

**Alkimos – Eglinton  
Metropolitan Region Scheme  
Amendment No. 1029/33**

---

**Western Australian Planning Commission**

**Report and recommendations  
of the Environmental Protection Authority**

**Environmental Protection Authority  
Perth, Western Australia  
Bulletin 1207  
November 2005**

### **Environmental Impact Assessment Process Timelines**

<b>Date</b>	<b>Progress stages</b>	<b>Time (weeks)</b>
<b>26 Dec 2000</b>	<b>Level of Assessment set</b>	
<b>19 Feb 2001</b>	<b>Instructions issued</b>	<b>8</b>
<b>23 Dec 2002</b>	<b>Environmental Review Document Released for Public Comment</b>	<b>96</b>
<b>23 Jan 2004</b>	<b>1<sup>st</sup> Public Comment Period Closed</b>	<b>57</b>
<b>13 May 2005</b>	<b>2<sup>nd</sup> Public Comment Period Closed (Modified Amendment )</b>	<b>67</b>
<b>29 Sep 2005</b>	<b>Final Responsible Authority response to the issues raised</b>	<b>19</b>
<b>21 Nov 2005</b>	<b>EPA report to the Minister for the Environment</b>	<b>7</b>

ISBN. 0 7307 6848 1

ISSN. 1030 - 0120

Assessment No.1365

## Summary and recommendations

The Western Australian Planning Commission proposes to amend reservations and zonings in the Metropolitan Region Scheme (MRS)(Amendment 1029/33) consistent with the Alkimos-Eglinton Structure Plan. This report provides the Environmental Protection Authority's (EPA's) advice to the Minister for the Environment on the environmental factors, conditions and procedures relevant to the proposed scheme amendment.

Section 48D of the *Environmental Protection Act 1986 (EP Act)* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to Amendment 1029/33 and on the conditions and procedures to which the proposed scheme amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the *EP Act*.

### Relevant environmental factors and principles

A number of environmental factors were considered by the EPA in the assessment. It is the EPA's opinion that the following are the environmental factors, relevant to the proposed scheme amendment, which require detailed evaluation in this report:

- (a) Vegetation
- (b) Fauna
- (c) Odour
- (d) Geoheritage
- (e) Aboriginal heritage
- (f) Risk

The following principles were considered by the EPA in relation to the proposed scheme amendment:

- (a) The precautionary principle;
- (b) The principle of intergenerational equity;
- (c) The principle of the conservation of biological diversity and ecological integrity; and
- (d) Principles relating to improved valuation, pricing and incentive mechanisms

**Conclusion** The EPA has concluded that Amendment 1029/33 to the MRS would, in part, be inconsistent with the conservation and protection of significant environmental and geoheritage values in the area. The EPA has therefore recommended conditions in Section 6 and set out in Appendix 11 which it considers should be imposed for the amendment to adequately protect these values, if the amendment were to proceed.

## Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the main purposes of MRS Amendment 1029/33 is to:
  - relocate the waste water treatment plant inland;
  - relocate the groundwater treatment plant inland;
  - modify the alignment of the Parks and Recreation reserve boundary alignment;
  - create new Parks and Recreation reserves
2. That the Minister considers the report on the relevant environmental factors of:
  - Vegetation;
  - Fauna;
  - Odour;
  - Geoheritage;
  - Aboriginal heritage; and
  - Riskand the following principles
  - The precautionary principle;
  - The principle of intergenerational equity;
  - The principle of the conservation of biological diversity and ecological integrity; and
  - Principles relating to improved valuation, pricing and incentive mechanismsas set out in Section 5;
3. That the Minister notes that the EPA has concluded that Amendment 1029/33 to the MRS would, in part, be inconsistent with the conservation and protection of significant environmental and geoheritage values in the area. The EPA has therefore recommended conditions in Section 6 and set out in Appendix 11 which it considers should be imposed for the amendment to adequately protect these values, if the amendment were to proceed.
4. that the EPA's objectives can be met, provided there is satisfactory implementation by the Responsible Authority of the recommended conditions set out in Appendix 11.
5. That the Minister imposes the conditions and procedures recommended in Appendix 11 of this report.
6. That the Minister notes that the EPA has deferred the assessment of a number of environmental factors, as shown in Section 6, so that the EPA will have the opportunity to assess proposals impacting on these environmental factors in more detail at the appropriate stage of the planning process.
7. That the Minister notes that where any development proposal complies with Amendment 1029/33 (as modified consistent with the EPA's recommended conditions) and raises no additional environmental factors and does not impact on the deferred factors, the development proposal will not normally be subject to further assessment

under Part IV of the *EP Act*. However, future development proposals may still require works approvals, licensing and pollution control conditions under the provisions of Part V of the *EP Act* where applicable.

### **Conditions**

Having considered the Responsible Authority's environmental management measures and information provided in this report, the EPA has developed a set of conditions. These conditions are presented in Appendix 11. Matters addressed in the conditions include the following:

Amendment 1029/33 be modified to include the following:

- 1) additional Public Purpose reserve surrounding the Waste Water Treatment Plant;
- 2) additional Parks and Recreation Reserve north of Ningana Bushland;
- 3) additional Parks and Recreation Reserves south of Ningana Bushland;
- 4) additional Parks and Recreation Reserve north of the Waste Water Treatment Plant;
- 5) additional Parks and Recreation reserve north of the Alkimos Regional Centre;
- 6) additional Parks and Recreation reserve adjacent to Karli Springs; and
- 7) additional Parks and Recreation reserve for the East-west parabolic dune linkage.

### **Other Advice**

In addition to the above environmental conditions the EPA provides advice and comment on the following matters related to Amendment 1029/33 and the future development of the Alkimos-Eglinton area:

#### **1. Deferred factors**

A number of environmental factors have not been included in the EPA's assessment due to the broad scale of the assessment or because insufficient information is available at this stage of the planning process. The EPA has decided that these factors should be "deferred" to ensure that the EPA has the opportunity to assess future local government scheme amendments, subdivisions or development proposals, whichever comes first, so that a more detailed consideration of the potential environmental impacts can be undertaken by the EPA pursuant to Part IV of the *Environmental Protection Act 1986*.

These deferred factors are:

- (a) Waste Water Treatment Plant  
Deferred factors – Odour
- (b) Rationalisation and reductions to the coastal foreshore Regional Open Space reservation (Area 7)  
Deferred factor - Aboriginal heritage

## **2. Waste Water Treatment Plant**

The EPA recommends that a 600m buffer measured from the boundary of the WWTP should be reserved for Public Purposes, to prevent the siting of odour sensitive land uses within an area likely to be impacted by unacceptable odour levels from the WWTP.

An 800m buffer west and north west of the WWTP measured from the boundary of the WWTP should be reserved for Public Purposes if the site is subject to ponding and an odour channel is not provided.

A buffer of 450m measured from the boundary of the WWTP may be achievable in the future, but the EPA understands that the cost of odour management at the WWTP would be significant and the reduced buffer size may also limit the size of the WWTP. The EPA advises recommends that the possibility of reducing the width of the buffer to less than 600m through odour control and management, be evaluated further as part of the section 38 environmental assessment of the WWTP at Sites A and B.

Finally responsibility should rest with the Water Corporation for ensuring that the WWTP operates to the required criteria within the recommended 600m Public Purpose reserve.

## **3. Groundwater Treatment Plant**

The EPA expects that the appropriate approvals in relation to the operation of the GWTP and storage of chlorine on-site be obtained by the Water Corporation from the Department of Consumer and Employment Protection prior to the construction of the plant.

## **4. Management of land recommended to be reserved as Parks and Recreation**

The natural values of the Parks and Recreation reserves in Amendment 1029/33, including those recommended by the EPA, should be managed to ensure that the natural values of the land are not degraded by inappropriate landuses over time.

## **5. Future MRS amendment to realign the Railway Reservation**

The EPA supports the realignment of the Railway Reservation as part of a future amendment to the Metropolitan Region Scheme to avoid the fragmentation of the geoheritage and landform values within the recommended Parks and Recreation reserve.

# Contents

	Page
<b>Summary and recommendations .....</b>	<b>i</b>
<b>1. Introduction .....</b>	<b>1</b>
<b>2. Brief history of planning and environmental studies in Alkimos–Eglinton .....</b>	<b>2</b>
<b>3. The proposed scheme amendment.....</b>	<b>3</b>
3.1 Environmental submissions received during the public consultation period .....	4
<b>4. Environmental factors and principles .....</b>	<b>4</b>
4.1 Relevant environmental factors.....	4
<b>5. Elements of the amendment requiring consideration and assessment by the EPA ...</b>	<b>8</b>
5.1 Relocation of the Waste Water Treatment Plant.....	9
5.2 Relocation of the Groundwater Treatment Plant.....	13
5.3 Changes to the boundary alignment of the Parks and Recreation reserve proposed by Amendment 1029/33 .....	14
5.4 Transfer from Public Purpose reserve to Urban zone (Area 8) .....	31
5.5 East-west parabolic dune linkage (Area 9).....	33
5.6 Relevant environmental principle/s.....	35
<b>6. Conditions .....</b>	<b>35</b>
<b>7. Other Advice.....</b>	<b>35</b>
<b>8. Conclusions .....</b>	<b>36</b>
<b>9. Recommendations .....</b>	<b>37</b>

## Tables

1. Key characteristics of the proposed scheme amendment.....	4
--	---

## Appendices

1. Amendment 1029/33 Metropolitan Region Scheme (as advertised from 26 September 2003 to 28 January 2004)	
---	--

2. Modified Amendment 1029/33 Metropolitan Region Scheme (as advertised from 11 March 2005 to 13 May 2005)
3. Draft Alkimos - Eglinton Concept Structure Plan
4. Areas of regionally significant bushland within Alkimos – Eglinton
5. Natural Area Assessment Sheets
6. Plans of the Environmental Protection Authority's recommended changes to Amendment 1029/33
7. Table 2 - Identification of Relevant Principles
8. Table 3 - Summary of assessment of amendment elements and relevant environmental factors
9. List of submitters
10. Summary of Submissions and the WAPC's Response to Submissions
11. Recommended Environmental Conditions
12. References



# 1. Introduction

The purpose of Amendment 1029/33 to the Metropolitan Region Scheme (MRS) (Appendix 2), is to change reservations and zonings in the Alkimos-Eglinton area of the City of Wanneroo consistent with the Alkimos-Eglinton Structure Plan (Appendix 3).

The amendment area is situated approximately 40 kilometres (km) northwest of the Perth Central Business District. The Alkimos-Eglinton area comprises of 2,660 hectares (ha) with a coastline 7.5km in length and is 4.5km in width from the coast inland. The site has the potential to yield around 20,000 dwellings, sufficient to accommodate a population of around 50,000 people. The amendment area is bounded by the Indian Ocean to the west, the Mitchell Freeway to the east, the suburbs of Butler and Jindalee to the south and Yanchep to the north.

The main elements of the amendment with the potential to impact on the environment are:

- the relocation inland of the waste water treatment plant (WWTP) (from current Site A to proposed Site B);
- relocation inland of the groundwater treatment plants that will service the North West Corridor, to improve access to the prime regional beach at Alkimos; and
- modifications to land reserved for Parks and Recreation, to improve coastal access and create a town park at Alkimos.

The elements of the scheme amendment are described in more detail in Section 3.

Amendment 1029/33 to the MRS was referred to the EPA by the WAPC in December 2000. The EPA decided that Amendment 1029/33 should be formally assessed pursuant to Division 3 of Part IV of the *Environmental Protection Act 1986 (EP Act)* because the proposed land use changes may have potentially significant impacts on a number of environmental factors.

The Environmental Review (ATA, 2003a) and Amendment 1029/33 were first advertised from 26 September 2003 to 28 January 2004. Twenty three submissions (14 raised environmental issues) were received by the Western Australian Planning Commission (WAPC) and a total of 11 requests for public hearings were also received. On 9 March 2004 the Metropolitan Region Planning Committee (MRPC) resolved to defer appointment of a hearings sub-committee until the location of the proposed Alkimos Waste Water Treatment Plant (WWTP) and the alignment of Marmion Avenue were resolved.

Once the relevant government agencies and landowners had agreed to a modified alignment for Marmion Avenue and to retain the WWTP in the location as originally advertised, a modified Amendment 1029/33 was advertised from 11 March 2005 to 13 May. The EPA did not require the Environmental Review to be modified on the basis that the Environmental Instructions and the Environmental Review were considered still applicable to the modified amendment. Twenty two submissions were received by the WAPC, thirteen of which raised environmental issues. It is this modified amendment that is the subject of this report.

In compiling this report, the EPA has considered the relevant environmental factors and principles associated with the proposed scheme amendment, issues raised in public submissions, specialist advice from the Department of Environment (DoE) and other government agencies, the Responsible Authority's response to submissions and the EPA's own research and expertise.

Further details of the proposed scheme amendment are presented in Section 3 of this report. The EPA's assessment of the components of the amendment likely to have significant impacts

are discussed in Section 5. The Conditions and Procedures to which the proposed scheme amendment should be subject, if the Minister determines that it may be implemented, are set out in Section 6. Section 7 provides the EPA's Other Advice, Section 8 presents the EPA's conclusions and Section 9, the EPA's recommendations.

A list of people and organisations that made submissions is included in Appendix 9. Appendix 10 contains a summary of the public submissions and the Responsible Authority's responses. The summary of public submissions and the Responsible Authority's responses is included as a matter of information only and does not form part of the EPA's report and recommendations. The EPA has considered issues raised in public submissions when identifying and assessing relevant environmental factors and principles.

Recommended environmental conditions and procedures are provided in Appendix 11. References are listed in Appendix 12.

## **2. Brief history of planning and environmental studies in Alkimos–Eglinton**

In February, 1991 the EPA published its report and recommendations (Bulletin 500) for a marina, resort and golf course development at Eglinton (EPA, 1991a). The Minister's statement of environmental conditions was published in July 1991. In 1992 the MRS was amended to enable the development of marina, resort and golf course consistent with the EPA's assessment and the environmental conditions. There are no proposals in Amendment 1029/33 that impact on the area the subject of the EPA's Bulletin 500.

The first District Structure Plan (DSP) for the Alkimos–Eglinton area was produced in 1993. A study defining the boundary of the foreshore reserve and assessing the alignment of Marmion Avenue and the Mitchell Freeway was completed by Alan Tingay and Associates in 1993 as part of the preparation of the DSP (Alan Tingay & Associates and Feilman Planning Consultants, 1993).

The MRS was amended (Amendment 932/33) in 1994 to implement the 1993 DSP. Amendment 932/33 was part of program of major amendments to the MRS undertaken through the 1990's to implement Metroplan (Department for Planning and Infrastructure(DPI), 1990) and the Urban Expansion Policy (DPI, 1990). The EPA provided informal advice to the then State Planning Commission on this amendment in 1993 (Bulletin 729)(EPA, 1993c). The advice addressed issues such as the protection of regionally significant vegetation and wetlands, groundwater resources and the marine environment, and the potential off-site impacts associated with the proposed WWTP.

A major review of development options for the site was undertaken in 1996 by the two major landowners, Eglinton Estates and Landcorp. The Alkimos–Eglinton Environmental Report was prepared by Alan Tingay & Associates in 1997 as part of this review (Alan Tingay & Associates, 1997). This review resulted in the development of a second DSP in 1997 which proposed a number of significant changes to the location, and area set aside for major land uses.

The current MRS Amendment 1029/33, the subject of this formal environmental assessment, has been initiated to implement the changes proposed by the 1997 DSP.

The Alkimos–Eglinton Concept Structure Plan was prepared in 2003, superseding the 1997 DSP.

Assessments of the vegetation and flora have been made by Trudgeon and Keighery for Alkimos (Trudgeon & Keighery, 1990a) and Ningana (now called Eglinton) (Trudgeon & Keighery, 1990b); and by Armstrong (Armstrong, 1996) for Lots 8 and 11, owned by Eglinton Estates. Also ATA Environmental surveyed those sections of the subject area that would be directly affected by the proposed Amendment 1029/33 in 2002 (ATA Environmental, 2003b).

A vertebrate fauna survey of the Alkimos–Eglinton area was undertaken in October 1996 (Alan Tingay & Associates, 1996).

In May 2004 the EPA requested the DPI to provide additional flora, vegetation and fauna information to supplement the ER. A report entitled *Alkimos-Eglinton Flora, Vegetation and Fauna Baseline Information* was submitted by ATA Environmental on behalf of the WAPC in September 2005.

### **3. The proposed scheme amendment**

Amendment 1029/33 (including modifications)(Appendix 2) proposes to amend the MRS as follows:

- move from the coast and modify the Public Purposes reservation to accommodate the Water Corporation’s Alkimos WWTP and GWTP, and relocate them to separate sites. The ocean outfall site is to be retained. Additional land around the Public Purposes reservation for the WWTP is to be included in the Urban Deferred zone as buffer;
- remove Private Recreation and Urban Deferred zonings, originally put in place around the Public Purposes (WWTP and GWTP) site for buffer purposes;
- reserve for Parks and Recreation an area adjacent to the Alkimos Regional Centre including a portion of the dunal ridge and a portion of the buffer for the Groundwater Treatment Plant, for a town park,
- rationalise the area of the northern Parks and Recreation reservation to provide better vegetation representation;
- reduce the coastal foreshore Parks and Recreation reservations, particularly immediately west of the Alkimos City Centre to provide better access to the prime regional beach and facilitate the establishment of a coastal node;
- introduce an area of Parks and Recreation reservation at Alkimos North adjacent to the proposed golf course development to provide a better environmental and topographic boundary to the proposed open space areas within the Environmental Approval for this development;
- reduce the land zoned Central City Area for the Alkimos Regional Centre to better reflect likely future land requirements and topographic features, and to include additional land in the Urban zone;
- realign and reduce the reservation width of Marmion Avenue, particularly through the Alkimos Regional Centre; and
- modify the reservation widths and alignments of Alkimos Drive and Eglinton Avenue.

The elements of Amendment 1029/33 which are likely to have significant environmental impacts are assessed in Section 5.

The main characteristics of the Amendment 1029/33 (including modifications) are summarised in Table 1 below.

**Table 1 - Key characteristics of proposed scheme amendment**

Element	Description		
Total area of Alkimos-Eglinton District Structure Plan	2,660ha		
Projected population of the Alkimos-Eglinton District Structure Plan	50,000 people		
Length of coastline within the Alkimos-Eglinton District Structure Plan	7.5km		
Area of waste water treatment plant and buffer	220ha (comprising 145ha reserved as Public Purposes and 75ha zoned as Urban Deferred)		
Capacity of waste water treat plant	160 megalitres/day (eventual long term capacity)		
Area of ground water treatment plant	45ha (comprising 21ha Public Purpose reserve plus a 24ha buffer reserved as Parks and Recreation)		
Capacity of ground water treatment plant	120ML/day of potable water		
Total area of Parks and Recreation reserve in the Alkimos Eglinton area	Current	Proposed by Amendment 1029/33	Recommended by EPA
	377ha	385ha	523ha

### 3.1 Environmental submissions received during the public consultation period

Amendment 1029/33 (Appendix 1) and a modified Amendment 1029/33 (Appendix 2) have been advertised for public comment on separate occasions to accommodate changes to infrastructure planning in the Alkimos-Eglinton District.

Amendment 1029/33 was advertised from 26 September to 28 January 2004. Twenty three submissions were received by the Western Australian Planning Commission (WAPC) and a total of 11 requests for public hearings were also received. Fourteen of these submissions raised environmental issues.

The modified Amendment 1029/33 was advertised from 11 March 2005 to 13 May 2005. Twenty two submissions were received by the WAPC, thirteen of which raised environmental issues.

## 4. Environmental factors and principles

### 4.1 Relevant environmental factors

Section 48D of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposed scheme amendment and the conditions and procedures to which the proposed scheme amendment

should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following are the environmental factors relevant to the proposed scheme amendment, which require detailed evaluation in this report:

- (a) Vegetation;
- (b) Fauna;
- (c) Odour (Waste Water Treatment Plant);
- (d) Geoheritage;
- (e) Aboriginal heritage; and
- (f) Risk (Groundwater Treatment Plant)

The above relevant factors were identified from the EPA's consideration and review of all environmental factors (preliminary factors) generated from the Environmental Review document and the submissions received, in conjunction with the proposed scheme amendment characteristics and alternative approvals processes which ensure that the factors will be appropriately managed. On this basis, the EPA considers that the preliminary factors and other issues raised in the submissions do not require further evaluation by the EPA.

The relevant factors are discussed below and in Sections 5 of this report, in relation to each of the element of the amendment likely to have a significant environmental impact. The EPA's assessment of the elements of Amendment 1029/33 is summarised in Table 3 (Appendix 8).

#### *Vegetation*

The Alkimos-Eglinton area comprises approximately 2,660ha. Native vegetation is present on approximately 80% of the area (2, 128ha). Although the area has been subject to bushfires, livestock grazing and off-road vehicles, the majority of the remnant vegetation is in *Good* condition.

The remnant vegetation of the Alkimos-Eglinton area represents the majority of the largest near coastal remnant within the Perth Metropolitan Region. This vegetation is representative of three vegetation complexes as defined by Heddle *et al.* (1980); the Quindalup and Cottesloe Central and South.

Amendment 1029/33 proposes to realign a number of Parks and Recreation boundaries and also relocate a number of Parks and Recreation reserves. The EPA estimates that this will result in a net increase of 8ha to the Parks and Recreation reservations in Alkimos and Eglinton bringing the total area of Parks and Recreation to approximately 385ha. The current area of Parks and Recreation reserve in the Alkimos-Eglinton area is approximately 377ha.

Following the closure of the submission period for the Environmental Review the EPA requested that further vegetation and fauna survey work be undertaken to assist with the assessment of Amendment 1029/33. The resulting report, along with a range of other reports and information gathered from a number of site visits has been analysed by the EPA to identify the areas that the EPA considers to be regionally significant bushland (Appendix 4).

The Alkimos-Eglinton area is considered to be a regionally significant natural area for flora and vegetation because it meets five (Representativeness, Diversity, Rarity, Maintaining Ecological Processes or Natural Systems and General Criteria for Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation) of the criteria being used by the EPA to identify regionally significant natural areas.

The proposed amendment will directly impact upon Bush Forever site 397 (coastal strip from Wilbinga to Mindarie) and site 289 (Ningana Bushland, Yanchep/Eglinton). Both sites consist of the Cottesloe Complex – Central and South and the Quindalup Complex, and include significant flora and fauna.

More specifically, the width of the coastal reserve (Bush Forever site 397) is proposed to be reduced in two places on Lot 102 by some 10ha but increased to the north on Lot M1482 by approximately 20ha (Appendix 2). The reduction is to allow for the development of a coastal village and a regional beach. At the site of the coastal village the reduction is proposed to be to 115m from the line of permanent vegetation, down from 145m. At the proposed regional beach the reduction is expected to a width of 160 – 300m down from 300 – 400m. The additional area proposed is an east-west area north of Pipidinny Drive.

An area to the east of the current foreshore reservation and immediately north of the WWTP site is also proposed to be rezoned from Parks and Recreation to Urban. This area is approximately 38ha in size and has conservation values recognised in Bush Forever site 397.

Potential impacts on the Ningana Bushland include a direct loss of Quindalup heath from the southern portion to accommodate urban development. In exchange, an inland area of banksia woodland abutting the Yanchep Parks and Recreation reserve, and a coastal landform feature around an existing trip point on the coast are to be added.

Further proposed additions to the Parks and Recreation reservations include the proposed reservation of an area of banksia and tuart woodland immediately to the north of the Central City Area zone. A portion of this land will be in the buffer area to the GWTP.

The EPA's assessment of the potential impacts of Amendment 1029/33 on regionally significant vegetation is set out in Sections 5.3 - 5.5.

#### *Fauna*

The large size, strong linkage to other areas of native vegetation and diversity of habitat are the key characteristics that make the Alkimos-Eglinton land an important area for fauna conservation on the metropolitan Swan Coastal Plain.

Based on soil/landform, vegetation communities and vegetation condition mapping, and information available from a survey conducted in 1996 (Alan Tingay & Associates, 1996) together with opportunistic records obtained by the EPA Service Unit during site visits during 2004-5, the habitats of the area are known or likely to support a rich assemblage of vertebrate species. Many of these have declined or become extinct within the more developed parts of the Perth Metropolitan area.

The diversity of this site reflects the large size of habitats in the area as well as floral and vegetation diversity. In particular limited surveys already show that the bird assemblage includes at least 19 bird species that are listed in *Bush Forever* as having special conservation significance on the Swan Coastal Plain as they are either habitat specialists with a reduced distribution on the Swan Coastal Plain or they are wide ranging species with reduced populations on the Swan Coastal Plain.

The Alkimos Eglinton area, particularly Banksia woodlands and *Dryandra sessilis* heaths provide significant feeding habitat for Carnaby's Cockatoo which is listed as Endangered in the *Environmental Protection and Biodiversity Conservation Act 1999* and as Rare or likely to become extinct under the *WA Wildlife Conservation Act 1950*. Saunders et al. (1985) has highlighted the importance of this part of the Coastal Plain for the conservation of this species, "One aspect of the biology of these cockatoos which has an important bearing on their conservation is the flocking behaviour during the non-breeding season. These flocks can

represent the total population of the species from a very large area. Following breeding the birds leave the nesting areas and cockatoos from many breeding populations amalgamate to form large flocks the size of which depends on the vegetation on which they are feeding. These flocks are concentrated in the coastal parts of the range of this species north of Perth.”

It is likely that the proximity of this area to favoured roosting sites in the Tuart woodlands of Yanchep National Park and Neerabup National Park may increase the significance of this area as an important feeding habitat for Carnaby’s Cockatoo.

Habitats in different parts of the Alkimos-Eglinton area also facilitate the seasonal migration of small Passerine and other birds. The large contiguous area of bushland at Alkimos-Eglinton also facilitates smaller scale movements of species between different habitats to utilize native vegetation for seasonal food resources, shelter, breeding and roosting sites that are needed to maintain populations of declining species. This also facilitates long-term genetic movement and thus the conservation of biological diversity.

The Alkimos-Eglinton area is considered, on purely technical grounds, to be at least a regionally significant natural area for fauna because it meets at least three (Diversity, Rarity and Maintaining Ecological Processes or Natural Systems) of the criteria being used by the EPA to identify regionally significant natural areas. It could be argued that the importance of the area as feeding habitat for Carnaby’s Cockatoo gives the area State significance.

The EPA’s assessment of the potential impacts of Amendment 1029/33 on regionally significant fauna is set out assessed in Sections 5.3 – 5-5.

#### *Odour (Waste Water Treatment Plant)*

Amendment 1029/33 proposes to relocate the Public Purpose reserve (the site for the WWTP) 600m to the east of the current location. The current location is referred to as Site A and the proposed location is referred to as Site B (Appendix 2).

Amendment 1029/33 proposes an odour buffer around the Site B WWTP of 450m. This land is shown as a Public Purpose reserve in Amendment 1029/33. An additional buffer of 150m is proposed to be zoned Urban Deferred in Amendment 1029/33 in order that the exact edge of the buffer may be determined once the WWTP is operating and the actual extent of the odour can be measured.

Site B is situated in a depression within the Alkimos dune system. The Department of Environment raised the issue of odour ponding occurring within the depression. Following further odour modelling work the Water Corporation has requested an 800m buffer to the west and north west of the WWTP to accommodate the effects of odour ponding with a 600m buffer being provided elsewhere.

Alternative measures to overcome ponding, such as constructing an odour drainage channel through to the coast, may be possible but require considerable investigation.

