Point Resolution Foreshore, Dalkeith</b>					
Largely Implemented	3/4	No current plans for Regional Park.	Whole	221	
<b>• M60 Aquatic Reserve, South Perth</b>					
Intent Being Met	1/2	Forms part of Swan Estuary Marine Park. Regional Park no longer proposed.	Outside (Estuarine)		
<b>• M61 Aquatic Reserve, Attadale</b>					
Largely Implemented	2/3	No current plans for Regional Park. Part of the Swan Estuary Marine Park.	Part (Estuarine area outside)	331	Boundaries have been adjusted to exclude open water which is managed by CALM as part of the Marine Park.
<b>• M62 Pelican Point, Crawley</b>					
Largely Implemented	3/4	No current plans for Regional Park. Part of Swan Estuary Marine Park.	Part (Estuarine area outside)	402	Boundaries adjusted to exclude open water which is managed by CALM as part of the Marine Park and to include adjacent bushland.





System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• M63 Harry Sandon Park, Attadale</b>					
Largely Implemented	1/2	Management plan required.	Whole	226	Boundaries extended to include adjacent bushland.
<b>• M64 Wireless Hill Park, Ardross</b>					
Implemented	1/1		Whole	336	
<b>• M65 Point Heathcote Foreshore, Applecross</b>					
Unresolved Issues	0/2	No current plans for Regional Park. Management plan required.	Whole	329	
<b>• M66 Mount Henry, Manning</b>					
Largely Implemented	1/2	No current plans for Regional Park.	Whole	227	Boundaries extended to match the management plan (Brooker et al. 1993).
<b>• M67 Canning River Foreshore, Salter Point to Clontarf</b>					
Largely Implemented	2/3	No current plans for Regional Park.	Whole	333	Boundaries extended to include adjacent bushland.
<b>• M68 Canning River, Riverton Bridge to Nicholson Road Bridge</b>					
Implemented	4/4	Funding for Canning River Regional Park made available to CALM for management 1997/1998.	Whole	224	Boundaries extended to include adjacent conservation wetlands.
<b>• M69 Kenwick Swamp</b>					
Partially Implemented	0/3	Mechanisms for providing buffer required. Still owned by UWA, therefore not Class A reserve.	Whole	387	Boundaries extended to include adjacent wetlands and bushland.
<b>• M70 Heathland, Wattle Grove</b>					
N/A	0/0	Cleared, no longer regionally significant.	Excluded		
<b>• M71 Cantonment Hill, Fremantle</b>					
Implemented	1/1		Whole	490	
<b>• M72 Sir Frederick Samson Park, Samson</b>					
Largely Implemented	2/3	Addition of adjacent bushland lots to reserve being progressed by council.	Whole	59	
<b>• M73 Booragoon Lake</b>					
Implemented	1/1		Whole	337	
<b>• M74 Bull Creek</b>					
Partially Implemented	1/4	Negotiation regarding Reserve C32563 and adjoining Vacant Crown Land.	Whole	338	Boundaries adjusted to incorporate wetland in exchange for area of adjacent grassland which now acts as firebreak between bushland and adjacent buildings.
<b>• M75 Upper Canning and Southern Rivers</b>					
Largely Implemented	2/3	No current plans for Regional Park.	Part	246, 224, 255	Part excluded is outside study area.

# Appendices



System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• M76 Mary Carroll Park, Gosnells</b>					
Largely Implemented	4/5	Protection of private property through planning mechanisms.	Whole	124	Boundaries altered to exclude developed area.
<b>• M83 Reserve C2457, Mundijong</b>					
Implemented	1/1		Whole	352	Boundaries extended to include adjacent bushland.
<b>• M88 Land North of Keysbrook</b>					
N/A	0/2	No longer considered regionally significant.	Excluded		
<b>• M90 Quarantine Station and Explosive Magazine Reserve, Woodman Point</b>					
Largely Implemented	4/5	Funding for management of Woodman Point Regional Park made available to CALM 1998/1999.	Whole	341	
<b>• M91 Reserve A24309, Coogee</b>					
Largely Implemented	1/2	Funding for management of Beeliar Regional Park made available to CALM 1997/1998; Local authority requires funding for management plan.	Whole	346	Boundaries extended to include adjacent bushland.
<b>• M92 Cockburn Wetlands, Western Chain</b>					
Implemented	2/2	Funding for Beeliar Regional Park made available to CALM for management 1998/1999.	Whole	247, 435, 429, 261, 346	Boundaries altered to exclude developed areas.
<b>• M93 Cockburn Wetlands, Eastern Chain</b>					
Largely Implemented	2/3	Funding for management of Beeliar Regional Park made available to CALM 1997/1998. Parks and Recreation reservation progressing.	Whole	244, 254, 256, 391, 392, 393	Boundaries altered to exclude developed areas.
<b>• M94 Jandakot Airport</b>					
Partially Implemented	0/1	Master plan identifies significant bushland area for conservation within airport site.	Whole	388	Boundaries extended to include adjacent bushland.
<b>• M95 Forrestdale Lake</b>					
Intent Being Met	0/1	No longer planned for Regional Park; Nature Reserve.	Whole	345	Boundaries extended to include adjacent bushland and wetlands.
<b>• M96 Garden Island</b>					
Implemented	1/1		Whole	63	Boundaries altered to include bushland area only.
<b>• M97 Reserve C36110, Wandi</b>					
Implemented	2/2		Whole	347	Boundaries extended to include adjacent bushland.
<b>• M98 Reserve C31874, Casuarina</b>					
Partially Implemented	1/1	One third of area has been developed as prison; remainder is managed for conservation.	Whole	273	Boundaries adjusted to exclude developed prison area.
<b>• M99 Reserve A25886, West of Byford</b>					
Implemented	1/1		Whole	348	Boundaries extended to include adjacent bushland.

