

# Stakehill Swamp, Baldivis

Environmental management plan

December 2010



Department of  
Planning

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## Executive summary

Stakehill Swamp is located 47 kilometres south of the Perth CBD of Perth within the municipal boundary of the City of Rockingham.

The land was proposed to be reserved for parks and recreation in the Metropolitan Region Scheme in 2004. Since that time the land has been progressively acquired as it has become available, with a view to its inclusion in the Rockingham Lakes Regional Park. Following the completion of purchase of all the outstanding private owned land within the reservation, the land will be transferred to the Conservation Commission of WA for management as part of the park.

This management plan has been prepared in accordance with Ministerial Statement 000752 by the Minister for the Environment, published on 11 October 2007 in respect of the environmental assessment and approval of MRS amendment 1050/33 which required the Western Australian Planning Commission (WAPC) to prepare an environmental management plan for Stakehill Swamp.

As the WAPC is the interim manager of the land until such time as the land transfer to the Conservation Commission of WA for DEC management is effected, it is intended that this management plan implements conservation and management initiatives that are consistent with DEC policy and expectations whilst delivering an appropriate level of sustainable recreation opportunities.

Emphasis is placed on the enhancement and protection of the natural values of the area, and the provision of pedestrian and vehicular visitor access through existing and proposed firebreaks, trails and roads. Some areas in the park have been subjected to landfill in the past, and it is proposed that public recreational parklands in two such areas is progressed. Unconfined and indiscriminate pedestrian and vehicular movement throughout the reserve will not be permitted, and parking is proposed to be confined to defined parking areas at key park entry and recreation nodes.

An effective system of firebreaks, upgraded and realigned fencing, trails and visitor amenities consistent with passive recreation are proposed to be created following the completion of the purchase of all outstanding reserved private land.

A progressive program of land rehabilitation and revegetation with indigenous species will be implemented on partially cleared land, in particular adjacent to Jarvis Road and in the northeast of the reserve.

At present there is minimal use of the reserve for recreational purposes as it is still in transition from its historic rural use to parks and recreation. Further land acquisition, consolidation of the reserve and development as region open space with appropriate public amenities should see public visitation increase substantially over time.

At the time of preparation of this plan, approximately 150 ha of the total park area of 201ha had been acquired. Whilst the plan covers the full extent of the Stakehill Swamp parks and recreation reservation, public access to the remaining private lands will not be available until purchase by the government. The owners, will however be encouraged to manage their land in accordance with the proposals contained within this environmental management plan. The most important immediate management priority is fire management and the protection of private residents living within the core of the reservation.



Figure 1: Stakehill Swamp aerial



# A Introduction

## 1 Purpose and status of the management plan

Stakehill Swamp is located to the southeast of the Rockingham City Centre, and is generally bounded by Stakehill Road, Mandurah Road, Sixty Eight Road and Eighty Road. It is situated in close proximity to Lake Cooloongup, which forms part of the Rockingham Lakes Regional Park.

The area was surveyed for rural subdivision in 1923, however the majority of Stakehill Swamp has remained undeveloped since that time.

This environmental management plan for Stakehill Swamp is prepared in recognition that the area provides an important ecological function due to the variety of habitats it supports and their importance to fauna. In particular the Stakehill suite of wetlands has been given a high significance for waterbirds. Stakehill Swamp itself has a variety of habitats including seasonal open water, sedge lands and paperbark forests. The plan seeks to establish a clear vision as to best to develop, manage and protect this important public asset. The swamp is ephemeral in nature but has remained dry in recent years as a result of low rainfall and the lowering of the watertable by groundwater allocations.

Metropolitan Region Scheme (MRS) Amendment 1050/33 was initiated by the then Perth Region Planning Committee (PRPC) at its meeting on 9th December 2003, and proposed to reserve the wetland known as Stakehill Swamp (identified as Conservation category in DEC's Geomorphic Wetlands Swan Coastal Plain dataset), and an appropriate management boundary, as Parks and Recreation.

The then Minister for Planning and Infrastructure and the WAPC identified the intention to include Stakehill Swamp within the boundary of the Rockingham Lakes Regional Park for management by the Conservation Commission of WA. This remains the intention once the WAPC completes the land assembly.

The boundary of the land reserved for Parks and Recreation generally extends to the outer extremity of the existing vegetation, and in some locations includes semi cleared open woodlands. Jarvis Road is included in the reservation for most of its alignment, which serves as the primary access into the reserve.

This interim management plan is prepared to satisfy the following ministerial condition as tabled in assessment 1507 by the Minister for the Environment:

- 2-1 The responsible authority shall prepare an environmental management plan for the land the subject of amendment 1050/33 to meet the objective and requirements set out in schedule 2.
- 2-2 The responsible authority shall implement the environmental management plan the subject of condition 2-1
- 2-3 The responsible authority shall make the environmental management plan the subject of condition 2-1 publicly available.

An environmental management plan shall be prepared in accordance with the specifications set out in the Minister for the Environment's statement that a scheme may be implemented, 000752 published on 11 October 2007, following finalisation of the Metropolitan Region Scheme process and prior to finalisation of the City of Rockingham town planning scheme process to reserve Stakehill Swamp for parks and recreation.

The objective of the environmental management plan is to ensure the protection of the significant values of Stakehill Swamp including wetland, flora, fauna and biodiversity. The environmental management plan shall include:

- fire management
- weed management
- recreation and public access
- groundwater resource management
- fauna
- flora, and
- wetland ecology.

This management plan is intended to be an active working document until such time as Stakehill Swamp is incorporated into the Rockingham Lakes Regional Park for management by the Department of Environment and Conservation (DEC) on behalf of the Conservation Commission of Western Australia (CCWA). The land will be managed in the interim by the WAPC in accordance with this plan until such time as it is transferred to the CCWA. A future review of the Rockingham Lakes Regional Park Management Plan will be prepared by DEC, and will incorporate the Stakehill land. The time frame of a DEC Regional Park management plan is currently set at a term of ten years.

## 2 Regional parks

The concept of regional open space was initially formulated in the Stephenson-Hepburn report of 1955. Regional parks are areas of regional open space identified by the statutory planning process as having outstanding recreation and conservation values. Regional parks provide the opportunity for a coordinated planning strategy by different land management agencies and private land owners.

Regional Parks are an integral component of the Metropolitan Region Scheme (MRS) and are assets that under Government policy come under the control and management of the Conservation Commission of WA, with DEC its management authority.

The State Government is committed to the establishment of regional parks to satisfy the increasing need for the protection of regional conservation and recreation areas in proximity to urban areas, to provide for the recreational demands of expanding urban development and to preserve areas of high landscape amenity.

Eleven (11) regional parks have been created to date within the Perth Metropolitan Area. Three more are proposed, with two of those earmarked for the regions of Peel and Greater Bunbury. Land was reserved from as early as 1962 as parks and recreation in the MRS, acquired as it became

available from private landowners, and amalgamated to form the basis of the regional parks. A period of interim management by the WAPC followed, after which the management of the land owned by the WAPC was progressively transferred to the Crown for vesting in the CCWA for management by DEC. The DEC was also given the responsibility to coordinate the management of parks containing a mix of land tenures managed by different authorities.

### 3 The management plan and community involvement

Following completion, the draft environmental management plan will be submitted to the WAPC for approval to submit the document to the Minister for the Environment to satisfy the environmental conditions imposed on MRS Amendment 1050/33. The plan will then be considered by staff at the Environmental Protection Authority. Following clearance, the WAPC shall release the draft plan for public comment for a period of twelve weeks, after which the responses received will be considered and amendments made for the release of the final management plan.

The WAPC will continue to manage Stakehill Swamp until arrangements are made for DEC to assume responsibility. The Commission will be responsive to community comment, but will not be establishing a formal consultative committee during the term of its active management.

At the time of amalgamation of Stakehill Swamp into the Rockingham Lakes Regional Park for management by DEC, it will become subject to community involvement and consultation under the provisions of the Conservation and Land Management Act (1984). Central to the planning, development and management of the regional parks in the Metropolitan Area is the establishment of community advisory committees for each respective park. These committees oversee and direct the planning, development, conservation and management of the regional parks as administered by staff of DEC on behalf of the CCWA.

The overseeing of the development and management of Stakehill Swamp by the committee is contingent on the land being managed by the CCWA and absorbed into the Rockingham Lakes Regional Park. In the situation where the land reserved for Parks and Recreation has been acquired by the WAPC but not formally transferred to the State for vesting in the CCWA, interim management will be undertaken by WAPC staff in accordance with the recommendations of this plan. Alternatively, section 16 of the Conservation and Land Management Act (1984) allows DEC to manage WAPC land on behalf of the WAPC, with terms and conditions negotiable.

The community advisory committee has a chairperson drawn from the community, and a membership comprising a varied cross section of community, local and state government representatives that act in the public interest for the park.

At the time of the review of the Rockingham Lakes Regional Park management plan, of which Stakehill Swamp is intended to form a part, public submissions will be invited to provide comment on the amended document

## B Principal management directions

### 4 The vision for Stakehill Swamp

The vision for Stakehill Swamp is as follows:

Stakehill Swamp will be managed as a regionally important seasonal wetland system, separate to, but intended to be, included within the Rockingham Lakes Regional Park. Its ecological and recreational attributes will be protected and enhanced by an active management regime.