#### *Geoheritage*

The Alkimos dune system is a parabolic feature approximately 2km wide and extends inland for 4km. The Alkimos dune system was described by the Geological Society of Australia in 1979 (Lemmon et al, 1979) as an excellent example of a complex system of parabolic dunes of Holocene age, belonging to the Quindalup dune system.

The dunes were identified by the Geological Society as having national and world significance as a record of Holocene beach activity and as an excellent example of the complex dunes that occur from Perth north to the Moore River. (Lemmon et al, 1979). The Semeniuk Research

Group has also recognised the Alkimos dune system as a feature of international geoheritage significance (Semeniuk, 2004).

Four phases of dunes have been defined, on the basis of profile maturity, soil development and vegetation cover.

The Alkimos dune system is currently zoned Urban, Central City and reserved for Public Purposes (Site A WWTP). A small portion is also reserved for Parks and Recreation and Private Recreation. Amendment 1029/33 proposes to relocate the Public Purposes reservation for the Site B WWTP within the Alkimos dune system. Amendment 1029/33 also proposes to realign the boundaries of the Urban and Central City Area zone and reserve land as Parks and Recreation.

The EPA's assessment of the impact that Amendment 1029/33 may have on the Alkimos dune system are set out and assessed in Section 5.1 and 5.3.5. The current zoning of the Alkimos dune system will significantly impact on the dune system. The objective of the EPA's assessment will be to determine whether Amendment 1029/33 is increasing the level of impact and how the level of impact could be reduced.

#### *Aboriginal heritage*

An Aboriginal site survey was commissioned by Landcorp (O'Connor, 1990) for the localities of Clarkson, Eglinton and Alkimos. The survey recorded a freshwater spring within Lot 102, known to Aboriginal people as Karli Spring.

Karli Spring is a site of mythical significance believed to be inhabited by the Waugal. The Waugal is referred to as a 'water creative, spiritual force with a serpentine physical manifestation'. It is the Aboriginal people's wish that the entire area enclosed by the surrounding dunes (an area of approximately 200m x 250m) be recorded as a sphere of influence by the Waugal.

The EPA's assessment of the potential impacts of Amendment 1029/33 on Karli Spring are set out assessed in Section 5.3.7.

#### *Risk (Groundwater Treatment Plant)*

The Groundwater Treatment Plant (GWTP) and associated 300m chlorine buffer are proposed to be relocated from Site A to a 21ha site north east of the Central City Area zone and included in the Public Purposes reservation (Appendix 2). An additional area of approximately 24ha is to be reserved as Parks and Recreation, Regional Road and Other Regional Road to provide an additional 200m wide buffer (total of 500m from the GWTP). It is proposed that both buffer areas will be retained primarily for bushland and recreation and managed in association with the adjacent Alkimos Town Park.

The EPA's assessment of the proposed buffers in Amendment 1029/33 for the relocated GWTP is set out assessed in Section 5.2.

## **5. Elements of the amendment requiring consideration and assessment by the EPA**

The elements of Amendment 1029/33 which are likely to have significant environmental impacts requiring are:

- Relocation of the Waste Water Treatment Plant
- Relocation of the Groundwater Treatment Plant



- Additional Parks and Recreation Reserve north of Ningana Bushland (Area 1);
- Additional Parks and Recreation Reserve south of Ningana Bushland (Area 2);
- Deletion from Parks and Recreation reserve south of Ningana Bushland (Area 3);
- Inclusion of an area adjacent to the coastal foreshore reserve on Lot M1482 (Area 4);
- Deletion of a Parks and Recreation Reserve north of the Waste Water Treatment Plant (Area 5);
- Introduction of a town park immediately north of the Alkimos Regional Centre (Area 6);
- Rationalisation and reductions to the coastal foreshore Regional Open Space reservation (Area 7);
- Public Purpose reserve to Urban zone (area 8); and

These elements are assessed against the relevant environmental factors in the following sections and identified in Appendix 6.

## 5.1 Relocation of the Waste Water Treatment Plant

### Description

Amendment 1029/33 proposes to relocate the existing Public Purposes Reserve for a WWTP to a dune valley some 600 metres east of the current proposed site so that development and planning opportunities along the coast can be maximised. The current site reserved as Public Purpose in the MRS is referred to as Site A and the proposed site, to the east, is referred to as Site B (Appendix 6). The discussion below refers to Site B.

The inner plant area and a 450m buffer beyond are proposed to be included in the Public Purposes reservation. An additional buffer of 150m is proposed to be zoned Urban Deferred in Amendment 1029/33 in order that the exact edge of the buffer may be determined once the WWTP is operating and the actual extent of the odour can be measured. The resultant site area is approximately 220ha, comprising 145ha Public Purposes reservation and 75ha Urban Deferred zoning.

It is important to note that the EPA's assessment of Amendment 1029/33 pursuant to section 48A of the *Environmental Protection Act 1986*, is only concerned with the environmental impacts of relocating the site and the size of the buffer. The proposed development of the WWTP facility has been referred to the EPA pursuant to section 38 of the *Environmental Protection Act 1986*. The EPA is currently conducting a separate formal assessment of this proposal at Site A and B pursuant to section 38 of the *Environmental Protection Act 1986*.

Site B is situated in a depression within the Alkimos Dune System, although part of the facility is located on the dune system which requires approximately 3,000,000 cubic metres of earth to be excavated. The dunes within the buffer area are to be generally retained in their natural state to further shield the plant from public view. However, significant excavation of the dunes on the eastern side of the WWTP will be required for the treatment plant to allow gravity wastewater inflow. The DoE has raised the issue of odour ponding occurring within the depression. This matter is discussed in detail below.

The Water Corporation has advised that the first stage of the WWTP will be a 10 ML/day plant, and that this should be adequate for about 15 years. After that time the plant will be progressively upgraded to about 60ML/day and this plant should be adequate until about 2040. After 2040 it will be progressively updated to its ultimate capacity of 160ML/day.

The associated ocean outfall is proposed to be retained in its current proposed location adjacent to the foreshore reserve on a 12ha site.

The Water Corporation has advised that ultimately the WWTP will serve up to 700,000 people.

### **Submissions**

The Urban Bushland Council expressed concern in its submission that the Environmental Review document does not adequately cover the significance of the landforms of the proposed WWTP site and its potential impact. Both the Urban Bushland Council and the Quinns Rock Environmental Group stated that the proposed location for the WWTP threatens the dune system and that these impacts need to be investigated.

The City of Wanneroo acknowledges in its submission that the proposed relocation of the WWTP has merit although it is concerned that odour from the WWTP will impact on surrounding residential areas.

In its presentation to the WAPC's Hearings Sub-committee the Water Corporation requested that:

- The proposed Urban Deferred component of the buffer (i.e. the additional 150m) be reserved for Public Purposes (i.e. increasing the buffer to 600m); and
- The buffer be extended westward a further 200m (to be zoned Urban Deferred) in order to address their concerns regarding odour ponding in certain night-time atmospheric conditions, making the buffer 800m on the seaward side of the WWTP facility.

The landowners, Landcorp, Eglinton Estates and Alkimos Developments have advised that although the buffer proposed by Amendment 1029/33 is supported it is hoped that over the long term technological advances will enable the buffer to be reduced.

### **WAPC response to submissions**

The WAPC has advised that the MRS should show the preferred outcome for the buffer around the WWTP with appropriate management and implementation measures being used until that outcome can be achieved. That is:

- a 450m wide Public Purposes reservation should be retained around Site B;
- the 150m wide outer buffer should remain as Urban Deferred around Site B;
- the land presently zoned Urban or Private Recreation, or reserved for Public Purposes and lying generally to the west of the outer buffer should remain as Urban (in the amendment), but the local town planning scheme amendment that must follow the MRS amendment should apply a zoning that will prevent subdivision for urban purposes until it is clear that the odours emanating from the WWTP will not be detrimental to the amenity of the land to be released.

To this end the local (town planning scheme) 'urban deferment' may be released progressively over time and it should be clear that there is no intent to ever increase the reservation for Public Purposes beyond 600m radius (except for minor adjustments supported by sound scientific and environmental analysis) and wherever possible the

odours are to be managed within the Public Purposes reservation as proposed (i.e. 450 meters or less).

The WAPC has also advised that it accepts that any EPA approval for the WWTP may impose an air quality buffer that extends into the land zoned Urban and Urban Deferred. In these circumstances it may be anticipated that (subject to a proper application and all other relevant issues having been addressed) the WAPC would then lift the deferment for land outside the buffer. Should a subsequent environmental review allow the buffer to be reduced then the WAPC could be expected to similarly lift the deferment for the land so released, and so on until the works are operating within a buffer of approximately 450m.

In its response to the submissions the WAPC also sought to draw the EPA's specific attention to the question of the location of the WWTP. Specific concerns over the extent of the buffer, request for advice as to whether the identified buffer represents current best practice or if a smaller buffer could be accommodated and to suggest that the EPA draws this to the attention of the Minister for the Environment.

### **Assessment**

The relevant environmental factors considered for this component of the amendment are:

#### *Odour*

The EPA's environmental objective for this factor is to ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and landuses by meeting statutory requirements and acceptable standards.

Modelling by CSIRO of the ponding effect at the Site B indicates that a buffer of more than 600m is required to the west and north west. However, the CSIRO model is based on the current depression in the dunes and meteorological measurements specific to the current depression. This depression will be significantly deepened by earthworks to lower the ground level of the WWTP so that sewers can be gravity fed into the facility. Deepening the depression will increase the ponding effect, particularly if the relatively low rim of the basin on the south-west side is built up.

Interpretation of the CSIRO work by the Water Corporation's consultant, Consulting Environmental Engineers (CEE), recommends that the buffer be increased to 800m to the west and north-west. However, the EPA notes that 800m appears to be an estimate made without a proven integrated model and without any means of quantifying the more severe ponding expected (by the CSIRO and DoE) in a deepened basin.

The WAPC has determined that the WWTP buffer should remain as proposed in Amendment 1029/33 based on an assumption that odour emissions can be managed so that unacceptable odour levels will not occur outside of the 600m and that the buffer will eventually be reduced to 450m.

The EPA notes that the 800m buffer proposed by the WAPC to the west and north west would substantially reduce the amount of land available for residential development between the Site B WWTP buffer and the foreshore, which is contrary to the reason for moving the WWTP from Site A to B.

Preliminary calculations undertaken by CSIRO on behalf of the Water Corporation suggest that alternative measures to overcome odour ponding, such as constructing an odour drainage channel through to the foreshore may be possible but requires considerable investigation. The Water Corporation and its consultant have started to develop procedures to model the channel odour.

### *Geoheritage*

The EPA's environmental objective for this factor is to ensure that changes to the biophysical environment do not adversely affect geoheritage values.

The Alkimos dune system is a parabolic feature approximately 2km wide and extends inland for 4km. The Alkimos dune system was described by the Geological Society of Australia in 1979 as an excellent example of a complex system of parabolic dunes of Holocene age, belonging to the Quindalup dune system.

The dunes were identified by the Geological Society as having national and world significance as a record of Holocene beach activity and as an excellent example of the complex dunes that occur from Perth north to the Moore River. (Lemmon et al, 1979). The Semeniuk Research Group has also recognised the Alkimos dune system as a feature of international geoheritage significance (Semeniuk, 2004).

A portion of the proposed Site B WWTP is located on the Alkimos dune system and the quarrying required as part of the proposed Site B earthworks will sever the east-west dune ridge (Appendix 6). The EPA considers that east-west dune is a significant landscape/vegetation linkage. To protect the dune system the WWTP would need to be relocated, the EPA is mindful that this will result in a substantial change to the Alkimos-Eglinton Concept Structure Plan.

The EPA notes that the current zones and reserves in the MRS will also impact on the dune system.

### **Summary and recommendations**

Having particular regard:

- (a) that the parabolic dune in the vicinity of the Site B WWTP facility is part of a regional ecological linkage referred to as the east-west parabolic dune linkage of Yanchep and Neerabup National Parks through Bush Forever Site (BFS) 129 and BFS 130 to the coast;
- (b) the National and International significance of the Alkimos dune system; and
- (c) to the findings of the studies and modelling undertaken by CSIRO and Consulting Environmental Engineers concerning odour ponding;

it is the EPA's opinion that:

- (a) the east-west parabolic dune linkage (Area 9 – Attachment 6) should be reserved as Parks and Recreation and shall only be used for conservation, landscape and complementary purposes;
- (b) under current best WWTP practices a 600m buffer measured from the boundary of the WWTP should be reserved for Public Purposes, to prevent the siting of odour sensitive land uses within an area likely to be impacted by unacceptable odour levels from the WWTP;
- (c) if the site for the WWTP is likely to experience odour ponding then the buffer from the boundary of the WWTP should be extended to 800m west and north west. To achieve a 600m buffer an odour channel will be required to mitigate the ponding effect; and

- (d) a buffer of 450m measured from the boundary of the WWTP may be achievable in the future, but the EPA understands that the cost of odour management at the WWTP would be significant and the reduced buffer size may also limit the size of the WWTP. The EPA recommends that the possibility of reducing the width of the buffer to less than 600m be evaluated further as part of the section 38 environmental assessment of the WWTP at Sites A and B.
- (e) responsibility should rest with the Water Corporation for ensuring that the WWTP operates to the required criteria within the Public Purpose reserve.

The EPA recommends that:

- (a) a 600m buffer measured from the boundary of the WWTP should be reserved for Public Purposes, to prevent the siting of odour sensitive land uses within an area likely to be impacted by unacceptable odour levels from the WWTP;
- (b) an odour channel be provided if the site for the WWTP is likely to experience odour ponding;
- (c) an 800m buffer west and north west of the WWTP measured from the boundary of the WWTP should be reserved for Public Purposes if an odour channel is not provided and the site is subject to ponding;
- (d) the possibility of reducing the width of the buffer to less than 600m through odour control and management, be evaluated further as part of the section 38 environmental assessment of the WWTP at Sites A and B; and
- (e) the environmental factor of odour should be deferred so that this factor can be assessed in more detail during the EPA's assessment of Site A and B pursuant to section 38 of the *Environmental Protection Act 1986*.

## 5.2 Relocation of the Groundwater Treatment Plant

### Description

Amendment 1029/33 proposes to relocate the Public Purpose reserve for the Groundwater Treatment Plant (GWTP) to a site north east of the Central City Area zone (Appendices 2 and 3). The amendment also proposes a 300m buffer around the GWTP and an additional 200m wide buffer to be reserved as Parks and Recreation, Regional Road and Other Regional Road. It is proposed that 500m wide buffer area will be retained primarily for bushland and recreation and managed in association with the adjacent Alkimos Town Park.

The GWTP is proposed to be built in one stage in 2010. The GWTP will provide approximately 120ML/ day of potable water.

### Submissions

Main Roads stated in its submission that it would prefer the Mitchell Freeway and Alkimos Drive reserves to be situated outside of any recommended chlorine hazard and evacuation buffer areas.

## **WAPC response to submissions**

The WAPC is of the view that it appears very likely that the environmental impact of the GWTP will be manageable within the 500m outer buffer and possibly within the 300m radius of the Public Purposes reservation.

### **Assessment**

The relevant environmental factor considered for this component of the amendment is:

#### *Risk*

The EPA's environmental objective for this factor is to ensure that risk is managed to appropriate regulatory standards.

The required buffer distance between a GWTP and sensitive landuses is currently determined on a case by case basis.

The chlorination facilities of the GWTP will be designed and constructed in accordance with the Water Corporation's Design Standards for Chlorination Plants. These standards have been developed with a philosophy of minimising risk.

The chlorination plant will be operated and maintained in accordance with the Water Corporation's *Chlorine Hazard and Safety Management System* (CHSMS) which was reviewed by the relevant agency at the time. The CHSMS sets the necessary standards, procedures and guidelines for the design, operation and management of chlorine facilities.

The Water Corporation will require a licence to store hazardous materials on site from the Department of Consumer and Employment Protection (DoCEP).

### **Summary**

The EPA notes the:

- (a) 300m wide Public Purpose reserve around the GWTP;
- (b) additional 200m wide evacuation buffer (reserved as Parks and Recreation) around the GWTP;
- (c) Water Corporation's intention to operate and maintain the GWTP in accordance with its *Chlorine Hazard and Safety Management System*;
- (d) requirement for the Water Corporation to obtain a licence to store hazardous materials on site from the Department of Consumer and Employment Protection.

The EPA expects that the appropriate approvals in relation to the operation of the GWTP and storage of chlorine on-site be obtained by the Water Corporation from the Department of Consumer and Employment Protection prior to the construction of the plant.

## **5.3 Changes to the boundary alignment of the Parks and Recreation reserve proposed by Amendment 1029/33**

### **Description**

Amendment 1029/33 proposes seven changes to the alignment and/or relocation of the Parks and Recreation boundary as described below and shown on Appendix 2:

- Additional Parks and Recreation Reserve north of Ningana Bushland (Area 1);
- Additional Parks and Recreation Reserve south of Ningana Bushland (Area 2);

- Deletion from Parks and Recreation reserve south of Ningana Bushland (Area 3);
- Inclusion of an area adjacent to the coastal foreshore reserve on Lot M1482 (Area 4);
- Deletion of a Parks and Recreation Reserve north of the Waste Water Treatment Plant (Area 5);
- Introduction of a town park immediately north of the Alkimos Regional Centre (Area 6); and
- Rationalisation and reductions to the coastal foreshore Regional Open Space reservation (Area 7).

The EPA Service Unit has calculated that there is an 8ha increase in Parks and Recreation reservation proposed by Amendment 1029/33. However, there are several significant characteristics that would not be protected by the proposed amendment that the EPA considers need protection. These include:

- Adequate representation of all phases of the Alkimos parabolic dunes that are recognised to be of National and International significance.
- Conservation of four significant flora that were otherwise not protected, including several locations of the mallee form of Tuart (*Eucalyptus gomphocephala*). Tuart mallee is only known to occur in one other location at Dalyellup, now proposed for protection in Regional Open Space by the Greater Bunbury Region Scheme.
- Conservation of several occurrences of a threatened ecological community, *Melaleuca huegelii* – *Melaleuca acerosa* shrublands on Limestone ridges (26a). This community is unusual in this Quindalup Dunes location and its floristic composition exhibits maritime influences, thus it may be regarded to have greater significance than typical occurrences of 26a.
- Adequate protection of critical feeding habitat for Carnaby's Cockatoo which is listed as Endangered in the *Environmental Protection and Biodiversity Conservation Act 1999* and as Rare or likely to become extinct under the *WA Wildlife Conservation Act 1950*.
- Adequate protection of a regional ecological linkage between the coastal foreshore reserve and regional conservation areas to the east, including Yanchep National Park and Neerabup National Park, via Bush Forever Sites 129 and 130. This linkage is a unique bushland link that connects areas of regional and local importance, provides a cross section of the vegetation, habitats and landforms from the coast inland, and the northern arm of the largest parabolic dune of the Alkimos dunes. It should be noted that the EPA considers a minimum width for regional ecological linkages of 300-500m, however the proposed linkage reserves are narrower in isolated sections in recognition of their poor condition (such as paddock areas disturbed by grazing).

The EPA has recommended an increase in Parks and Recreation reservation of 146ha to a total of 523ha.

The changes proposed by the amendment, and additional modifications proposed by the EPA, are described in the following sections with reference to the six criteria for regional significance that were adopted for *Bushplan/Bush Forever* (1998, 2000) and the Greater Bunbury Region Scheme (Bulletin 1108, 2003) and defined in the EPA's Guidance for the Assessment of Environmental Factors No. 10 *Level of assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 region* (2003). The six criteria are:

1. Representation
2. Diversity
3. Rarity
4. Maintaining ecological processes or natural systems
5. Scientific or evolutionary importance
6. Protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

It should be noted that the EPA recognises the majority of the Alkimos-Eglinton area is regionally significant, satisfying all six criteria, and it would be desirable to reserve all of the site, particularly with regards to the protection of the entire Alkimos parabolic dune formation in its intact state, and protection of critical feeding habitat for Carnaby's Cockatoo. However, it is acknowledged that the area has been identified as part of the north-west corridor for a number of decades.

### **5.3.1 Additional Parks and Recreation Reserve north of Ningana Bushland (Area 1)**

#### **Description**

Amendment 1029/33 proposes an additional 11.2ha of Parks and Recreation reserve at Area 1a to expand the width of the corridor and increase the connectivity of the Ningana Parks and Recreation reserve to the coast (Appendix 2).

#### **Submissions**

The Urban Bushland Council, Wildflower Society and the Quinns Rocks Environment Group support the addition of the Parks and Recreation reserve as proposed by Amendment 1029/33 for Area 1a.

The Quinns Rocks Environment Group state that in fact a broader corridor should be retained between the coast and the national park.

#### **WAPC Response to submissions**

The WAPC advises that the Parks and Recreation reserve for Area 1a as proposed by Amendment 1029/33 is supported.

#### **Assessment**

##### *Vegetation*

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA considers that Areas 1a and 1b form part of a larger natural area of outstanding regional significance, the Ningana Bushland. Area 1a and 1b contain a consolidated vegetated area of Quindalup Dunes and are centred on the dune landform and protect a population of *Eucalyptus gomphocephala* mallee (Appendix 6).

##### *Fauna*

The EPA's environmental objective for this factor 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 improvement in knowledge.



One of the natural attributes that contribute to Areas 1a and 1b being regionally significant is that it is the location for critical habitat for White-breasted Robin. It is also the location for at least four other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.

### *Regional Significance*

Areas 1a and 1b are considered to be regionally significant natural areas meeting five criteria. The natural attributes of Areas 1a and 1b that contribute to meeting the criteria are listed below.

- Representation of Ecological Communities
  - Intact vegetated parabolic Quindalup Dunes; and
  - Representative area of natural vegetation in *Very Good* to *Good* condition of the Quindalup Vegetation Complex.
- Diversity
  - A highly diverse area with respect to diversity of Quindalup Dunes, upland vegetation units and habitat.
- Rarity
  - Location for three significant flora taxa. Of particular interest is the population of *Eucalyptus gomphocephala* mallee; and
  - Location for five bird species listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.
- Maintaining Ecological Processes and Natural Systems
  - Part of a regional ecological linkage: Yanchep National Park to the coast (east-west).
- General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation.

The EPA does not consider that the Parks and Recreation reserve proposed by Amendment 1029/33 (Area 1a only) adequately protects the regionally significant values in this area.

There is a population of *Eucalyptus gomphocephala* mallee situated in Area 1b that is outside of the Parks and Recreation reserve proposed by Amendment 1029/33 (Area 1a). Area 1b also provides critical habitat for the White-breasted Robin and is habitat for at least four other bird species which are conservation significant species.

Furthermore, the northern boundary of Area 1a bisects a dune landform. Therefore, the EPA recommends that the Parks and Recreation reserve boundary be realigned, to include Area 1b as well as Area 1a, so that the reserve includes the *Eucalyptus gomphocephala* mallee population and avoids bisecting the dune.

The EPA considers that Area 1c does not have any special regional conservation value because the values attributed to Area 1c are considered to be conserved in other area, the vegetation is *Degraded* to *Completely Degraded* and will be partly isolated by the construction of Marmion Ave.

## Summary and recommendations

Having particular regard to the:

- (a) location of Areas 1a and 1b within a regional ecological linkage;
- (b) impact that the proposed Parks and Recreation reserve boundary alignment will have on dune landform by bisecting it;
- (c) location of a population of *Eucalyptus gomphocephala* mallee situated outside of the Parks and Recreation reserve proposed by Amendment 1029/33 (the mallee is situated in Area 1b); and
- (d) area being critical habitat for the White-breasted Robin and habitat value for at least four other conservation significant bird species; and

it is the EPA's opinion that the Parks and Recreation reserve proposed by Amendment 1029/33 (Area 1a only) does not meet the EPA's objectives in relation vegetation and fauna in this area.

The EPA recommends that:

- (a) the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned, to include Area 1b, as well as 1a to conserve these regionally significant natural areas; and
- (b) Area 1c does not have regional conservation values.

### 5.3.2 Additional Parks and Recreation Reserve south of Ningana Bushland (Area 2)

#### Description

Amendment 1029/33 proposes to increase the corridor linkage (Area 2a) between the coast and inland Parks and Recreation reserve by up to 450m south of the Ningana Bushland. The proposed addition of this area would increase the reservation of the Spearwood Dunes to be included in the Ningana Parks and Recreation reserve by approximately 38.2ha (Appendix 6).

The WAPC propose that this lateral wedge will accommodate regional and district recreation and other public functions consistent with the reservation in addition to conservation functions.

#### Submissions

The Urban Bushland Council and the Wildflower Society support the proposed addition of Parks and Recreation reserve at Area 2a.

#### WAPC response to submissions

The WAPC advises that the Parks and Recreation reserve for Area 2a as proposed by Amendment 1029/33 is supported.

#### EPA Assessment

##### *Vegetation*

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA considers that Areas 2a and 2b form part of a larger natural area of outstanding regional significance, the Ningana Bushland. This area contains a consolidated vegetated area of Quindalup Dunes. Areas 2a and 2b are centred on the dune landform.

#### *Fauna*

The EPA's environmental objective for this factor 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 improvement in knowledge.

One of the natural attributes that contribute to Areas 2a and 2b being regionally significant is that it is the location for critical habitat for Carnaby's Cockatoo. It is also the location for at least nine bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.

#### *Regional Significance*

Areas 2a and 2b are considered to be regionally significant natural area meeting the following four criteria:

- Representation of Ecological Communities
  - Intact vegetated Quindalup Dunes; and
  - Representative area of natural vegetation in *Very Good* to *Good* condition of the Quindalup Vegetation Complex.
- Diversity
  - A highly diverse area with respect to diversity of Quindalup Dunes, upland vegetation units, habitat, flora and fauna species.
- Rarity
  - - Location for critical habitat for Carnaby's Cockatoo; and  
Location for at least nine bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.
- Maintaining Ecological Processes and Natural Systems.
  - Part of a regional ecological linkage: Yanchep National Park to the coast (east-west).

The EPA does not consider that the Parks and Recreation reserve proposed by Amendment 1029/33, south of the Ningana Bushland (Area 2a only) adequately protects the regionally significant values in this area.

The southern boundary of the Parks and Recreation reserve proposed by Amendment 1029/33, south of the Ningana Bushland, (Area 2a) bisects a dune landform and a *Banksia attenuata*, *Banksia menziesii* Low Woodland which is critical habitat for Carnaby's Cockatoo. Therefore, the EPA recommends that the Parks and Recreation reserve boundary be realigned, to include Area 2b as well as Area 2a, so that the reserve avoids bisecting the dune and includes all of the *Banksia attenuata*, *Banksia menziesii* Low Woodland. The EPA considers that this will improve the management of the woodland by reducing the likelihood of weed invasion.

#### **Summary and recommendations**

Having particular regard to the:

- (a) location of Areas 2a and 2b within a regional ecological linkage;
- (b) presence of critical habitat for Carnaby's Cockatoo (*Banksia attenuata*, *Banksia menziesii* Low Woodland);
- (c) area being habitat for at least nine other conservation significant bird species; and
- (d) impact that the proposed Parks and Recreation boundary alignment will have on the habitat by bisecting it;

it is the EPA's opinion that the Parks and Recreation reserve proposed by Amendment 1029/33 (Area 2a only) does not meet the EPA's objectives in relation vegetation and fauna values in this area.

The EPA recommends that the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned to include Area 2b, as well as Area 2a to conserve these regionally significant natural areas.