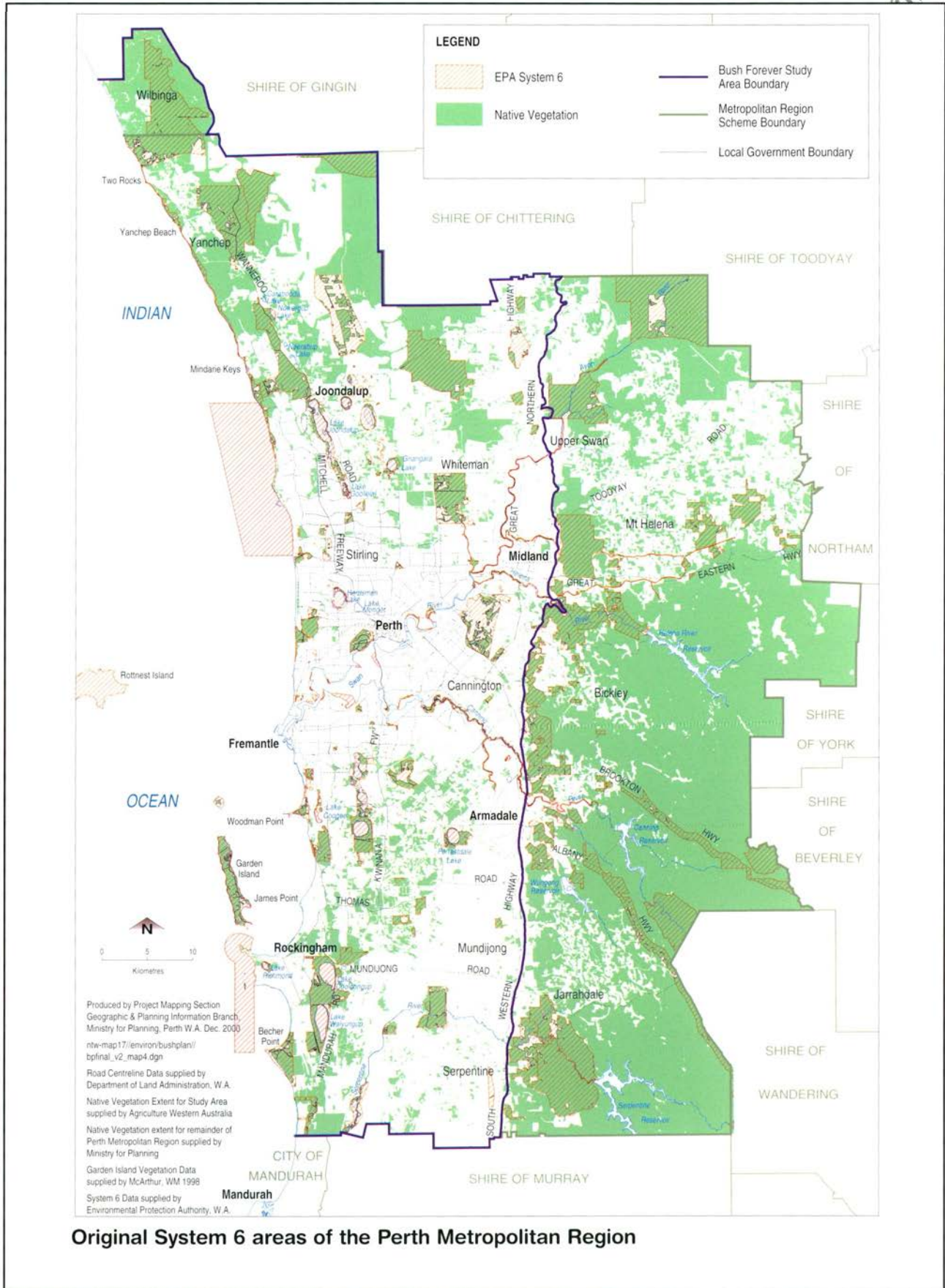




System 6 Implementation Status	Proportion of Recommendations Implemented	System 6 Implementation Comments and Outstanding Issues	Inclusion in Bush Forever	Bush Forever Site Number/s	Comments
<b>• MI00 Reserve C28167, South of Byford</b>					
Implemented	1/1		Whole	353	
<b>• MI01 Cape Peron, Shoalwater Bay and Warnbro Sound</b>					
Implemented	5/5	Regional Park recommendation is no longer appropriate as area is now Shoalwater Islands Marine Park.	Part (Marine area outside)	367	Terrestrial area only.
<b>• MI02 Lake Richmond, Rockingham</b>					
Partially Implemented	1/4	Included in Rockingham Lakes Regional Park. Funding for management made available to CALM 1998.	Whole	358	Boundaries extended to include upland bushland and provide buffer area.
<b>• MI03 Lakes Cooloongup and Walyungup</b>					
Implemented	1/1	Included in Rockingham Lakes Regional Park. Funding for management made available to CALM 1998/1999.	Whole	356	Boundaries adjusted to exclude developed areas and include adjacent bushland.
<b>• MI04 Reserves C31102 and C33581, Leda</b>					
Implemented	3/3	Reserve C33581 now a Nature Reserve.	Whole	349	Boundaries extended to include adjacent bushland north and south.
<b>• MI05 Lowlands Property West of Serpentine</b>					
Largely Implemented	2/3	There is no Regional Park proposal for area. Conservation zoning under Town Planning Scheme.	Whole	368, 371, 372	Boundaries altered to include bushland only.
<b>• MI06 Port Kennedy</b>					
Intent Being Met	2/2	Funding for Rockingham Lakes Regional Park made available to CALM for management 1998; Portion of area set aside for tourism development.	Part	377	Boundaries adjusted to exclude development area.
<b>• MI07 Peelhurst, Singleton and Madora</b>					
Largely Implemented	2/3	Recommendation revised through planning development proposals with greater emphasis on coastal reserve.	Exclude		Degraded. No longer considered regionally significant. Only metropolitan portion within the Project study area.
<b>• MI08 Geogrup Lakes</b>					
Partially Implemented	3/6	Area outside metropolitan area is included in Peel Regional Plan. Reserve purposes still to be amended.	Part	394	Part excluded is outside study area. Otherwise boundary is extended to include adjacent bushland and wetlands.
<b>C46 Carnac Island</b>					
Largely Implemented	2/3	Management plan required.	Whole	473	
<b>• M34 Helena Valley</b>					
Unresolved Issues	1/6	Darling Range portion included in Darling Range Regional Park. Funding for management made available to CALM 1999/2000; Remaining areas protected through Swan-Canning EPP.	Part	215, 213	Part excluded is outside study area.



# Appendices







# Appendices



## APPENDIX 4: BUSH FOREVER SITE INDICES

**THIS APPENDIX CONTAINS TWO INDICES:**

- **Site Number Index** – this lists Bush Forever Sites by Site number.
- **Site Name Index** – this lists Bush Forever Sites alphabetically by Site name.





# Appendices



## SITE NUMBER INDEX

### KEY

Column 1 Bush Forever Site Number

# Indicates more than one Bush Forever Site is covered by the description.

Column 2 Bush Forever Site(s) Name

Column 3 Page Number

Refers to the page number of the Bush Forever Site description in Volume 2.

Column 4 Bush Forever Map Number

Refers to the number of the Bush Forever Site map in Volume 1.

Column 5 System 6

Refers to the System 6 Recommendation number where applicable.

Column 6 Landform Element

Refers to the major landform element on which the Bush Forever Site is located.

### SITE NUMBER INDEX

Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
1#	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	14		Spearwood Dunes
2	North East Ellen Brook Bushland, Bullsbrook	122	17, 24		Foothills/Pinjarra Plain
6	Cooper Road Water Reserve and Adjacent Bushland, Bullsbrook	218	23, 24, 30, 31		Bassendean Dunes
13	Sawpit Road Bushland, Bullsbrook	130	31		Foothills/Pinjarra Plain
22	Egerton Mound Spring and Adjacent Bushland, Ellenbrook	226	31		Bassendean Dunes
23	Cardinal Drive Bushland, Ellenbrook	224	31		Bassendean Dunes
39	Shepherds Bush Reserve, Kingsley	328	34		Spearwood Dunes
42	Toodyay Road Bushland, Red Hill	135	38		Foothills/Pinjarra Plain
43	Cottonwood Crescent, Dianella	341	41		Spearwood Dunes
45	Poison Gully Bushland, High Wycombe	147	49		Foothills/Pinjarra Plain
48	Kensington Bushland, Kensington	240	47		Bassendean Dunes
50	Welshpool Road Bushland, Wattle Grove	158	49		Foothills/Pinjarra Plain
51	White Road Bushland, Orange Grove	162	55		Foothills/Pinjarra Plain
53	Clifford Street Bushland, Maddington	163	55		Foothills/Pinjarra Plain
59	Sir Frederick Samson Park, Samson	351	52	M72	Spearwood Dunes
61	Connell Avenue Bushland, Kelmscott	165	61		Foothills/Pinjarra Plain
62	Bob Blackburn Reserve Bushland, Armadale	166	61		Foothills/Pinjarra Plain
63	Garden Island	393	56, 62, 68	M96	Quindalup Dunes
65	Abernethy Road Bushland, Oakford	169	67		Foothills/Pinjarra Plain
67	Parmelia Avenue Bushland, Parmelia	359	70		Spearwood Dunes
68	Jackson Road Bushland, Peel Estate	178	72		Foothills/Pinjarra Plain
70	Duckpond Bushland, Peel Estate	281	71		Bassendean Dunes
71	Transit Road Bushland, Jarrahdale	182	73		Foothills/Pinjarra Plain
74	Rapids Road Bushland, Peel Estate	186	77		Foothills/Pinjarra Plain