#### Strategy

**Manage the land with the conservation and enhancement of indigenous vegetation as the primary objective. Investigate and identify opportunities for recreation amenities and activities that are compatible with the conservation and management objectives.**

### 5 Planning history and legislation

In November 1993 the South-West Corridor Structure Plan identified the "horse shoe shaped" Stakehill Swamp, for conservation. The conservation area included land either side of Jarvis Road, which extends up the central 'peninsula' of the subject area. Also in 1993 the WAPC proposed to reserve 173 ha of Stakehill Swamp for 'Parks and Recreation' in the MRS to ensure its protection and management (as part of MRS Amendment 937/33) which flowed from the SW Corridor Structure Plan. The Stakehill Rural Landowners Group (SRLAG) was formed to oppose this amendment and was successful in having this part of the amendment deleted by the then Minister for Planning whilst the landowners developed an alternative proposal.

The portions of Stakehill Swamp were gazetted for protection under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992. The area of the swamp that is covered by the policy is approximately 120ha.

Stakehill Swamp was identified as a Conservation Category Wetland (CCW) in 1996. Ground thruthing in 2001 by the Department of Water (then Water and Rivers Commission) supported the mapped CCW boundary. The CCW covers an area of approximately 180ha.

An environmental investigation of Stakehill Swamp was undertaken by Overall Consulting Biologist Dave Overall for the Ministry for Planning in 1999. The report was commissioned to identify suitable implementation options and protection mechanisms through the public consultation process in accordance with the implementation of Bushplan/Bush Forever site 275, Stakehill Swamp and to identify the concerns and land use aspirations of some individual landowners and SRLAG. At this time the land was zoned rural in the MRS and most of the land surrounding the wetland had been extensively cleared for agriculture. The wetland was once again

proposed for reservation for 'Parks and Recreation' in the MRS. The WAPC did not accept aspects of the Everall plan as it proposed a number of compromises that had the proposed reservation inside the wetland boundary. Instead the WAPC proposed a boundary that included the whole of the mapped wetland but a reduction in the normal buffer width.

MRS amendment 1050/33, in its initial form was assessed by the EPA as 'Scheme Not Assessed-Advice Given' on 17th December 2001. The advice referred to the following factors:

- conservation category wetland
- Bush Forever site 275, and
- Environmental Protection (Swan Coastal Plain Lakes) Policy 1992.

Before the MRS Amendment was released for public comment SRLAG approached the then Minister for Planning and Infrastructure who agreed that the boundary generally proposed under the Everall plan be advertised but gave no guarantee that it would be acceptable to the EPA.

The revised amendment was referred to the EPA in December 2003 and it was determined that it was a significant modification to the 2001 proposal and therefore required formal assessment under Section 48 of the Environmental Protection Act.

MRS amendment 1050/33 became effective on 14th November 2008 and was formally gazetted on 23rd December 2008. The final parks and recreation boundary approved by Parliament substantially reflected the initial MRS 1050/33 proposal.

## 6 Stakehill Swamp management boundary

For the purposes of this environmental management plan, the area available for active management by the WAPC includes the land reserved for parks and recreation in the MRS which has been acquired by the WAPC. Additional land will be included in the management boundary as and when it is purchased from private landowners.

### Strategy

**Actively pursue the completion of acquisition of all the outstanding privately owned land reserved for parks and recreation within the Stakehill management boundary as it becomes available for purchase.**

## 7 Land Tenure

Stakehill Swamp was previously zoned rural in the MRS and was fully owned in fee simple by private landholders. Following a systematic program of acquisition, 23 landholdings, representing an area of 150 ha, have been acquired for parks and recreation as at April 2010. A further nine properties are either under negotiation or

proposed for acquisition. These will be held in fee simple by the WAPC until all land is accumulated, whereupon the land will be amalgamated as one lot and transferred to the State of WA for vesting in the CCWA and management by DEC.

## 8 Interim management

The land reserved for Parks and Recreation at Stakehill Swamp is initially being managed on an interim basis by staff of the Department of Planning on behalf of the WAPC. The current expectation is that WAPC will continue its interim management of the reserved land until most or all of the land has been acquired.

Section 16 of the Conservation and Land Management Act 1984 allows DEC to enter into agreements for the management of private (freehold) land.

Following a decision by Cabinet in June 1997, when the establishment of Regional Parks was adopted as Government policy and responsibility for management of the parks was to be assumed by the then Department for Conservation and Land Management (now DEC), WAPC and CALM agreed to enter into a Section 16 agreement. This formal agreement acts as an interim management arrangement prior to the land being vested in the CCWA or the relevant local government authority. The agreement generally includes all WAPC owned lands, except those leased.

Existing private landowners are under no obligation to sell the whole or portions of their land that has been reserved for Parks and Recreation. This being the case, some time may elapse before all the reserved land at Stakehill is in WAPC ownership and the area is able to be managed as a total and complete entity. The WAPC and DEC welcome the opportunity to work with existing owners to manage their land in recognition of its environmental attributes, and in accordance with the intent of this plan. However this management plan is not binding on private landowners and does not change any existing lawful "non conforming use" rights.

Following the acquisition of most, or all of the remaining privately held land, the WAPC will enter into discussions with DEC with a view to entering into a Section 16 agreement. This will be the precursor to formal land transfer and management of Stakehill Swamp by DEC as part of the Rockingham Lakes Regional Park.

### Strategy

**Implement an active management program administered by the WAPC as an interim measure until more, or all, land is acquired for parks and recreation, and discussions can commence between WAPC and DEC in respect of ongoing management, land transfer and formal incorporation of Stakehill into the Rockingham Lakes Regional Park.**

## 9 Management zones

Management zones are a framework for protecting the park by minimising existing and potential conflicts between users and activities. They provide a broad guide to the uses and management activities appropriate in certain park areas and indicate which management objectives have priority in a given area. A clear zoning scheme also helps to communicate management intentions to the public. Examples of zones in use within DEC administered regional parks include:

- conservation and protection
- natural environment uses
- recreation
- sport and recreation
- special use.

As this plan is written for interim management by staff of the DoP, such zonings are not considered appropriate to be identified at this time, and will be considered and addressed in future by DEC under the provisions of its review process for the Rockingham Lakes Regional Park.

This will however not impede the implementation of capital works consistent with appropriate and well considered conservation and management requirements during interim administration by the WAPC.

## 10 Research

Whilst the WAPC is proposing an interim management regime for Stakehill Swamp, there is a requirement to develop and maintain an understanding of the level of visitor use, type of activities undertaken, and the nature of natural, human and other external influences and processes acting on the environment.

Stakehill Swamp is not currently subject to significant visitor pressure due to its location, low local population densities, emergence as a park resource, and surrounding rural land uses. Its reservation in the MRS will inevitably promote and encourage use of the area for various recreation activities. Accordingly the WAPC intends to undertake monitoring of the community use of the area, with a view to maximising the visitor experience without compromise to its environmental values.

Furthermore, there is a need to monitor the wetland environment and the catchment to assess factors such as receiving water quality, seasonal water levels and salinity for their impact on the reserve.

It is envisaged that this process will be enhanced once the land is absorbed into Rockingham Lakes Regional Park, and DEC assume active management.

# C Conserving the natural environment

## 11 Guiding principles for conserving the natural environment

### a) Conservation and protection of the natural environment

The Stakehill Swamp ecosystem has been degraded to a minor extent due to human presence and adjacent land use practices over the years. The objective going forward is to arrest the decline in environmental and landscape values with a view to maintaining and enhancing the integrity and diversity of natural systems over the long term.

### b) Restoration of the natural environment

Restoration and revegetation of the environment will be undertaken progressively to restore Stakehill Swamp. Areas with high nature conservation significance will be considered priorities for rehabilitation.

### c) Features requiring special protection

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

### d) Consistency of management

DoP land management personnel will apply consistent, holistic and coordinated management policies and practices to Stakehill Swamp whilst under WAPC control.

### e) Recognition of cultural and social values

The WAPC intends, under its term of management, to maintain cultural traditions and places of cultural significance pertaining to Stakehill Swamp, and to provide opportunities for recreation, education and research.

### Strategy

**Apply the above principles as the basis for conserving the natural environment of Stakehill Swamp.**

## 12 Geomorphology, soils and landform

Stakehill Swamp is a "horse shoe shaped" wetland that occupies a total area of 180 ha. The wetland consists of a western arm, a broader eastern arm and a narrow strip of higher ground in between the two.

Stakehill Swamp belongs to the Stakehill suite of wetlands which are a series of local sumplands in inter-dunal swales of the Spearwood dune system. Stakehill swamp is technically described as a sump land type of wetland,



which are seasonally inundated basins which only have water above the ground for part of the year and are dry for the remainder.

The topography of Stakehill Swamp includes a ridgeline to the west (outside the reserve boundary) adjacent to Mandurah Road. This falls away to the east, with the remainder of the site relatively level, with the exception of a small ridge in the south east corner. There are further less dominant ridgelines to the east of the subject land.

The entire area is located within the Spearwood land system. The area of Stakehill Swamp that becomes seasonally inundated consists of yellow to brown siliceous sands. There is an area of filled land (to above original ground levels) that consists of deep, pale sands with yellow-brown subsoils. This area remains above the inundation levels historically achieved during winter.

## 13 The wetland

The Stakehill Suite of wetlands, including Stakehill Swamp, has been identified as providing an important ecological function due to the variety of habitats and their importance to fauna. In particular, the Stakehill Suite has been given a high significance for waterbirds. Stakehill Swamp itself has a variety of habitats including seasonal open water, sedgeland and paperbark forests.

Stakehill Swamp is classified as a sumpland and assigned a Conservation Category in DEC's Geomorphic Wetlands Swan Coastal Plain dataset. It is also identified in Bush Forever as a Conservation Category wetland.

The former Water and Rivers Commission position statement on wetlands (WRC, 1997) provides a general description and management objectives for each of three different management categories for wetlands: Conservation (CCW), Resource Enhancement (REW) and Multiple Use (MU). The wetland classification category is established by the application of EPA Bulletin 686.