### **5.3.3 Deletion from Parks and Recreation Reserve south of Ningana Bushland (Area 3)**

#### **Description**

Amendment 1029/33 proposes the deletion of 56.7ha of Parks and Recreation reserve, south of the Ningana Bushland, and rezoning the land for urban purposes (Areas 3a and 3b)(Appendix 6).

#### **Submissions**

The Wildflower Society and the Urban Bushland Council oppose the proposed deletion of Parks and Recreation reserve (Area 3) as it will result in a net loss of vegetation within Bush Forever site 289.

#### **WAPC response to submissions**

The WAPC advises that deletion of the Area 3 Parks and Recreation reserve as proposed by Amendment 1029/33 is supported.

#### **EPA Assessment**

##### *Vegetation*

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA considers that Area 3a forms part of a larger natural area of outstanding regional significance, the Ningana Bushland. This area contains a consolidated vegetated area of Quindalup Dunes.

##### *Fauna*

The EPA's environmental objective for this factor 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 improvement in knowledge.

One of the natural attributes that contribute to Area 3a being regionally significant is that it is the location of critical habitat for Carnaby's Cockatoo. It is also the location for at least six bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.

### *Regional Significance*

Area 3a is considered to be a regionally significant natural area meeting four criteria. The natural attributes of Area 3a that contribute to meeting the criteria are listed below:

- Representation of Ecological Communities
  - Intact vegetated Quindalup Dunes; and
  - Representative area of natural vegetation in *Very Good* to *Good* condition of the Quindalup Vegetation Complex.
- Diversity
  - A highly diverse area with respect to diversity of Quindalup Dunes, upland vegetation units, habitat, flora and fauna species.
- Rarity
  - Location for critical habitat for Carnaby's Cockatoo; and
  - Location for at least six bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.
- Maintaining Ecological Processes and Natural Systems
  - Part of a regional ecological linkage: Yanchep National Park to the coast (east-west).

The EPA recommends modifying the alignment of the Parks and Recreation boundary proposed by Amendment 1029/33 to include Area 3a and concurs with the WAPC's decision to exclude Area 3b from the Parks and Recreation reserve.

The alignment of the Parks and Recreation reserve boundary proposed by Amendment 1029/33 is not considered suitable in this location as it:

- bisects the dune landform; and
- does not adequately protect the diversity of Quindalup Dunes, upland vegetation units, habitat, and flora and fauna species in this location.

### **Summary and recommendations**

Having particular regard to the:

- (a) location of Areas 3a within a regional ecological linkage;
- (b) presence of critical habitat for Carnaby's Cockatoo; and
- (c) area being habitat for at least six other conservation significant bird species;

it is the EPA's opinion that the realignment of the Parks and Recreation reserve proposed by Amendment 1029/33 does not meet the EPA objectives in relation vegetation and fauna values in this area.

The EPA recommends that the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned to include Area 3a to conserve this regionally significant natural area.

### **5.3.4 Inclusion of a Parks and Recreation reserve adjacent to the coastal foreshore reserve on Lot M1482 (Area 4)**

#### **Description**

Amendment 1029/33 proposed reserving an area of approximately 20ha as Parks and Recreation on the northern boundary of Lot M1482 adjacent to the coast (referred to as Area 4). The environmental approval for the proposed Eglinton Marina and golf course (Bulletin No. 500)(EPA, 1991a) includes the transfer to the State a foreshore and dune reserve on the

southern boundary of Lot 11, in exchange for land transfers elsewhere. Area 4 was proposed to provide an appropriate interface to this reserve and replace the Parks and Recreation reserve being deleted to the north of the WWTP (Area 5). However, as described in the WAPC's response to submissions this proposed reservation is no longer supported by the WAPC (Appendix 6).

### **Submissions**

WR Carpenter Holdings Pty Ltd, the owners of Lot M1482, strongly object to the proposed reservation of Area 4 for Parks and Recreation.

CALM and the Wildflower Society question the long term viability of Area 4.

### **WAPC response to submissions**

The WAPC has advised that it does not consider the 20ha Parks and Recreation reserve (Area 4) proposed in Amendment 1029/33 to be appropriate. The WAPC advises that the Floristic Communities on the subject land are not threatened and are present within seven other Parks and Recreation reserves. This, combined with the relatively small area to be reserved has lead the WAPC to the conclusion that the reservation is not appropriate. Furthermore, part of the planning logic for the proposal is to provide an area of Parks and Recreation reserve to round off the golf course proposal on the land immediately to the north. However, the golf course may not eventuate.

The WAPC response to submissions concludes that in the absence of strong evidence as to the environmental value of Area 4 and the appropriateness of the shape and size of the reservation, it is the WAPC's view that this component of the amendment should not proceed.

### **EPA Assessment**

#### *Regional Significance*

Area 4 is considered to be a regionally significant natural area meeting two criteria. The natural attributes of Area 4 that contribute to meeting the criteria are listed below:

- Representation of Ecological Communities
  - Intact vegetated Quindalup Dunes of two phases; and
  - Intact vegetation Tamala Limestone surfaces.
- General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation
  - Representative area of natural vegetation in *Very Good* to *Good* condition of the Quindalup and Cottesloe Central and South Vegetation Complexes.

Amendment 1029/ intends to replace Area 5 Parks and Recreation reserve with Area 4, although Area 4 is not considered to have exceptional values. Area 4 is not considered an adequate replacement for the Area 5 because:

- Proposed future development surrounding Area 4 will isolate this site and further reduce its linkage value;
- Area 4 does not contribute to an east-west regional ecological linkage;
- Area 4 does not contain a significant area of the main Alkimos parabolic dune which is a geoheritage site recognised as of National and International significance;
- the limestone heath community that occurs at Area 4 is unlikely to be a threatened ecological community 26a (which does occur at Area 5);

- it is not known to contain a high number of Priority listed and significant flora species like that observed at Area 5; and
- it does not contain critical habitat for Carnaby's Cockatoo.

### **Summary and recommendations**

It is the EPA's opinion that natural values of Area 4 do not justify including the area within a Parks and Recreation reserve.

### **5.3.5 Deletion of the Parks and Recreation Reserve north of the Waste Water Treatment Plant (Area 5)**

#### **Description**

Amendment 1029/33 proposed to delete a 38ha area of Parks and Recreation reserve east of the coastal foreshore reservation and immediately north of the WWTP site and include it in the Urban zone (Areas 5a, 5b, 5c and 5d). The land was originally reserved as Parks and Recreation in the MRS to protect an area of near coastal limestone heath vegetation.

#### **Submissions**

CALM and the Urban Bushland Council oppose the rezoning of Area 5 from Parks and Recreation reserve to Urban as this area contains

- vegetation in much better condition than the proposed Area 4;
- populations of Priority 3 species; and
- forms part of a link between the coast and the Alkimos Town Park.

#### **WAPC response to submissions**

The WAPC is concerned that the perimeter of this reservation does not relate well to either the relocation of the WWTP, the Public Purpose reservation for the launching of the ocean outfall sewer or the urban structure shown in the District Concept Structure Plan. The WAPC is also mindful of the need to maximise the development of land within the north west corridor in order to minimise the need to further expand the metropolitan area.

The WAPC response to submissions advice concludes that only so much of Area 5 as is necessary for the protection of the environment, should be reserved for Parks and Recreation.

#### **EPA Assessment**

##### *Vegetation*

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA considers that Areas 5a and 5d form part of a larger natural area of outstanding regional significance. This area contains a consolidated vegetated area of Quindalup dunes of various phases, and Spearwood sands and limestones. Areas 5a and 5d are centred on the dune landform and the limestone surface where greatest flora of significance and several occurrences of a threatened ecological community are located.

### *Fauna*

The EPA's environmental objective for this factor 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 improvement in knowledge.

One of the natural attributes that contribute to Areas 5a and 5d being regionally significant is that it is the location for critical habitat for Carnaby's Cockatoo. It is also the location for at least seven other bird species which are listed in *Bush Forever* as conservation significant species on the Coastal Plain.

### *Geoheritage*

The EPA's environmental objective for this factor is to ensure that changes to the biophysical environment do not adversely affect geoheritage values.

Areas 5a and 5d contains parabolic Quindalup Dunes of various phases that overlie Spearwood Dunes. This is an important geoheritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity and is recognised as having National and International significance (Lemon *et al.* 1979; Semeniuk and Semeniuk 2000).

### *Regional Significance*

Areas 5a and 5d are considered to be a regionally significant natural areas meeting five criteria. The natural attributes of Areas 5a and 5d Parks and Recreation that contribute to meeting the criteria are listed below:

- Representation of Ecological Communities
  - Intact vegetated Quindalup Dunes of various phases;
  - Intact vegetation Spearwood sands and Tamala Limestone surfaces; and
  - Representative area of natural vegetation in Very Good to Good condition of the Quindalup and Cottesloe Central and South Vegetation Complexes.
- Diversity
  - A highly diverse area with respect to diversity of Quindalup and Spearwood Dunes, upland vegetation units, habitat, flora and fauna species.
- Rarity
  - Location of an occurrence of a Threatened Ecological Community (26a);
  - Location for five Priority flora and 10 significant flora that are listed in *Bush Forever*; and
  - Location for a significant fauna taxa, Carnaby's Cockatoo and at least seven other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.
- Maintaining Ecological Processes and Natural Systems
  - Part of two regional ecological linkages: north-south coastal reserve; and east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast.
- Scientific or Evolutionary Importance
  - Important geoheritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity.



Amendment 1029/33 proposes to remove the Parks and Recreation reservation from this location and to zone it Urban (Areas 5a, 5b, 5c). The EPA does not support all of this proposal as it would not adequately protect:

- the diversity of Quindalup dunes phases, Spearwood dunes and Tamala Limestone surfaces, upland vegetation units, habitat, flora and fauna species in this location;
- five Priority flora and 10 flora that are listed as significant in *Bush Forever*;
- habitat for a significant fauna taxa, Carnaby's Cockatoo and at least seven other bird species which are listed in *Bush Forever* as conservation significant species on the Coastal Plain;
- the regional ecological linkage that connects Yanchep and Neerabup National Parks, through Bush Forever Site 129 and Bush Forever Site 130, to the coast; and
- part of a geoheritage site recognised as of National and International significance.

Therefore, the EPA recommends not supporting the removal of the reservation at Area 5a. Should the reservation be lifted and Area 5a be zoned Urban, the regionally significant values of this area highlighted above would not be adequately protected, and this may subsequently result in significant negative impacts to those values.

The EPA recommends modifying the boundary to include Areas 5a and 5d and exclude Areas 5b and 5c, on the basis that:

- the current boundary bisects the parabolic dune landform at Area 5c;
- the boundary of the regional linkage should be widened at Area 5d; and
- values within Areas 5b and 5c, while significant and desirable to retain if possible are protected elsewhere on the site.

### **Summary and recommendations**

Having particular regard to the:

- (a) diversity of vegetation units, habitat, flora and fauna species in Areas 5a and 5d
- (b) presence of five Priority flora and 10 flora that are listed as significant in *Bush Forever*;
- (c) habitat for a significant fauna taxa, Carnaby's Cockatoo and at least seven other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain;
- (d) location of Areas 5a and 5d within a regional ecological linkage that connects Yanchep and Neerabup National Parks, through Bush Forever Site 129 and Bush Forever Site 130, to the coast; and
- (e) presence of part of a geoheritage site recognised as of National and International significance in Areas 5a and 5d.

it is the EPA's opinion that the deletion of the Parks and Recreation reserve in Area 5a as proposed by Amendment 1029/33 does not meet the EPA's objectives in relation vegetation, fauna and geoheritage in this area.

The EPA recommends that:

- (a) Amendment 1029/33 be modified to reserve Areas 5a and 5d as Parks and Recreation reserve to conserve these regionally significant natural areas;
- (b) Area 5b not be reserved Parks and Recreation; and
- (c) Area 5c be deleted from the Parks and Recreation reserve.

### **5.3.6 Introduction of a town park immediately north of the Alkimos Regional Centre (Area 6)**

#### **Description**

Amendment 1029/33 proposes a reservation for Parks and Recreation for an area comprising *Banksia* woodland and limestone heath immediately north of the Central City Area zone to form a town park (Areas 6a and 6b). The WAPC advises that the southern boundary of the reservation is proposed to include the northern edge of the parabolic dune, a significant landform feature that will provide a backdrop to the Alkimos Regional Centre (Appendix 2 and 6).

The proposed town park will abut the Public Purposes reservation for the GWTP, and the WAPC envisage that much of the treatment plant buffer will be retained as bushland and managed with the town park (Area 3). The total area proposed for reservation as Parks and Recreation in this area is approximately 66ha.

#### **Submissions**

The Urban Bushland Council notes that the rail reserve fragments the proposed Parks and Recreation reserve and would support the railway being realigned so that it does not impact on the reserve.

#### **WAPC response to submissions**

The WAPC advises that the Parks and Recreation reserve for Area 6 as proposed by Amendment 1029/33 is supported. However, the WAPC is concerned that the area is fragmented by the existing Railway reservation. The WAPC has advised that it is intended to rectify this by amending the MRS to provide a railway reserve to the west of Area 6, in accordance with the Draft Concept Structure Plan (Appendix 3).

#### **EPA Assessment**

##### *Vegetation*

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA considers that Areas 6a and 6c form part of a larger natural area of outstanding regional significance. This area contains a consolidated vegetated area of Quindalup and Spearwood Dunes. Areas 6a and 6c also maintain the regional ecological linkage between the coast and the Yanchep and Neerabup National Parks.

##### *Fauna*

The EPA's environmental objective for this factor 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 improvement in knowledge.

One of the natural attributes that contribute to Areas 6a and 6c being regionally significant is that it is the location for critical habitat for Carnaby's Cockatoo. It is also the location for at

least eight other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.

#### *Geoheritage*

The EPA's environmental objective for this factor is ensure that changes to the biophysical environment do not adversely affect geoheritage values.

The area contains part of a parabolic Quindalup Dune that is an important geoheritage site and is recognised as having National and International significance (Lemon *et al.* 1979; Semeniuk and Semeniuk 2000).

#### *Regional Significance*

Areas 6a and 6c are considered to form a regionally significant natural area meeting five criteria. The natural attributes of areas 6a and 6c that contribute to meeting the criteria are listed below:

- Representation of Ecological Communities
  - intact vegetated parabolic Quindalup Dunes (Q2 phase) adjacent to intact vegetated Spearwood sands and limestone surfaces; and
  - Representative area of natural vegetation in *Very Good* to *Good* condition of the Quindalup and Cottesloe Central and South Vegetation Complexes.
- Diversity
  - A highly diverse area with respect to diversity of upland vegetation units and habitat.
- Rarity
  - Location for a significant fauna taxa, Carnaby's Cockatoo and at least eight other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.
- Maintaining Ecological Processes and Natural Systems
  - Part of a regional ecological linkage: east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast BFS 397.
- Scientific or Evolutionary Importance
  - Important geoheritage site recognised as of National and International significance.

The current configuration of the Parks and Recreation reserve (Areas 6a and 6b) as proposed by Amendment 1029/33 is not considered suitable to protect all values in this location as it:

- does not protect the important geoheritage site in this location; and
- bisects the dune landform.

Therefore the EPA recommends modifying the boundary to include area 6c and exclude area 6b, on the basis that:

- including 6c will protect the important geoheritage site;
- by including 6c, the Parks and Recreation reserve boundary will not bisect the parabolic dune landform; and
- values within area 6b, while significant and desirable to retain if possible, are protected elsewhere on the site.

The EPA supports the realignment of the Railway Reservation as part of a future amendment to the Metropolitan Region Scheme to avoid the fragmentation of the geoheritage and landform values within the recommended Parks and Recreation reserve.

### **Summary and recommendations**

Having particular regard to the:

- (a) location of Areas 6a and 6c within a regional ecological linkage; and
- (b) impact that the alignment of the Parks and Recreation reserve as proposed by Amendment 1029/33 will have on the important geoheritage values of the parabolic dune;

it is the EPA's opinion that the realignment of the Parks and Recreation reserve as proposed by Amendment 1029/33 does not meet the EPA objectives in relation vegetation, fauna and geoheritage in this area.

The EPA recommends that:

- (a) the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned to include Area 6c, as well as Area 6a; and
- (b) Area 6b not be reserved Parks and Recreation.

### **5.3.7 Rationalisation and reductions to the coastal foreshore Regional Open Space reservation (Area 7)**

#### **Description**

The WAPC advises that the width of the current coastal MRS foreshore reservation is based on the *Alkimos Eglinton Coastal Planning Strategy* (1993) and generally has a setback in excess of 100m increasing to 300-400m south of the Water Corporation site (Lot 101) to accommodate Karli Springs (an Aboriginal site) and representative Quindalup dunes.

The boundary of the foreshore reserve was defined on the basis of the *draft Guidelines for Coastal Protection* at that time as published by the then Department for Planning and Urban Development (now the Department for Planning and Infrastructure). These guidelines suggested a general boundary approximately 100m in-shore from the first line of permanent vegetation along the coast. This width was varied according to assessments of the erosion potential of the coast at each specific location, and the landforms and vegetation in the vicinity of the 100m setback. The reserve width was increased or reduced so that the boundary went around rather than through prominent features. However, where there was no evidence of limestone cliffs within 100m of the coast, either exposed or buried under more recent dunes, the reserve was made wider to provide a safety margin in case of increased coastal erosion associated with a rise in sea level.

The coastal foreshore reservation is proposed to be reduced in the western portion of Lot 102 to accommodate a coastal node. The landowners have prepared Report *No. 5: Alkimos Eglinton MRS Amendment 1029/33 – Coastal Planning Strategy* (WAPC; 2003e) in support of a reduction below the current coastal setback to accommodate a coastal node.

The proposed coastal node on Lot 102 will provide for the development of a range of public and private facilities including residential development in the proximity to the district's best regional beach, and directly west of the Alkimos Regional Centre. The proposed width of the Regional Open Space Reserve at this coastal node is approximately 115m east of the vegetation line.

It is separately proposed in the south western portion of Lot 102 to reduce the reservation from its current width varying from 250 – 350m from the vegetation line to a width varying from 150-350m (Area 7b). This is to allow more direct access to the coast's regional beaches from the Urban zoned hinterland while retaining major topographic and vegetation features. The foreshore reserve remains wide in the southern most extremity to accommodate and protect the catchment area of Karli Spring and surrounding representative examples of Quindalup dunal systems, but has been adjusted for better topographic fit.

### **Submissions**

The Urban Bushland Council, Wildflower Society of Western Australia, Quinns Rocks Environmental Group and CALM do not support the proposed reduction of the width of the coastal foreshore.

The Urban Bushland Council states that the foreshore reserve provides a critical regionally significant ecological linkage along the coast, contains Karli Spring and highly saline seasonal wetlands. The Wildflower Society consider that the health of Karli Springs will be compromised by the reduction of the foreshore reserve.

The Department of Indigenous Affairs (DIA) has advised in its submission that some registered Aboriginal sites may be affected by the Alkimos-Eglinton development.

The DIA has further advised that any person requiring to use the land on which the sites are located must obtain the consent of the Minister for Indigenous Affairs under section 18 of the *Aboriginal Heritage Act 1972*.

### **WAPC response to submissions**

The WAPC advises that the Area 7a Parks and Recreation reserve as proposed by Amendment 1029/33 is supported. The WAPC has advised that the reduction in the width of the foreshore reserve proposed by Amendment 1029/33 is supported because of the overall sustainability benefits that will arise from a well designed coastal village, providing amenity to the Alkimos regional beach and well connected by public transport to the proposed Alkimos train station.

The WAPC advises that the reduction in the width of the Parks and Recreation reserve in the vicinity of Karli Springs (Area 7b) as proposed by Amendment 1029/33 is not supported. The WAPC is concerned that the Parks and Recreation reserve boundary does not provide for beach access and parking facilities, and that such facilities should be provided outside the immediate catchment of Karli Springs.

The WAPC has advised that DPI will work with the Department of Indigenous Affairs to ensure compliance with the *Aboriginal Heritage Act 1972*.

### **EPA Assessment**

#### *Vegetation*

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA consider that Areas 7b and 7c form part of a larger natural area of outstanding regional significance, the Coastal strip from Wilbinga to Mindarie. This area contains a consolidated vegetated area of Quindalup Dunes. Areas 7b and 7c are centred on the dune landform and protect an excellent population of *Allocasuarina lehmanniana* Closed Heath that is not recorded elsewhere in the area.

### *Fauna*

The EPA's environmental objective for this factor 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.

One of the natural attributes that contribute to Area 7b and 7c being regionally significant is that it is the location of at least five bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain and the Threatened Carnaby's Cockatoo.

### *Regional Significance*

Areas 7b and 7c are considered to be a regionally significant natural areas meeting four criteria. The natural attributes of Areas 7b and 7c that contribute to meeting the criteria are listed below:

- Diversity
  - A highly diverse area with respect to diversity of vertebrate fauna species especially birds.
- Rarity
  - Location for a significant fauna taxa, Carnaby's Cockatoo and at least four other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.
- Maintaining Ecological Processes and Natural Systems
  - Part of a regional north-south coast ecological linkage: coastal foreshore reserve Bush Forever Site 397.
- General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation.

The EPA does not support the deletion of Area 7b from the Parks and Recreation as proposed by Amendment 1029/33 reserve because it provides a consolidated reserve of sufficient habitat size that can maintain important breeding and feeding habitat surrounding Karli Springs and the *Allocasuarina* thicket for significant fauna including Carnaby's Cockatoo and conservation significant bird species.

### *Aboriginal heritage*

The EPA's objective for this factor is to ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.

An Aboriginal site survey was commissioned by Landcorp (O'Connor, 1990) for the localities of Clarkson, Eglinton and Alkimos. The survey recorded a freshwater spring within Lot 102, known to Aboriginal people as Karli Spring.

Karli Spring is a site of mythical significance as it is inhabited by the Waugal. The Waugal is referred to as a 'water creative, spiritual force with a serpentine physical manifestation'. It is the Aboriginal people's wish that the entire area enclosed by the surrounding dunes (an area of approximately 200m x 250m) be recorded as a sphere of influence by the Waugal.

The EPA advises that further detailed Aboriginal site survey should be conducted as part of the detailed planning for the area and any recommendations required as subdivision or development condition.

## Summary and recommendations

Having particular regard to the:

- (a) intact vegetated parabolic coastal Quindalup Dunes;
- (b) the location for four significant fauna and the Threatened Carnaby's Cockatoo;
- (c) location of Areas 7b and 7c within a regional north-south coast ecological linkage;
- (d) The need to provide a consolidated reserve of sufficient habitat size surrounding Karli Springs and the *Allocasuarina* thicket that provide important habitat for significant fauna including Carnaby's Cockatoo and conservation significant bird species;
- (e) The current Parks and Recreation boundary bisects the dune landform between Areas 7b and 7c; and
- (f) significance of Karli Springs to Aboriginal people;

it is the EPA's opinion that:

- (a) the realignment of the Parks and Recreation reserve proposed by Amendment 1029/33 does not adequately meet the EPA's objectives in relation vegetation, fauna values in this area; and
- (b) the environmental factor of Aboriginal heritage should be deferred until the subdivision or development stages, whichever comes first, so that a more detailed consideration of the potential environmental impacts of urban development can be undertaken by the EPA pursuant to section 38 of the *Environmental Protection Act 1986*.

Therefore, the EPA recommends modifying the boundary to include Area 7b and 7c and exclude Area 7a, on the basis that:

- (a) including Areas 7b and 7c will protect the parabolic coastal dunes and Karli Springs;
- (b) Areas 7b and 7c are located within a regional north-south coast ecological linkage; and
- (c) values within Area 7a, while significant and desirable to retain if possible, are protected elsewhere on the site.

## 5.4 Transfer from Public Purpose reserve to Urban zone (Area 8)

### Description

Area 8 is currently reserved for Public Purposes for the buffer area of the WWTP located at Site A. Amendment 1029/33 proposes to transfer it from Public Purpose reserve to Urban.

### EPA Assessment

#### *Regional significance*

Area 8 is considered to be a regionally significant natural area meeting five criteria. The natural attributes of Area 8 that contributes to meeting the criteria are listed below:

- Representation of Ecological Communities

- intact vegetated Quindalup Dunes of various phases;
  - intact vegetation Spearwood sands and Tamala Limestone surfaces; and
  - representative area of natural vegetation in Good condition of the Quindalup and Cottesloe Central and South Vegetation Complexes;
- Diversity
    - highly diverse area with respect to diversity of upland vegetation units, habitat, flora and fauna species;
  - Rarity
    - location for five Priority flora and 10 significant flora that are listed in *Bush Forever*;
    - location of three occurrences of a Threatened Ecological Community (26a) listed by CALM; and
    - location for a significant fauna taxa, Carnaby's Cockatoo and at least three bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.
  - Scientific or Evolutionary Importance and General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation
    - part of two regional ecological linkages: North-south coastal reserve; and east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast; and
    - important geohéritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity.

Some significant attributes, that provide this area with values that fulfil the Diversity, Rarity and Scientific Importance criteria, would be protected within an area that is proposed for protection by the EPA (Area 9). Similar values are found in Area 5 in generally better condition. Area 8 is poorly connected to the north-south and east-west regional ecological linkage and is constrained by the proposed coastal node and dissected by Water Corporation's proposed pipeline construction area.

Therefore the EPASU considers that the values within Area 8, while desirable to retain if possible, are protected elsewhere on the site.

#### **Summary and recommendations**

Having particular regard that;

- (a) the areas of regional significance in Area 8 are adequately represented in Areas 5 and 9;
- (b) Area 8 is poorly connected to the north-south and east-west regional ecological linkage and is constrained by the proposed coastal node and dissected by Water Corporation's proposed pipeline construction area.

it is the EPA's opinion that the natural values of Area 8 do not justify including the area within a Parks and Recreation reserve.



## **5.5 East-west parabolic dune linkage (Area 9)**

### **Description**

The EPA proposes an additional area of Parks and Recreation area reserve in addition to the area of Parks and Recreation advertised in Amendment 1029/33.

The WAPC advise that the parabolic dune is proposed to be included in a special development zoning in the District Structure Plan to ensure protection of its landscape and visual qualities.

### **Submissions**

The Urban Bushland Council notes in its submission that the Environmental Review does not demonstrate how the dune ridge will be managed.

### **Assessment**

Amendment 1029//3 does not propose to include Area 9 within a Parks and Recreation reserve. The majority of Area 9 is proposed to be zoned as either Urban, Central City Area or Urban Deferred, with a smaller area proposed to be reserved as Public Purpose. This would not adequately protect the regionally significant values of this area that are highlighted below, and specifically would not retain the regionally significant ecological linkage and contiguous dune landform, and would subsequently result in significant negative impacts to those values.

#### *Vegetation*

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA considers that Area 9 forms part of a larger natural area of outstanding regional significance. This area contains a consolidated vegetated area of Quindalup dunes of various phases, and Spearwood sands and limestones. Area 9 is centred on the dune landform and the limestone surface where greatest flora of significance and occurrences of a threatened ecological community are located.

#### *Fauna*

The EPA's environmental objective for this factor 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.

One of the natural attributes that contribute to Area 9 being regionally significant is that it is the location for critical habitat for Carnaby's Cockatoo. It is also the location for at least seven other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain.

#### *Geoheritage*

The EPA's environmental objective for this factor is ensure that changes to the biophysical environment do not adversely affect geoheritage values.

Area 9 contains parabolic Quindalup Dunes of various phases that overlie Spearwood Dunes. This is an important geoheritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity and are recognised as having National and International significance (Lemon et al. 1979; Semeniuk and Semeniuk 2000).