### SITE NUMBER INDEX

Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
75	Churcher Swamp, Baldivis	364	75		Spearwood Dunes
76	Kingsbury Drive Bushland, Keysbrook	189	83	M76	Foothills/Pinjarra Plain
77	Yangedi Swamp, Keysbrook	288	81, 82		Bassendean Dunes
78	Page Road Bushland, Keysbrook	191	83		Foothills/Pinjarra Plain
79	Polinelli Road Bushland, Bullsbrook	100	18		Dandaragan Plateau
80#	Jenkins Road North Bushland, Bullsbrook	100	18		Dandaragan Plateau
81	Wandena Road Bushland, Bullsbrook	121	17		Foothills/Pinjarra Plain
82#	Jenkins Road North Bushland, Bullsbrook	100	18		Dandaragan Plateau
86	Burley Park and Adjacent Bushland, Bullsbrook	103	25		Dandaragan Plateau
87N	Morley Road Bushland, Bullsbrook	101	18		Dandaragan Plateau
87S#	Jenkins Road North Bushland, Bullsbrook	100	18		Dandaragan Plateau
88	Ashton Road Bushland, Bullsbrook	128	25		Foothills/Pinjarra Plain
89	Maroubra Avenue Bushland, Bullsbrook	127	24, 25		Foothills/Pinjarra Plain
94#	State Forest 65 — Pinjar Plantation North Bushland, Yanchep	207	10		Bassendean Dunes
95#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	20		Spearwood Dunes
96#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	21, 22	M8	Bassendean Dunes
97	Kirby Road Bushland, Bullsbrook	214	23, 24		Bassendean Dunes
99#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	21, 22	M8	Bassendean Dunes
100	Neaves Road Creek, Bullsbrook	125	24		Foothills/Pinjarra Plain
101#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
102#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
103#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
104#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	21	M8	Bassendean Dunes
105#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	21	M8	Bassendean Dunes
106#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	21, 22	M8	Bassendean Dunes
107#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
108#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
119	Underwood Avenue Bushland, Shenton Park	345	46		Spearwood Dunes
122	Hawkevale Bushland, High Wycombe	144	43, 49		Foothills/Pinjarra Plain
123	Sultana Road West Bushland, High Wycombe	148	49		Foothills/Pinjarra Plain
124	Mary Carroll Park and Adjacent Bushland, Gosnells	164	55	M76	Foothills/Pinjarra Plain
125	Holmes Street Bushland, Southern River/Huntingdale	258	54, 55, 60, 61		Bassendean Dunes
126#	State Forest 65 — Gngangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
127#	State Forest 65 — Yanchep Plantation Bushland, Yanchep	303	8		Spearwood Dunes

# Appendices



SITE NUMBER INDEX					
Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
128#	State Forest 65 — Yanchep Plantation Bushland, Yanchep	303	8		Spearwood Dunes
129	Bernard Road Bushland, Carabooda	308	13		Spearwood Dunes
130	Link between Yanchep and Neerabup National Parks	309	13		Spearwood Dunes
134#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
135#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
136#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	20		Spearwood Dunes
137#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
139#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
140#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
141#	Numbat Road Bushland, Mariginiup	215	29		Bassendean Dunes
146#	Numbat Road Bushland, Mariginiup	215	29		Bassendean Dunes
147	Mariginiup Lake and Adjacent Bushland, Mariginiup	325	28	M8	Spearwood Dunes
164	Conti Road Bushland, Wanneroo	321	28		Spearwood Dunes
192#	Wetherell Road Bushland, Lexia/Ellenbrook	228	36		Bassendean Dunes
193	Gnangara Lake and Adjacent Bushland, Gnangara/Lexia	227	35	M8	Bassendean Dunes
195#	Wetherell Road Bushland, Lexia/Ellenbrook	228	36		Bassendean Dunes
196	Gnangara Road Bushland, Landsdale/Cullacabardee	229	35		Bassendean Dunes
198	Beechboro Road Bushland, Cullacabardee/Ballajura	231	35, 36		Bassendean Dunes
199	Landsdale Road Bushland, Landsdale	332	35		Spearwood Dunes
200	Caversham Airbase Bushland, West Swan/Whiteman	235	37		Bassendean Dunes
201	Koondoola Regional Bushland	335	35		Spearwood Dunes
202	Warwick Open Space Conservation Area	334	34	M11	Spearwood Dunes
203	Carine Swamps, Carine	338	34, 40	M37	Spearwood Dunes
204	Star Swamp Reserve and Adjacent Bushland, North Beach/Waterman	336	33, 39	M35	Spearwood Dunes
212	Lake Gwelup Reserve, Gwelup	339	40	M39	Spearwood Dunes
213	Bushmead Bushland, Swan	140	43, 44, 50	M34	Foothills/Pinjarra Plain
214	Ashfield Flats, Bassendean/Ashfield	416	42		Estuaries, Rivers & Creeks
215	Helena River; Helena Valley	412	44, 50	M33	Estuaries, Rivers & Creeks
216	Adelaide Crescent Bushland, Helena Valley	142	44		Foothills/Pinjarra Plain
217	Ridge Hill Road Bushland, Gooseberry Hill	145	50		Foothills/Pinjarra Plain
218	Shenton Bushland, Shenton Park	346	46		Spearwood Dunes
220	Lake Claremont, Claremont/Swanbourne	348	45, 46	M48	Spearwood Dunes
221	Point Resolution Reserve, Dalkeith	421	46	M59	Estuaries, Rivers & Creeks
224	Canning River Regional Park and Adjacent Bushland, Riverton to Langford	434	54	M68 M75	Estuaries, Rivers & Creeks
226	Harry Sandon Park, Attadale	350	52	M63	Spearwood Dunes
227	Mount Henry Bushland, Salter Point	431	53	M66	Estuaries, Rivers & Creeks
228	Blue Gum Reserve, Brentwood/Mount Pleasant	240	53		Bassendean Dunes





### SITE NUMBER INDEX

Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
244	North Lake and Bibra Lake, North Lake/Bibra Lake	244	52, 53, 58, 59	M93	Bassendean Dunes
245	Ken Hurst Park, Leeming	252	53		Bassendean Dunes
246	Canning and Southern Rivers, Beckenham to Martin/Kelmscott	436	54, 55, 61	M75	Estuaries, Rivers & Creeks
247	Manning Lake and Adjacent Bushland, Hamilton Hill/Spearwood	352	51, 57, 58	M92	Spearwood Dunes
253	Harrisdale Swamp and Adjacent Bushland, Forrestdale	257	60		Bassendean Dunes
254	South Lake	245	58	M93	Bassendean Dunes
255	Dallen Road Bushland, Southern River/Gosnells	437	61	M75	Estuaries, Rivers & Creeks
256	Yangebup and Little Rush Lakes, Yangebup	246	58, 59	M93	Bassendean Dunes
260	Southern River and Adjoining Bushland, Westfield	438	61		Estuaries, Rivers & Creeks
261	Lake Coogee and Adjacent Bushland, Munster	354	58	M92	Spearwood Dunes
262	Piarra Nature Reserve, Forrestdale	267	60		Bassendean Dunes
263	Banjup Bushland, Banjup	268	59		Bassendean Dunes
264	Lambert Lane Bushland, Wungong	167	67		Foothills/Pinjarra Plain
266	Wungong Brook, Byford	440	67		Estuaries, Rivers & Creeks
267	Mandogalup Road Bushland, Hope Valley	357	64		Spearwood Dunes
268	Mandogalup Road Bushland, Mandogalup	275	64, 65		Bassendean Dunes
269	The Spectacles	276	64, 65		Bassendean Dunes
270	Sandy Lake and Adjacent Bushland, Anketell	277	65		Bassendean Dunes
271#	Cardup Brook Bushland, Cardup/Peel Estate	174	67		Foothills/Pinjarra Plain
272	Sicklemore Road Bushland, Parmelia/Casuarina	358	64, 65, 71		Spearwood Dunes
273	Casuarina Prison Bushland	280	65, 71	M98	Bassendean Dunes
275	Stakehill Swamp, Baldivis	363	75		Spearwood Dunes
277	River, Stakehill and Harvey Roads Bushland, Karnup	187	75, 76		Foothills/Pinjarra Plain
278	Cassia Drive Bushland, Karnup	365	75		Spearwood Dunes
280	Dianella Open Space	237	41	M40	Bassendean Dunes
281	Herdsmen Lake	342	40, 46	M43	Spearwood Dunes
282	Tomah Road Bushland, Wattle Grove	151	49		Foothills/Pinjarra Plain
283	Queens Park Bushland, Queens Park	153	48, 49		Foothills/Pinjarra Plain
284	South-West Link from Wilbinga to Yanchep National Park	301	7	M1	Spearwood Dunes
285#	State Forest 65 — Pinjar Plantation North Bushland, Yanchep	207	10		Bassendean Dunes
286#	State Forest 65 — Pinjar Plantation North Bushland, Yanchep	207	9		Bassendean Dunes
288	Yanchep National Park and Adjacent Bushland	303	7, 8, 13	M3	Spearwood Dunes
289	Ningana Bushland, Yanchep/Eglington	381	12, 13		Quindalup Dunes
290	Hopkins Road Bushland, Nowergup	310	14, 20		Spearwood Dunes
291	Jenkins Road South Bushland, Bullsbrook	102	18, 25		Dandaragan Plateau
292	Bullsbrook Nature Reserve and Adjacent Bushland, Bullsbrook	123	24, 25	M14	Foothills/Pinjarra Plain
293	Shire View Hill and Adjacent Bushland, Nowergup/Neerabup	315	20, 21		Spearwood Dunes
294	Pearce Aerodrome and Adjacent Bushland, Bullsbrook	126	24, 25	M15	Foothills/Pinjarra Plain