Conservation Category Wetlands are wetlands which support high levels of attributes and functions. The management objectives are to preserve wetland attributes and functions through various mechanisms including reservation in national parks, crown reserves, state owned land and protection under environmental protection policies.

In the case of Stakehill Swamp, priority is given to prohibiting public access to the coastal wetland areas, and confine public use to open (cleared) areas and access trails.

## 14 Flora and vegetation

The natural vegetation on the upland areas surrounding Stakehill Swamp has been extensively cleared; however, remnant tuart (*Eucalyptus gomphocephala*), consistent with the Spearwood system, and some marri (*Corymbia calophylla*) and jarrah (*Eucalyptus marginata*) trees remain. Closer to the lake margins some flooded gum (*Eucalyptus rudis*) are in evidence, both as mature specimens and as regrowth.

The western arm of Stakehill Swamp contains a narrow central section of seasonally open water surrounded by sedgeland. The remainder of this location is covered by paperbark (*Melaleuca raphiophylla*) over the understorey sedge of *Lepidosperma longitudinale*.

The vegetation in the northern portion of the swamp contains further forest of paperbark (*Melaleuca raphiophylla*) which extends across the width of the swamp. This occurs in high densities and forms a low closed formation in some areas, while others are more scattered over dense sedgeland of *Lepidosperma tenue*.

The vegetation of the eastern arm of the swamp consists of a large central sedgeland zone consisting of jointed twig rush *Baumea articulata*, *Gahnia trifida*, *Baumea juncea* and isolated stands of *Juncus pallidus*. Paperbark forest mostly surrounds the central sedgeland area.

Acacia saligna is evident as regrowth in the northern and western sections of the swamp in areas previously disturbed by the clearing of paperbarks.

The wetland vegetation associated with Stakehill Swamp generally ranges from very good condition to pristine, with little evidence of stress in the paperbarks or sedges. The perimeter has a large quantity of introduced kikuyu grass (*Pennisetum clandestinum*); however, there is minimal incursion of kikuyu or other weeds into the central wetland itself due to a dense canopy of paperbarks which inhibits the growth of understorey species, the seasonal flooding and the presence of dense sedge communities.

Currently, the Stakehill Swamp wetland area encompasses some 170 ha of remnant vegetation. The MRS amendment resulted in approximately 92% being protected in the Parks and Recreation reservation.

A total of 42 plant species (comprising 28 native and 14 introduced species) were recorded in the general area from a survey undertaken during June 2004 (refer to appendix 2). None of these was DEC listed declared rare flora or priority taxa.

## 15 Weed Management

The invasion of weeds is a major threat to the conservation values of Stakehill Swamp and it is vital that measures be employed to limit or control the degradation processes.

There are a number of reasons for the presence of weeds:

- previous rural land uses such as crops, grazing and horse agistment
- soil disturbance caused by vehicle access
- path, road or drain construction
- wildfire occurrences
- drainage outlets that convey plant and seed matter to the wetland
- indiscriminate organic matter disposal
- invasive species that migrate from domestic gardens.
- increased nutrient loads
- weed seed transport by birds
- spread of recreational grasses planted in designated areas.

Weed infestation in natural areas for the most part, therefore, is the consequence of human land use practices. In the case of Stakehill Swamp, its previous rural zoning, together with resident landowners living in close proximity to the wetland system has created a situation in which exotic species have been able to establish.

As indicated previously, some 14 introduced species have been recorded at Stakehill Swamp, and these are commonly found in many wetland locations on the Swan coastal plain.

In some instances these are originally garden species that have escaped into natural areas, such as pampas grass and asparagus fern. Others, such as olive trees, are garden and plantation species that have become established in the damp, heavier soils that inhabit the wetland.

The introduced grass species, in particular common couch and kikuyu, are well established on the margins of the wetland. However the closed canopy of the paperbark forest and dense sedges have curtailed the intrusion of these into the central wetland.

Planning for weed control at Stakehill Swamp will consider the following:

- recognition of weed potential (invasiveness, distribution and environmental impact);
- the maintenance of weed free areas in the park; and
- control of weeds impacting on particular indigenous species.

## Strategy

### Develop and implement a weed control strategy and implementation plan for Stakehill Swamp.

## 16 Fire Management

The incidence of wildfires are a constant threat to the integrity of region open space. In the case of Stakehill Swamp, its historic pattern of winter inundation and drying out in summer renders it susceptible to fire events at that time.

Wildfires need to be prevented at Stakehill Swamp because they threaten human life, property and assets, and the natural values inherent in the land. Whilst deliberate controlled “cool” burns to reduce fuel loads may be considered, wildfires in wetland environments will prevent the establishment of fringing paperbark vegetation and may result in the outbreak and proliferation of weed species.

Fire prevention works required to minimise the potential for a large and damaging outbreak include the construction and maintenance of firebreaks and access trails in alignments that reflect the likely fire behaviour. The dry north easterly winds and strong south westerly sea breezes of the summer fire prone season, predominantly from December to March predicate the need to create firebreaks aligned generally in a north/south direction, and one in a east west direction with the aim of ‘compartmenting’ the park and providing access for both management and recreation purposes where possible. Jarvis Road acts as a natural firebreak through and separating the wetlands, and will be instrumental as a key access for fire control.



Jarvis Road intersects Stakehill swamp in a north-south alignment.

Further access through the area is provided by the two causeways that extend in an east west direction from adjacent to Jarvis Road through to the western park boundary. The boundary of the swamp in most areas is serviced with wide cleared margins that provide the basis of generous firebreak service. This should be developed into a peripheral management road/firebreak on the Parks and Recreation reservation/ rural zone boundary. The final Parks and Recreation boundary established under MRS Amendment 1050/33 anticipated the introduction of a 10m wide management/fire track outside the existing vegetated wetland boundary as an interface to the adjoining rural properties.

The preparation of a formal fire management plan for Stakehill Swamp will be included in the review of the DEC Rockingham Lakes Regional Park Management Plan. The current fire strategy as applied to the Regional Park will be adopted in due course to include Stakehill Swamp.

### Strategy

**Construct and maintain firebreaks and access trails to provide protection from wildfire occurrences and create access to the susceptible areas of the wetland for fire management purposes.**

## 17 Mosquito and midge control

- Mosquitoes

Wetlands in urban areas often require a management response to mosquito populations. Mosquitoes are present at Stakehill Swamp and may cause nuisance to local residents; they can be a public health risk as some species have the potential to transmit diseases such as Ross River virus.

The Department of Health administers a mosquito control program; however, it is the local authority's responsibility to implement the on-ground control programs.

- Midges

The presence of high midge densities is the result of wetland nutrient enrichment and, therefore, is indicative of disturbed ecosystems and poor water quality. The eutrophication of wetland environments provides conditions that allow midge numbers to proliferate and often adversely affect other invertebrates. There are few natural predators for midges, and the populations increase dramatically as they feed on algal blooms that are the result of nutrient inflows to the wetland.

Midge outbreaks have historically not been a serious problem at Stakehill, principally due to the drying out of the inundated areas during the warmer months. As the area is rural in character, with a corresponding low density of human occupation, outbreaks are experienced by few local residents.

## 18 Native and Introduced Fauna

### a) Native species

The objective for fauna management at Stakehill Swamp is to maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvements in knowledge.

A search of the WA Museum on line database (Faunabase) was undertaken by ATA Environmental during 2004 as part of the Public Environmental Review for the MRS Amendment. This provided a list of potential birds, reptiles, mammals and amphibians that were likely to be present in the general Stakehill area.

Data from Faunabase was supplemented with information from Tyler et al(2000) for frogs, Storr et al (1983,86,1990 and 1999) for reptiles, Johnstone and Storr (1998) for birds and Strahan(1995) for mammals.

A search of the Department of Environment and Conservation's threatened and priority species database was undertaken to identify potential scheduled and threatened species in the region. A search of the Commonwealth Environment Protection and Biodiversity Conservation(EPBC) Act 1999 on-line database was also undertaken.

These information sources were used to prepare lists of species that might be expected to occur at the site, and to use the project area. These may include species recorded in the general region as vagrants or for which suitable habitat is absent.

Bird Species that may occur at Stakehill Swamp are listed in appendix 3. Base on the results of the database searches a total of 135 species of birds may potentially occur at the site.

Amphibian, reptile and mammal species expected to occur at Stakehill Swamp are listed in appendix 4, 5 and 6 respectively.

The regional desktop of the WA Museum database identified 13 species of amphibian, 57 species of reptile and 28 species of mammal( 6 introduced or feral) that may be present at Stakehill Swamp.

### b) Pets and Problem Animals

Problem animals are those species that have the potential to have a serious impact on natural systems through direct effects such as predation, habitat destruction, competition for food and territory, introduction of disease, and environmental degradation; eg, overgrazing.

Problem animals can be either native species that are impacting on natural values or introduced species that have become established as wild or naturalised populations.

Introduced animals such as feral cats, foxes and rabbits all have a detrimental effect on the conservation values of the park. No clear evidence exists at Stakehill Swamp of the presence and influence of these animals.

A large population of western grey kangaroos is in the area. The kangaroo population has swelled in recent years. If there is an increase in the kangaroo population, vegetation within the swamp will be overgrazed, habitat will be destroyed, flora values diminished and natural regrowth and regeneration compromised.

The impact of kangaroos will require monitoring, and a management program implemented if there is clear evidence of significant environmental degradation arising from their presence.