### *Regional Significance*

Area 9 is considered to be a regionally significant natural area meeting five criteria. The natural attributes of Areas 5a and 5d Parks and Recreation that contribute to meeting the criteria are listed below.

- Representation of Ecological Communities
  - Intact vegetated parabolic Quindalup Dunes of 4 phases (Q1, Q2, Q3 and Qp);
  - Intact vegetation Spearwood sands and Tamala Limestone surfaces; and
  - Representative area of natural vegetation in *Very Good* to *Good* condition of the Quindalup and Cottesloe Central and South Vegetation Complexes.
- Diversity
  - A highly diverse area with respect to diversity of Quindalup and Spearwood Dunes, vegetation associations, fauna habitats, and flora and fauna species.
- Rarity
  - Location for five Priority flora and 10 significant flora that are listed in *Bush Forever*;
  - Location for a significant fauna taxa, Carnaby's Cockatoo and at least seven other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain; and
  - Location of an occurrence of a Threatened Ecological Community (26a).
- Maintaining Ecological Processes and Natural Systems
  - Part of a regional ecological linkage: east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast.
- Scientific or Evolutionary Importance
  - Important geoheritage site recognised as of National and International significance.

### **Summary and recommendations**

Having particular regard to the:

- (a) location of an occurrence of a Threatened Ecological Community (26a) listed by CALM;
- (b) important feeding habitat for a significant fauna taxa, Carnaby's Cockatoo and at least seven other bird species which are listed in *Bush Forever* as conservation significant species on the Swan Coastal Plain;
- (c) part of a regional ecological linkage: east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast;
- (d) part of a geoheritage site recognised as of National and International significance; and
- (e) location for 15 significant flora taxa. Of these, five are Priority flora.

it is the EPA's opinion that Area 9 (Appendix 6) be reserved as Parks and Recreation in order to meet the EPA's objectives in relation vegetation, fauna and geoheritage in this area.

The EPA recommends that Amendment 1029/33 be modified to reserve Area 9 as Parks and Recreation reserve.

## 5.6 Relevant environmental principle/s

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in section 48A of the *Environmental Protection Act 1986*. Table 2 (Appendix 7) contains a summary of the EPA's consideration of the principles.

## 6. Conditions

Section 48D of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to Amendment 1029/33 and on the conditions to which the proposed scheme amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

Having considered the Responsible Authority's environmental management measures and the information provided in this report, the EPA has developed a set of conditions. These conditions are presented in Appendix 11. Matters addressed in the conditions include the following:

Amendment 1029/33 be modified to include the following:

1. additional Public Purpose reserve surrounding the Waste Water Treatment Plant;
2. additional Parks and Recreation Reserve north of Ningana Bushland;
3. additional Parks and Recreation Reserves south of Ningana Bushland;
4. additional Parks and Recreation Reserve north of the Waste Water Treatment Plant;
5. additional Parks and Recreation reserve north of the Alkimos Regional Centre;
6. additional Parks and Recreation reserve adjacent to Karli Springs; and
7. additional Parks and Recreation reserve for the East-west parabolic dune linkage.

## 7. Other Advice

In addition to the above environmental conditions the EPA provides advice and comment on the following matters related to Amendment 1029/33 and the future development of the Alkimos-Eglinton area:

### 1 Deferred factors

A number of environmental factors have not been included in the EPA's assessment due to the broad scale of the assessment or because insufficient information is available at this stage of the planning process. The EPA has decided that these factors should be "deferred" to ensure that the EPA has the opportunity to assess future local government scheme amendments, subdivisions or development proposals, whichever comes first, so that a more detailed consideration of the potential environmental impacts can be undertaken by the EPA pursuant to Part IV of the *Environmental Protection Act 1986*.

These deferred factors are:

(a) Waste Water Treatment Plant

Deferred factors – Odour

(b) Rationalisation and reductions to the coastal foreshore Regional Open Space reservation (Area 7)

Deferred factor - Aboriginal heritage

**2. Waste Water Treatment Plant**

The EPA recommends that a 600m buffer measured from the boundary of the WWTP should be reserved for Public Purposes, to prevent the siting of odour sensitive land uses within an area likely to be impacted by unacceptable odour levels from the WWTP.

An 800m buffer west and north west of the WWTP measured from the boundary of the WWTP should be reserved for Public Purposes if the site is subject to ponding and an odour channel is not provided.

A buffer of 450m measured from the boundary of the WWTP may be achievable in the future, but the EPA understands that the cost of odour management at the WWTP would be significant and the reduced buffer size may also limit the size of the WWTP. The EPA advises recommends that the possibility of reducing the width of the buffer to less than 600m through odour control and management, be evaluated further as part of the section 38 environmental assessment of the WWTP at Sites A and B.

Finally responsibility should rest with the Water Corporation for ensuring that the WWTP operates to the required criteria within the recommended 600m Public Purpose reserve.

**3. Groundwater Treatment Plant**

The EPA expects that the appropriate approvals in relation to the operation of the GWTP and storage of chlorine on-site be obtained by the Water Corporation from the Department of Consumer and Employment Protection prior to the construction of the plant.

**4. Management of land recommended to be reserved as Parks and Recreation**

The natural values of the Parks and Recreation reserves in Amendment 1029/33, including those recommended by the EPA, should be managed to ensure that the natural values of the land are not degraded by inappropriate landuses over time.

**5. Future MRS amendment to realign the Railway Reservation**

The EPA supports the realignment of the Railway Reservation as part of a future amendment to the Metropolitan Region Scheme to avoid the fragmentation of the geoheritage and landform values within the recommended Parks and Recreation reserve.

## **8. Conclusions**

The EPA has concluded that Amendment 1029/33 to the MRS would, in part, be inconsistent with the conservation and protection of significant environmental and geoheritage values in the area. The EPA has therefore recommended conditions in Section 6 and set out in

Appendix 11 which it considers should be imposed for the amendment to adequately protect these values, if the amendment were to proceed.

## 9. Recommendations

Section 48D of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposed scheme amendment and on the conditions and procedures to which the proposed scheme amendment should be subject, if implemented. The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986*. In addition, the EPA may make recommendations as it sees fit.

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the main purposes of Amendment 1029/33 to the Metropolitan Region Scheme are to:
  - relocate the waste water treatment plant inland;
  - relocate the groundwater treatment plant inland;
  - modify the alignment of the Parks and Recreation reserve boundary alignment; and
  - create new Parks and Recreation reserves
2. That the Minister considers the report on the relevant environmental factors of:
  - Vegetation
  - Fauna
  - Odour
  - Geoheritage
  - Aboriginal heritage
  - Riskand the following principles
  - The precautionary principle;
  - The principle of intergenerational equity;
  - The principle of the conservation of biological diversity and ecological integrity; and
  - Principles relating to improved valuation, pricing and incentive mechanismsas set out in Section 5.
3. That the Minister notes that the EPA has concluded that Amendment 1029/33 to the MRS would, in part, be inconsistent with the conservation and protection of significant environmental and geoheritage values in the area. The EPA has therefore recommended conditions in Section 6 and set out in Appendix 11 which it considers should be imposed for the amendment to adequately protect these values, if the amendment were to proceed.
4. That the Minister imposes the conditions and procedures recommended in Appendix 11 of this report.

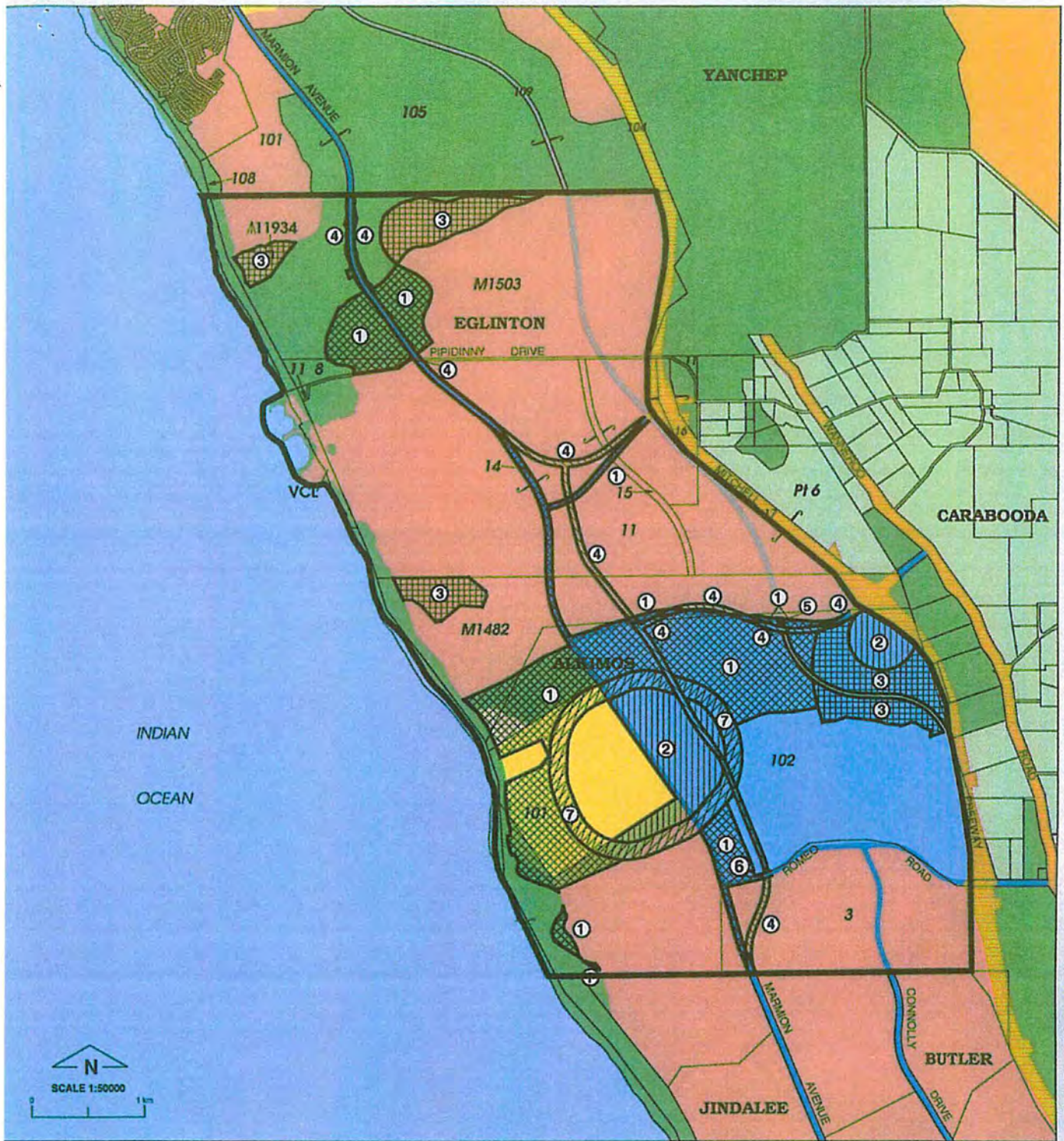
5. That the Minister notes that the EPA has deferred the assessment of a number of environmental factors, as shown in Section 6, so that the EPA has the opportunity to assess proposals impacting on these environmental factors in more detail at the appropriate stage of the planning process.
6. That the Minister notes that where any development proposal complies with Amendment 1029/33 (as modified consistent with the EPA's recommended conditions) and raises no additional environmental factors and does not impact on the deferred factors, the development proposal will not normally be subject to further assessment under Part IV of the *Environmental Protection Act 1986*. However, future development proposals may still require works approvals, licensing and pollution control conditions under the *Environmental Protection Act 1986* where applicable.

## **Appendix 1**

**Amendment 1029/33**

**Metropolitan Region Scheme**








**(as advertised from 26 September 2003 to 28 January 2004)**



**PROPOSED MRS AMENDMENT 1029/33  
AS ADVERTISED**



8th OCTOBER 2002

**PROPOSED:**







-  URBAN ZONE
-  PUBLIC PURPOSES (WSD) RESERVATION
-  PARKS AND RECREATION RESERVATION
-  OTHER REGIONAL ROADS RESERVATION
-  RAILWAYS RESERVATION
-  CENTRAL CITY AREA ZONE
-  URBAN DEFERRED ZONE

**LEGEND**

**EXISTING**

-  URBAN ZONE
-  RURAL ZONE
-  URBAN DEFERRED ZONE
-  PRIVATE RECREATION ZONE
-  CENTRAL CITY AREA ZONE
-  STATE FORESTS RESERVATION

**BOUNDARY OF AMENDMENT AREA**

-  RAILWAYS RESERVATION
-  WATERWAYS RESERVATION
-  PARKS AND RECREATION RESERVATION
-  PUBLIC PURPOSES (WSD) RESERVATION
-  PRIMARY REGIONAL ROADS RESERVATION
-  OTHER REGIONAL ROADS RESERVATION

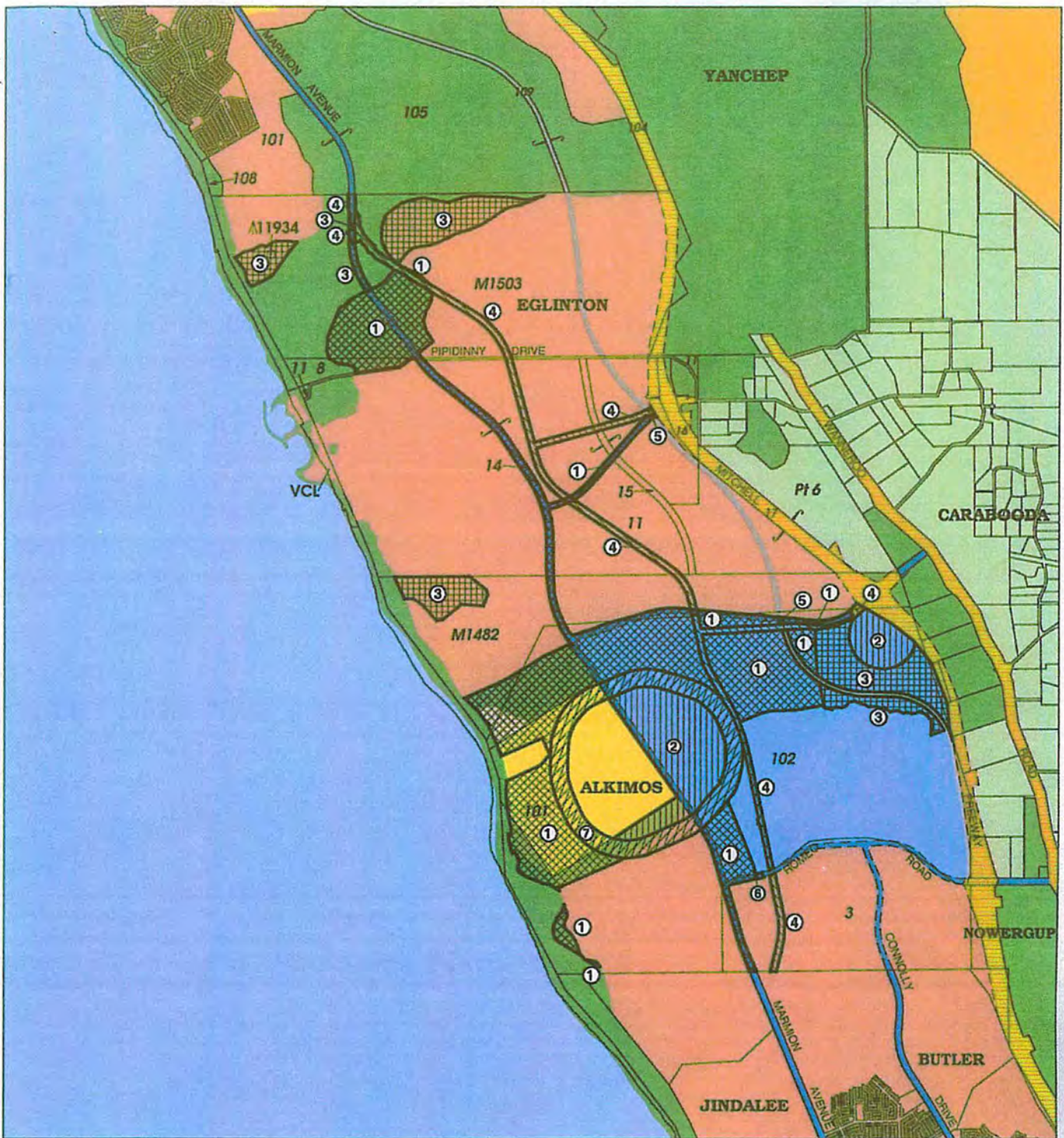


## **Appendix 2**

**Modified Amendment 1029/33**

**Metropolitan Region Scheme**

**(as advertised from 11 March 2005 to 13 May 2005)**



## NORTH-WEST DISTRICTS - ALKIMOS-EGLINTON

14 DECEMBER 2004

**AS MODIFIED**

FIGURE (ii)

**PROPOSED:**

- 1** URBAN ZONE
- 2** PUBLIC PURPOSES (WSD) RESERVATION
- 3** PARKS AND RECREATION RESERVATION
- 4** OTHER REGIONAL ROADS RESERVATION
- 5** RAILWAYS RESERVATION
- 6** CENTRAL CITY AREA ZONE
- 7** URBAN DEFERRED ZONE

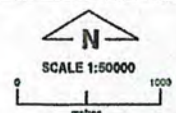
**LEGEND**

**EXISTING**

- |                           |                                    |
|---------------------------|------------------------------------|
| URBAN ZONE                | RAILWAYS RESERVATION               |
| RURAL ZONE                | WATERWAYS RESERVATION              |
| URBAN DEFERRED ZONE       | PARKS AND RECREATION RESERVATION   |
| PRIVATE RECREATION ZONE   | PUBLIC PURPOSES (WSD) RESERVATION  |
| CENTRAL CITY AREA ZONE    | PRIMARY REGIONAL ROADS RESERVATION |
| STATE FORESTS RESERVATION | OTHER REGIONAL ROADS RESERVATION   |

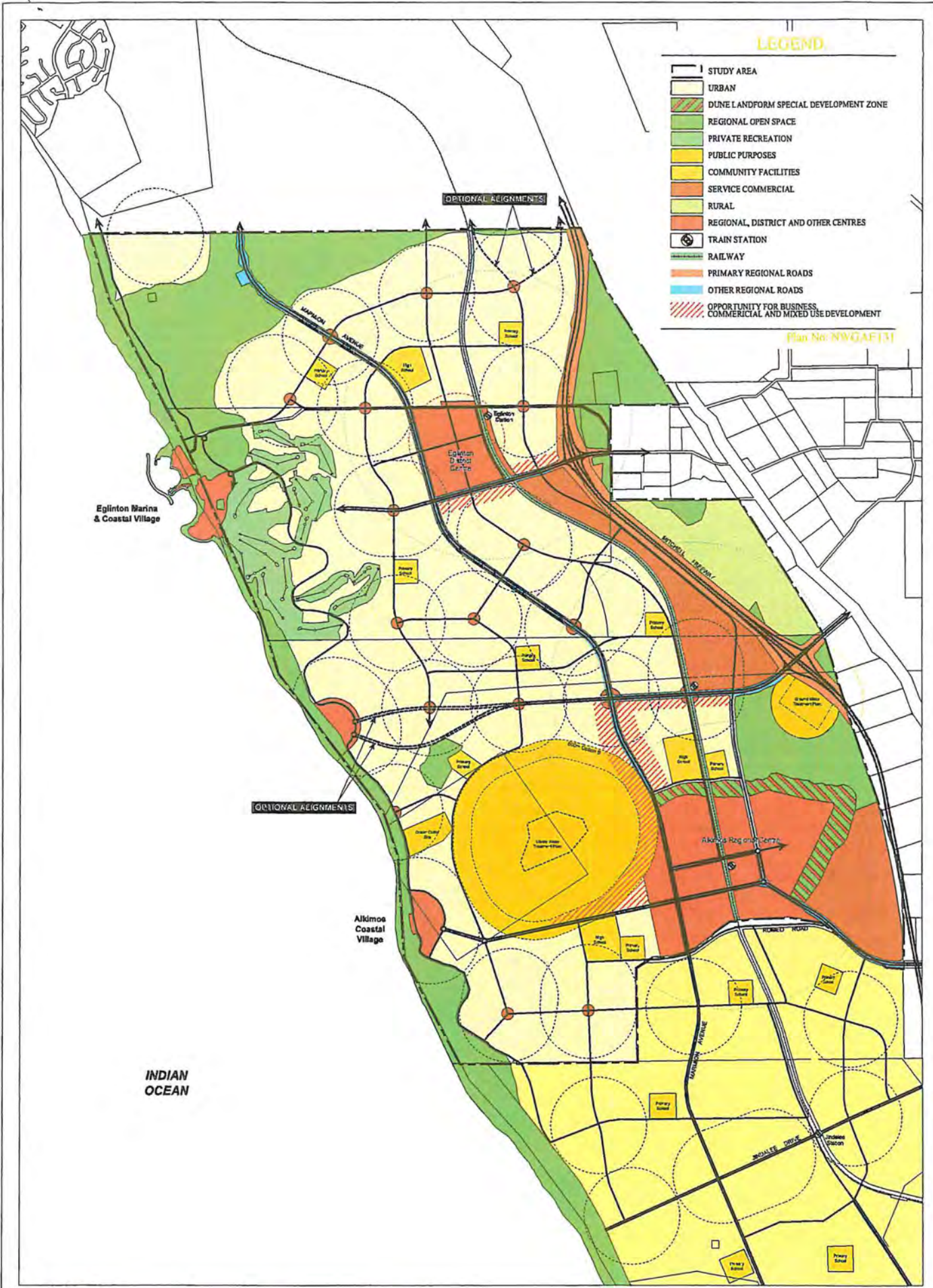
FILENAME: tw1\_gll.fig

Produced by Statutory Mapping Section,  
Planning Information - Mapping and Spatial



## **Appendix 3**

### **Draft Alkimos - Eglinton Concept Structure Plan**



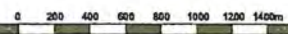
**LEGEND**

- STUDY AREA
- URBAN
- DUNE LANDFORM SPECIAL DEVELOPMENT ZONE
- REGIONAL OPEN SPACE
- PRIVATE RECREATION
- PUBLIC PURPOSES
- COMMUNITY FACILITIES
- SERVICE COMMERCIAL
- RURAL
- REGIONAL, DISTRICT AND OTHER CENTRES
- TRAIN STATION
- RAILWAY
- PRIMARY REGIONAL ROADS
- OTHER REGIONAL ROADS
- OPPORTUNITY FOR BUSINESS, COMMERCIAL AND MIXED USE DEVELOPMENT

Plan No: NWGAE/131

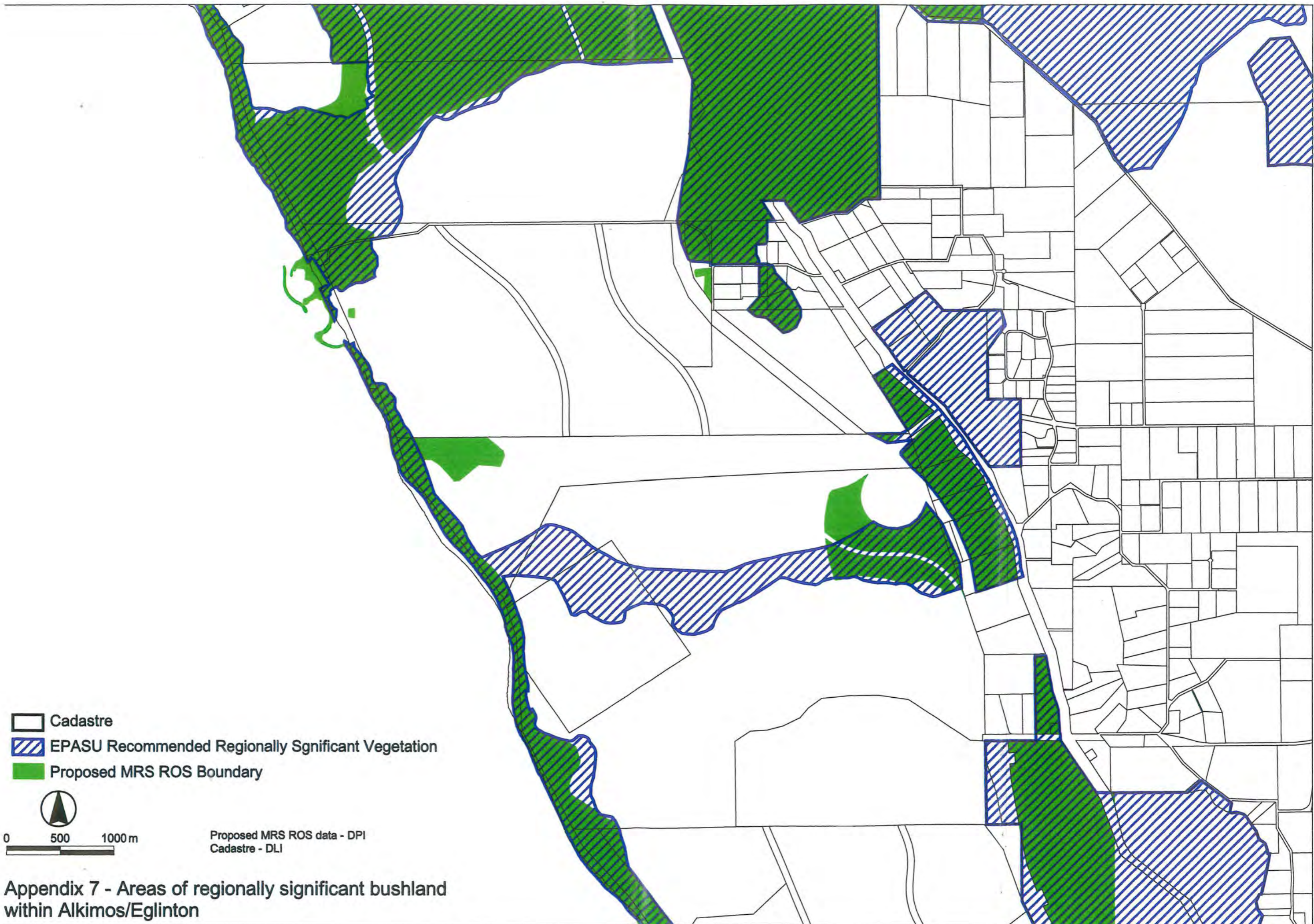
**Alkimos - Eglinton Concept Structure Plan**

**ALKIMOS  
EGLINTON**



## **Appendix 4**

**Areas of regionally significant bushland within Alkimos - Eglinton**



Appendix 7 - Areas of regionally significant bushland within Alkimos/Eglinton

## **Appendix 5**

### **Natural Area Assessment Sheets**

## Background

The following assessment sheets assess the natural values of the sites the subject of Amendment 1029/33 against the criteria used in *Bush Forever* to identify regionally sites.

The assessment process considered all known available information relevant to the application of the criteria. Information came from both regional data sets and area specific survey. The regional data sets are listed in the Reference list (Appendix ) and not referenced in each sheet. The sources of specific area information are referenced in the assessments sheets. Unless a source is specifically quoted the information is summarised from several sources. These references are listed in the Reference list (Appendix ).