# Appendices



SITE NUMBER INDEX					
Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
295	Flynn Drive Bushland, Neerabup	318	21	M8	Spearwood Dunes
296	Ellen Brook, Upper Swan	410	24, 31, 32		Estuaries, Rivers & Creeks
298	Della Road South Bushland, Bullsbrook	129	30, 31		Foothills/Pinjarra Plain
299	Yellagonga Regional Park, Wanneroo/ Woodvale/Kingsley	320	27, 28, 34	M7	Spearwood Dunes
300	Maralla Road Bushland, Ellenbrook/Upper Swan	222	30, 31, 32, 37		Bassendean Dunes
301	Ellenbrook Nature Reserve and Adjacent Bushland, Upper Swan	134	32	M17	Foothills/Pinjarra Plain
302	Swan River and Jane Brook, Ashfield to Upper Swan	411	37, 38, 43	M19 M20	Estuaries, Rivers & Creeks
303	Whitfords Avenue Bushland, Craigie/Padbury	327	33, 34		Spearwood Dunes
304	Whiteman Park, Whiteman/West Swan	232	35, 36, 37, 42	M13	Bassendean Dunes
305	Bennett Brook, Eden Hill to West Swan	413	42, 43	M41	Estuaries, Rivers & Creeks
306	Talbot Road Bushland, Stratton/Swan View	136	44		Foothills/Pinjarra Plain
307	Lightning Swamp and Adjacent Bushland, Noranda	236	41, 42		Bassendean Dunes
308	Trigg Bushland and Adjacent Coastal Reserve, Trigg/Scarborough	387	39, 40	M36	Quindalup Dunes
309	Farrall Road Bushland, Stratton	137	44		Foothills/Pinjarra Plain
310	Floreat Beach Bushland, City Beach/Scarborough	388	39, 45		Quindalup Dunes
311	South Guildford Bushland, Hazelmere	138	43		Foothills/Pinjarra Plain
312	Bold Park and Adjacent Bushland, City Beach	343	45, 46	M47	Spearwood Dunes
313	Swan River Saltmarshes, Bayswater/Maylands	417	48	M51	Estuaries, Rivers & Creeks
314	Swan River Foreshore, Mount Lawley/Maylands	418	47, 48	M50	Estuaries, Rivers & Creeks
315	Swanbourne Bushland, Swanbourne/City Beach	389	45	M46	Quindalup Dunes
316	Maida Vale Reserve and Adjacent Bushland, Maida Vale	146	49, 50		Foothills/Pinjarra Plain
317	Kings Park	347	46, 47	M49	Spearwood Dunes
319	Dundas Road Bushland, Forrestfield	149	49	M53	Foothills/Pinjarra Plain
320	Hartfield Park Bushland, Forrestfield	157	49		Foothills/Pinjarra Plain
321	Brickwood Reserve and Adjacent Bushland, Byford	172	67		Foothills/Pinjarra Plain
322	Burns Beach Bushland	382	26, 27	M2	Quindalup Dunes
323	Link from Burns Beach Bushland to Neerabup National Park	384	27	M6	Quindalup Dunes
324	Jandabup Lake and Adjacent Bushland, Jandabup/ Marigniuip	219	28, 29	M8	Bassendean Dunes
325	Coastal Strip from Burns Beach to Hillarys	385	27, 33	M8	Quindalup Dunes
326	Hawkins Road Bushland, Jandabup/Gnangara	221	29		Bassendean Dunes
327	Badgerup Lake and Adjacent Bushland, Wanneroo	329	28, 29, 34, 35	M8	Spearwood Dunes
328	Decourcey Way Bushland, Marangaroo	331	34	M12	Spearwood Dunes
329	Point Heathcote Foreshore, Applecross	429	47	M65	Estuaries, Rivers & Creeks
331	Blackwall Reach, Point Walter, Alfred Cove and Adjacent Bushland, Bicton to Applecross	427	52	M58	Estuaries, Rivers & Creeks
333	Canning River Foreshore, Salter Point to Wilson	433	53, 54	M67	Estuaries, Rivers & Creeks
334	Chidley Point and Adjacent Bushland, Mosman Park	423	51, 52	M56 M61	Estuaries, Rivers & Creeks
335	Minim Cove, Mosman Park	424	51, 52	M57	Estuaries, Rivers & Creeks
336	Wireless Hill Park, Ardross	350	52	M64	Spearwood Dunes
337	Booragoon Lake, Booragoon	242	53	M73	Bassendean Dunes





**SITE NUMBER INDEX**

Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
338	Yagan Wetland and Adjacent Bushland, Rossmoyne to Bull Creek	430	53	M74	Estuaries, Rivers & Creeks
339	Piney Lake Reserve, Winthrop	243	52, 53		Bassendean Dunes
340	Phoebe Street Bushland, Southern River	261	61		Bassendean Dunes
341	Woodman Point, Coogee/Munster	391	57	M90	Quindalup Dunes
342	Anstey/Keane Dampland and Adjacent Bushland, Forrestdale	269	60		Bassendean Dunes
344	Dennis De Young Reserve and Gibbs Road Swamp Bushland, Banjup/Forrestdale	270	59, 60, 65, 66		Bassendean Dunes
345	Forrestdale Lake and Adjacent Bushland, Forrestdale	272	60, 61, 66	M95	Bassendean Dunes
346	Brownman Swamp, Mt Brown Lake and Adjacent Bushland, Henderson/Naval Base	356	57, 58, 63, 64	M91 M92	Spearwood Dunes
347	Wandi Nature Reserve and Anketell Road Bushland, Wandii/Oakford	273	65, 66	M96	Bassendean Dunes
348	Modong Nature Reserve and Adjacent Bushland, Oakford	278	65, 66	M99	Bassendean Dunes
349	Leda and Adjacent Bushland, Leda	360	64, 70, 71	M104	Spearwood Dunes
350#	Byford to Serpentine Rail/Road Reserves and Adjacent Bushland	170	67, 73		Foothills/Pinjarra Plain
351#	Cardup Brook Bushland, Cardup/Peel Estate	174	67		Foothills/Pinjarra Plain
352	Cardup Nature Reserve and Adjacent Bushland, Cardup	175	67, 73	M83	Foothills/Pinjarra Plain
353	Banksia Road Nature Reserve, Peel Estate	282	71	M100	Bassendean Dunes
354#	Norman Road Bushland, Whitby/Cardup	177	73		Foothills/Pinjarra Plain
355	Point Peron and Adjacent Bushland, Peron/Shoalwater Bay	395	68, 69		Quindalup Dunes
356	Lake Cooloongup, Lake Walyungup and Adjacent Bushland, Hillman to Port Kennedy	400	69, 70, 74, 75	M103	Quindalup Dunes
358	Lake Richmond, Rockingham	396	69	M102	Quindalup Dunes
360	Mundijong and Watkins Roads Bushland, Mundijong/Peel Estate	180	71, 72, 73		Foothills/Pinjarra Plain
361#	Norman Road Bushland, Whitby/Cardup	177	73		Foothills/Pinjarra Plain
362	Roman Road Bushland, Whitby	179	73		Foothills/Pinjarra Plain
365#	Byford to Serpentine Rail/Road Reserves and Adjacent Bushland	170	73, 78		Foothills/Pinjarra Plain
367	Penguin, Seal, Bird and Gull Islands and Shag Rock	398	68	M101	Quindalup Dunes
368	Lowlands Bushland — Eastern Block, Peel Estate	283	72, 76, 77	M105	Bassendean Dunes
369	Doghill Road Bushland, Baldivis	183	71, 76		Foothills/Pinjarra Plain
371	Serpentine River, Peel Estate to Serpentine	441	77, 78	M105	Estuaries, Rivers & Creeks
372	Lowlands Bushland — Western Block (Hymus Swamp), Peel Estate	284	76	M105	Bassendean Dunes
375#	Byford to Serpentine Rail/Road Reserves and Adjacent Bushland	170	78		Foothills/Pinjarra Plain
376	Baldivis Road Bushland, Baldivis	285	75		Bassendean Dunes
377	Port Kennedy	402	74, 79	M106	Quindalup Dunes
378	Henderson Road Bushland, Peel Estate	287	76, 81		Bassendean Dunes
379	Anstey Swamp, Kamup	366	75, 80		Spearwood Dunes
380	Rosella Road Bushland, Bullsbrook	206	9, 10, 11, 15, 16, 21, 22	M5	Bassendean Dunes