### Strategy

**Enforce the provisions of the *Dog Act*.**

**Monitor the kangaroo population to ensure the sustainability of the environment.**

## 19 Rehabilitation

Environmental degradation is a principal management issue for most, if not all, park systems. Very few can be considered to be in a pristine state, and even those with largely intact vegetation associations and minimal human intrusion are subject to weed species and landscape modification to some extent.

The rehabilitation of degraded areas to sustainable indigenous natural habitats is a difficult and labour intensive exercise, with a limited guarantee of success. Effective weed control should be a consideration, and areas may regenerate naturally as weed competition is reduced or eliminated. Considerable conservation gains can be achieved if a full suite of indigenous canopy and understorey species is used for revegetation.

Where possible, plant stock for rehabilitation should be grown from seed stock sourced from the vegetation associations on the site to be rehabilitated. This ensures that the genetic integrity of the plants on the site is preserved as closely as possible. Where mulching is employed in the program, it should be sourced from vegetative material obtained on site.

Given Stakehill Swamp's rural context, there is less human pressure on the reserve, and landscape amenity expectations will be lower than would reasonably be expected in an urban context. Nevertheless, the swamp has considerable open areas that will benefit from supplementary rehabilitation planting.

Primary species proposed for rehabilitation include:

#### *Canopy*

*Eucalyptus gomphocephala* (tuart)

*Eucalyptus marginata* (jarrah)

*Corymbia calophylla* (marri)

*Melaleuca raphiophylla* (swamp paperbark)

*Melaleuca preissiana*

*Banksia menziesii*

#### *Understorey*

*Acacia saligna* (golden wreath wattle)

*Melaleuca teretifolia*

*Melaleuca lateritia*

*Viminaria juncea*

*Banksia attenuata*

These plants represent the key species proposed for rehabilitation. Low plantings are predominantly sedges and reeds. Canopy tree structure will be required in order to provide the sheltered environments that will assist the regrowth of the low plantings.

### Strategy

**Prepare a landscape rehabilitation plan for Stakehill Swamp, and implement an ongoing seasonal program of revegetation works in accordance with the plan.**

## 20 Landscape aesthetics and amenity

The integrity of the landscape, its regional aesthetic quality and the amenity it provides to the community are key determinants for Stakehill Swamp to be considered as an area worthy of reservation for Parks and Recreation in the MRS.

The management of the landscape amenity is a major consideration in the overall management of the park. The following guidelines provide a practical framework for enhancing and managing the landscape value of the park.

- Alterations to the natural landscape should be subtle, remaining subordinate to natural elements by borrowing extensively from line, form, colour, texture, and scale found commonly in the surrounding landscape.
- Site-specific visual resource factors should be carefully identified and evaluated before any management activities are undertaken.
- Where appropriate, degraded landscapes such as disused access tracks should be rehabilitated or upgraded for multiple use.
- Roads, management tracks and firebreaks should follow the natural landform or land use patterns.
- Prescribed burning operations (if required) should incorporate prescriptions and techniques that minimise the visual and biodiversity impact.
- Where structures are required, they should be sympathetic in design and harmonise with the landscape in terms of colour and materials used. They should be sited away from natural focus points or attractions and be appropriately screened by vegetation and/or landform.

The park is located within the Spearwood land formation and is consistent with the inter dune depressions which exist on the Swan coastal plain within this geomorphic association. Whilst Stakehill Swamp is a seasonally waterlogged sump land that dries out during late spring, summer and autumn, it is typical of the linear interdunal swales that run parallel to the coast in the region.



The depression and its role as a drainage point for the surrounding catchment have generally provided ideal conditions for healthy woodland establishment. This has afforded the evolution and development of a landscape with quality aesthetics and amenity.

### Landscape quality

Generally, there is a direct correlation between the intactness of natural elements (vegetation and landform) and high scenic quality.

Stakehill Swamp's landscape can be described as being in an intact condition in areas that have not been disturbed, and particularly those not in proximity to Jarvis Road. Jarvis Road acts as a north/south cleared alignment through the area and the land adjacent has been subject to land filling, clearing and housing infrastructure development. Surrounding rural land uses including areas of cropping and grazing have also caused some clearing of woodlands, and as a result some deterioration of the landscape integrity on the outer boundaries of the swamp's woodland. This however is mitigated to some extent by its value as firebreak provision. Further clearing or filling of the reserve by private landowners on land remaining in private ownership is unlikely to be approved.

Maintaining or improving the natural and cultural landscapes of Stakehill Swamp is an integral component of the management of the land. Whilst this means the protection of natural areas, in other instances it involves rehabilitating modified and degraded landscapes in the area. View corridors, incorporating the use of low vegetation should also be considered in rehabilitation planning.

## 21 Groundwater and drainage

Stakehill Swamp is an ephemeral wetland; that is, surface water appears and remains in low areas when the superficial aquifer groundwater level breaks the surface. Extensive rainfall and drainage catchment inflows maintain the levels in the swamp during the winter to spring period each year. In a typical winter period with average rains some surface water would be expected to be present from July until at least October each year.

Only a small portion of Stakehill Swamp experiences inundation each year, and the remainder is dry, albeit with the groundwater near the surface, and wetland species are dominant in the landscape as a result.

In order to preserve the quality and quantity of the ground water, no development that will consume large quantities of the superficial aquifer will be permitted.

In addition, no development or activity that has the potential to contaminate the groundwater quality is to be undertaken.

There is the possibility that local and regional drainage could in future be directed into the reserve to maintain shallow open water in the low areas of Stakehill Swamp all year round. This initiative will require further investigation with respect to its feasibility.

## 22 Greenway corridors and links

The purpose of ecological linkages is to connect native areas, preferably with continuous corridors of native vegetation in ways that allow both fauna and flora to move between these areas to access resources and suitable habitat for survival and reproduction.

Greenway corridors create extensions to effective bushland area, increase recreation potential, enhance wildlife movement and are a primary consideration in the planning process and facilitated where possible within the provisions of the MRS. Whilst Stakehill Swamp is earmarked for inclusion in the Rockingham Lakes Regional Park, there is no physical connectivity with other park areas.

Stakehill Swamp is surrounded by rural land uses, including market gardens, horticulture and horse agistment. Whilst some indigenous vegetation structure is in place in the surrounding landscape, conflicting land uses and major transport routes, such as the Ennis Avenue, Mandurah Road and the Perth to Mandurah passenger rail line in close proximity have severed potential greenway corridors to other lands at Warnbro and Port Kennedy.

## D Managing cultural heritage

### 23 Aboriginal cultural heritage

The aboriginal people of the Rockingham/Stakehill area are part of the Nyoongar people. Nyoongar people traditionally lived a nomadic hunter-gatherer lifestyle, and moved through the wetland chain that extends in a north-south linear fashion on the Swan Coastal Plain. The wetlands were recognised as the Waughal Dreaming Trail, with lakes in close proximity to Stakehill, lakes Cooloongup and Walyungup holding special significance as places where the Sea Waughal laid her eggs. Both these names are Nyoongar in origin, with Cooloongup meaning 'place for children' and Walyungup being 'place for adults'.

The Wetlands were important areas for the people as meeting sites and for reliable food sources. The area still holds significance for Aboriginal people, however heritage sites at Stakehill are not yet known to the Department of Indigenous Affairs.

### 24 Non Aboriginal cultural heritage

The first European exploration of the Rockingham area occurred between 1801 and 1804 by a French expedition under Nicolas Baudin, however it is not yet known if the ships crew moved as far inland as Stakehill Swamp on its forays. Whilst there may have been limited agricultural activity at Stakehill during the 1800's the area was formally subdivided for rural land use in 1923, with the lots remaining intact to the present day. Intensive agriculture appears to have been confined to the perimeter of the wetland, with little evidence of activity in the central areas.

### 25 Guiding principles for managing cultural heritage

- Conservation

Stakehill Swamp will be managed in a manner that delivers community benefits by maintaining cultural traditions and attributes. Heritage sites, both indigenous and European, will be identified and be preserved and maintained for their inherent cultural and social values. Impacts from human use and management practices will be minimised in order to maintain heritage values.

- Consistency of management policies

The WAPC, during its tenure, will apply management practices that are consistent with state, national and international heritage legislation, conventions and guidelines.

- Community involvement

The Community will be involved in managing sites of heritage value through the existing DEC administered community advisory committee for Rockingham Lakes Regional Park. Aboriginal people are especially encouraged to be involved and contribute to the management of the park and indigenous heritage interpretation.

- Research and interpretation

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

- Restoration of cultural heritage

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

#### Strategy

**Apply the above principles as required in managing the cultural heritage of the park.**

## E Managing recreation

### 26 Guiding principles for recreation

- Preserving the value of the land

Natural systems (including landscapes, particular sites and biota) should be able to sustain the recreation that is proposed and occurs. Active recreation should be focused in discrete areas that minimise landscape intrusion, modification or destruction. Intensity of use may require control to maintain the integrity and amenity of Stakehill Swamp for the enjoyment of visitors.

- Consistency of recreation with reserve purpose.

The purpose and intent of the reserve needs to be maintained, and not compromised by recreational activity. As the land is proposed for inclusion in the Rockingham Lakes Regional Park, recreation, development and management regimes, consistent with DEC policies for the regional park will be recognised and implemented.

- Equity

A range of activities consistent with a conservation reserve purpose should be allowed in the park. However, uses that negatively affect other forms of acceptable use or jeopardise the safety of visitors should be specifically managed, directed to other more appropriate locations or not permitted.

- Management

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

- Recreation opportunities

Recreation opportunities should be provided for in a local and regional context, thereby providing park visitors with a choice of recreational activities and experiences that enhance the values of the park.