Assessment Sheet Number	Location
1.	Additional Parks and Recreation Reserve north of Ningana Bushland (Area 1)
2.	Additional Parks and Recreation Reserve south of Ningana Bushland (Area 2)
3.	Deletion from Parks and Recreation reserve south of Ningana Bushland (Area 3)
4.	Inclusion of an area adjacent to the coastal foreshore reserve on Lot M1482 (Area 4)
5.	Deletion of a Parks and Recreation Reserve north of the Waste Water Treatment Plant (Area 5)
6.	Introduction of a town park immediately north of the Alkimos Regional Centre (Area 6)
7.	Rationalisation and reductions to the coastal foreshore Regional Open Space reservation (Area 7)
8.	Public Purpose reserve to Urban zone (Area 8)
9.	East-west parabolic linkage (Area 9)

INFORMATION	COMMENT
<b>1.1 Background Information</b>	
Area Number	1 - includes 1a and 1b but excludes 1c
Area Name	Part of Bush Forever Site 289 P&R (existing)
Location	
Proposed P&R Size (ha) 1a	11.2



EPASU recommended add 1b (ha)	2.0
EPASU recommended deletion 1c (ha)	13.3
Change relative to current MRS P&R reserve (ha)	
<b>Environmental Considerations</b>	
<b>1.2 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	Yes. M2 area is coastal foreshore reserve.
Others	
<b>1.3 Environmental Considerations - Natural Attributes</b>	
<b>1.4 Landforms</b>	
1.5 Sandy coastline, vegetated coastal dunes. See also <i>Area Specific</i> description of vegetation associations.	
<b>1.6 Vegetation &amp; Flora</b>	
<b>Regional</b>	
Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex</b>
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> *24 Northern Spearwood shrublands and woodlands *29a Coastal shrublands on shallow sands *S11 Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities	
<b>Area Specific</b>	
Summary of findings	<b>Quindalup Dunes</b> <b>1a and 1b Uplands:</b> <i>Myoporum insulare</i> , <i>Spyridium globulosum</i> Shrubland; <i>Scaevola nitida</i> , <i>Acacia truncata</i> Closed Heath; <i>Acacia rostellifera</i> Closed Scrub/Heath; <i>Melaleuca systema</i> , <i>Lomandra maritima</i> Low Open Heath; <i>Melaleuca systema</i> , <i>Olearia asillaris</i> , <i>Lomandra maritima</i> Low Open Heath; <i>Acacia cochlearis</i> Closed Heath. <b>1c Uplands:</b> <i>Acacia rostellifera</i> Closed Scrub/Heath; <i>Acacia cochlearis</i> Closed Heath; <i>Acacia truncata</i> , <i>Acrotriche cordata</i> , <i>Melaleuca systema</i> , <i>Pimelea ferruginea</i> Low Open Shrubland to Low Shrubland; <i>Acacia cochlearis</i> , <i>Acacia rostellifera</i> Low Open Heath; <i>Dryandra sessilis</i> Open to Closed Heath; <i>Xanthorrhoea preissii</i> Shrubland; <i>Melaleuca huegelii</i> , <i>Melaleuca systema</i> , <i>Acacia truncata</i> Low Open Heath (inferred as FCT

	<p>24 in this location).</p> <p><b>Vegetation Condition</b> (ATA Environmental 2005):  <u>1a and 1b</u>: 95% Very Good to Good, 5% Completely Degraded.  <u>1c</u>: 20% Good to Degraded, 80% Degraded to Completely Degraded.  Significant Flora:  <u>1a and 1b</u>: <i>Trymalium ledifolium</i> subsp. <i>ledifolium</i>, <i>Allocasuarina lehmanniana</i> (ATA Environmental 2005), <i>Eucalyptus gomphocephala</i> mallee (EPASU 2004-5).  <u>1c</u>: <i>Trymalium ledifolium</i> subsp. <i>ledifolium</i>, <i>Allocasuarina lehmanniana</i>, <i>Conostylis pauciflora</i> (P3), <i>Grevillea preissii</i> (ATA Environmental 2005).</p>
<b>1.7 Fauna</b>	
<i>Area Specific</i>	
Fauna Survey	<p>Alan Tingay and Associates (1996): Limited survey of whole amendment area.</p> <p>ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people.</p> <p>EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.</p>
Summary of findings	<p>Important feeding habitat for Carnaby's Cockatoo and good quality habitat for vertebrates especially habitat specialist sedentary birds. Eight bird species recorded including White-breasted Robin, Collared Sparrowhawk, White-browed Scrub-wren and Splendid and Variegated Fairy-wrens which are listed in Bush Forever as conservation significant species on the Coastal Plain.</p>
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
Linkage Values	Consolidated area forms part of a significant east/west regional ecological linkage between Yanchep National Park to the coast.
<b>Consideration Against Criteria#</b>	
<b>Criterion Met</b>	
<b>Representation of Ecological Communities</b>	
<b>YES</b>	
<i>Regional vegetation representation</i>	
Vegetation Complexes	<p>Quindalup Complex</p> <p>47 % remaining on SCP, 5 % in secure tenure;  48% remaining in PMR, Bush Forever proposed protection 20%.</p>
Floristic Community types	considered to be representative of the vegetation complex
Uplands and Wetlands	
Habitats	
<b>1.7.1 Size and Shape</b>	
<p>Forms part of Bush Forever Site 289 that is much greater than 20ha. A range of upland communities/habitats is found in the area. Contains significant habitat for fauna and forms part of a corridor for fauna and contiguous upland habitat types for seasonal faunal movement.</p>	
<i>Vegetation Condition</i> : Naturally vegetated areas are in Very Good to Good condition.	
<p>Comment: While &gt;30% of Quindalup Complex remains, areas proposed to be cleared reduce area remaining to approx. 20%. Upland vegetation of a quality and type to be considered typical of these Dunes in this location. Contiguous upland habitat types provides ecological linkages for fauna.</p>	
<b>Diversity</b>	
<b>YES</b>	
Landforms	diversity of form - vegetated coastline, coastal parabolic dunes.
Vegetation Complexes	1

Floristic Community Types	3
Vegetation units	6. Moderate diversity for vegetation units, related to complex of dunes.
Flora	Upland diversity typical.
Habitats	
Fauna	Not fully assessed but preliminary assessment indicates several habitat specialist sedentary birds.
Comment: High diversity of Quindalup landform units and associated vegetation. Note that the diversity of vegetation associations at 1c is related to disturbance.	
<b>Rarity</b>	<b>YES</b>
Vegetation Complex <10% remaining	No complex at <10% remaining.
Threatened Ecological Communities	No
Flora	3 significant taxa. <i>Eucalyptus gomphocephala</i> mallee of particular importance as is not known to be protected elsewhere in the area and would not be protected within 1a alone.
Fauna	Not fully assessed but contains significant feeding habitat for Carnaby's Cockatoo and the presence of at least five bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain.
Comment: 3 significant plant species in areas 1a and 1b. Note that while 1c supports significant plant species, these are protected in other locations.	
<b>Maintaining Ecological Processes and Natural Systems</b>	<b>YES</b>
<i>Relationship/proximity to:</i>	
Regional Ecological Link	Part of regional east-west ecological linkage: Yanchep National Park to the coast.
Protected areas	Area proposed for protection since 1998.
Naturally vegetated areas	Contiguous native vegetation to north and east
Creekline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	Areas of the dune suitable, particularly where uncontrolled 4WD tracks traverse steep dunes are potential source of dune blowouts.
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</i> - see Representation of Ecological Communities	
Comment: Forms part of a regional east-west ecological linkage.	
<b>Scientific or Evolutionary Importance</b>	<b>NO</b>
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation</b>	
	<b>YES</b>
Comment: Coastal vegetation	

## 1.8 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&R

### 1.9 Regional Significance - Assessment of area against Criteria

The Eglinton Rocks P&R (as recommended) forms part of a larger natural area of outstanding regional significance, the Ningana Bushland. This area contains a consolidated vegetated area of Quindalup Dunes. The areas of proposed P&R are centred on the dune landform and protects a population of *Eucalyptus gomphocephala* mallee.

The Eglinton Rocks P&R is considered to be a regionally significant natural area meeting five criteria, being: *Representation of Ecological Communities, Diversity, Rarity, Maintaining Ecological Processes and Natural Systems, and General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation*. The natural attributes of the Eglinton Rocks P&R that contribute to meeting the criteria are listed below.

- Intact vegetated parabolic Quindalup Dunes.
- Representative area of natural vegetation in Very Good to Good condition of the Quindalup Vegetation Complex.
- A highly diverse area with respect to diversity of Quindalup Dunes, upland vegetation units and habitat
- Location for three significant flora taxa. Of particular interest is the population of *Eucalyptus gomphocephala* mallee.
- Part of a regional ecological linkage: Yanchep National Park to the coast (E-W).

#### Comment on Proposed MRS P&R boundary in relation to the boundaries of the regionally significant natural area

The current configuration of the P&R is not considered suitable to protect all values in this location as it:

- does not protect the *Eucalyptus gomphocephala* mallee;
- bisects the dune landform; and
- includes an area that is mostly Degraded to Completely Degraded that will be partly isolated by the construction of Marmion Ave (1c).

Therefore the EPASU recommends modifying the boundary to include 1b as well as the proposed 1a, and exclude 1c.

Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the EPASU.

INFORMATION	COMMENT
<b>1.10 Background Information</b>	
Area Number	2 - includes 2a and 2b
Area Name	Part of Bush Forever Site 289 P&R (existing)
Location	
Proposed P&R Size (ha) 2a	38.2
EPASU recommended add 2b (ha)	4.4
Change relative to current	

MRS P&R reserve (ha)	
<b>Environmental Considerations</b>	
<b>1.11 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	No
Others	
<b>1.12 Environmental Considerations - Natural Attributes</b>	
<b>1.13 Landforms</b>	
1.14 vegetated near-coastal dunes.	
<b>1.15 Vegetation &amp; Flora</b>	
<b>Regional</b>	
Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex</b>
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> *24 Northern Spearwood shrublands and woodlands *28 Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands *S11 Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities	None
<b>Area Specific</b>	
Summary of findings	<b>Quindalup Dunes</b> <b>2a and 2b Uplands:</b> <i>Dryandra sessilis</i> Open to Closed Heath; <i>Xanthorrhoea preissii</i> Shrubland; <i>Banksia attenuata</i> , <i>Banksia menziesii</i> Low Woodland; <i>Banksia attenuata</i> , <i>Banksia menziesii</i> Low Woodland over <i>Xanthorrhoea preissii</i> ; <i>Acacia rostellifera</i> Low Closed Forest; <i>Acacia rostellifera</i> Low Closed Woodland includes a small admixture of <i>Banksia attenuata</i> , <i>Hardenbergia comptoniana</i> with a very open understorey; <i>Acacia rostellifera</i> / <i>Jaksonia furcellata</i> Open Shrubland; <i>Hakea trifurcata</i> , <i>Dryandra sessilis</i> Open Heath to Closed Heath; <i>Calothamnus quadrifidus</i> Open Heath to Closed Heath; <i>Calothamnus quadrifidus</i> , <i>Dryandra sessilis</i> Open Heath to Closed Heath. <b>Vegetation Condition</b> (ATA Environmental 2005): <b>2a and 2b:</b> 90% Very Good, 10% Good. Significant Flora: <b>2a and 2b:</b> <i>Stylidium repens</i> (ATA Environmental 2005).

<b>1.16 Fauna</b>	
<i>Area Specific</i>	
Fauna Survey	Alan Tingay and Associates (1996): Limited survey of whole amendment area. ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people. EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.
Summary of findings	Important feeding habitat for Carnaby's Cockatoo and good habitat for habitat specialist sedentary birds. Fourteen bird species recorded including Carnaby's Cockatoo and Brown Goshawk, Grey Shrike-thrush, White-cheeked Honeyeater, White-browed Scrub-wren and Splendid Fairy-wren which are listed in Bush Forever as conservation significant species on the Coastal Plain. One reptile species and two native mammals including Echidna recorded.
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
Linkage Values	Consolidated area forms part of a significant east/west regional ecological linkage between Yanchep National Park to the coast.
<b>Consideration Against Criteria#</b>	
<b>Criterion Met</b>	
<b>Representation of Ecological Communities</b>	
<b>YES</b>	
<i>Regional vegetation representation</i>	
Vegetation Complexes	Quindalup Complex 47 % remaining on SCP, 5 % in secure tenure; 48% remaining in PMR, Bush Forever proposed protection 20%.
Floristic Community types	Considered to be representative of the vegetation complex
Uplands and Wetlands	
Habitats	
<b>1.16.1 Size and Shape</b>	
Forms part of Bush Forever Site 289 that is much greater than 20ha. A range of upland communities/habitats is found in the area. Forms part of a corridor for fauna and contiguous upland habitat types for seasonal faunal movement.	
<i>Vegetation Condition:</i> Naturally vegetated areas are in Very Good to Good condition.	
Comment: While >30% of Quindalup Complex remains, areas proposed to be cleared reduce area remaining to approx. 20%. Upland vegetation of a quality and type to be considered typical of these dunes in this location. Contiguous upland habitat types provides ecological linkages for fauna.	
<b>Diversity</b>	
<b>YES</b>	
Landforms	
Vegetation Complexes	1
Floristic Community Types	3
Vegetation units	9. High diversity for vegetation units, related to complex of dunes.
Flora	High upland diversity associated with diversity of vegetation units.
Habitats	High habitat diversity
Fauna	High fauna diversity including six bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain.
Comment: High diversity of vegetation associations, fauna habitats and fauna species.	
<b>Rarity</b>	
<b>YES</b>	
Vegetation Complex <10% remaining	No complex at <10% remaining.

Threatened Ecological Communities	No
Flora	1 significant taxa.
Fauna	
Comment: Consolidated area provides a series of feeding habitats for Carnaby's Cockatoo.	
<b>Maintaining Ecological Processes and Natural Systems</b>	<b>YES</b>
<i>Relationship/proximity to:</i>	
Regional Ecological Link	Part of regional east-west ecological linkage: Yanchep National Park to the coast.
Protected areas	
Naturally vegetated areas	Contiguous native vegetation to Southwest and northeast
Creekline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	NA
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</i> - see Representation of Ecological Communities	
Comment: Forms a critical part of a regional east-west ecological linkage.	
<b>Scientific or Evolutionary Importance</b>	<b>NO</b>
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation</b>	
	<b>NO</b>
<b>1.17 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&amp;R</b>	
<b>1.18 Regional Significance - Assessment of area against Criteria</b>	
<p>The Eglinton East P&amp;R (as recommended) forms part of a larger natural area of outstanding regional significance, the Ningana Bushland. This area contains a consolidated vegetated area of Quindalup Dunes. The areas of proposed P&amp;R are centred on the dune landform and protects critical habitat for Carnaby's Cockatoo.</p> <p>The Eglinton East P&amp;R is considered to be a regionally significant natural area meeting four criteria, being: <i>Representation of Ecological Communities, Diversity, Rarity, and Maintaining Ecological Processes and Natural Systems</i>. The natural attributes of the Eglinton East P&amp;R that contribute to meeting the criteria are listed below.</p> <ul style="list-style-type: none"> <li>• Intact vegetated Quindalup Dunes.</li> <li>• Representative area of natural vegetation in Very Good to Good condition of the Quindalup Vegetation Complex.</li> <li>• A highly diverse area with respect to diversity of Quindalup Dunes, upland vegetation units, habitat, flora and fauna species.</li> <li>• Location for a significant fauna taxa, Carnabys' Cockatoo and at least six bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain.</li> <li>• Part of a regional ecological linkage: Yanchep National Park to the coast (E-W).</li> </ul>	
<b>Comment on Proposed MRS P&amp;R boundary in relation to the boundaries of the regionally significant natural area</b>	

The current configuration of the P&R is not considered suitable in this location as it:

- bisects the dune landform; and
- bisects the *Banksia attenuata*, *Banksia menziesii* Low Woodland, which is critical habitat for Carnaby's Cockatoo. Note also that a boundary that bisects this unit would also be highly vulnerable to weed invasion.

Therefore the EPASU recommends modifying the boundary to include 2b as well as the proposed 2a.

Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the EPASU.

INFORMATION	COMMENT
<b>1.19 Background Information</b>	
Area Number	3 - includes 3a but excludes 3b
Area Name	Part of Bush Forever Site 289 P&R (existing)
Location	
Proposed MRS amend to P&R to exclude 3a & 3b (ha)	60.6
EPASU recommended keep 3a (ha)	29.4
Change relative to current MRS P&R reserve (ha)	
<b>Environmental Considerations</b>	
<b>1.20 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	No
Others	
<b>1.21 Environmental Considerations - Natural Attributes</b>	
<b>1.22 Landforms</b>	
1.23 vegetated near-coastal dunes.	
<b>1.24 Vegetation &amp; Flora</b>	
<b>Regional</b>	
Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex; Spearwood Dunes – Cottesloe Central and South Complex</b>
Floristic Community Types (FCT)	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b>



*type inferred	*24 Northern Spearwood shrublands and woodlands *29b <i>Acacia</i> shrublands on taller dunes *S11 Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities	None
<b>Area Specific</b>	
Summary of findings	<p><b>Quindalup Dunes</b></p> <p><b>3a Uplands:</b> <i>Acacia rostellifera</i> Low Closed Forest; <i>Acacia rostellifera/Jaksonia furcellata</i> Open Shrubland; <i>Acacia rostellifera/Spyridium globulosum</i> Closed Scrub; <i>Melaleuca systema</i> Low Shrubland to Shrubland; <i>Melaleuca systema, Lomandra maritima</i> Low Open Heath; <i>Acacia rostellifera, Melaleuca cardiophylla</i> Closed Heath; <i>Xanthorrhoea preissii</i> Shrubland.</p> <p><b>3b Uplands:</b> <i>Acacia rostellifera/Spyridium globulosum</i> Closed Scrub; <i>Melaleuca systema, Lomandra maritima</i> Low Open Heath; <i>Banksia attenuata, Banksia menziesii</i> Low Woodland; <i>Acacia rostellifera</i> Low Closed Forest; <i>Dryandra sessilis</i> Open to Closed Heath; <i>Dryandra sessilis, Hakea trifurcata</i> Open to Closed Heath; <i>Calothamnus quadrifidus</i> Open Heath to Closed Heath; <i>Calothamnus quadrifidus, Dryandra sessilis</i> Open Heath to Closed Heath.</p> <p><b>Vegetation Condition</b> (ATA Environmental 2005):  <b>3a:</b> 90% Very Good to Good, 10% Degraded.  <b>3b:</b> 90% Very Good to Good, 10% Degraded.</p> <p>Significant Flora:  <b>3a:</b> <i>Allocasuarina lehmanniana, Trymalium ledifolium</i> subsp. <i>ledifolium</i>; <i>Stylidium maritimum</i> (P3) (ATA Environmental 2005).  <b>3b:</b> <i>Allocasuarina lehmanniana, Petrophile axillaris</i> (pink form of <i>Petrophile serruriae</i>) (ATA Environmental 2005).</p>
<b>1.25 Fauna</b>	
<b>Area Specific</b>	
Fauna Survey	Alan Tingay and Associates (1996): Limited survey of whole amendment area. ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people. EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.
Summary of findings	Important feeding habitat for Carnaby's Cockatoo and good habitat for habitat specialist sedentary birds. Nineteen bird species recorded including Carnaby's Cockatoo and Grey Shrike-thrush, White-cheeked Honeyeater, Western Little Wattlebird, White-browed Scrub-wren and Variegated Fairy-wren which are listed in Bush Forever as conservation significant species on the Coastal Plain. One native mammal species recorded.
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
Linkage Values	Consolidated area forms part of a significant east/west regional ecological linkage between Yanchep National Park to the coast.
<b>Consideration Against Criteria#</b>	<b>Criterion Met</b>
Representation of Ecological Communities	<b>YES</b>
<i>Regional vegetation representation</i>	

Vegetation Complexes	Quindalup Complex (47 % remaining on SCP, 5 % in secure tenure).
Floristic Community types	Considered to be representative of the vegetation complex
Uplands and Wetlands	
Habitats	
<b>1.25.1 Size and Shape</b>	
Forms part of Bush Forever Site 289 that is much greater than 20ha. A range of upland communities/habitats is found in the area. Forms part of a corridor for fauna and contiguous upland habitat types for seasonal faunal movement.	
<i>Vegetation Condition:</i> Naturally vegetated areas are in Very Good to Good condition.	
Comment: While >30% of Quindalup Complex remains, areas proposed to be cleared reduce area remaining to approx. 30%. Upland vegetation of a quality and type to be considered typical of these dunes in this location. Contiguous upland habitat types provides ecological linkages for fauna.	
<b>Diversity</b> YES	
Landforms	Complexity of dune
Vegetation Complexes	1
Floristic Community Types	3
Vegetation units	7. High diversity for vegetation units, related to complex of dunes.
Flora	High upland diversity associated with diversity of vegetation units.
Habitats	High habitat diversity
Fauna	High fauna diversity including one Threatened and five bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain.
Comment: High diversity of landform, vegetation associations, fauna habitats and fauna species.	
<b>Rarity</b> NO	
Vegetation Complex <10% remaining	No complex at <10% remaining.
Threatened Ecological Communities	No
Flora	3 significant taxa.
Fauna	
Comment: Consolidated area provides a series of feeding habitats for Carnaby's Cockatoo.	
<b>Maintaining Ecological Processes and Natural Systems</b> YES	
<i>Relationship/proximity to:</i>	
Regional Ecological Link	Part of regional east-west ecological linkage: Yanchep National Park to the coast.
Protected areas	
Naturally vegetated areas	Contiguous native vegetation to west and northeast
Creekline/River/Estuary	NA
Contains areas suitable for ecological restoration	NA
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</i> - see Representation of Ecological Communities	
Comment: Forms a critical part of a regional east-west ecological linkage.	
<b>Scientific or Evolutionary Importance</b> NO	
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation</b> NO	

## **1.26 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&R**

### **1.27 Regional Significance - Assessment of area against Criteria**

The Eglinton South P&R (as recommended) forms part of a larger natural area of outstanding regional significance, the Ningana Bushland. This area contains a consolidated vegetated area of Quindalup Dunes. The area of proposed P&R is centred on the dune landform.

The Eglinton South P&R is considered to be a regionally significant natural area meeting three criteria, being: *Representation of Ecological Communities, Diversity, and Maintaining Ecological Processes and Natural Systems*. The natural attributes of the Eglinton South P&R that contribute to meeting the criteria are listed below.

- Intact vegetated Quindalup Dunes.
- Representative area of natural vegetation in Very Good to Good condition of the Quindalup Vegetation Complex.
- A highly diverse area with respect to diversity of Quindalup Dunes, upland vegetation units, habitat, flora and fauna species.
- Part of a regional ecological linkage: Yanchep National Park to the coast (E-W).

#### **Comment on Proposed MRS P&R boundary in relation to the boundaries of the regionally significant natural area**

The proposed configuration of the P&R is not considered suitable in this location as it:

- bisects the dune landform; and
- does not adequately protect the diversity of Quindalup Dunes, upland vegetation units, habitat, flora and fauna species in this location.

Therefore the EPASU recommends modifying the boundary to include 3a and concurs with the WAPC to exclude 3b.

Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the EPASU.

INFORMATION	COMMENT
<b>1.28 Background Information</b>	
Area Number	4
Area Name	
Location	
Proposed P&R Size (ha) 4	20.4
EPASU recommended change relative to current MRS P&R reserve (ha)	0
<b>Environmental Considerations</b>	
<b>1.29 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	No
Others	

<b>1.30 Environmental Considerations - Natural Attributes</b>	
<b>1.31 Landforms</b>	
<p>1.32 Vegetated near-coastal dunes. Quindalup Dunes of two phases (Q1 and Q3) that overly Spearwood Dunes.</p> <p>1.33 Spearwood Tamala Limestone surfaces protrude through the surface (Ks). See also <i>Area Specific</i> description of vegetation associations.</p>	
<b>1.34 Vegetation &amp; Flora</b>	
<b>Regional</b>	
Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex; Spearwood Dunes – Cottesloe Central and South Complex</b>
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> *24 Northern Spearwood shrublands and woodlands *29b <i>Acacia</i> shrublands on taller dunes *S11 Northern <i>Acacia rostelifera</i> – <i>Melaleuca acerosa</i> shrublands
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological	None

Communities	
<i>Area Specific</i>	
Summary of findings	<p>1.34.1.1 <u>Quindalup Dunes</u> Uplands – Older dunes and plains: <i>Acacia rostellifera</i>, <i>Melaleuca systena</i> Low Open Heath; <i>Melaleuca systena</i>, <i>Lomandra maritima</i> Low Open Heath. Uplands – Younger dunes: <i>Acacia rostellifera</i>, <i>Melaleuca systena</i> Low Open Heath; <i>Melaleuca systena</i>, <i>Lomandra maritima</i> Low Open Heath; <i>Acacia rostellifera</i> Low Closed Forest.</p> <p>1.34.1.2 <u>Spearwood Dunes</u> Uplands – Tamala Limestone surfaces: <i>Melaleuca huegelii</i>, <i>Melaleuca systena</i>, <i>Acacia truncata</i> Low Open Heath;</p> <p><b>Vegetation Condition</b> (ATA Environmental 2005): 20% Very Good to Good, 80% Good.</p> <p style="text-align: center;"><b>Significant Flora</b> (ATA Environmental 2005): none</p>
<b>1.35 Fauna</b>	
<i>Area Specific</i>	
Fauna Survey	<p>Alan Tingay and Associates (1996): Limited survey of whole amendment area. ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people. EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.</p>
Summary of findings	Good habitat for several bird species including White-browed Scrubwrens and Splendid Fairywrens which are listed in Bush Forever as conservation significant species on the Coastal Plain. However the relatively small size and future isolation of this site reduces long-term viability of some fauna species in this area.
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
<b>Linkage Values</b>	Currently has significant fauna linkage values but proposed future development will isolate this site and reduce its linkage value.
<b>Consideration Against Criteria#</b>	<b>Criterion Met</b>
Representation of Ecological Communities	<b>YES</b>
<i>Regional vegetation representation</i>	
Vegetation Complexes	<p>Quindalup Complex 47 % remaining on SCP, 5 % in secure tenure; 48% remaining in PMR, Bush Forever proposed protection 20%.</p> <p>Cottesloe Central and South Complex 41% remaining in on SCP, 9% in secure tenure; 36% remaining in PMR, Bush Forever proposed protection 18%.</p>
Floristic Community types	Considered to be representative of the vegetation complexes
Uplands and Wetlands	
Habitats	

<b>1.35.1 Size and Shape</b>	
This area is approximately 20ha, which is a minimum for providing adequate habitat function.	
<i>Vegetation Condition:</i> Naturally vegetated areas are in Good condition.	
Comment: While >30% of Quindalup and Cottesloe Central and South Complexes remains, areas proposed to be cleared reduce area remaining to approx. 20%. Upland vegetation of a quality and type to be considered typical of these dunes occurs in this location.	
<b>Diversity</b> <span style="float: right;"><b>NO</b></span>	
Landforms	Two Quindalup dune phases and a Spearwood limestone ridge.
Vegetation Complexes	2
Floristic Community Types	3
Vegetation units	6. Moderate diversity for vegetation units, related to complex of Quindalup and Spearwood dunes, and limestone and sands.
Flora	Moderate upland diversity.
Habitats	Moderate habitat diversity.
Fauna	Moderate fauna diversity.
Comment: Moderate diversity of landform, vegetation associations, fauna habitats and fauna species.	
<b>Rarity</b> <span style="float: right;"><b>NO</b></span>	
Vegetation Complex <10% remaining	No complex at <10% remaining.
Threatened Ecological Communities	None.
Flora	None.
Fauna	
Comment:	
<b>Maintaining Ecological Processes and Natural Systems</b> <span style="float: right;"><b>NO</b></span>	
<i>Relationship/proximity to:</i>	
Regional Ecological Link	Adjacent to a regional north-south coast ecological linkage: coastal foreshore reserve BFS 397.
Protected areas	
Naturally vegetated areas	Contiguous native vegetation to north, south and east
Creekline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	NA
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</i> - see Representation of Ecological Communities	
Comment: This area is poorly connected to the north-south and does not contribute to an east-west regional ecological linkage. Proposed future development will isolate this site and further reduce its linkage value in the maintenance of natural systems.	
<b>Scientific or Evolutionary Importance</b> <span style="float: right;"><b>NO</b></span>	
Comment:	
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation</b> <span style="float: right;"><b>YES</b></span>	
Comment: Coastal vegetation	

Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the MRS amendment.