# Appendices



SITE NUMBER INDEX					
Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
381	Ridges and Adjacent Bushland, Yanchep/Nowergup	306	8, 9, 13, 14	M4	Spearwood Dunes
382	Lake Pinjar and Adjacent Bushland, Pinjar	209	15, 21	M8	Bassendean Dunes
383	Neerabup National Park, Lake Gnowergup Nature Reserve and Adjacent Bushland, Neerabup	312	19, 20, 27, 28	M6	Spearwood Dunes
384	Neerabup Lake and Adjacent Bushland, Neerabup	314	20	M6	Spearwood Dunes
385	Reid Highway Bushland, Mirrabooka/Malaga	340	35, 41		Spearwood Dunes
386	Perth Airport and Adjacent Bushland	238	43, 48, 49	M52	Bassendean Dunes
387	Greater Brixton Street Wetlands, Kenwick	159	49, 55	M69	Foothills/Pinjarra Plain
388	Jandakot Airport, Jandakot	253	53, 54, 59	M94	Bassendean Dunes
389	Acourt Road Bushland, Banjup	254	59, 60		Bassendean Dunes
390	Fraser Road Bushland, Banjup	265	59, 60		Bassendean Dunes
391	Thomsons Lake Nature Reserve and Adjacent Bushland, Beeliam	248	58, 59	M93	Bassendean Dunes
392	Harry Waring Marsupial Reserve, Wattleup	249	58, 59, 64, 65	M93	Bassendean Dunes
393	Wattleup Lake and Adjacent Bushland, Wattleup/Mandogalup	250	64	M93	Bassendean Dunes
394	Lake Amarillo, Serpentine River and Adjacent Bushland, Karnup	442	80	M108	Estuaries, Rivers & Creeks
395	Paganoni Swamp and Adjacent Bushland, Karnup	367	79, 80		Spearwood Dunes
396	East Link from Wilbinga to Yanchep National Park	302	7, 8		Spearwood Dunes
397	Coastal Strip from Wilbinga to Mindarie	379	6, 7, 12, 13, 19	M1 M2	Quindalup Dunes
398	Chitty Road Bushland, Pinjar	211	21, 22		Bassendean Dunes
399	Melaleuca Park and Adjacent Bushland, Bullsbrook/Lexia	216	22, 23, 29, 30, 31, 36	M9	Bassendean Dunes
400	Twin Swamps Nature Reserve and Adjacent Bushland, Bullsbrook	131	31	M17	Foothills/Pinjarra Plain
401	Bougainvillea Avenue Bushland, Forrestfield	156	49		Foothills/Pinjarra Plain
402	Pelican Point, Crawley	420	46	M62	Estuaries, Rivers & Creeks
403	Peppermint Grove Foreshore	422	45	M54	Estuaries, Rivers & Creeks
406	Wilbinga-Caraban Bushland	378	1, 2, 3, 4, 5, 6, 7, 8		Quindalup Dunes
407	Woodvale Nature Reserve, Woodvale	326	34	M7	Spearwood Dunes
408#	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	14		Spearwood Dunes
409#	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	14		Spearwood Dunes
410#	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	14		Spearwood Dunes
411#	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	14		Spearwood Dunes
412	Walyunga Road Bushland, Bullsbrook	133	32		Foothills/Pinjarra Plain
413	Balannup Lake and Adjacent Bushland, Southern River/Forrestdale	260	60		Bassendean Dunes
414#	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	14		Spearwood Dunes
415#	State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	307	9		Spearwood Dunes





**SITE NUMBER INDEX**

Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
417#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
418	Folly Pool, Baldivis	184	70, 71, 75		Foothills/Pinjarra Plain
419	Maramanup Pool, Baldivis	185	76		Foothills/Pinjarra Plain
422	Kenwick Road Bushland, Kenwick	161	55		Foothills/Pinjarra Plain
424	McDowell Street Bushland, Welshpool	152	48, 49		Foothills/Pinjarra Plain
425#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	15, 21		Spearwood Dunes
426	Myara Brook Bushland, Keysbrook	190	83		Foothills/Pinjarra Plain
427#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
428#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
429#	Market Garden Swamps, Spearwood/Munster	353	58	M92	Spearwood Dunes
432#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
433#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
434#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
435#	Market Garden Swamps, Spearwood/Munster	353	58	M92	Spearwood Dunes
440	Pioneer Park Bushland, Forrestfield	150	49	M53	Foothills/Pinjarra Plain
441#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
442#					
443	Little Coogee Flat, Pinjar	319	21		Spearwood Dunes
444#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
446#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
448#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
449	Oscar Bruns Reserve, Wungong	168	67		Foothills/Pinjarra Plain
450#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
451#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
452#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
455#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
456	Nicholson Road Bushland, Langford/Thornlie	155	54		Foothills/Pinjarra Plain
457#	State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	311	21		Spearwood Dunes
459#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
461#	State Forest 65 — Gnangara Plantation Bushland, Pinjar	208	22	M8	Bassendean Dunes
462	Department of Defence — Muchea Air Weapons Range Bushland, Pinjar	212	22, 23		Bassendean Dunes
463	Starlight Grove Bushland, Gnangara/Wangara	330	35		Spearwood Dunes

# Appendices



SITE NUMBER INDEX					
Site No.	Bush Forever Site(s) Name	Page No.	Map No.	System 6	Landform Element
464	Maison Street Bushland, Southern River	262	61		Bassendean Dunes
465	Passmore Street Bushland, Southern River	263	61		Bassendean Dunes
466	Gooseberry Hill Road Bushland, Gooseberry Hill	143	50		Foothills/Pinjarra Plain
467	Gosnells Golf Course Bushland, Canning Vale	255	60		Bassendean Dunes
468	Serpentine National Park and Adjacent Bushland, Serpentine	188	78		Foothills/Pinjarra Plain
469	Caporn Street Bushland, Mariginiup	322	28		Spearwood Dunes
470	Garden Park Bushland, Wanneroo	323	28		Spearwood Dunes
471	High Road Bushland, Wanneroo	324	28		Spearwood Dunes
472	Canning Vale Prison Bushland	756	60		Bassendean Dunes
473	Carnac Island	392	56	C46	Quindalup Dunes
480	Victoria Road Bushland, Malaga/Beechboro	233	42		Bassendean Dunes
481	Stirling Crescent Bushland, Hazelmere	139	43		Foothills/Pinjarra Plain
490	Cantonment Hill, Fremantle	426	51	M71	Estuaries, Rivers & Creeks
491	Swan River Backwater, South Guildford	415	42, 43	M44	Estuaries, Rivers & Creeks
492	Lyon Road Bushland, Banjup	264	59		Bassendean Dunes
493	Errina Road Bushland, Alexander Heights	333	35		Spearwood Dunes
494	West Flynn Drive Bushland, Carramar	317	21		Spearwood Dunes
495	Baldivis Swamp and Adjacent Bushland	362	75		Spearwood Dunes





# Appendices



## SITE NAME INDEX

### KEY

Column 1 Bush Forever Site(s) Name

Column 2 Bush Forever Site Number

Column 3 Page Number

Refers to the page number of the Bush Forever Site description in Volume 2.

Column 4 Bush Forever Map Number

Refers to the number of the Bush Forever Site map in Volume 1.

Column 5 System 6

Refers to the System 6 Recommendation number where applicable.

Column 6 Landform Element

Refers to the major landform element on which the Bush Forever Site is located.