#### Strategy

**Apply the above principles as required in managing recreation in the park.**

### 27 Visitor use

As Stakehill Swamp has only recently been reserved for parks and recreation in the MRS from its previous rural zoning, its potential and use for recreation is yet to be realised. Inclusion within the Rockingham Lakes Regional Park will assist in promoting the area as a conservation and recreation resource. However, due to its location and previous rural land use, the area is unlikely to be in strong demand for recreational use until such time as visitor amenities are provided, and public use is promoted and encouraged.

### 28 Recreation sites and facilities

No formal facilities are in place for recreational purposes at this time, except for access tracks in random locations. It is not possible currently to undertake a circuit walk around the reserve on the existing trails, so the recreational opportunity is yet to be realised.

An off road motor sport track was developed on the eastern flank of Stakehill Swamp. Access to the area has been curtailed following recent fencing works by the WAPC following the recent purchase of the land concerned and the improvements shown in the photo below are to be removed.



The observation deck and amenities room constructed at the informal off-road racing track on the eastern flank of the reserve. These will be removed and the land rehabilitated.



One location in the central wetland has been filled approximately one metre above adjacent ground levels. This area is suitable for development as a local public recreation area.



The existing access trails will be investigated with a view to usage for general pedestrian and management vehicle including FESA and volunteer fire brigade access. Where the alignments are in suitable location for key access around the reserve they will be upgraded for management and public use. The remainder will be ripped and overtime be reclaimed by the reed beds and woodlands as rehabilitation occurs.

Jarvis Road is the primary access road to Stakehill Swamp from Stakehill Road and legally extends to Sixty Eight Road. Jarvis Road provides access to existing dwellings, and an overhead power line but is not constructed nor able to be traversed at its northern end. It may serve a key recreational function in future as the main entry point to the reserve, but should not be extended with a northerly connection to Sixty Eight road.

An area of the reserve in the central region, and west of Jarvis Road has been filled previously to a level one metre above original surface. The cost of removal would be prohibitive, and it may be considered appropriate for the development of this area as a passive park. As the surface is above the flood level, seasonal inundation is unlikely to occur. This proposal will be incorporated into the master plan for Stakehill Swamp.

Another filled area on the eastern flank of the reserve may be developed in a similar manner, and be designated as one of the key pedestrian entry points, visitor parking and recreation nodes within the reserve from Eighty Road.

### Strategy

**Investigate the potential for recreational trails to be created from existing roads through Stakehill Swamp, and consider the potential for public parkland development on land that has been subject to landfill.**

## 29 Park access and circulation

The primary road into Stakehill Swamp is Jarvis Road which is currently in use as access to the remaining dwellings situated off the road. Upon purchase of the remaining private properties and demolition of the houses, the requirement for access will cease, and the general road usage can be reduced accordingly to a parking location with a boom gated or cordoned off management / recreational trail. Jarvis Road can be legally closed north of the car park proposed for Lot 112 (Fig. XX)

In addition to Jarvis Road, there is a sand access road off Sixty Eight road in the north east corner of the reserve, with a locked gate providing entry. Movement from there is available through cleared pasture down the eastern flank as far as a local road off Eighty Road, which is currently on the limit of WAPC ownership.

To the west, two raised causeways cross in an east/west direction through low samphire swampland. The southern causeway transits the landfill site, with both terminating near the western boundary of the reserve. Historically the rural lots extended between Mandurah Road and Jarvis Road. The internal causeways were established by owners across the western arm of the wetland to access cleared grazing land on the part of their property fronting Jarvis



One of the two raised causeways through the wetland on the western flank.



Jarvis Road closure gate, management vehicle access only from this point to the north of the reserve.

Road from residences located on the high dunal ridge adjacent to Mandurah Road. The southern causeway was also used as a "shortcut" by Stakehill Swamp residents to Mandurah Road.

There is limited peripheral access around the outer reserve boundary of Stakehill Swamp. Access is available in the northeast, southwest and central north to south adjacent to Jarvis Road, however linkages to other trails is poor. When fully consolidated a management/ fire/access track will be established around the perimeter of the Parks and Recreation reserve.



### 30 Signage

As Stakehill Swamp is under a progressive acquisition program with the objective of amalgamating all land within the reservation, no signage or public information is currently in place. A basic level of directional signage for vehicle users and pedestrians will be installed on trails and in parking areas. When all the reserved land is acquired and amalgamated, and progress is made towards its inclusion in the Rockingham Lakes Regional Park, appropriate signage that conforms to that in use within the regional park will be deployed for use at Stakehill Swamp. Such signage will indicate the following.

- 1) General interpretive information on the history, landform, flora and fauna of the reserve.
- 2) Directional/promotional signage to indicate site features and their locations.
- 3) Permitted and prohibited activities.
- 4) Permitted and prohibited locations for public access.

## F Community involvement and consultation

### 31 Guiding principles for working with the community

- Community participation

The WAPC encourages the community to provide input to the planning and management of Stakehill Swamp. Participation is to be centred on ensuring a shared understanding (with stakeholders) of objectives, responsibilities, behaviour and expected outcomes. Participation will provide opportunities for input, representation and joint learning for relevant stakeholders.

- Information exchange

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

- Outcomes and decision-making

The outcomes of public participation form part of the decision-making process. Participants should be informed as to how their involvement affected the WAPC decisions.

- Management objectives

The community will be encouraged to contribute to the achievement of nature conservation and recreation objectives outlined in this plan and in the future under DEC management. This will assist in building community awareness, understanding of and commitment to these objectives.

- Education and interpretation

Education and interpretation will be aimed at giving visitors a take-home message that will create awareness of Stakehill Swamp's values and management issues, encourage community involvement and positively influence visitor behaviour.

### 32 Community involvement

The Rockingham Lakes Regional Park Community Advisory Committee, administered by DEC provides a forum at which issues affecting the park are discussed. The committee, established in 1999 consists of community members and representatives from DEC and the City of Rockingham. At the time of formal inclusion within the Rockingham Lakes Regional Park, Stakehill swamp will commence being overseen by the Committee.

Until that time WAPC will manage the park in consultation with DEC staff and the City of Rockingham in respect of development and management outcomes during its term of administration. Individuals (particularly landowners owning land within the Swamp or on its perimeter) and stakeholder groups will be able to discuss any park issues directly with DoP management staff on a day to day basis.

### **33 Information, interpretation and education**

An effective communication program is essential to achieve the objectives of this plan. It informs the public of attractions, facilities and recreation opportunities available within the park and provides an avenue to promote an appreciation and greater understanding of the local natural environment.

In the interim, signage and general visitor information will be as advised in section 28. When the park is included in the Rockingham Lakes Regional Park general, interpretation and education information will be conveyed in the DEC Rockingham Lakes Regional Park promotional brochures and management plan.

## **G Implementing and evaluating the plan**

### **34 Priorities, funding and staff**

Stakehill Swamp is being progressively acquired on a lot by lot basis as and when the current owners wish to sell, or in response to claims for compensation for the reservation of their land.

The management of all land currently in WAPC ownership is undertaken by field officers within the Property Management Services branch of the DoP. The staff engage private contractors and community land care groups for the provision of primary management services such as weed control, mowing and slashing, fencing and firebreak construction and maintenance. There is close supervision of the reserve for unauthorised access and damage.

Funds for the planning, acquisition of land and interim management are sourced from the Metropolitan Region Improvement Fund. Additional capital funding will be required to implement basic park infrastructure. The land will be transferred in fee simple to the State of WA for creation as a Crown reserve with vesting in the CCWA for management by DEC with funding continuing at that stage from the Consolidated Account budget allocations provided to DEC.

### **35 Term of this plan**

This plan is intended to satisfy the ministerial conditions pertaining to MRS amendment 1050/33. It will remain active in its current form until Stakehill Swamp is amalgamated as proposed with the current Rockingham Lakes Regional Park. An addendum to, or review of, the DEC management plan will be prepared with Stakehill Swamp incorporated into the plan.

The Rockingham Lakes Regional Park Management Plan is a recent release (2010), and with DEC management plans having a statutory term of ten years before being updated, it may be that Stakehill Swamp does not come under the umbrella of the RLRP management plan until a future review is undertaken. Accordingly, no defined term is declared for this plan.

### **36 References and bibliography**

Department of Environment and Conservation (2009) Rockingham Lakes Regional Park proposed final management plan.

Metropolitan Region Scheme Amendment 1050/33 Stakehill Swamp Baldivis Environmental Review (October 2004) ATA Environmental, Western Australian Planning Commission.

Metropolitan Region Scheme Amendment 1050/33 Stakehill Swamp Baldivis - Report on submissions (February 2008) Western Australian Planning Commission.