### **1.36 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&R**

### **1.37 Regional Significance - Assessment of area against Criteria**

Area 4 contains a consolidated vegetated area of Quindalup dunes of two phases and Spearwood limestones.

Area 4 is considered to be a regionally significant natural area meeting two criteria, being: *Representation of Ecological Communities* and *General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation*. The natural attributes of area 4 that contribute to meeting the criteria are listed below.

- intact vegetated parabolic Quindalup Dunes; and
- representative area of natural vegetation in Very Good to Good condition of the Quindalup and Cottesloe Central and South Vegetation Complexes;

### **Comment on Proposed MRS P&R boundary in relation to the boundaries of the regionally significant natural area**

Area 4 was intended to replace the Parks and Recreation reserve at area 5 in the MRS amendment, but is not considered to have exceptional values. Proposed future development surrounding area 4 will isolate this site and further reduce its linkage value. Of particular concern, it does not contribute to an east-west regional ecological linkage nor contain a significant area of the main Alkimos parabolic dune, a geoheritage site recognised as of National and International significance.

Therefore the EPASU recommends not supporting the proposal to reserve area 4 in place of area 5, which fulfils five of the criteria for regional significance.

INFORMATION	COMMENT
<b>1.38 Background Information</b>	
Area Number	5 - includes 5a and 5d but excludes 5b and 5c
Area Name	Part of Bush Forever Site 397A P&R (existing)
Location	
Current P&R Size (ha) 5a, 5b and 5c	38.4
EPASU recommended keep 5a (ha)	27.9
EPASU recommended add 5d (ha)	2.2
EPASU recommended delete 5b (ha)	10.2
EPASU recommended deletion 5c (ha)	0.3
Total recomm area (ha)	30.1
Change relative to current MRS P&R reserve (ha)	- 8.3
<b>Environmental Considerations</b>	
<b>1.39 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	No
Others	
<b>1.40 Environmental Considerations - Natural Attributes</b>	
<b>1.41 Landforms</b>	
<p data-bbox="210 1581 1385 1693">1.42 Vegetated near-coastal dunes. Quindalup Dunes of various ages (Q1 and Q3), of Holocene age, that overly Spearwood Dunes. These are recognised as of National and International significance (Lemon <i>et al.</i> 1979; Semeniuk and Semeniuk 2000).</p> <p data-bbox="210 1760 1385 1794">1.43 Spearwood Tamala Limestone surfaces protrude through the surface (Ks).</p> <p data-bbox="210 1805 1385 1839">See also <i>Area Specific</i> description of vegetation associations.</p>	
<b>1.44 Vegetation &amp; Flora</b>	
<b>Regional</b>	
Vegetation Complex	Quindalup Dunes - Quindalup Complex; Spearwood Dunes –



	Cottesloe Central and South Complex
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> *24 Northern Spearwood shrublands and woodlands *26a <i>Melaleuca huegelii</i> – <i>Melaleuca acerosa</i> shrublands on Limestone ridges *28 Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands *29b <i>Acacia</i> shrublands on taller dunes *S11 Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities	26a is listed by CALM as a TEC. Three locations of 26a (inferred) within area 5a (ATA Environmental 2005).
<b>Area Specific</b>	
Summary of findings	<p>1.44.1.1 <u>Structural Units:</u></p> <p><b>1.44.1.2 5a</b></p> <p>1.44.1.3 <u>Quindalup Dunes</u> Uplands – Older dunes and plains: <i>Acacia rostellifera</i>, <i>Melaleuca systema</i> Low Open Heath; <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath.</p> <p>1.44.1.4 <u>Spearwood Dunes</u></p> <p><b>1.44.1.5 Uplands – Sands derived from Tamala Limestone: <i>Banksia attenuata</i>, <i>Banksia menziesii</i> Low Woodland.</b> Uplands – Tamala Limestone surfaces: <i>Acacia rostellifera</i> Low Closed Forest; <i>Dryandra sessilis</i> Open to Closed Heath; <i>Dryandra sessilis</i> with <i>Melaleuca huegelii</i> or <i>Acacia truncata</i> Closed Heath; <i>Melaleuca huegelii</i>, <i>Acacia truncata</i>, <i>Trymalium ledifolium</i> subsp. <i>ledifolium</i> Low Open Heath; <i>Melaleuca huegelii</i>, <i>Melaleuca systema</i>, <i>Acacia truncata</i> Low Open Heath; <i>Melaleuca cardiophylla</i>/<i>Dryandra sessilis</i> Closed Heath; <i>Melaleuca cardiophylla</i>/<i>Dryandra sessilis</i>/<i>Acacia truncata</i> Low Closed Heath; <i>Melaleuca huegelii</i>, <i>Melaleuca cardiophylla</i>, <i>Melaleuca systema</i> Low Open Heath.</p> <p><b>1.44.1.6 5b</b></p> <p>1.44.1.7 <u>Spearwood Dunes</u></p> <p><b>1.44.1.8 Uplands – Sands derived from Tamala Limestone: <i>Banksia attenuata</i>, <i>Banksia menziesii</i> Low Woodland.</b> Uplands – Tamala Limestone surfaces: <i>Dryandra sessilis</i> Open to Closed Heath.</p> <p><u>5c</u></p> <p>1.44.1.9 <u>Quindalup Dunes</u> Uplands – Younger dunes: <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath; <i>Acacia rostellifera</i> Low Closed Forest.</p> <p><u>5d</u></p> <p>1.44.1.10 <u>Quindalup Dunes</u> Uplands – Younger dunes: <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath; <i>Acacia rostellifera</i>, <i>Melaleuca systema</i> Low Open Heath.</p> <p><b>1.44.1.11</b></p>

	<p><b>Vegetation Condition</b> (ATA Environmental 2005):</p> <p><u>5a:</u> 100% Very Good to Good.  <u>5b:</u> 100% Very Good to Good.  <u>5c:</u> 100% Very Good to Good.  <u>5d:</u> 100% Very Good to Good.</p> <p>Significant Flora:</p> <p><u>5a:</u> <i>Petrophile axillaris</i> (pink form of <i>Petrophile serruriae</i>), <i>Allocasuarina lehmanniana</i>, <i>Stylidium maritimum</i> (P3), <i>Leptorhynchoscaber</i>, <i>Grevillea preissii</i>, <i>Conospermum triplinervium</i>, <i>Crassula colorata</i> (P2), <i>Pimelea calcicola</i>, <i>Melaleuca cardiophylla</i>, <i>Sarcozona bicarinata</i> (P3), <i>Diplopeltis huegelii</i>, <i>Hibbertia spicata</i> subsp. <i>Leptotheca</i> (P3), <i>Lepidium rotundum</i>, <i>Trymalium ledifolium</i> subsp. <i>ledifolium</i> (ATA Environmental 2005), <i>Astroloma microcalyx</i> (P3) (Syrinx Environmental 2005, EPASU 2004-5).</p> <p><u>5b:</u> none  <u>5c:</u> none  <u>5d:</u> none</p>
<b>1.45 Fauna</b>	
<i>Area Specific</i>	
Fauna Survey	<p>Alan Tingay and Associates (1996): Limited survey of whole amendment area.</p> <p>ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people.</p> <p>EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.</p>
Summary of findings	<p>Important feeding habitat for Carnaby's Cockatoo and good habitat for habitat specialist sedentary birds. Twenty bird species recorded including Emu, Wedge-tailed Eagle, Carnaby's Cockatoo, White-cheeked and Tawny-crowned Honeyeaters, White-browed Scrub-wren, Broad-tailed Thornbill and Variegated Fairy-wren which are listed in Bush Forever as conservation significant species on the Coastal Plain. Two native mammal species including Echidna, recorded.</p>
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
Linkage Values	This key east/west ecological linkage facilitates movements of bird species between different habitats to utilize native vegetation for seasonal food resources, shelter, breeding and roosting sites to maintain populations of habitat sensitive declining species. This linkage also allows long-term genetic movement and the conservation of biological diversity.
<b>Consideration Against Criteria#</b>	
<b>Representation of Ecological Communities</b>	
<b>Criterion Met</b>	
<b>YES</b>	
<i>Regional vegetation representation</i>	
Vegetation Complexes	<p>Quindalup Complex  47 % remaining on SCP, 5 % in secure tenure;  48% remaining in PMR, Bush Forever proposed protection 20%.</p> <p>Cottesloe Central and South Complex  41% remaining in on SCP, 9% in secure tenure;  36% remaining in PMR, Bush Forever proposed protection 18%.</p>
Floristic Community types	Considered to be representative of the vegetation complexes

Uplands and Wetlands	
Habitats	
<b>1.45.1 Size and Shape</b>	
Forms part of Bush Forever Site 397 that is much greater than 20ha. A range of upland communities/habitats is found in the area. Forms part of a corridor for fauna and contiguous upland habitat types for seasonal faunal movement.	
<i>Vegetation Condition:</i> Naturally vegetated areas are in Very Good to Good condition.	
Comment: While >30% of Quindalup and Cottesloe Central and South Complexes remains, areas proposed to be cleared reduce area remaining to approx. 20%. Upland vegetation of a quality and type to be considered typical of these dunes in this location. Contiguous upland habitat types provides ecological linkages for fauna.	
<b>Diversity YES</b>	
Landforms	Diversity of Quindalup dune phases and Spearwood limestone ridges.
Vegetation Complexes	2
Floristic Community Types	5
Vegetation units	11. High diversity for vegetation units, related to complex of Quindalup and Spearwood dunes, and limestone and sands.
Flora	High upland diversity associated with diversity of vegetation units.
Habitats	High habitat diversity
Fauna	High fauna diversity
Comment: High diversity of landform, vegetation associations, fauna habitats and fauna species.	
<b>Rarity YES</b>	
Vegetation Complex <10% remaining	No complex at <10% remaining.
Threatened Ecological Communities	Yes. FCT 26a is listed by CALM as a TEC.
Flora	5 Priority taxa, 9 taxa listed as significant on the Swan Coastal Plain in Bush Forever.
Fauna	
Comment: 3 locations of a Threatened Ecological Community, 15 significant flora, 7 significant birds, 1 Threatened bird.	
<b>Maintaining Ecological Processes and Natural Systems YES</b>	
<i>Relationship/proximity to:</i>	
Regional Ecological Link	Part of regional north-south coast ecological linkage: coastal foreshore reserve. Part of regional east-west ecological linkage: Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast BFS 397.
Protected areas	
Naturally vegetated areas	Contiguous native vegetation to north, south and east
Creekline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	NA
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</i> - see Representation of Ecological Communities	
Comment: Forms a critical part of a regional east-west ecological linkage.	
<b>Scientific or Evolutionary Importance YES</b>	
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation NO</b>	
Comment:	

## **1.46 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&R**

### **1.47 Regional Significance - Assessment of area against Criteria**

Areas 5a and 5d form part of a larger natural area of outstanding regional significance. This area contains a consolidated vegetated area of Quindalup dunes of various phases, and Spearwood sands and limestones. The area of proposed P&R is centred on the dune landform and the limestone surface where greatest flora of significance and several occurrences of a threatened ecological community are located. It also protects habitat of Carnaby's Cockatoo.

Areas 5a and 5d are considered to be a regionally significant natural area meeting five criteria, being: *Representation of Ecological Communities, Diversity, Rarity, Maintaining Ecological Processes and Natural Systems* and *Scientific or Evolutionary Importance*. The natural attributes of areas 5a and 5d Parks and Recreation that contribute to meeting the criteria are listed below.

- intact vegetated Quindalup Dunes of various phases;
- intact vegetation Spearwood sands and Tamala Limestone surfaces;
- representative area of natural vegetation in Very Good to Good condition of the Quindalup and Cottesloe Central and South Vegetation Complexes;
- highly diverse area with respect to diversity of Quindalup and Spearwood Dunes, upland vegetation units, habitat, flora and fauna species;
- location for five Priority flora and 10 significant flora that are listed in Bush Forever;
- location for a significant fauna taxa, Carnaby's Cockatoo and at least seven bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain;
- location of three occurrences of a Threatened Ecological Community (26a) listed by CALM;
- part of two regional ecological linkages: North-south coastal reserve; and east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast; and
- important geoh heritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity.

**Comment on Proposed MRS P&R boundary in relation to the boundaries of the regionally significant natural area**

The proposed MRS amendment to remove the Parks and Recreation reservation from this location and to zone it Urban (5a, 5b, 5c) is generally not recommended as it would not adequately protect:

- the diversity of Quindalup dunes phases, Spearwood dunes and Tamala Limestone surfaces, upland vegetation units, habitat, flora and fauna species in this location;
- five Priority flora and 10 flora that are listed as significant in Bush Forever;
- several occurrences of a Threatened Ecological Community (26a) listed by CALM;
- habitat for a significant fauna taxa, Carnaby's Cockatoo and at least seven bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain;
- the regional ecological linkage that connects Yanchep and Neerabup National Parks, through BFS 129 and BFS 130, to the coast; and
- part of a geoheritage site recognised as of National and International significance.

The area (area 4) intended to replace this Parks and Recreation reserve in the MRS amendment is not considered to have exceptional values.

Therefore the EPASU recommends not supporting the removal of the reservation at 5a. Should the reservation be lifted and area 5a be zoned Urban, the regionally significant values of this area highlighted above would not be adequately protected, and this may subsequently result in significant negative impacts to those values.

The EPASU recommends modifying the boundary to include area 5d and exclude areas 5b and 5c, on the basis that:

- the current boundary bisects the parabolic dune landform at 5c;
- the boundary of the regional linkage should be widened at 5d; and
- values within area 5b, while significant and desirable to retain if possible, are protected elsewhere on the site.

Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the EPASU.

INFORMATION	COMMENT
<b>1.48 Background Information</b>	
Area Number	6
Area Name	P&R surrounding Groundwater Treatment Plant
Location	
Proposed P&R Size (ha) 6a	44.2
EPASU recommended deletion 6b (ha)	14.7
EPASU recommended add 6c (ha)	13.8
Change relative to current MRS P&R reserve (ha)	
<b>Environmental Considerations</b>	
<b>1.49 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	No
Others	
<b>1.50 Environmental Considerations - Natural Attributes</b>	
<b>1.51 Landforms</b>	
<p>1.52 Vegetated parabolic dunes. Quindalup Dunes of phase Q2, of Holocene age, that overlie Spearwood Dunes. This forms part of the Alkimos Dune Complex that is recognised as of National and International significance (Lemon <i>et al.</i> 1979; Semeniuk and Semeniuk 2000).</p> <p>1.53 Spearwood dunes derived from Tamala limestone, and protruding Tamala Limestone surfaces (Ks).</p> <p>See also <i>Area Specific</i> description of vegetation associations.</p>	
<b>1.54 Vegetation &amp; Flora</b>	
<i>Regional</i>	
Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex; Spearwood Dunes – Cottesloe Central and South Complex</b>
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> *24 Northern Spearwood shrublands and woodlands *28 Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> –

	<p><i>Eucalyptus</i> woodlands  *29b <i>Acacia</i> shrublands on taller dunes  *S11 Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands</p>
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities	Not assessed
<b>1.54.1.1.1.1 Area Specific</b>	
Summary of findings	<p><b>Structural Units: (ATA Environmental 2005)</b></p> <p><u>6a</u>  1.54.1.2 <u>Quindalup Dunes</u>  Uplands – Older dunes and plains: <i>Acacia rostellifera</i> Closed Scrub/Heath.</p> <p><b>1.54.1.3</b>  1.54.1.4 <u>Spearwood Dunes</u>  <b>1.54.1.5 <u>Uplands – Sands derived from Tamala Limestone: <i>Banksia attenuata</i>, <i>B. menziesii</i> Low Woodland; <i>Eucalyptus todtiana</i>, <i>Banksia attenuata</i>, <i>B. menziesii</i> Low Open Woodland; <i>Allocasuarina fraseriana</i>, <i>Banksia</i> spp., <i>E. todtiana</i> Low Open Forest to Open Forest; <i>Eucalyptus gomphocephala</i> (Tuart) Open Woodland to Woodland over <i>Banksia attenuata</i>, <i>Acacia saligna</i> and <i>Xanthorrhoea preissii</i>.</u></b>  Uplands – Tamala Limestone surfaces: <i>Xanthorrhoea preissii</i>, <i>Hibbertia hypericoides</i> Open Heath; <i>Dryandra sessilis</i> Open to Closed Heath; <i>Dryandra sessilis</i>/<i>Xanthorrhoea preissii</i> Closed Heath.</p> <p><b>1.54.1.6</b>  <u>6b</u>  1.54.1.7 <u>Spearwood Dunes</u>  <b>1.54.1.8 <u>Uplands – Sands derived from Tamala Limestone: <i>Banksia attenuata</i>, <i>B. menziesii</i> Low Woodland; <i>Banksia attenuata</i>, <i>B. menziesii</i> Low Woodland over <i>Dryandra sessilis</i>; <i>Banksia attenuata</i>, <i>Allocasuarina fraseriana</i> Low Open Forest over <i>Jacksonia sternbergiana</i> High Shrubland; <i>Eucalyptus todtiana</i>, <i>Banksia attenuata</i>, <i>B. menziesii</i> Low Open Woodland; <i>Allocasuarina fraseriana</i>, <i>Banksia</i> spp., <i>E. todtiana</i> Low Open Forest to Open Forest.</u></b>  Uplands – Tamala Limestone surfaces: <i>Dryandra sessilis</i> Open to Closed Heath; <i>Xanthorrhoea preissii</i>, <i>Dryandra sessilis</i>, <i>Hakea trifurcata</i> Closed Heath.</p> <p><u>6c</u>  1.54.1.9 <u>Quindalup Dunes</u>  Uplands – Older dunes and plains: <i>Acacia rostellifera</i> Closed Scrub/Heath; <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath.</p> <p><b>1.54.1.10</b>  <b>Vegetation Condition: (ATA Environmental 2005):</b>  <u>6a:</u> 70% Excellent, 30% Very Good to Good.  <u>6b:</u> 100% Very Good to Good.  <u>6c:</u> 100% Very Good to Good.  <b>Significant Flora: (ATA Environmental 2005)</b></p>

	6a: none 6b: <i>Lechenaultia linarioides, Grevillea preisii, Persoonia comata.</i> 6c: none
<b>1.55 Fauna</b>	
<i>Area Specific</i>	
Fauna Survey	Alan Tingay and Associates (1996): Limited survey of whole amendment area. ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people. EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.
Summary of findings	Important feeding habitat for Carnaby's Cockatoo and good quality habitat for vertebrates especially habitat specialist sedentary birds. Six bird species recorded including Grey Shrike-thrush and Western Little Wattlebird which are listed in Bush Forever as conservation significant species on the Coastal Plain.
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
Linkage Values	This key east/west ecological linkage facilitates movements of bird species between different habitats to utilize native vegetation for seasonal food resources, shelter, breeding and roosting sites to maintain populations of habitat sensitive declining species. This linkage also allows long-term genetic movement and the conservation of biological diversity.
<b>Consideration Against Criteria#</b>	
<b>Representation of Ecological Communities</b>	
<b>Criterion Met</b>	
<b>YES</b>	
<i>Regional vegetation representation</i>	
Vegetation Complexes	Quindalup Complex 47 % remaining on SCP, 5 % in secure tenure; 48% remaining in PMR, Bush Forever proposed protection 20%.  Cottesloe Central and South Complex 41% remaining in on SCP, 9% in secure tenure; 36% remaining in PMR, Bush Forever proposed protection 18%.
Floristic Community types	considered to be representative of the vegetation complex
Uplands and Wetlands	
Habitats	
<b>1.55.1 Size and Shape</b>	
Area is much greater than 20ha. A range of upland communities/habitats is found in the area. Forms part of a corridor for fauna and contiguous upland habitat types for seasonal faunal movement.	
<i>Vegetation Condition:</i> Naturally vegetated areas are in Very Good to Good condition.	
Comment: While >30% of Quindalup and Cottesloe Central and South Complexes remains, areas proposed to be cleared reduce area remaining to approx. 20%. Upland vegetation of a quality and type to be considered typical of these dunes occur in this location. Contiguous upland habitat types provides ecological linkages for fauna.	
<b>Diversity</b>	
<b>YES</b>	
Landforms	Diversity from parabolic dune, limestone sands and limestone ridges.
Vegetation Complexes	2
Floristic Community Types	4



Vegetation units	9. High diversity for vegetation units, related to diversity of substrates.
Flora	Upland diversity typical.
Habitats	High diversity of vegetation units is reflected in habitat diversity.
Fauna	Not fully assessed but preliminary assessment indicates several habitat specialist sedentary birds. Feeding habitat for Carnaby's Cockatoo.
Comment: High diversity of Quindalup landform units and associated vegetation.	
<b>Rarity</b>	<b>YES</b>
Vegetation Complex <10% remaining	No complex at <10% remaining.
Threatened Ecological Communities	No
Flora	3 significant taxa listed in Bush Forever.
Fauna	Not fully assessed but contains significant feeding habitat for Carnaby's Cockatoo.
Comment: 3 significant plant species, habitat for Carnaby's Cockatoo.	
<b>Maintaining Ecological Processes and Natural Systems</b>	<b>YES</b>
<i>Relationship/proximity to:</i>	
Regional Ecological Link	Part of regional east-west ecological linkage: Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast BFS 397.
Protected areas	
Naturally vegetated areas	Contiguous native vegetation to north, south, east and west.
Creekline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	Areas of the dune suitable, particularly where uncontrolled 4WD tracks traverse steep dunes are potential source of dune blowouts.
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition - see Representation of Ecological Communities</i>	
Comment: Forms a critical part of a regional east-west ecological linkage.	
<b>Scientific or Evolutionary Importance</b>	<b>YES</b>
Comment: Part of an important geoheritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity. This site is of particular educational value for both secondary and tertiary students as well as the community.	
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation</b>	<b>NO</b>
Comment:	

## **1.56 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&R**

### **1.57 Regional Significance - Assessment of area against Criteria**

Areas 6a and 6c form part of a larger natural area of outstanding regional significance. This area contains a consolidated vegetated area of Quindalup and Spearwood Dunes. The areas of proposed P&R are centred on the parabolic dune landform, protect habitat for Carnaby's Cockatoo, and maintains the regional ecological linkage.

Areas 6a and 6c are considered to form a regionally significant natural area meeting five criteria, being: *Representation of Ecological Communities, Diversity, Rarity, Maintaining Ecological Processes and Natural Systems, and Scientific or Evolutionary Importance*. The natural attributes of areas 6a and 6c that contribute to meeting the criteria are listed below.

- intact vegetated parabolic Quindalup Dunes (Q2 phase) adjacent to intact vegetated Spearwood sands and limestone surfaces;
- representative area of natural vegetation in Very Good to Good condition of the Quindalup and Cottesloe Central and South Vegetation Complexes;
- highly diverse area with respect to diversity of upland vegetation units and habitat;
- habitat for a Threatened fauna taxa, Carnaby's Cockatoo;
- part of a regional ecological linkage: east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast BFS 397; and
- part of a geoh heritage site recognised as of National and International significance.

#### **Comment on Proposed MRS P&R boundary in relation to the boundaries of the regionally significant natural area**

The current configuration of the Parks and Recreation reserve (6a and 6b) is not considered suitable to protect all values in this location as it:

- does not protect the important geoh heritage site in this location; and
- bisects the dune landform.

Therefore the EPASU recommends modifying the boundary to include area 6c and exclude area 6b, on the basis that:

- including 6c will protect the important geoh heritage site;
- by including 6c, the reserve boundary will not bisect the parabolic dune landform; and
- values within area 6b, while significant and desirable to retain if possible, are protected elsewhere on the site.

Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the EPASU.