SITE NAME INDEX					
Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
Abernethy Road Bushland, Oakford	65	169	67		Foothills/Pinjarra Plain
Acourt Road Bushland, Banjup	389	254	59, 60		Bassendean Dunes
Adelaide Crescent Bushland, Helena Valley	216	142	44		Foothills/Pinjarra Plain
Anstey Swamp, Karnup	379	366	75, 80		Spearwood Dunes
Anstey/Keane Dampland and Adjacent Bushland, Forrestdale	342	269	60		Bassendean Dunes
Ashfield Flats, Bassendean/Ashfield	214	416	42		Estuaries, Rivers & Creeks
Ashton Road Bushland, Bullsbrook	88	128	25		Foothills/Pinjarra Plain
Badgerup Lake and Adjacent Bushland, Wanneroo	327	329	28, 29, 34, 35	M8	Spearwood Dunes
Balannup Lake and Adjacent Bushland, Southern River/Forrestdale	413	260	60		Bassendean Dunes
Baldivis Road Bushland, Baldivis	376	285	75		Bassendean Dunes
Baldivis Swamp and Adjacent Bushland	495	362	75		Spearwood Dunes
Banjup Bushland, Banjup	263	268	59		Bassendean Dunes
Banksia Road Nature Reserve, Peel Estate	353	282	71	M100	Bassendean Dunes
Beechboro Road Bushland, Cullacabardee/Ballajura	198	231	35, 36		Bassendean Dunes
Bennett Brook, Eden Hill to West Swan	305	413	42, 43	M41	Estuaries, Rivers & Creeks
Bernard Road Bushland, Carabooda	129	308	13		Spearwood Dunes
Blackwall Reach, Point Walter; Alfred Cove and Adjacent Bushland, Bicton to Applecross	331	427	52	M58	Estuaries, Rivers & Creeks
Blue Gum Reserve, Brentwood/Mount Pleasant	228	240	53		Bassendean Dunes
Bob Blackburn Reserve Bushland, Armadale	62	166	61		Foothills/Pinjarra Plain
Bold Park and Adjacent Bushland, City Beach	312	343	45, 46	M47	Spearwood Dunes
Booragoon Lake, Booragoon	337	242	53	M73	Bassendean Dunes
Bougainvillea Avenue Bushland, Forrestfield	401	156	49		Foothills/Pinjarra Plain
Brickwood Reserve and Adjacent Bushland, Byford	321	172	67		Foothills/Pinjarra Plain





### SITE NAME INDEX

Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
Brownman Swamp, Mt Brown Lake and Adjacent Bushland, Henderson/Naval Base	346	356	57, 58, 63, 64	M91 M92	Spearwood Dunes
Bullsbrook Nature Reserve and Adjacent Bushland, Bullsbrook	292	123	24, 25	M14	Foothills/Pinjarra Plain
Burley Park and Adjacent Bushland, Bullsbrook	86	103	25		Dandaragan Plateau
Burns Beach Bushland	322	382	26, 27	M2	Quindalup Dunes
Bushmead Bushland, Swan	213	140	43, 44, 50	M34	Foothills/Pinjarra Plain
Byford to Serpentine Rail/Road Reserves and Adjacent Bushland	350 365 375	170	67, 73		Foothills/Pinjarra Plain
Canning and Southern Rivers, Beckenham to Martin/Kelmscott	246	436	54, 55, 61	M75	Estuaries, Rivers & Creeks
Canning River Foreshore, Salter Point to Wilson	333	433	53, 54	M67	Estuaries, Rivers & Creeks
Canning River Regional Park and Adjacent Bushland, Riverton to Langford	224	434	54	M68 M75	Estuaries, Rivers & Creeks
Canning Vale Prison Bushland	472	256	60		Bassendean Dunes
Cantonment Hill, Fremantle	490	426	51	M71	Estuaries, Rivers & Creeks
Caporn Street Bushland, Mariginiup	469	322	28		Spearwood Dunes
Cardinal Drive Bushland, Ellenbrook	23	224	31		Bassendean Dunes
Cardup Brook Bushland, Cardup/Peel Estate	271 351	174	67		Foothills/Pinjarra Plain
Cardup Nature Reserve and Adjacent Bushland, Cardup	352	175	67, 73	M83	Foothills/Pinjarra Plain
Carine Swamps, Carine	203	338	34, 40	M37	Spearwood Dunes
Camac Island	473	392	56	C46	Quindalup Dunes
Cassia Drive Bushland, Karnup	278	365	75		Spearwood Dunes
Casuarina Prison Bushland	273	280	65, 71	M98	Bassendean Dunes
Caversham Airbase Bushland, West Swan/Whiteman	200	235	37		Bassendean Dunes
Chidley Point and Adjacent Bushland, Mosman Park	334	423	51, 52	M56 M61	Estuaries, Rivers & Creeks
Chitty Road Bushland, Pinjar	398	211	21, 22		Bassendean Dunes
Churcher Swamp, Baldivis	75	364	75		Spearwood Dunes
Clifford Street Bushland, Maddington	53	163	55		Foothills/Pinjarra Plain
Coastal Strip from Burns Beach to Hillarys	325	385	27, 33	M8	Quindalup Dunes
Coastal Strip from Wilbinga to Mindarie	397	379	6, 7, 12, 13, 19	M1 M2	Quindalup Dunes
Connell Avenue Bushland, Kelmscott	61	165	61		Foothills/Pinjarra Plain
Conti Road Bushland, Wanneroo	164	321	28		Spearwood Dunes
Cooper Road Water Reserve and Adjacent Bushland, Bullsbrook	6	218	23, 24, 30, 31		Bassendean Dunes
Cottonwood Crescent, Dianella	43	341	41		Spearwood Dunes
Dallen Road Bushland, Southern River/Gosnells	255	437	61	M75	Estuaries, Rivers & Creeks
Decourcey Way Bushland, Marangaroo	328	331	34	M12	Spearwood Dunes
Della Road South Bushland, Bullsbrook	298	129	30, 31		Foothills/Pinjarra Plain
Dennis De Young Reserve and Gibbs Road Swamp Bushland, Banjup/Forrestdale	344	270	59, 60, 65, 66		Bassendean Dunes



# Appendices



SITE NAME INDEX					
Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
Department of Defence — Muchea Air Weapons Range Bushland, Pinjar	462	212	22, 23		Bassendean Dunes
Dianella Open Space	280	237	41	M40	Bassendean Dunes
Doghill Road Bushland, Baldivis	369	183	71, 76		Foothills/Pinjarra Plain
Duckpond Bushland, Peel Estate	70	281	71		Bassendean Dunes
Dundas Road Bushland, Forrestfield	319	149	49	M53	Foothills/Pinjarra Plain
East Link from Wilbinga to Yanchep National Park	396	302	7, 8		Spearwood Dunes
Egerton Mound Spring and Adjacent Bushland, Ellenbrook	22	226	31		Bassendean Dunes
Ellen Brook, Upper Swan	296	410	24, 31, 32		Estuaries, Rivers & Creeks
Ellenbrook Nature Reserve and Adjacent Bushland, Upper Swan	301	134	32	M17	Foothills/Pinjarra Plain
Erina Road Bushland, Alexander Heights	493	333	35		Spearwood Dunes
Farrall Road Bushland, Stratton	309	137	44		Foothills/Pinjarra Plain
Floreat Beach Bushland, City Beach/Scarborough	310	388	39, 45		Quindalup Dunes
Flynn Drive Bushland, Neerabup	295	318	21	M8	Spearwood Dunes
Folly Pool, Baldivis	418	184	70, 71, 75		Foothills/Pinjarra Plain
Forrestdale Lake and Adjacent Bushland, Forrestdale	345	272	60, 61, 66	M95	Bassendean Dunes
Fraser Road Bushland, Banjup	390	265	59, 60		Bassendean Dunes
Garden Island	63	393	56, 62, 68	M96	Quindalup Dunes
Garden Park Bushland, Wanneroo	470	323	28		Spearwood Dunes
Gnangara Lake and Adjacent Bushland, Gnangara/Lexia	193	227	35	M8	Bassendean Dunes
Gnangara Road Bushland, Landsdale/Cullacabardee	196	229	35		Bassendean Dunes
Gooseberry Hill Road Bushland, Gooseberry Hill	466	143	50		Foothills/Pinjarra Plain
Gosnells Golf Course Bushland, Canning Vale	467	255	60		Bassendean Dunes
Greater Brixton Street Wetlands, Kenwick	387	159	49, 55	M69	Foothills/Pinjarra Plain
Harrisdale Swamp and Adjacent Bushland, Forrestdale	253	257	60		Bassendean Dunes
Harry Sandon Park, Attadale	226	350	52	M63	Spearwood Dunes
Harry Waring Marsupial Reserve, Wattleup	392	249	58, 59, 64, 65	M93	Bassendean Dunes
Hartfield Park Bushland, Forrestfield	320	157	49		Foothills/Pinjarra Plain
Hawkevale Bushland, High Wycombe	122	144	43, 49		Foothills/Pinjarra Plain
Hawkins Road Bushland, Jandabup/Gnangara	326	221	29		Bassendean Dunes
Helena River, Helena Valley	215	412	44, 50	M33	Estuaries, Rivers & Creeks
Henderson Road Bushland, Peel Estate	378	287	76		Bassendean Dunes
Herdsmen Lake	281	342	40, 46	M43	Spearwood Dunes
High Road Bushland, Wanneroo	471	324	28		Spearwood Dunes
Holmes Street Bushland, Southern River/Huntingdale	125	258	54, 55, 60, 61		Bassendean Dunes
Hopkins Road Bushland, Nowergup	290	310	14, 20		Spearwood Dunes
Jackson Road Bushland, Peel Estate	68	178	72		Foothills/Pinjarra Plain