# Maps







Figure 1: Stakehill Swamp aerial

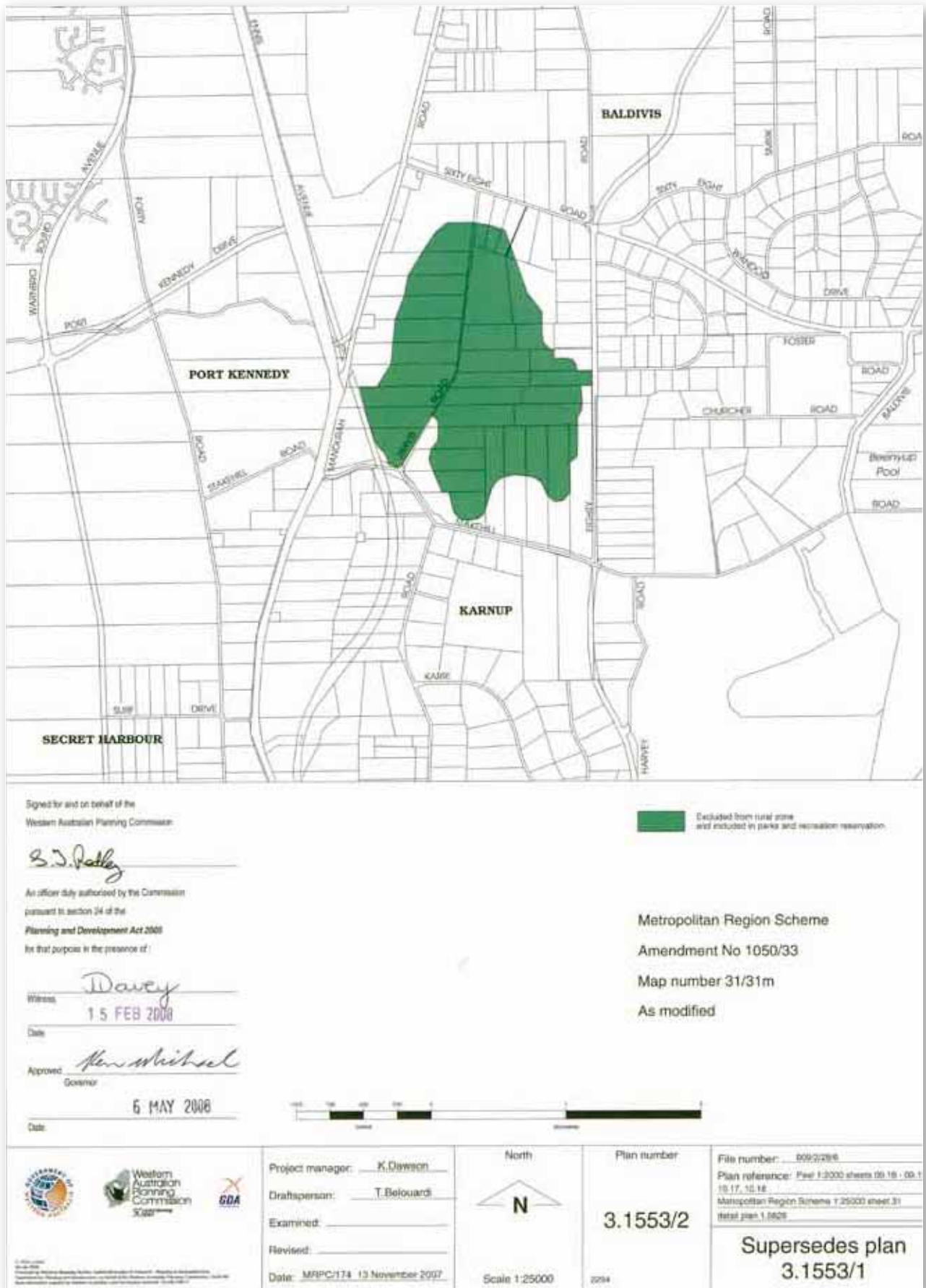


Figure 2: Metropolitan Region Scheme amendment 1050/33 plan



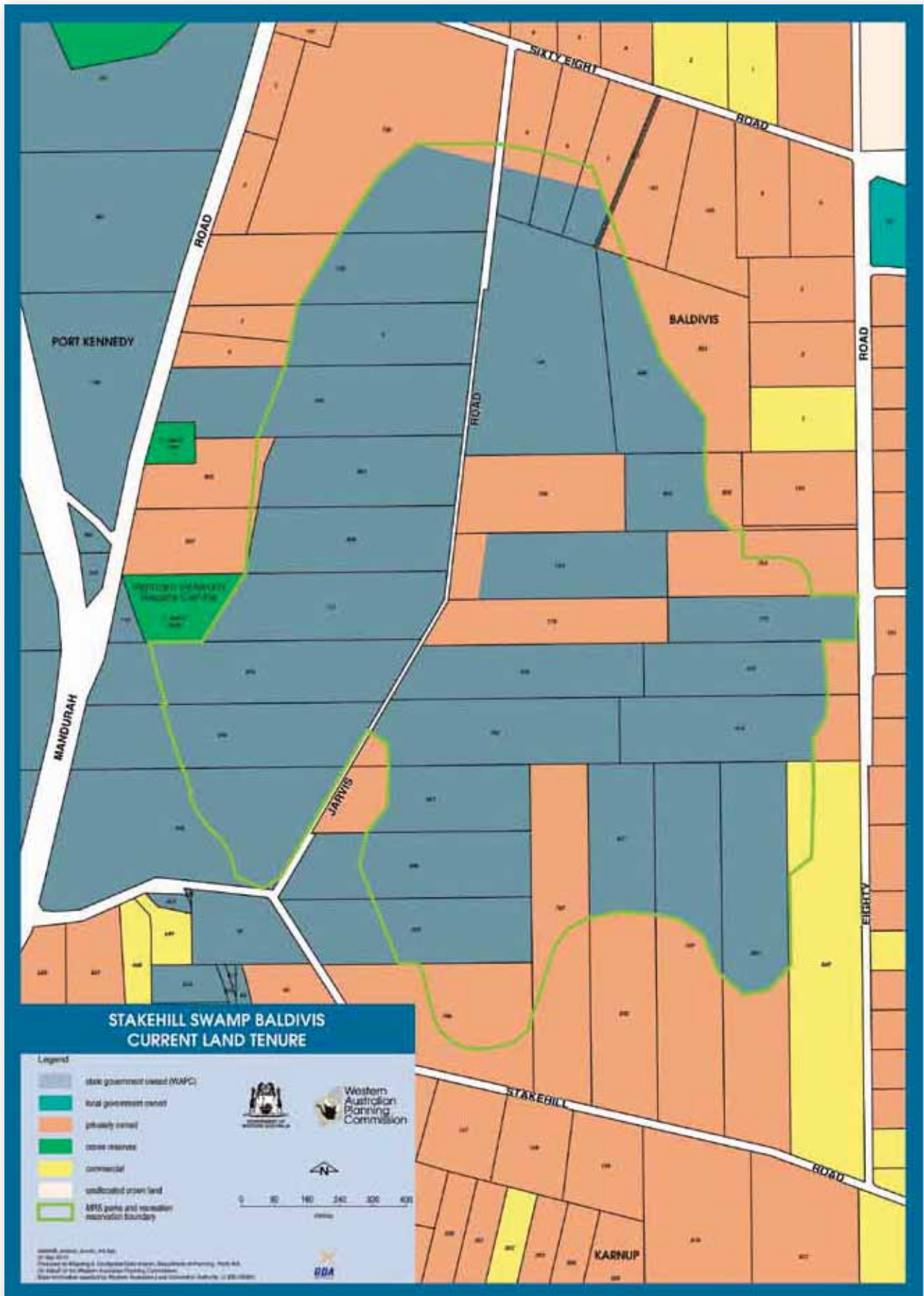


Figure 3: Current ownership (at time of publishing)





Figure 4: Landscape development and management masterplan

# Appendices





# **APPENDIX 1**

## **SCHEDULE 8**

**MINISTER FOR ENVIRONMENT'S STATEMENT  
AND  
ENVIRONMENTAL CONDITIONS STATEMENT NO. 000752**



Minister for the Environment; Climate Change; Peel

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Statement No.

000752

**STATEMENT THAT A SCHEME MAY BE IMPLEMENTED  
(PURSUANT TO THE PROVISIONS OF DIVISION 3 OF PART IV OF THE  
ENVIRONMENTAL PROTECTION ACT 1986)**

**METROPOLITAN REGION SCHEME AMENDMENT No. 1050/33  
STAKEHILL SWAMP, BALDIVIS**

- Scheme Purpose:**
- (a) to reserve approximately 201 hectares of the subject land as shown shaded in Figure 1 from the 'Rural' Zone to the 'Parks and Recreation' Reservation; and
  - (b) to amend the Scheme maps accordingly.

**Responsible Authority:** Western Australian Planning Commission

**Responsible Authority Address:** 469 Wellington Street, PERTH WA 6000

**Assessment Number:** 1507

**Report of the Environmental Protection Authority:** Bulletin 1197

Subject to the following conditions, there is no known environmental reason why the amendment to the Metropolitan Region Scheme to which Bulletin 1197, the Report of the Environmental Protection Authority relates should not be implemented:

**1 Proposal implementation**

- 1-1 The Responsible Authority shall implement the proposal as documented and described in schedule 1 and Figure 1 of this statement subject to the conditions and procedures of this statement.

**2 Environmental Management Plan**

- 2-1 The Responsible Authority shall prepare an Environmental Management Plan for the land the subject of Amendment 1050/33 to meet the objective and requirements as set out in schedule 2.

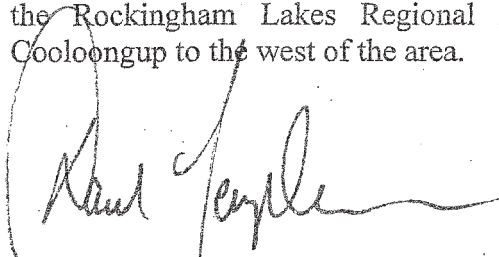
Published

11 OCT 2007

- 2-2 The Responsible Authority shall implement the Environmental Management Plan the subject of condition 2-1.
- 2-3 The Responsible Authority shall make the Environmental Management Plan the subject of condition 2-1 publicly available.

NOTES

1. The City of Rockingham is currently carrying out a planning study in the area surrounding Stakehill Swamp, and this study would likely lead to adequate controls on private land adjacent to Stakehill Swamp provided that study and subsequent planning response is based on the advice in the EPA report.
2. The WAPC has committed to include in this Reserve at a later time, land which would provide an ecological link for the Stakehill Swamp Reserve to the section of the Rockingham Lakes Regional Park that covers Lakes Walyungup and Cooalongup to the west of the area.