INFORMATION	COMMENT
<b>1.58 Background Information</b>	
Area Number	7 - includes 7b and 7c but excludes 7a
Area Name	Part of Bush Forever Site 397 P&R (existing)
Location	
Proposed removal of P&R Size 7a (ha)	5.7
Proposed removal of P&R Size 7b (ha), not supported by EPASU	4.5
EPASU recommended add 7c (ha)	5.9
Change relative to current MRS P&R reserve (ha)	
<b>Environmental Considerations</b>	
<b>1.59 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	Yes. M2 area is coastal foreshore reserve.
Adjacent System 6 Area	No
Others	
<b>1.60 Environmental Considerations - Natural Attributes</b>	
<b>1.61 Landforms</b>	
1.62 Sandy coastline, vegetated coastal dunes. See also <i>Area Specific</i> description of vegetation associations.	
<b>1.63 Vegetation &amp; Flora</b>	
<b>Regional</b>	
Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex</b>
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> <u>7b and 7c</u> *29a Coastal shrublands on shallow sands *29b Acacia shrublands on taller dunes *S11 Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands  <u>7b and 7c</u> *28 Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands

	*29a Coastal shrublands on shallow sands *29b Acacia shrublands on taller dunes
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities	
<b>Area Specific</b>	
Summary of findings	<p>1.63.1.1 <b><u>Structural Units:</u></b> <u>7a:</u> 1.63.1.2 <b><u>Quindalup Dunes</u></b> Uplands – Older dunes and plains: <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath (Q1); <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath (Q3); <i>Allocasuarina lehmanniana</i> Closed Heath. Uplands – Younger dunes: <i>Lepidospermum gladiatum</i> Sedgeland.</p> <p>1.63.1.3 <b><u>Spearwood Dunes</u></b> 1.63.1.4 <b><u>Uplands – Sands derived from Tamala Limestone: <i>Eucalyptus gomphocephala</i> (Tuart) Open Woodland.</u></b></p> <p><u>7b:</u> 1.63.1.5 <b><u>Quindalup Dunes</u></b> Uplands – Older dunes and plains: <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath (Q3); <i>Allocasuarina lehmanniana</i> Closed Heath; <i>Allocasuarina lehmanniana</i>, <i>Melaleuca systema</i> Closed Heath. Uplands – Younger dunes: <i>Spyridium globulosum</i>, <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath.</p> <p>1.63.1.6 <b><u>7c:</u></b> 1.63.1.7 <b><u>Quindalup Dunes</u></b> Uplands – Older dunes and plains: <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath (Q3); <i>Allocasuarina lehmanniana</i> Closed Heath; <i>Acacia rostellifera</i> Closed Scrub/Heath (Q) Uplands – Younger dunes: <i>Spyridium globulosum</i>, <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath.</p> <p><b>Vegetation Condition (ATA Environmental 2005):</b> <u>7a:</u> 75% Good, 25% Completely Degraded. <u>7b:</u> 50% Very Good, 50% Very Good to Good. <u>7c:</u> 80% Very Good, 20% Good.</p> <p>Significant Flora: <u>7a:</u> none <u>7b:</u> none <u>7c:</u> none</p>

<b>1.64 Fauna</b>	
<b>Area Specific</b>	
Fauna Survey	Alan Tingay and Associates (1996): Limited survey of whole amendment area. ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people. EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.
Summary of findings	Provides feeding habitat for Carnaby's Cockatoo and good habitat for habitat specialist sedentary birds. Ten bird species recorded including Collared Sparrowhawk, Broad-tailed Thornbill, White-browed Scrubwren, and Splendid Fairywren which are listed in Bush Forever as conservation significant species on the Coastal Plain. One native mammal species recorded. Karli Spring is breeding site for at least two amphibian species and a likely drinking site for Carnaby's Cockatoo.
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
Linkage Values	Consolidated area forms part of a significant north/south regional ecological linkage.
<b>Consideration Against Criteria#</b>	<b>Criterion Met</b>
Representation of Ecological Communities	<b>NO</b>
<b>1.64.1 Regional vegetation representation</b>	
Vegetation Complexes	Quindalup Complex 47 % remaining on SCP, 5 % in secure tenure; 48% remaining in PMR, Bush Forever proposed protection 20%.
Floristic Community types	Considered to be representative of vegetation complexes
Uplands and Wetlands	
Habitats	
<b>Size and Shape</b>	
Forms part of Bush Forever Site 397 that is much greater than 20ha. A range of upland communities/habitats is found in the area. Contains habitat for fauna, and forms part of a corridor for fauna and contiguous upland habitat types for seasonal faunal movement.	
<b>Vegetation Condition:</b> Naturally vegetated areas are in Excellent to Good condition.	
While >30% of Quindalup Complex remains, areas proposed to be cleared reduce area remaining to approx. 20%. Upland vegetation of a quality and type to be considered typical of these Dunes in this location. Contiguous upland habitat types provides ecological linkages for fauna. While this is part of a much larger bushland area, this area is small and could not be considered to meet this criterion.	
<b>Diversity</b>	<b>YES</b>
Landforms	diversity of form - vegetated coastline, coastal parabolic dunes,
Vegetation Complexes	1
Floristic Community Types	2
Vegetation units	5. Moderate diversity for vegetation units, related to complex of dune landforms
Flora	Upland diversity typical, wetlands have an unusual diversity of sedges and shrubs for Quindalup Dunes
Habitats	
Fauna	High diversity of vertebrate fauna species

Comment: High diversity of vertebrate fauna species	
<b>Rarity</b>	<b>YES</b>
Landform	Karli Springs is an unusual freshwater wetland within the Quindalup Dunes.
Vegetation Complex <10% remaining	No complex at <10% remaining.
Threatened Ecological Communities	None
Flora	None recorded
Fauna	1 Threatened bird species Carnaby's Cockatoo, 4 significant bird species. Karli Spring is a likely drinking site for Carnaby's Cockatoo and the only amphibian breeding site in the area..
Comment: 1 Threatened bird species Carnaby's Cockatoo.	
<b>Maintaining Ecological Processes and Natural Systems</b>	<b>YES</b>
<i>Relationship/proximity to:</i> Regional Ecological Link	Part of regional north-south coast ecological linkage: coastal foreshore reserve BFS 397.
Protected areas	
Naturally vegetated areas	Contiguous native vegetation to north and south
Creekline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	Areas of the sumpland suitable, currently sedge growth controlled by burning and grazing, invasion by natives. Uplands restoration possible, <i>Agonis</i> readily colonises.
<b>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</b> - see Representation of Ecological Communities	
Comment: Forms part of a regional north-south ecological linkage	
<b>Scientific or Evolutionary Importance</b>	<b>NO</b>
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal vegetation</b>	
	<b>YES</b>
Comment: Coastal vegetation	

## **1.65 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&R**

### **1.66 Regional Significance - Assessment of area against Criteria**

Areas 7a, 7b and 7c forms part of a larger natural area of outstanding regional significance, the Coastal strip from Wilbinga to Mindarie. This area contains a consolidated vegetated area of Quindalup Dunes. Areas 7b and 7c that are recommended P&R are centred on the dune landform and protect an occurrence of *Allocasuarina lehmanniana* Closed Heath that is not recorded elsewhere in the area and which provides important habitat for Carnaby's Cockatoo.

Areas 7b and 7c are considered to be a regionally significant natural area meeting four criteria, being: *Diversity, Rarity, Maintaining Ecological Processes and Natural Systems, and General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation.* The natural attributes of areas 7b and 7c that contribute to meeting the criteria are listed below.

- intact vegetated parabolic coastal Quindalup Dunes;
- highly diverse area with respect to diversity of vertebrate fauna species;
- location for four significant fauna and the Threatened Carnaby's Cockatoo;
- part of a regional north-south coast ecological linkage: coastal foreshore reserve BFS 397;

### **Comment on Proposed MRS P&R boundary in relation to the boundaries of the regionally significant natural area**

The EPASU does not support the proposed removal of area 7b from the Parks and Recreation reserve because it:

- provides a consolidated reserve of sufficient habitat size surrounding Karli Springs and the *Allocasuarina* thicket that provide important habitat for significant fauna including Carnaby's Cockatoo and conservation significant bird species.

Furthermore, the current configuration of the P&R is not considered suitable to protect all values in this location as it:

- bisects the dune landform between areas 7a and 7b; and
- includes an area that has significant areas that are Completely Degraded (7a).

Therefore the EPASU recommends modifying the boundary to exclude 7a as proposed by the WAPC, and to include 7c on the basis that:

- values within area 7a, while desirable to retain if possible, are protected elsewhere on the site; and
- by including 7c, the reserve boundary will not bisect the parabolic dune landform.

. Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the EPASU.

INFORMATION	COMMENT
<b>1.67 Background Information</b>	
Area Number	8
Area Name	
Location	
Existing Public Purposes reserve Size (ha)	46.0
MRS proposed Urban	46.0
EPASU recommended change relative to current MRS P&R reserve (ha)	0

<b>Environmental Considerations</b>	
<b>1.68 General Policy</b>	
Existing Bush Forever site	
Adjacent Bush Forever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	No
Others	

<b>1.69 Environmental Considerations - Natural Attributes</b>	
<b>1.70 Landforms</b>	
<p>1.71 Vegetated near-coastal dunes. Quindalup Dunes of various ages (Q1 and Q3), of Holocene age, that overly Spearwood Dunes. These are recognised as of National and International significance (Lemon <i>et al.</i> 1979; Semeniuk and Semeniuk 2000).</p> <p>Spearwood dunes derived from Tamala limestone, and protruding Tamala Limestone surfaces (Ks). See also <i>Area Specific</i> description of vegetation associations.</p>	
<b>1.72 Vegetation &amp; Flora</b>	
<b>Regional</b>	
Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex; Spearwood Dunes – Cottesloe Central and South Complex</b>
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> *24 Northern Spearwood shrublands and woodlands *28 Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands *29a Coastal shrublands on shallow sands *S11 Northern <i>Acacia rostellifera</i> – <i>Melaleuca acerosa</i> shrublands



Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities	none
<b>1.72.1.1.1.1 Area Specific</b>	
Summary of findings	<p><b>1.72.1.2 <u>Quindalup Dunes</u></b> Uplands – Older dunes and plains: <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath (Q1); <i>Melaleuca systema</i>, <i>Lomandra maritima</i> Low Open Heath (Q3); <i>Acacia cochlearis</i> Closed Heath; <i>Acacia rostellifera</i> Closer Scrub/Heath (Q3); Uplands – Younger dunes:</p> <p><b>1.72.1.3 <u>Spearwood Dunes</u></b></p> <p><b>1.72.1.4 <u>Uplands – Sands derived from Tamala Limestone:</u></b> <u><i>Banksia attenuata</i>, <i>B. menziesii</i> Low Woodland; <i>Eucalyptus gomphocephala</i> (Tuart) Open Woodland to Woodland over <i>Banksia attenuata</i>, <i>Acacia saligna</i> and <i>Xanthorrhoea preissii</i>; <i>Eucalyptus gomphocephala</i> (Tuart) Open Woodland to Woodland over <i>Melaleuca systema</i> Heath.</u> Uplands –Tamala Limestone surfaces: <i>Xanthorrhoea preissii</i> Shrubland; <i>Dryandra sessilis</i> Open to Closed Heath; <i>Melaleuca huegelii</i>, <i>Dryandra sessilis</i> Open Heath to Heath; ; <i>Melaleuca cardiophylla</i>/<i>Dryandra sessilis</i> Closed Heath;</p> <p><b>Vegetation Condition</b> (ATA Environmental 2005): 20% Very Good to Good, 50% Good, 10% Degraded, 20% Completely Degraded.</p> <p style="text-align: center;"><b>Significant Flora (ATA Environmental 2005):</b></p> <p><b>1.72.1.5 <u>Leptorhynchos scaber</u>, <u>Sarconzonia bicarinata</u> (P3), <u>Thomasia triphylla</u>, <u>Stylidium maritimum</u> (P3), <u>Grevillea preissii</u>, <u>Hibbertia spicata subsp. leptotheca</u> (P3), <u>Conospermum triplinervium</u>, <u>Crassula colorata</u> (P3).</b></p>
<b>1.73 Fauna</b>	
<b>Area Specific</b>	
Fauna Survey	Alan Tingay and Associates (1996): Limited survey of whole amendment area. ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people. EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.
Summary of findings	Important feeding habitat for Carnaby's Cockatoo and good habitat for habitat specialist sedentary birds. Five bird species recorded including White-browed Scrubwrens and Splendid and Variegated Fairy-wrens which are listed in Bush Forever as conservation significant species on the Coastal Plain.
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.

1.73.1.1.1.1.1 Linkage Values	Currently has significant fauna linkage values but proposed future development will isolate this site and reduce its linkage value.
-------------------------------	---

Consideration Against Criteria#		Criterion Met
Representation of Ecological Communities		YES
<i>Regional vegetation representation</i>		
Vegetation Complexes	<p>Quindalup Complex 47 % remaining on SCP, 5 % in secure tenure; 48% remaining in PMR, Bush Forever proposed protection 20%.</p> <p>Cottesloe Central and South Complex 41% remaining in on SCP, 9% in secure tenure; 36% remaining in PMR, Bush Forever proposed protection 18%.</p>	
Floristic Community types	considered to be representative of the vegetation complex	
Uplands and Wetlands		
Habitats		
<b>1.73.2 Size and Shape</b>		
Forms part of Bush Forever Site 289 that is much greater than 20ha. A range of upland communities/habitats is found in the area.		
<i>Vegetation Condition:</i> Naturally vegetated areas are in Very Good to Good condition.		
Comment: While >30% of Quindalup Complex remains, areas proposed to be cleared reduce area remaining to approx. 30%. Upland vegetation of a quality and type to be considered typical of these Dunes in this location.		
<b>Diversity</b>		<b>YES</b>
Landforms	diversity of form - vegetated coastline, coastal parabolic dunes.	
Vegetation Complexes	1	
Floristic Community Types	4	
Vegetation units	13. High diversity for vegetation units, related to complex of Quindalup and Spearwood dunes, and limestone and sands.	
Flora	Upland diversity typical.	
Habitats	Typical diversity of habitats.	
Fauna	Moderate vertebrate diversity.	
Comment: High diversity of Quindalup landform units and associated vegetation.		
<b>Rarity</b>		<b>YES</b>
Vegetation Complex <10% remaining	No complex at <10% remaining.	
Threatened Ecological Communities	No	
Flora	4 Priority taxa, 4 taxa listed as significant on the Swan Coastal Plain in Bush Forever.	
Fauna	1 Threatened bird species and at least 3 other bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain.	
Comment: 8 significant flora and 4 significant fauna species.		
<b>Maintaining Ecological Processes and Natural Systems</b>		<b>NO</b>
<i>Relationship/proximity to:</i>		
Regional Ecological Link	Adjacent to a regional north-south coast ecological linkage: coastal foreshore reserve BFS 397. Part of regional east-west ecological linkage: Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast BFS 397.	

Protected areas	
Naturally vegetated areas	Contiguous native vegetation to north, south and east
Creekline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	Areas of the dune suitable, particularly where uncontrolled 4WD tracks traverse steep dunes are potential source of dune blowouts.
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</i> - see Representation of Ecological Communities	
Comment: This area is poorly connected to the north-south and east-west regional ecological linkage and is constrained by the proposed coastal node and dissected by Water Corporation's proposed pipeline construction area.	
<b>Scientific or Evolutionary Importance</b>	<b>YES</b>
Comment: Part of an important geoheritage site that demonstrates two phases of dune formation that occur on the Swan Coastal Plain.	
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation</b>	<b>YES</b>
Comment: Coastal vegetation	

Note #: Some areas of significance, that provide this area with values that fulfil the Diversity, Rarity and Scientific Importance criteria, would be protected within an area that is proposed for protection by the EPA (Area 9).

## **1.74 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&R**

### **1.75 Regional Significance - Assessment of area against Criteria**

Area 8 contains a consolidated vegetated area of Quindalup dunes of two phases and Spearwood limestones.

Area 8 is considered to be a regionally significant natural area meeting five criteria, being: *Representation of Ecological Communities, Diversity, Rarity, Scientific or Evolutionary Importance and General Criteria for the Protection of Wetland and Streamline and Estuarine fringing Vegetation and Coastal Vegetation.* The natural attributes of area 8 that contribute to meeting the criteria are listed below.

- intact vegetated Quindalup Dunes of various phases;
- intact vegetation Spearwood sands and Tamala Limestone surfaces;
- representative area of natural vegetation in Good condition of the Quindalup and Cottesloe Central and South Vegetation Complexes;
- highly diverse area with respect to diversity of upland vegetation units, habitat, flora and fauna species;
- location for five Priority flora and 10 significant flora that are listed in Bush Forever;
- location for a significant fauna taxa, Carnaby's Cockatoo and at least three bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain;
- location of three occurrences of a Threatened Ecological Community (26a) listed by CALM;
- part of two regional ecological linkages: North-south coastal reserve; and east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast; and
- important geoheritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity.

**Comment on Proposed MRS P&R boundary in relation to the boundaries of the regionally significant natural area**

Area 8 is currently reserved for Public Purposes for the buffer area of the Waste Water Treatment Plant located at Site A. Some areas of significance, that provide this area with values that fulfil the Diversity, Rarity and Scientific Importance criteria, would be protected within an area that is proposed for protection by the EPA (Area 9). Similar values are found in area 5 in generally better condition. Area 8 is poorly connected to the north-south and east-west regional ecological linkage and is constrained by the proposed coastal node and dissected by Water Corporation's proposed pipeline construction area

Therefore the EPASU considers that the values within area 8, while desirable to retain if possible, are protected elsewhere on the site.

INFORMATION	COMMENT
<b>1.76 Background Information</b>	
Area Number	9
Area Name	Alkimos Dune
Location	
EPASU recommended add 9 (ha)	92.5
Public Purpose reserve proposed as Urban (part of 8) that EPASU recommended to add P&R (ha)	3.8 Note: a significant proportion of this area is within the buffer area of WWTP Site B proposed to be reserved for Public Purpose.
Change relative to current MRS P&R reserve (ha)	
<b>Environmental Considerations</b>	
<b>1.77 General Policy</b>	
Existing BushForever site	
Adjacent BushForever site	
Existing System 6 area (inc. comparison with proposed P&R boundary)	No
Adjacent System 6 Area	No
Others	

## 1.78 Environmental Considerations - Natural Attributes

### 1.79 Landforms

1.80 Vegetated parabolic dunes. Quindalup Dunes of phase Q3, of Holocene age, that overlies Spearwood Dunes. This forms part of the Alkimos Dune Complex that is recognised as of National and International significance (Lemon *et al.* 1979; Semeniuk and Semeniuk 2000).

1.81 Spearwood dunes derived from Tamala limestone, and protruding Tamala Limestone surfaces (Ks).

1.82 See also *Area Specific* description of vegetation associations.

### 1.83 Vegetation & Flora

#### Regional

Vegetation Complex	<b>Quindalup Dunes - Quindalup Complex; Spearwood Dunes – Cottesloe Central and South Complex</b>
Floristic Community Types (FCT) *type inferred	<b>Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes</b> *24 Northern Spearwood shrublands and woodlands *26a <i>Melaleuca huegelii</i> – <i>Melaleuca acerosa</i> shrublands on Limestone ridges *28 Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands *29b <i>Acacia</i> shrublands on taller dunes
Vegetation types (Beard/Smith/Hopkins)	Acacia shrubland/mixed heathland
Threatened Ecological Communities (TEC)	26a is listed by CALM as a TEC. One location of inferred 26a occurs within area 9 (Weston 2004, Syrinx 2005). Analysis by Griffin (2005) of a vegetation unit recorded by Weston (2004) concluded that this unit cannot be distinguished between the threatened unit FCT 26a and the more common 29a (Syrinx 2005). It is possible that this unit may in fact be regarded to have greater conservation significance than 26a, and therefore is considered a TEC by the EPASU for the purposes of this assessment.

#### 1.83.1.1.1 Area Specific

Summary of findings	1.83.1.2 <u>Quindalup Dunes</u> Uplands – Older dunes and plains: <i>Melaleuca systema</i> , <i>Lomandra maritima</i> Low Open Heath (Q1); <i>Melaleuca systema</i> , <i>Lomandra maritima</i> Low Open Heath (Q2); <i>Melaleuca systema</i> , <i>Lomandra maritima</i> Low Open Heath (Q3); <i>Acacia cochlearis</i> Closed Heath; Uplands – Younger dunes: <i>Melaleuca systema</i> , <i>Lomandra maritima</i> Low Open Heath (Qp);
---------------------	---

	<p>1.83.1.3 <u>Spearwood Dunes</u></p> <p><b>1.83.1.4 Uplands – Sands derived from Tamala Limestone:</b>  <u><i>Eucalyptus gomphocephala</i> (Tuart) (mallee form); <i>Banksia attenuata</i>, <i>B. menziesii</i> Low Woodland; <i>Banksia attenuata</i> Low Woodland over <i>Xanthorrhoea preissii</i>; <i>Eucalyptus todiana</i>, <i>Banksia attenuata</i>, <i>B. menziesii</i> Low Open Woodland;</u>  Uplands –Tamala Limestone surfaces: <i>Dryandra sessilis</i> Open to Closed Heath; <i>Melaleuca cardiophylla</i>/<i>Dryandra sessilis</i> Closed Heath; <i>Xanthorrhoea preissii</i> Shrubland; <i>Melaleuca huegelii</i>, <i>Melaleuca cardiophylla</i>, <i>Melaleuca systema</i> Low Open Heath.</p> <p><b>Vegetation Condition</b> (ATA Environmental 2005):  5% Excellent to Very Good, 10% Very Good, 80% Very Good to Good, 5% Degraded to Completely Degraded.  <b>Significant Flora</b> (ATA Environmental 2005):  <i>Trymalium ledifolium</i> subsp. <i>ledifolium</i>, <i>Stylidium maritimum</i> (P3), <i>Leptorhynchus scaber</i>, <i>Lechenaultia liniarioides</i>, <i>Grevillea preissii</i>, <i>Conospermum triplinervium</i>, <i>Crassula colorata</i> (P2), <i>Pimelea calcicola</i>, <i>Melaleuca cardiophylla</i>, <i>Sarcozona bicarinata</i> (P3), <i>Dipopeltis huegelii</i>, <i>Hibbertia spicata</i> (P3), <i>Conostylis pauciflora</i> (P3), <i>Hibbertia spicata</i> subsp. <i>leptotheca</i></p>
<b>1.84 Fauna</b>	
<i>Area Specific</i>	
Fauna Survey	Alan Tingay and Associates (1996): Limited survey of whole amendment area. ATA Environmental (2005): Desktop compiled information (no on-ground site specific information) of provisional list of vertebrates from general texts and anecdotal records from local people. EPASU: single day visits on 5 February 2004, 6 and 28 April and 15 September 2005.
Summary of findings	Important feeding habitat for Carnaby's Cockatoo and good habitat for habitat specialist sedentary birds. Sixteen bird species recorded including Emu, Wedge-tailed Eagle, Grey Shrike-thrush, White-cheeked and Tawny-crowned Honeyeaters, White-browed Scrub-wren, and White-winged Fairy-wren which are listed in Bush Forever as conservation significant species on the Coastal Plain. Two native mammal species, including Echidna, and two reptile species recorded.
Fauna Survey Limitations	All surveys are short visits. Comprehensive surveys at other times would add additional species.
<b>Linkage Values</b>	This key east/west ecological linkage facilitates movements of bird species between different habitats to utilize native vegetation for seasonal food resources, shelter, breeding and roosting sites to maintain populations of habitat sensitive declining species. This linkage also allows long-term genetic movement and the conservation of biological diversity.
<b>Consideration Against Criteria#</b>	
<b>Representation of Ecological Communities</b>	
<b>Criterion Met</b>	
<b>YES</b>	
1.84.1.1.1.1 Regional vegetation representation	
Vegetation Complexes	Quindalup Complex 47 % remaining on SCP, 5 % in secure tenure; 48% remaining in PMR, Bush Forever proposed protection 20%.

	Cottesloe Central and South Complex 41% remaining in on SCP, 9% in secure tenure; 36% remaining in PMR, Bush Forever proposed protection 18%.
Floristic Community types	Considered to be representative of the vegetation complex
Uplands and Wetlands	
Habitats	
<b>1.84.2 Size and Shape</b>	
Area is much greater than 20ha. A range of upland communities/habitats is found in the area. Forms part of a corridor for fauna and contiguous upland habitat types for seasonal faunal movement.	
<i>Vegetation Condition:</i> 95% of the areas is naturally vegetated in Good or better condition.	
Comment: While >30% of Quindalup and Cottesloe Central and South Complexes remains, areas proposed to be cleared reduce area remaining to approx. 20%. Upland vegetation of a quality and type to be considered typical of these dunes occurs in this location. Contiguous upland habitat types provides ecological linkages for fauna.	
<b>Diversity YES</b>	
Landforms	Diversity of Quindalup parabolic dune phases (Q1, Q2, Q3 and Qp) and Spearwood limestone ridges.
Vegetation Complexes	2
Floristic Community Types	4
Vegetation units	13. High diversity for vegetation units, related to complex of Quindalup and Spearwood dunes, and limestone and sands.
Flora	High upland diversity associated with diversity of vegetation units.
Habitats	High diversity of vegetation units is reflected in high habitat diversity.
Fauna	High diversity of birds which are listed in Bush Forever as conservation significant species on the Coastal Plain
Comment: High diversity of Quindalup and Spearwood landform units, vegetation associations, fauna habitats, and flora and fauna species.	
<b>Rarity YES</b>	
Vegetation Complex <10% remaining	No complex at <10% remaining.
Threatened Ecological Communities	Yes. FCT 26a is listed by CALM as a TEC.
Flora	5 Priority taxa, 10 taxa listed as significant on the Swan Coastal Plain in Bush Forever.
Fauna	Provides important feeding habitat for threatened Carnaby's Cockatoo
Comment: 1 location of a Threatened Ecological Community, 15 significant flora, 7 significant birds, 1 Threatened bird.	
<b>Maintaining Ecological Processes and Natural Systems YES</b>	
<i>Relationship/proximity to:</i>	
Regional Ecological Link	Part of regional east-west ecological linkage: Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast BFS 397.
Protected areas	
Naturally vegetated areas	Contiguous native vegetation to north, south, east and west
Creepline/River/Estuary	NA
<i>Contains areas suitable for ecological restoration</i>	Isolated areas of the parabolic dune suitable, particularly where uncontrolled 4WD tracks that traverse steep dunes are potential source of dune blowouts.
<i>Size and Shape, Uplands and Wetlands &amp; Vegetation Condition</i> - see Representation of Ecological Communities	
Comment: Forms a critical part of a regional east-west ecological linkage.	

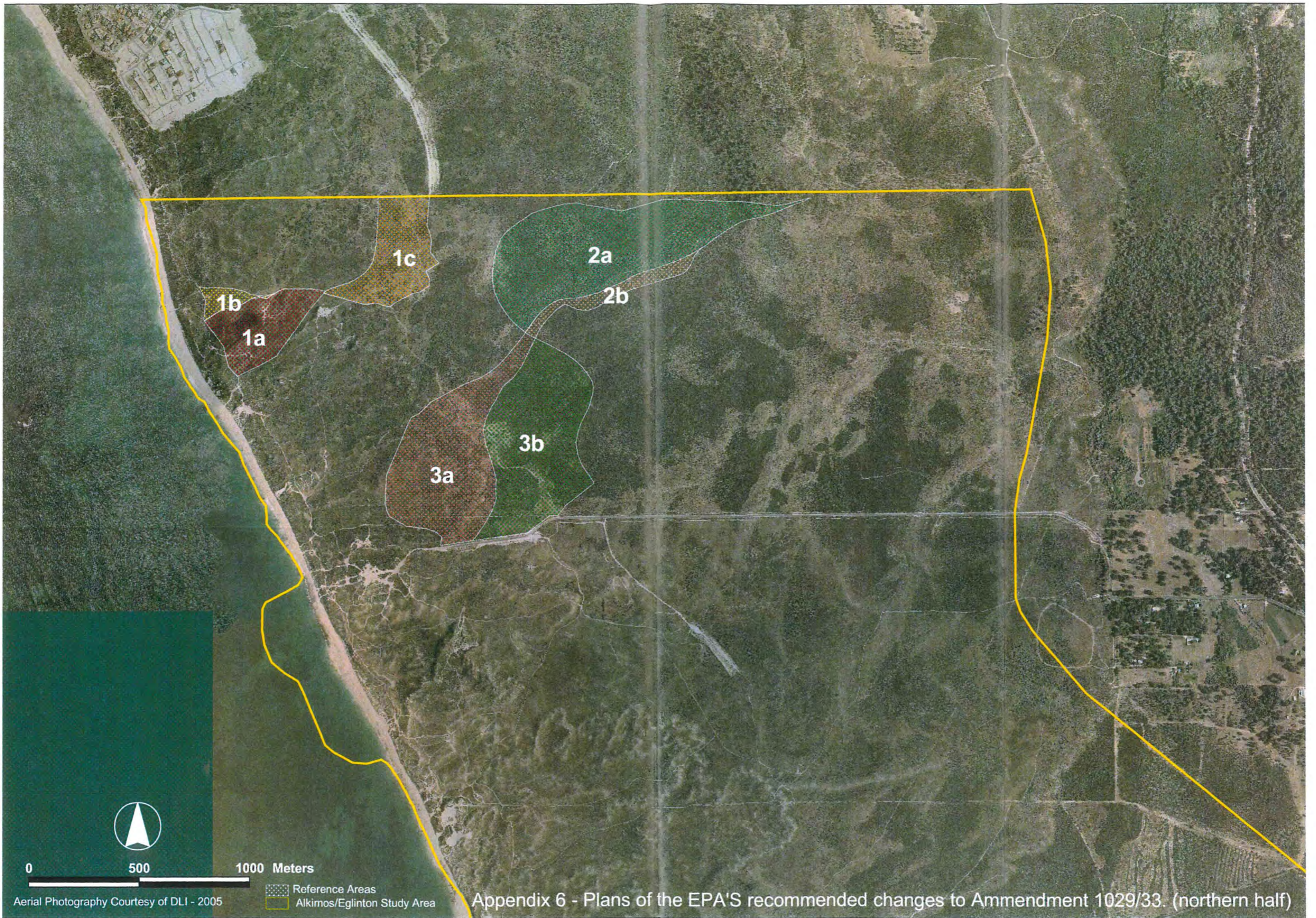
<b>Scientific or Evolutionary Importance</b>	<b>YES</b>
Comment: Part of an important geoheritage site that demonstrates all of the stages of dune formation that occur on the Swan Coastal Plain, in close proximity. This site is of particular educational value for both secondary and tertiary students as well as the community.	
<b>General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal Vegetation</b>	<b>NO</b>
Comment:	
<b>1.85 DRAFT COMMENT ON ADEQUACY PROPOSED BOUNDARY P&amp;R</b>	
<b>1.86 Regional Significance - Assessment of area against Criteria</b>	
<p>Area 9 forms part of a larger natural area of outstanding regional significance. This area contains a consolidated vegetated area of Quindalup and Spearwood Dunes. The areas of proposed P&amp;R are centred on the Alkimos parabolic dune landforms, limestone ridges that support an occurrence of a threatened ecological community, protects populations of significant flora and habitat for Carnaby's Cockatoo and other significant fauna species.</p> <p>Area 9 is considered to be a regionally significant natural area meeting five criteria, being: <i>Representation of Ecological Communities, Diversity, Rarity, Maintaining Ecological Processes and Natural Systems and Scientific or Evolutionary Importance</i>. The natural attributes of area 9 that contribute to meeting the criteria are listed below.</p> <ul style="list-style-type: none"> <li>• intact vegetated parabolic Quindalup Dunes of 4 phases (Q1, Q2, Q3 and Qp);</li> <li>• representative area of natural vegetation in Very Good to Good condition of the Quindalup and Cottesloe Central and South Vegetation Complexes;</li> <li>• highly diverse area with respect to diversity of Quindalup and Spearwood landform units, vegetation associations, fauna habitats and flora and fauna species;</li> <li>• location for 15 significant flora taxa. Of these, five are Priority flora;</li> <li>• location of an occurrence of a threatened ecological community (26a) listed by CALM;</li> <li>• important feeding habitat for a significant fauna taxa, Carnaby's Cockatoo and at least seven bird species which are listed in Bush Forever as conservation significant species on the Coastal Plain.</li> <li>• part of a regional ecological linkage: east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast; and</li> <li>• part of a geoheritage site recognised as of National and International significance.</li> </ul>	
<b>Comment on Proposed MRS P&amp;R boundary in relation to the boundaries of the regionally significant natural area</b>	
<p>The MRS amendment does not propose to protect Area 9 as Parks and Recreation. The majority of area 9 is proposed to be zoned as either Urban, Central City Area or Urban Deferred, with a smaller area proposed to be reserved as Public Purpose (WSD). This would not adequately protect the regionally significant values of this area highlighted above, and specifically would not retain the regionally significant ecological linkage and contiguous dune landform, and may subsequently result in significant negative impacts to those values.</p> <p>Therefore the EPASU recommends reserving area 9 for Parks and Recreation..</p>	

Note #: Values that were considered in satisfying the criteria are those that would be protected by the area recommended for P&R by the EPASU.