**SITE NAME INDEX**

Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
Jandabup Lake and Adjacent Bushland, Jandabup/Mariginiup	324	219	28, 29	M8	Bassendean Dunes
Jandakot Airport, Jandakot	388	253	53, 54, 59	M94	Bassendean Dunes
Jenkins Road North Bushland, Bullsbrook	80 82 87S	100	98		Dandaragan Plateau
Jenkins Road South Bushland	291	102	18, 25		Dandaragan Plateau
Ken Hurst Park, Leeming	245	252	53		Bassendean Dunes
Kensington Bushland, Kensington	48	240	47		Bassendean Dunes
Kenwick Road Bushland, Kenwick	422	161	55		Foothills/Pinjarra Plain
Kings Park	317	347	46, 47	M49	Spearwood Dunes
Kingsbury Drive Bushland, Keysbrook	76	189	83	M76	Foothills/Pinjarra Plain
Kirby Road Bushland, Bullsbrook	97	214	23, 24		Bassendean Dunes
Koondoola Regional Bushland	201	335	35		Spearwood Dunes
Lake Amarillo, Serpentine River and Adjacent Bushland, Karnup	394	442	80	M108	Estuaries, Rivers & Creeks
Lake Claremont, Claremont/Swanbourne	220	348	45, 46	M48	Spearwood Dunes
Lake Coogee and Adjacent Bushland, Munster	261	354	58	M92	Spearwood Dunes
Lake Coo loongup, Lake Walyungup and Adjacent Bushland, Hillman to Port Kennedy	356	400	69, 70, 74, 75	M103	Quindalup Dunes
Lake Gwelup Reserve, Gwelup	212	339	40	M39	Spearwood Dunes
Lake Pinjar and Adjacent Bushland, Pinjar	382	209	15, 21	M8	Bassendean Dunes
Lake Richmond, Rockingham	358	396	69	M102	Quindalup Dunes
Lambert Lane Bushland, Wungong	264	167	67		Foothills/Pinjarra Plain
Landsdale Road Bushland, Landsdale	199	332	35		Spearwood Dunes
Leda and Adjacent Bushland, Leda	349	360	64, 70, 71	M104	Spearwood Dunes
Lightning Swamp and Adjacent Bushland, Noranda	307	236	41, 42		Bassendean Dunes
Link between Yanchep and Neerabup National Parks	130	309	13		Spearwood Dunes
Link from Burns Beach Bushland to Neerabup National Park	323	384	27	M6	Quindalup Dunes
Little Coogee Flat, Pinjar	443	319	21		Spearwood Dunes
Lowlands Bushland — Eastern Block, Peel Estate	368	183	72, 76, 77	M105	Bassendean Dunes
Lowlands Bushland — Western Block (Hymus Swamp), Peel Estate	372	284	76	M105	Bassendean Dunes
Lyon Road Bushland, Banjup	492	264	59		Bassendean Dunes
Maida Vale Reserve and Adjacent Bushland, Maida Vale	316	146	49, 50		Foothills/Pinjarra Plain
Mandogalup Road Bushland, Hope Valley	267	357	64		Spearwood Dunes
Mandogalup Road Bushland, Mandogalup	268	275	66		Bassendean Dunes
Manning Lake and Adjacent Bushland, Hamilton Hill/Spearwood Dunes	247	352	51, 57, 58	M92	Spearwood Dunes
Maralla Road Bushland, Ellenbrook/Upper Swan	300	222	30, 31, 32, 37		Bassendean Dunes
Maramanup Pool, Baldvis	419	185	76		Foothills/Pinjarra Plain



# Appendices



SITE NAME INDEX					
Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
Mariginiup Lake and Adjacent Bushland, Mariginiup	147	325	28	M8	Spearwood Dunes
Market Garden Swamps, Spearwood/Munster	429 435	353	58	M92	Spearwood Dunes
Maroubra Avenue Bushland, Bullsbrook	89	127	24, 25		Foothills/Pinjarra Plain
Mary Carroll Park and Adjacent Bushland, Gosnells	124	164	55	M76	Foothills/Pinjarra Plain
Matson Street Bushland, Southern River	464	262	61		Bassendean Dunes
McDowell Street Bushland, Welshpool	424	152	48, 49		Foothills/Pinjarra Plain
Melaleuca Park and Adjacent Bushland, Bullsbrook/Lexia	399	216	22, 23, 29, 30, 31, 36	M19	Bassendean Dunes
Minim Cove, Mosman Park	335	424	51, 52	M57	Estuaries, Rivers & Creeks
Modong Nature Reserve and Adjacent Bushland, Oakford	348	278	65, 66	M99	Bassendean Dunes
Morley Road Bushland, Bullsbrook	87N	101	18		Dandaragan Plateau
Mount Henry Bushland, Salter Point	227	431	53	M66	Estuaries, Rivers & Creeks
Mundijong and Watkins Roads Bushland, Mundijong/Peel Estate	360	180	71, 72, 73		Foothills/Pinjarra Plain
Myara Brook Bushland, Keysbrook	426	190	83		Foothills/Pinjarra Plain
Neaves Road Creek, Bullsbrook	100	125	24		Foothills/Pinjarra Plain
Neerabup Lake and Adjacent Bushland, Neerabup	384	314	20	M6	Spearwood Dunes
Neerabup National Park, Lake Gnowergup Nature Reserve and Adjacent Bushland, Neerabup	383	312	19, 20, 27, 28	M6	Spearwood Dunes
Nicholson Road Bushland, Langford/Thornlie	456	155	54		Foothills/Pinjarra Plain
Ningana Bushland, Yanchep/Eglington	289	381	12, 13		Quindalup Dunes
Norman Road Bushland, Whitby/Cardup	354 361	177	73		Foothills/Pinjarra Plain
North East Ellen Brook Bushland, Bullsbrook	2	122	17, 24		Foothills/Pinjarra Plain
North Lake and Bibra Lake, North Lake/Bibra Lake	244	244	52, 53, 58, 59	M93	Bassendean Dunes
Numbat Road Bushland, Mariginiup	141 146	215	29		Bassendean Dunes
Oscar Bruns Reserve, Wungong	449	168	67		Foothills/Pinjarra Plain
Paganoni Swamp and Adjacent Bushland, Karnup	395	367	79, 80		Spearwood Dunes
Page Road Bushland, Keysbrook	78	191	83		Foothills/Pinjarra Plain
Parmelia Avenue Bushland, Parmelia	67	359	70		Spearwood Dunes
Passmore Street Bushland, Southern River	465	263	61		Bassendean Dunes
Pearce Aerodrome and Adjacent Bushland, Bullsbrook	294	126	24, 25	M15	Foothills/Pinjarra Plain
Pelican Point, Crawley	402	420	46	M62	Estuaries, Rivers & Creeks
Penguin, Seal, Bird and Gull Islands and Shag Rock	367	398	68	M101	Quindalup Dunes
Peppermint Grove Foreshore	403	422	45	M54	Estuaries, Rivers & Creeks
Perth Airport and Adjacent Bushland	386	238	43, 48, 49	M52	Bassendean Dunes
Phoebe Street Bushland, Southern River	340	261	61		Bassendean Dunes
Piarra Nature Reserve, Forrestdale	262	267	60		Bassendean Dunes