David Templeman M.L.A.  
MINISTER FOR THE ENVIRONMENT; CLIMATE CHANGE; PEEL

11 OCT 2007



## SCHEDULE 1

### METROPOLITAN REGION SCHEME AMENDMENT No. 1050/33 STAKEHILL SWAMP, BALDIVIS

Metropolitan Region Scheme Amendment No. 1050/33, as modified by the Western Australian Planning Commission and through the Minister's appeal determinations, proposes to reserve approximately 201 hectares of Stakehill Swamp for *Parks and Recreation*. The area is currently zoned *Rural* and many of the lots are in private ownership. The proposed Reserve is shown on Figure 1 (attached). Lot locations are shown on Figure 2 (attached).

Land proposed for *Parks and Recreation* is reserved in view of its regional significance for ecological, recreation and/or landscape purposes.

The main characteristics of the amendment are summarised in Table 1 below.

**Table 1 - Key Characteristics of the Scheme Amendment**

Element	Description
Stakehill Swamp	Regionally significant wetland. Approximately 201 hectares proposed for reservation as Parks & Recreation in the Metropolitan Region Scheme.
Management	The Western Australian Planning Commission has committed to preparing a Management Plan for the reservation.

## SCHEDULE 2

### Objective and requirements of the Environmental Management Plan

#### 1 Environmental Management Plan

An Environmental Management Plan shall be prepared following finalisation of the Metropolitan Region Scheme process and prior to finalisation of the City of Rockingham Town Planning Scheme process to reserve Stakehill Swamp for Parks and Recreation.

The objective of the Environmental Management Plan is to ensure the protection of the significant values of Stakehill Swamp including wetland, vegetation, flora, fauna and biodiversity.

The Environmental Management Plan shall include:

- Fire management, including the closure of Jarvis Road;
- Weed management;
- Recreation and public access;
- Groundwater resource management;
- Fauna;
- Flora; and
- Wetland ecology.

**SCHEDULE 9**

**PROPOSED ADDITION TO  
METROPOLITAN REGION SCHEME  
SCHEDULE 1 ENVIRONMENTAL CONDITIONS**

SCHEDULE 1  
ENVIRONMENTAL CONDITIONS

AMENDMENT No. AND GAZETTAL DATE	LOCATION	ENVIRONMENTAL CONDITIONS
<p><b>METROPOLITAN REGION SCHEME AMENDMENT No. 1050/33 (STAKEHILL SWAMP)</b></p> <p>Effective Date:</p> <p>Gazettal Date:</p>	<p><b>Stakehill Swamp, Baldivis</b></p> <p>Stakehill Swamp is generally bounded by Stakehill Road, Mandurah Road, Sixty Eight Road and Eighty Road, south east of Lake Coo loongup as per MRS Amendment 1050/33.</p>	<p>An Environmental Management Plan shall be prepared in accordance with the specifications set out in the Minister for the Environment's "Statement that a Scheme may be Implemented" No. 000752 published on 11 October 2007 following finalisation of the Metropolitan Region Scheme process and prior to finalisation of the City of Rockingham Town Planning Scheme process to reserve Stakehill Swamp for Parks and Recreation.</p> <p>The objective of the Environmental Management Plan is to ensure the protection of the significant values of Stakehill Swamp including wetland, flora, fauna and biodiversity.</p> <p>The Environmental Management Plan shall include:</p> <ul style="list-style-type: none"> <li>• Fire management, including the closure of Jarvis Road;</li> <li>• Weed management;</li> <li>• Recreation and public access;</li> <li>• Groundwater resource management;</li> <li>• Fauna;</li> <li>• Flora; and</li> <li>• Wetland ecology.</li> </ul>



**APPENDIX 2**  
**FLORA LIST - STAKEHILL SWAMP**

FAMILY	SPECIES
<b>GYMNOSPERMA</b> CYCADACEAE	<i>Macrozamia fraseri</i>
<b>MONOCOTYLEDONS</b> ASPARAGACEAE	* <i>Myrsiphyllum asparagoides</i>
CYPERACEAE	<i>Baumea articulata</i> <i>Baumea juncea</i> * <i>Gahnia trifida</i> <i>Lepidosperma longitudinale</i> <i>Lepidosperma gracile</i> <i>Lepidosperma tenue</i>
DASYPOGONACEAE	<i>Acanthocarpus preissii</i>
JUNCACEAE	<i>Juncus kraussii</i>
POACEAE	* <i>Cortaderia selloana</i> * <i>Ehrharta calycina</i> * <i>Cynodon dactylon</i> * <i>Poa annua</i> * <i>Pennisetum clandestinum</i>
RESTIONACEAE	<i>Desmocladus flexuosus</i>
XANTHORRHOEACEAE	<i>Xanthorrhoea preissii</i>
<b>DICOTYLEDONS</b> ASTERACEAE	* <i>Hypochaeris glabra</i> * <i>Senecio vulgaris</i> * <i>Sonchus oleraceus</i> * <i>Taraxacum officinale</i>
ASCLEPIADACEAE	* <i>Gomphocarpus fruticosus</i>
CASUARINACEAE	<i>Allocasuarina fraseriana</i>
EUPHORBIACEAE	<i>Phyllanthus calycinus</i>
LAURACEAE	<i>Cassytha racemosa</i>
MIMOSACEAE	<i>Acacia saligna</i>

MYRTACEAE	<i>Eucalyptus gomphocephala</i> <i>Eucalyptus rudis</i> <i>Melaleuca lateritia</i> <i>Melaleuca raphiophylla</i> <i>Melaleuca preissiana</i> <i>Melaleuca teretifolia</i>
OLEACEAE	* <i>Olea europaea</i>
PAPILIONACEAE	<i>Jacksonia furcellata</i> * <i>Lupinus cosentinii</i> * <i>Trifolium campestre</i> <i>Viminaria juncea</i>
PRIMULACEAE	* <i>Anagallis arvensis</i>
PROTEACEAE	<i>Banksia attenuata</i> <i>Banksia menziesii</i>
RANUNCULACEAE	<i>Clematis pubescens</i>
RHAMNACEAE	<i>Spyridium globulosum</i>

\* Introduced species

## APPENDIX 3

### SPECIES OF BIRD PREDICTED AND RECORDED AT STAKEHILL SWAMP, BALDIVIS

- X represents birds that were present during the survey period.  
 \* represents an introduced species.  
 E represents species listed under the *Environment Protection and Biodiversity Conservation Act 1999*.  
 EM represents migratory bird species listed under the *Environment Protection and Biodiversity Conservation Act 1999*.  
 S represents species listed on the Department of Conservation and Land Management's Scheduled Fauna list.  
 P represents species listed on the Department of Conservation and Land Management's Priority Fauna list.  
 BF1 represents species identified by Bushforever as being habitat specialists with a reduced distribution on the Swan Coastal Plain.  
 BF2 represents species identified by Bushforever as wide-ranging species with reduced populations on the Swan Coastal Plain.

<b>Acanthizidae</b> (Thornbills, Gerygones, Whitefaces, Wrens)		
Broad-tailed Thornbill	<i>Acanthiza apicalis</i> BF1	X
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i> BF1	
Western Thornbill	<i>Acanthiza inornata</i> BF1	X
Western Warbler	<i>Gerygone fusca</i>	X
White-browed Shrubwren	<i>Sericornis frontalis</i> BF1	X
Weebill	<i>Smicronis brevirostris</i> BF1	X
<b>Accipitridae</b> (Kites, hawks and eagles)		
Collared Sparrowhawk	<i>Accipiter cirrocephalus</i> BF2	X
Brown Goshawk	<i>Accipiter fasciatus fasciatus</i> BF2	X
Wedge-tailed Eagle	<i>Aquila audax</i> BF2	
Little Eagle	<i>Aquila morphnoides</i> BF2	
Swamp Harrier	<i>Circus approximans</i>	
Black-shouldered Kite	<i>Elanus caeruleus</i>	
Whistling Kite	<i>Haliastur sphenurus</i> BF2	X
Square-tailed Kite	<i>Hamirostra isura</i> BF2	
<b>Aegothelidae</b> (Frogmouths)		
Australian Owlet Nightjar	<i>Aegotheles cristatus</i>	
<b>Anatidae</b> (Ducks, geese and swans)		
Chestnut Teal	<i>Anas castanea</i>	
Grey Teal	<i>Anas gracilis</i>	
Blue-winged Shoveller	<i>Anas rhynchotis rhynchotis</i> BF1	
Pacific Black Duck	<i>Anas superciliosa</i>	
White-eyed Duck	<i>Aythya australis</i>	
Muck Duck	<i>Biziura lobata</i> BF1	
Australian Wood Duck	<i>Chenonetta jubata</i>	
Black Swan	<i>Cygnus atratus</i>	
Pink-eared Duck	<i>Malacorhynchus membranaceus</i> BF1	
Blue-billed Duck	<i>Oxyura australis</i> BF1	
Freckled Duck	<i>Stictonetta naevosa</i> BF2	
Australian Shelduck	<i>Tadorna tadornoides</i>	
<b>Anhingidae</b> (Darter)		
	<i>Anhinga melanogaster novaehollandiae</i>	
<b>Apodidae</b> (Swifts)		
Fork-tailed Swift	<i>Apus pacificus pacificus</i>	
<b>Ardeidae</b> (Herons, Egrets, Bitterns)		
Great Egret	<i>Ardea alba modesta</i>	
Cattle Egret	<i>Ardea ibis coromanda</i>	
White-faced Heron	<i>Ardea novaehollandiae</i>	X
White-necked Heron	<i>Ardea pacifica</i>	X
Australian Bittern	<i>Botaurus poiciloptilus</i>	
Little Egret	<i>Egretta garzetta</i>	
Rufous Night Heron	<i>Nycticorax caledonicus</i> BF2	
<b>Artamidae</b> (Woodswallows)		