**SITE NAME INDEX**

Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
Piney Lake Reserve, Winthrop	339	243	52, 53		Bassendean Dunes
Pioneer Park Bushland, Forrestfield	440	150	49	M53	Foothills/Pinjarra Plain
Point Heathcote Foreshore, Applecross	329	429	47	M65	Estuaries, Rivers & Creeks
Point Peron and Adjacent Bushland, Peron/ Shoalwater Bay	355	395	68, 69		Quindalup Dunes
Point Resolution Reserve, Dalkeith	221	421	46	M59	Estuaries, Rivers & Creeks
Poison Gully Bushland, High Wycombe	45	147	49		Foothills/Pinjarra Plain
Polinelli Road Bushland, Bullsbrook	79	100	18		Dandaragan Plateau
Port Kennedy	377	402	74, 79	M106	Quindalup Dunes
Queens Park Bushland, Queens Park	283	153	48, 49		Foothills/Pinjarra Plain
Rapids Road Bushland, Peel Estate	74	186	77		Foothills/Pinjarra Plain
Reid Highway Bushland, Mirrabooka/Malaga	385	340	35, 41		Spearwood Dunes
Ridge Hill Road Bushland, Gooseberry Hill	217	145	50		Foothills/Pinjarra Plain
Ridges and Adjacent Bushland, Yanchep/ Nowergup	381	306	8, 9, 13, 14	M4	Spearwood Dunes
River, Stakehill and Harvey Roads Bushland, Karnup	277	187	75, 76		Foothills/Pinjarra Plain
Roman Road Bushland, Whitby	362	179	73		Foothills/Pinjarra Plain
Rosella Road Bushland, Bullsbrook	380	206	9, 10, 11, 15, 16, 21, 22	M5	Bassendean Dunes
Sandy Lake and Adjacent Bushland, Anketell	270	277	65		Bassendean Dunes
Sawpit Road Bushland, Bullsbrook	13	130	31		Foothills/Pinjarra Plain
Serpentine National Park and Adjacent Bushland, Serpentine	468	188	78		Foothills/Pinjarra Plain
Serpentine River, Peel Estate to Serpentine	371	441	77, 78	M105	Estuaries, Rivers & Creeks
Shenton Bushland, Shenton Park	218	346	46		Spearwood Dunes
Shepherds Bush Reserve, Kingsley	39	328	34		Spearwood Dunes
Shire View Hill and Adjacent Bushland, Nowergup/Neerabup	293	315	20, 21		Spearwood Dunes
Sicklemore Road Bushland, Parmelia/ Casuarina	272	358	64, 65, 71		Spearwood Dunes
Sir Frederick Samson Park, Samson	59	351	52	M72	Spearwood Dunes
South Guildford Bushland, Hazelmere	311	138	43		Foothills/Pinjarra Plain
South Lake	254	245	58	M93	Bassendean Dunes
Southern River and Adjoining Bushland, Westfield	260	438	61		Estuaries, Rivers & Creeks
South-West Link from Wilbinga to Yanchep National Park	284	301	7	M1	Spearwood Dunes
Stakehill Swamp, Baldivis	275	363	75		Spearwood Dunes
Star Swamp Reserve and Adjacent Bushland, North Beach/Waterman	204	336	33, 39	M35	Spearwood Dunes
Starlight Grove Bushland, Gngangara/Wangara	463	330	35		Spearwood Dunes

# Appendices



SITE NAME INDEX					
Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
State Forest 65 — Gnangara Plantation Bushland, Pinjar	96	208	21, 22	M8	Bassendean Dunes
	99				
	101				
	102				
	103				
	104				
	105				
	106				
	107				
	108				
	126				
	427				
	432				
	433				
	434				
	441				
	442				
	448				
	450				
	452				
459					
461					
State Forest 65 — Pinjar Plantation Central Bushland, Yanchep	1	307	14		Spearwood Dunes
	408				
	409				
	410				
	411				
	414				
	415				
State Forest 65 — Pinjar Plantation North Bushland, Yanchep	94	207	10		Bassendean Dunes
	285				
	286				
State Forest 65 — Pinjar Plantation South Bushland, Nowergup/Yanchep/Neerabup	95	311	20		Spearwood Dunes
	134				
	135				
	136				
	137				
	139				
	140				
	417				
	425				
	428				
	444				
	446				
	451				
	455				
457					
State Forest 65 — Yanchep Plantation Bushland, Yanchep	127	303	8		Spearwood Dunes
	128				
Stirling Crescent Bushland, Hazelmere	481	139	43		Foothills/Pinjarra Plain
Sultana Road West Bushland, High Wycombe	123	148	49		Foothills/Pinjarra Plain
Swan River and Jane Brook, Ashfield to Upper Swan	302	411	37, 38, 43	M19 M20	Estuaries, Rivers & Creeks





**SITE NAME INDEX**

Bush Forever Site(s) Name	Site No.	Page No.	Map No.	System 6	Landform Element
Swan River Backwater, South Guildford	491	415	42, 43	M44	Estuaries, Rivers & Creeks
Swan River Foreshore, Mount Lawley/Maylands	314	418	47, 48	M50	Estuaries, Rivers & Creeks
Swan River Saltmarshes, Bayswater/Maylands	313	417	48	M51	Estuaries, Rivers & Creeks
Swanbourne Bushland, Swanbourne/City Beach	315	389	45	M46	Quindalup Dunes
Talbot Road Bushland, Stratton/Swan View	306	136	44		Foothills/Pinjarra Plain
The Spectacles	269	276	64, 65		Bassendean Dunes
Thomsons Lake Nature Reserve and Adjacent Bushland, Beeliar	391	248	58, 59	M93	Bassendean Dunes
Tomah Road Bushland, Wattle Grove	282	151	49		Foothills/Pinjarra Plain
Toodyay Road Bushland, Red Hill	42	135	38		Foothills/Pinjarra Plain
Transit Road Bushland, Jarrahdale	71	182	73		Foothills/Pinjarra Plain
Trigg Bushland and Adjacent Coastal Reserve, Trigg/Scarborough	308	387	39, 40	M36	Quindalup Dunes
Twin Swamps Nature Reserve and Adjacent Bushland, Bullsbrook	400	131	31	M17	Foothills/Pinjarra Plain
Underwood Avenue Bushland, Shenton Park	119	345	46		Spearwood Dunes
Victoria Road Bushland, Malaga/Beechboro	480	233	42		Bassendean Dunes
Walyunga Road Bushland, Bullsbrook	412	133	32		Foothills/Pinjarra Plain
Wandena Road Bushland, Bullsbrook	81	121	17		Foothills/Pinjarra Plain
Wandi Nature Reserve and Anketell Road Bushland, Wandii/Oakford	347	273	65	M96	Bassendean Dunes
Warwick Open Space Conservation Area	202	334	34	M11	Spearwood Dunes
Wattleup Lake and Adjacent Bushland, Wattleup/Mandogalup	393	250	64	M93	Bassendean Dunes
Welshpool Road Bushland, Wattle Grove	50	158	49		Foothills/Pinjarra Plain
West Flynn Drive Bushland, Carramar	494	317	21		Spearwood Dunes
Wetherell Road Bushland, Lexia/Ellenbrook	192 195	228	36		Bassendean Dunes
White Road Bushland, Orange Grove	51	162	55		Foothills/Pinjarra Plain
Whiteman Park, Whiteman/West Swan	304	232	35, 36, 37, 42	M13	Bassendean Dunes
Whitfords Avenue Bushland, Craigie/Padbury	303	327	33, 34		Spearwood Dunes
Wilbinga-Caraban Bushland	406	378	1, 2, 3, 4, 5, 6, 7, 8		Quindalup Dunes
Wireless Hill Park, Ardross	336	350	52	M64	Spearwood Dunes
Woodman Point, Coogee/Munster	341	391	57	M90	Quindalup Dunes
Woodvale Nature Reserve, Woodvale	407	326	34	M7	Spearwood Dunes
Wungong Brook, Byford	266	440	67		Estuaries, Rivers & Creeks
Yagan Wetland and Adjacent Bushland, Rossmoyne to Bull Creek	338	430	53	M74	Estuaries, Rivers & Creeks
Yanchep National Park and Adjacent Bushland	288	303	7, 8, 13	M3	Spearwood Dunes
Yangebup and Little Rush Lakes, Yangebup	256	246	58, 59	M93	Bassendean Dunes
Yangedi Swamp, Keysbrook	77	288	81, 82		Bassendean Dunes
Yellagonga Regional Park, Wanneroo/Woodvale/Kingsley	299	320	27, 28, 34	M7	Spearwood Dune