Black-faced Woodswallow	<i>Artamus cinereus</i> BF2	
Dusky Woodswallow	<i>Artamus cyanopterus</i> BF2	
Masked Woodswallow	<i>Artamus personatus</i>	
<b>Campephagidae</b> (Cuckoo-shrikes)		
White-winged Triller	<i>Lalage tricolor</i>	
<b>Caprimulgidae</b> (Nightjars)		
Spotted Nightjar	<i>Eurostopodus argus</i>	
<b>Casuariidae</b> (Emu, Cassowaries)		
Emu	<i>Dromaius novaehollandiae</i>	
<b>Charadriidae</b> (Lapwings and plovers)		
Black-fronted Dotterel	<i>Charadrius melanops</i>	
Red-kneed Dotterel	<i>Erythrogonys cinctus</i>	
Banded Lapwing	<i>Vanellus tricolor</i>	
<b>Climacteridae</b> (Trecreeper)		
Rufous Trecreeper	<i>Climacteris rufa</i> BF1	
<b>Columbidae</b> (Pigeons and doves)		
Domestic Pigeon	<i>Columba livia</i>	X
Common Bronzewing	<i>Phaps chalcoptera</i> BF1	X
	<i>Streptopelia chinensis tigrina</i>	X
Senegal Turtle-dove	<i>Streptopelia senegalensis</i>	X
<b>Corvidae</b> (Crows, Ravens)		
Australian Raven	<i>Corvus coronoides</i>	
<b>Cracticidae</b> (Magpies, Currawongs, Butcherbirds)		
Magpie	<i>Cracticus tibicen</i>	X
Grey Butcherbird	<i>Cracticus torquatus</i>	
Grey Currawong	<i>Strepera versicolor</i> BF2	
<b>Cuculidae</b> (Cuckoos)		
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	
Horsfield's Bronze Cuckoo	<i>Chrysococcyx basalis</i>	
	<i>Chrysococcyx lucidus</i>	
Pallid Cuckoo	<i>Cuculus pallidus</i>	
<b>Dicaeidae</b> (Flower-peckers)		
Mistletoebird	<i>Dicaeum hirundinaceum</i>	
<b>Dicruridae</b> (Flycatchers)		
Magpie-lark	<i>Grallina cyanoleuca</i>	X
Restless Flycatcher	<i>Myiagra inquieta</i> BF1	
Grey Fantail	<i>Rhipidura fuliginosa</i>	X
Willie Wagtail	<i>Rhipidura leucophrys</i>	X
<b>Falconidae</b> (Falcons)		
Brown Falcon	<i>Falco berigora</i> BF2	
Nankeen Kestrel	<i>Falco cenchroides</i>	X
Australian Hobby	<i>Falco longipennis</i>	X
Peregrine Falcon	<i>Falco peregrinus</i> S1 BF2	
<b>Halcyonidae</b> (Forest kingfishers)		
Laughing Kookaburra	<i>Dacelo novaeguineae</i> *	X
Sacred Kingfisher	<i>Todiramphus sanctus</i>	
<b>Hirundinidae</b> (Swallows)		
Welcome Swallow	<i>Hirundo neoxena</i>	X
Tree Martin	<i>Hirundo nigricans</i>	X
<b>Maluridae</b> (Fairy-wrens)		
Red-winged Fairy Wren	<i>Malurus elegans</i>	X
Variegated Fairy-wren	<i>Malurus lamberti</i> BF1	
	<i>Malurus lamberti assimilis</i>	
White-winged Fairy-wren	<i>Malurus leucopterus</i> BF1	
Splendid Wren	<i>Malurus splendens</i> BF1	X
	<i>Stipiturus malachurus westernensis</i>	
<b>Meliphagidae</b> (Honeyeaters)		
Western Spinebill	<i>Acanthorhynchus superciliosus</i>	X
Red Wattlebird	<i>Anthochaera carunculata</i>	X
Western Wattlebird	<i>Anthochaera lunulata</i> BF2	X
Singing Honeyeater	<i>Lichenostomus virescens</i>	X
Brown Honeyeater	<i>Lichmera indistincta indistincta</i>	X



Western White-naped Honeyeater	<i>Melithreptus chloropsis</i> BF2	X
White-cheeked Honeyeater	<i>Phylidonyris nigra</i> BF2	X
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i> BF2	X
<b>Meropidae (Bee-eaters)</b>		
Rainbow Bee-eater	<i>Merops ornatus</i>	
<b>Motacillidae (Pipits and true wagtails)</b>		
Richards Pipit	<i>Anthus australis australis</i>	
<b>Neosittidae (Sittellas)</b>		
Varied Sittella	<i>Daphoenositta chrysoptera</i> BF1	
<b>Pachycephalidae (Whistlers)</b>		
Rufous Whistler	<i>Colluricincla harmonica rufiventris</i>	X
Shriketit	<i>Falcunculus frontatus</i>	
<b>Pardalotidae (Pardalotes)</b>		
Spotted Pardalote	<i>Pardalotus punctatus</i>	
Striated Pardalote	<i>Pardalotus striatus</i>	X
<b>Pelecanidae (Pelicans)</b>		
Australian Pelican	<i>Pelecanus conspicillatus</i>	
<b>Petroicidae (Flycatchers, Robins)</b>		
Western Yellow Robin	<i>Eopsaltria australis griseogularis</i> BF1	
Scarlet Robin	<i>Petroica multicolor campbelli</i> BF1	
<b>Phasianidae (Pheasants and quails)</b>		
Stubble Quail	<i>Coturnix pectoralis</i>	
Brown Quail	<i>Coturnix ypsilophora</i>	
<b>Podargidae (Frogmouths)</b>		
Tawny Frogmouth	<i>Podargus strigoides</i>	
<b>Podicipedidae (Grebes)</b>		
Australian Grebe	<i>Tachybaptus novaehollandiae novaehollandiae</i>	
<b>Psittacidae (Pittas)</b>		
Galah	<i>Cacatua roseicapilla</i>	X
Long-billed Corella	<i>Cacatua tenuirostris</i>	X
Forest Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii naso</i> E P3 BF2	
Carnaby's Cockatoo	<i>Calyptorhynchus latirostris</i> E S1 BF2	X
Purple-crowned Lorikeet	<i>Glossopsitta porphyrocephala</i>	
Elegant Parrot	<i>Neophema elegans</i>	
Western Rosella	<i>Platycercus icterotis</i> BF1	
Red-capped Parrot	<i>Platycercus spurius</i>	X
Australian Ringneck Parrot	<i>Platycercus zonarius</i>	X
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	X
<b>Rallidae (Coots, Crakes, Moorhens)</b>		
Coot	<i>Fulica atra australis</i>	
Dusky Moorhen	<i>Gallinula tenebrosa tenebrosa</i> BF1	
Purple Swamphen	<i>Porphyrio porphyrio bellus</i>	
Ballions Crake	<i>Porzana pusilla palustris</i>	
Spotless Crake	<i>Porzana tabuensis</i>	
<b>Recurvirostridae (Avocets, Stilts)</b>		
Banded Stilt	<i>Cladorhynchus leucocephalus</i>	
Black-winged Stilt	<i>Himantopus himantopus</i>	
Red-necked Avocet	<i>Recurvirostra novaehollandiae</i>	
<b>Scelopacidae (Curlews, Godwits, Knots, Sandpipers, Stints)</b>		
Long-toed Stint	<i>Calidris subminuta</i>	
Eastern Curlew	<i>Numenius madagascariensis</i> P4	
Wood Sandpiper	<i>Tringa glareola</i>	
Common Sandpiper	<i>Tringa hypoleucos</i>	
Marsh Sandpiper	<i>Tringa stagnatilis</i>	
<b>Strigidae (Hawk-owls)</b>		
Barking Owl	<i>Ninox connivens</i>	
Southern Boobook Owl	<i>Ninox novaeseelandiae</i>	
<b>Sylviidae (Cisticolas, Grassbirds, Songlarks, Warblers)</b>		
Australian Reed Warbler	<i>Acrocephalus australis</i>	
Brown Songlark	<i>Cincloramphus cruralis</i>	

Rufous Songlark	<i>Cincloramphus mathewsi</i>	
Little Grassbird	<i>Megalurus gramineus gramineus</i>	
<b>Threskiornithidae (Ibis, Spoonbills)</b>		
Yellow-billed Spoonbill	<i>Platalea flavipes</i>	
Royal Spoonbill	<i>Platalea regia</i>	
Glossy Ibis	<i>Plegadis falcinellus</i>	
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	
<b>Tytonidae (Barn owls)</b>		
Barn Owl	<i>Tyto alba</i>	
Masked Owl	<i>Tyto novaehollandiae</i>	
<b>Zosteropidae (White-eyes)</b>		
Silver-eye	<i>Zosterops lateralis gouldi</i>	X

## **APPENDIX 4**

### **SPECIES OF AMPHIBIAN PREDICTED AND RECORDED AT STAKEHILL SWAMP, BALDIVIS**



## **APPENDIX 5**

### **SPECIES OF REPTILE PREDICTED AND RECORDED AT STAKEHILL SWAMP, BALDIVIS**







## **APPENDIX 6**

### **SPECIES OF MAMMAL PREDICTED AND RECORDED AT STAKEHILL SWAMP, BALDIVIS**