## **Appendix 6**

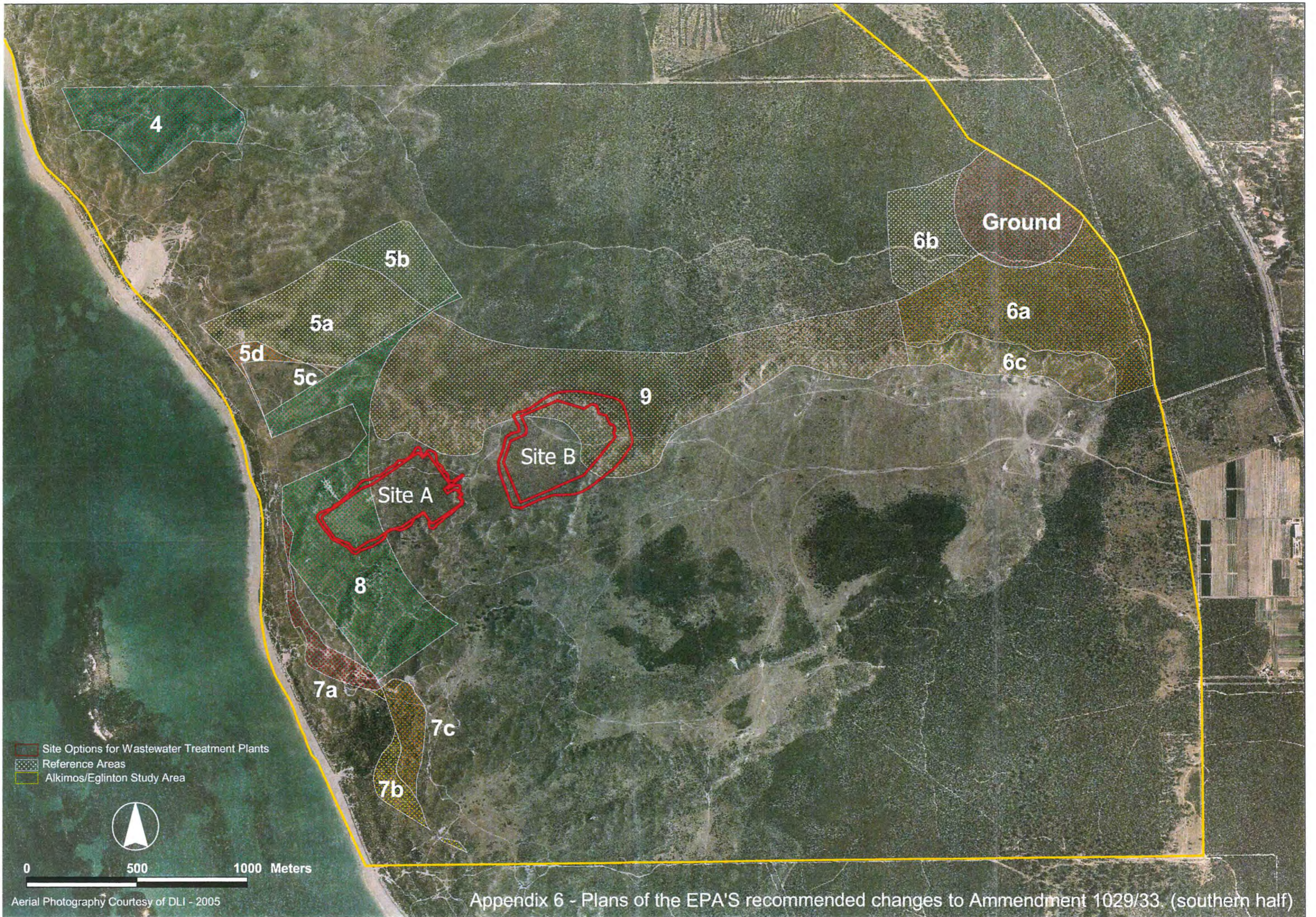
**Plans of the Environmental Protection Authority's recommended changes to  
Amendment 1029/33**



Aerial Photography Courtesy of DLI - 2005

Reference Areas  
Alkimos/Eglinton Study Area

Appendix 6 - Plans of the EPA'S recommended changes to Ammendment 1029/33. (northern half)



## **Appendix 7**

### **Table-Identification of Relevant Principles**

<b>PRINCIPLES</b>		
<b>Principle</b>	<b>Yes/No</b>	<b>Consideration</b>
<p>1. The precautionary principle  <i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by —</i></p> <p>(a) <i>careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i></p> <p>(b) <i>an assessment of the risk-weighted consequences of various options.</i></p>		
	<b>Yes</b>	The EPA's assessment of Amendment 1029/33 has been guided by careful evaluation to avoid, where practicable, serious or irreversible damage to remnant vegetation and fauna and impacts from odour emissions from the proposed WWTP on sensitive landuses
<p>2. The principle of intergenerational equity  <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</i></p>		
	<b>Yes</b>	In its assessment of Amendment 1029/33 the EPA has had regard for the maintenance of the health, diversity and productivity of remnant vegetation and fauna on the subject land. The EPA's recommendations aim to achieve this.
<p>3. The principle of the conservation of biological diversity and ecological integrity  <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>		
	<b>Yes</b>	In its assessment of Amendment 1029/33 the EPA has had regard for the conservation of biological diversity and ecological integrity of the area the subject of Amendment 1029/33. The EPA's recommendations aim to achieve this.

<p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p> <p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</i></p> <p>(3) <i>The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.</i></p> <p>(4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.</i></p>		
	<b>Yes</b>	In its assessment of Amendment 1029/33 the EPA has had regard for the polluter pays principle in ensuring that an adequate buffer is provided around the WWTP. The Watercorp will be purchasing the land within the buffer.
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p>		
	<b>No</b>	

## **Appendix 8**

**Table-Summary of assessment of amendment elements and relevant environmental factors**

AMENDMENT ELEMENT	ENVIRONMENTAL FACTOR	EPA OBJECTIVE	EPA RECOMMENDATION
Relocation of the WWTP	Odour	To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and landuses by meeting statutory requirements and acceptable standards.	<p>Having particular regard:</p> <ul style="list-style-type: none"> <li>(a) that the parabolic dune in the vicinity of the Site B WWTP facility is part of a regional ecological linkage referred to as the east-west parabolic dune linkage of Yanchep and Neerabup National Parks through Bush Forever Site (BFS) 129 and BFS 130 to the coast;</li> <li>(b) the National and International significance of the Alkimos dune system; and</li> <li>(c) to the findings of the studies and modelling undertaken by CSIRO and Consulting Environmental Engineers concerning</li> </ul>



	Geoheritage	To ensure that changes to the biophysical environment do not adversely affect geoheritage values.	
Relocation of the GWTP	Risk	To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria.	<p>The EPA notes the:</p> <ul style="list-style-type: none"> <li>(a) 300m wide Public Purpose reserve around the GWTP;</li> <li>(b) additional 200m wide evacuation buffer (reserved as Parks and Recreation) around the GWTP;</li> <li>(c) Water Corporation's intention to operate and maintain the GWTP in accordance with its <i>Chlorine Hazard and Safety Management System</i>;</li> <li>(d) requirement for the Water Corporation to obtain a licence to store hazardous materials on site from the Department of Consumer and Employment Protection.</li> </ul> <p>The EPA expects that the appropriate approvals in relation to the operation of the GWTP and storage of chlorine on-site be obtained by the Water Corporation from the Department of Consumer and Employment Protection prior to the construction of the plant.</p>
Additional Parks and Recreation Reserve north of Ningana bushland (Area 1)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard to the:</p> <ul style="list-style-type: none"> <li>(a) location of Areas 1a and 1b within a regional ecological linkage;</li> <li>(b) impact that the proposed Parks and Recreation reserve boundary alignment will have on dune landform by bisecting it;</li> </ul>

	Fauna	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 improvement in knowledge.	<p>(c) location of a population of <i>Eucalyptus gomphocephala</i> mallee situated outside of the Parks and Recreation reserve proposed by Amendment 1029/33 (the mallee is situated in Area 1b); and</p> <p>(d) area being critical habitat for the White-breasted Robin and habitat value for at least four other conservation significant bird species; and</p> <p>it is the EPA's opinion that the Parks and Recreation reserve proposed by Amendment 1029/33 (Area 1a only) does not meet the EPA's objectives in relation vegetation and fauna in this area.</p> <p>The EPA recommends that:</p> <p>(a) the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned, to include Area 1b, as well as 1a to conserve these regionally significant natural areas; and</p> <p>(b) Area 1c does not have regional conservation values.</p>
Additional Parks and Recreation Reserve south of Ningana bushland (Area 2)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard to the:</p> <p>(a) location of Areas 2a and 2b within a regional ecological linkage;</p> <p>(b) presence of critical habitat for Carnaby's Cockatoo (<i>Banksia attenuata</i>, <i>Banksia menziesii</i> Low Woodland);</p> <p>(c) area being habitat for at least nine other conservation significant bird species; and</p> <p>(d) impact that the proposed Parks and Recreation boundary alignment will have on the habitat by bisecting it;</p> <p>it is the EPA's opinion that the Parks and Recreation reserve proposed by Amendment 1029/33 (Area 2a only) does not meet the EPA's objectives in relation vegetation and fauna values in this area.</p> <p>The EPA recommends that the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned to include Area 2b, as well as Area 2a to conserve these regionally significant natural areas.</p>
	Fauna	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 improvement in knowledge.	

Deletion from Parks and Recreation Reserve south of Ningana bushland (Area 3)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard to the:</p> <ul style="list-style-type: none"> <li>(a) location of Areas 3a within a regional ecological linkage;</li> <li>(b) presence of critical habitat for Carnaby's Cockatoo; and</li> <li>(c) area being habitat for at least six other conservation significant bird species;</li> </ul> <p>it is the EPA's opinion that the realignment of the Parks and Recreation reserve proposed by Amendment 1029/33 does not meet the EPA objectives in relation vegetation and fauna values in this area..</p> <p>The EPA recommends that the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned to include Area 3a to conserve this regionally significant natural area.</p>
	Fauna	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 improvement in knowledge.	
Inclusion of a Parks and Recreation reserve adjacent to the coastal foreshore reserve on Lot M1482 (Area 4)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	It is the EPA's opinion that natural values of Area 4 do not justify including the area within a Parks and Recreation reserve.
Deletion of the Parks and Recreation reserve north of the WWTP (Area 5)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard to the:</p> <ul style="list-style-type: none"> <li>(a) diversity of vegetation units, habitat, flora and fauna species in Areas 5a and 5d</li> <li>(b) presence of five Priority flora and 10 flora that are listed as significant in <i>Bush Forever</i>;</li> <li>(c) habitat for a significant fauna taxa, Carnaby's Cockatoo and at least seven other bird species which are listed in <i>Bush Forever</i> as conservation significant species on the Swan Coastal Plain.</li> </ul>

	Fauna	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 improvement in knowledge.	<p>as conservation significant species on the Swan Coastal Plain;</p> <p>(d) location of Areas 5a and 5d within a regional ecological linkage that connects Yanchep and Neerabup National Parks, through Bush Forever Site 129 and Bush Forever Site 130, to the coast; and</p> <p>(e) presence of part of a geoheritage site recognised as of National and International significance in Areas 5a and 5d.</p> <p>it is the EPA's opinion that the deletion of the Parks and Recreation reserve in Area 5a as proposed by Amendment 1029/33 does not meet the EPA's objectives in relation vegetation, fauna and geoheritage in this area.</p> <p>The EPA recommends that:</p> <p>(a) Amendment 1029/33 be modified to reserve Areas 5a and 5d as Parks and Recreation reserve to conserve these regionally significant natural areas;</p> <p>(b) Area 5b not be reserved Parks and Recreation; and</p> <p>(c) Area 5c be deleted from the Parks and Recreation reserve.</p>
	Geoheritage	To ensure that changes to the biophysical environment do not adversely affect geoheritage values.	
Introduction of a town park immediately north of the Alkimos Regional Centre (Area 6)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard to the:</p> <p>(a) location of Areas 6a and 6c within a regional ecological linkage; and</p> <p>(b) impact that the alignment of the Parks and Recreation reserve as proposed by Amendment 1029/33 will have on the important geoheritage values of the parabolic dune;</p> <p>it is the EPA's opinion that the realignment of the Parks and Recreation reserve as proposed by Amendment 1029/33 does not meet the EPA objectives in relation vegetation, fauna and geoheritage in this area.</p> <p>The EPA recommends that:</p>
	Fauna	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 improvement in knowledge.	

	Geoheritage	To ensure that changes to the biophysical environment do not adversely affect geoheritage values.	<p>(a) the Parks and Recreation reserve boundary as proposed by Amendment 1029/33 be realigned to include Area 6c; as well as Area 6a; and</p> <p>(b) Area 6b not be reserved Parks and Recreation.</p>
Rationalisation and reductions to the coastal foreshore ROS (Area 7)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard to the:</p> <p>(a) intact vegetated parabolic coastal Quindalup Dunes;</p> <p>(b) the location for four significant fauna and the Threatened Carnaby's Cockatoo;</p> <p>(c) location of Areas 7b and 7c within a regional north-south coast ecological linkage;</p> <p>(d) The need to provide a consolidated reserve of sufficient habitat size surrounding Karli Springs and the <i>Allocasuarina</i> thicket that provide important habitat for significant fauna including Carnaby's Cockatoo and conservation significant bird species;</p> <p>(e) The current Parks and Recreation boundary bisects the dune landform between Areas 7b and 7c; and</p>
	Fauna	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 improvement in knowledge.	

	Aboriginal heritage	To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.	<p>(f) significance of Karli Springs to Aboriginal people;</p> <p>it is the EPA's opinion that:</p> <p>(a) the realignment of the Parks and Recreation reserve proposed by Amendment 1029/33 does not adequately meet the EPA's objectives in relation vegetation, fauna values in this area; and</p> <p>(b) the environmental factor of Aboriginal heritage should be deferred until the subdivision or development stages, whichever comes first, so that a more detailed consideration of the potential environmental impacts of urban development can be undertaken by the EPA pursuant to section 38 of the <i>Environmental Protection Act 1986</i>.</p> <p>Therefore, the EPA recommends modifying the boundary to include Area 7b and 7c and exclude Area 7a, on the basis that:</p> <p>(a) including Areas 7b and 7c will protect the parabolic coastal dunes and Karli Springs;</p> <p>(b) Areas 7b and 7c are located within a regional north-south coast ecological linkage; and</p> <p>(c) values within Area 7a, while significant and desirable to retain if possible, are protected elsewhere on the site.</p>
Transfer from Public Purpose reserve to Urban zone (Area 8)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard that;</p> <p>(a) the areas of regional significance in Area 8 are adequately represented in Areas 5 and 9;</p> <p>(b) Area 8 is poorly connected to the north-south and east-west regional ecological linkage and is constrained by the proposed coastal node and dissected by Water Corporation's proposed pipeline construction area.</p> <p>it is the EPA's opinion that the natural values of Area 8 do not justify including the area within a Parks and Recreation reserve.</p>
	Fauna	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 improvement in knowledge.	

East west parabolic dune linkage (Area 9)	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p>Having particular regard to the:</p> <ul style="list-style-type: none"> <li>(a) location of an occurrence of a Threatened Ecological Community (26a) listed by CALM;</li> <li>(b) important feeding habitat for a significant fauna taxa, Carnaby's Cockatoo and at least seven other bird species which are listed in <i>Bush Forever</i> as conservation significant species on the Swan Coastal Plain;</li> <li>(c) part of a regional ecological linkage: east-west linkage of Yanchep and Neerabup National Parks through BFS 129 and BFS 130 to the coast;</li> <li>(d) part of a geoheritage site recognised as of National and International significance; and</li> <li>(e) location for 15 significant flora taxa. Of these, five are Priority flora.</li> </ul> <p>it is the EPA's opinion that Area 9 (Appendix 6) be reserved as Parks and Recreation in order to meet the EPA's objectives in relation vegetation, fauna and geoheritage in this area.</p> <p>The EPA recommends that Amendment 1029/33 be modified to reserve Area 9 as Parks and Recreation reserve.</p>
	Fauna	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 improvement in knowledge.	
	Geoheritage	To ensure that changes to the biophysical environment do not adversely affect geoheritage values.	
Marmion Avenue	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	There is no regionally significant vegetation or fauna within the proposed road reserve. Therefore, the EPA is of the view that the proposed Other Regional Road reservation for Marmion Av is environmentally acceptable because it is unlikely that construction of a road on the subject land will cause any regionally significant impacts on remnant vegetation or fauna.

	Fauna	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 improvement in knowledge.	
Eglinton Avenue	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	There is no regionally significant vegetation or fauna on the subject land. Therefore, the EPA is of the view that the proposed Other Regional Road reservation for Eglinton Av is environmentally acceptable because it is unlikely that a road on the subject land will cause any regionally significant impacts on remnant vegetation or fauna.
	Fauna	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 improvement in knowledge.	
Alkimos Drive	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	There is no regionally significant vegetation or fauna on the subject land. Therefore, the EPA is of the view that the proposed Other Regional Road reservation for Alkimos Drive is environmentally acceptable because it is unlikely that a road on the subject land will cause any regionally significant impacts on remnant vegetation or fauna.
	Fauna	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 improvement in knowledge.	
Romeo Road	Vegetation	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	There is no regionally significant vegetation or fauna on the subject land. Therefore, the EPA is of the view that the proposed Other Regional Road reservation for Romeo Road is environmentally acceptable because it is unlikely that a road on the subject land will cause any regionally significant impacts on remnant vegetation or fauna.



	Fauna	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 improvement in knowledge.	
--	-------	--	--

## **Appendix 9**

### **List of submitters**

**Submissions received on Amendment 1029/33 as advertised from 26 September 2003 to 28 January 2004**

**Organisations:**

City of Wanneroo  
Department of Conservation and Land Management  
Department of Health  
Department of Indigenous Affairs  
Development Planning Strategies (on behalf of Landcorp)  
Development Planning Strategies (on behalf of Eglinton Estates)  
Heritage Council  
Main Roads  
Masterplan Consultants WA Pty Ltd (on behalf of WR Carpenters Landholdings Pty Ltd)  
Quinns Rocks Environmental Group  
Swan River Trust  
Urban Bushland Council WA Inc.  
Water Corporation  
Wildflower Society of Western Australia Inc.

**Submissions received on Amendment 1029/33 as advertised from 11 March 2005 to 13 May 2005**

**Organisations:**

City of Wanneroo  
Department of Conservation and Land Management  
Department for Planning and Infrastructure  
Development Planning Strategies (on behalf of Eglinton Estates)  
Development Planning Strategies (on behalf of Alkimos Developments)  
Development Planning Strategies (on behalf of Landcorp)  
Heritage Council of Western Australia  
Masterplan Consultants WA Pty Ltd (on behalf of WR Carpenter Landholdings Pty Ltd)  
Quinns Rocks Environmental Group  
Urban Bushland Council  
Water Corporation  
Woodsome Management Pty Ltd

**Individuals:**

Robert Bropho

## **Appendix 10**

### **Summary of Submissions and the WAPC's Response to Submissions**

**MRS Amendment 1029/33**

**Alkimos - Eglinton**

**Summary of Submissions**

**Part 1: 26 September 2003 - 23 January 2004**

---

**Submission:** 1

**Submitted by:** Swan River Trust

**Nature of Interest:** Government Agency

**Summary of Submission:** Not required to comment.

1. Proposed amendment is not within or abutting the Swan River Trust Management Area.
2. The Trust is not required to comment.

**Determination:** Noted.

---

**Submission:** 2

**Submitted by:** Main Roads, WA.

**Nature of Interest:** Government Agency

**Summary of Submission:** Comments on proposed amendment

1. Marmion Avenue should continue to operate as a north-south road until the Mitchell Freeway reaches Pipidiny Road and only then should Marmion Avenue be reconfigured to terminate at the east-west road.
2. The development provides the opportunity to install traffic management devices during the construction phase.

**Planning Comment:**

1. This relates to the alignment proposed in the first advertising and is now no longer relevant.
2. DPI will liaise with Main Roads WA on an ongoing basis during planning and development.

**Determination:** Noted.

---

**Submission:** 7

**Submitted by:** Department of Indigenous Affairs

**Nature of Interest:** Government Agency

**Summary of Submission:** Comments on proposed amendment

1. Some registered Aboriginal Sites may be affected by the proposed development.
2. Any person requiring to use the land on which the site is located must obtain the consent of the Minister for Indigenous Affairs under Section 18 of the Aboriginal Heritage Act (1972).
3. Whilst environmental issues appear to have been addressed by the proponent it is unclear as to whether Aboriginal Heritage has been taken into account.

**Planning Comment:**

1. The DPI will work with Aboriginal Affairs to ensure compliance with the Aboriginal Heritage Act on an ongoing basis.

**Determination:** Noted.

---

**Submission:** 8

**Submitted by:** City of Wanneroo

**Nature of Interest:** Local Government Authority

**Summary of Submission:** Comments in support, concerns and additional information.

1. Concerned about inconsistencies related to surrounding land ie. Butler - Jindalee District Structure Plan.
2. Supports relocation of WWTW inland so that development in the vicinity of the regional beach and the linkage to the Alkimos Regional Centre can be improved.
3. Location of the Public Purpose reserve will create a barrier to the orderly development of the narrow urban belt.
4. Concerned that detailed, site-specific odour modelling has not been finalised.
5. Comments that the Ground Water Treatment Plant should be provided with a chlorine buffer to the satisfaction of the EPA.
6. Arrangements need to be made for the ongoing, long term management responsibilities for the coastal area ie. MOU.
7. Concerned that Parks and Recreation areas contain good vegetation. City seeks area for major regional and district level recreation facilities (75 - 100ha).
8. Concerned at proposals to reduce the widths of regional road reserves.
9. Proposes that Marmion Avenue be designed as a direct through road during the interim period and rebuilt as a T at Eglinton Avenue when the freeway is constructed.

**Planning Comment:**

1. This has been superseded by submission no.30.

**Determination:** Noted.

---

**Submission:** 11

**Submitted by:** Wildflower Society of WA Inc.

**Nature of Interest:** Conservation Group

**Summary of Submission:** ('Areas' as referred to in Environmental Report)

1. Wildflower Society of WA Inc. supports addition of Areas 1 and 2.
2. Wildflower Society of WA Inc. does not support deletion of Area 3 because there is a net loss of 7.3 ha of Bush Forever.
3. Wildflower Society of WA Inc. does not support inclusion of Area 4 (approx. 20ha.) because it is too small and isolated to be effective.
4. Wildflower Society of WA Inc. supports proposed protection of Area 5 (i.e. they do not support the change to urban).
5. Wildflower Society of WA Inc. supports addition of 45.7ha, Alkimos Town Park, as Parks and Recreation, but does not support the Amendment as an offset for deletion of existing and proposed Bush Forever areas.
6. Reduction of Foreshore Reserve/Bush Forever Site 397 by 10.2ha. is not supported by the Wildflower Society of WA Inc. This Amendment may negatively affect Karli Springs.
7. Rezoning of 74.7ha. WWTW from Public Purposes to Urban/Urban Deferred, no comment.

**Planning Comment:**

1. Noted.
2. The changes to the arrangement of land to be set aside as the Ningana Bushland have been developed with the intent of better preserving important flora, to minimise the perimeter of the bushland, to follow appropriate terrain features and to minimise the length of Marmion Avenue through the reserve. While the areas to be exchanged are not equal in size, it should be noted that the Ningana Bushland is much larger than the area subject to the amendment.
3. Supported, see planning comments 5 to 8 to Submission 46.
4. The most environmentally valuable part of Area 5 has been identified in the District Concept Plan and is intended to be reserved for Parks and Recreation as part of either a subsequent amendment or the Town Planning Scheme process.
5. Noted.
6.
  - a. The reduction of the foreshore reserve at the southern end of Alkimos Beach is necessary to allow urban development to occur close to the beach, in order that an active beachside village can develop.
  - b. The reduction in the foreshore reserve to the northeast of Karli Springs has occurred in response to a more detailed examination of the landform. The proposed line now runs at the foot of the eastern side of the dune line surrounding Karli Springs. It may be that this approach has not considered additional recreation needs such as beach access and parking (which in this case should not occur on the Karli Springs side of the dune line).
7. Noted.
8. Ensure buffer is adequate so that odours do not become ongoing problem.

**Interim Determination:**

1. Noted (see WAPC *Response to Environmental Submissions*, issue 3, Area 1 and Area 2).
2. Noted (see WAPC *Response to Environmental Submissions*, issue 3, Area 3).

3. Upheld (see WAPC *Response to Environmental Submissions*, issue 3, Area 4).
4. Upheld (see WAPC *Response to Environmental Submissions*, issue 3, Area 5).
5. Noted.
6. Upheld in part (see WAPC *Response to Environmental Submissions*, issue 3, Areas 7a and 7b).
7. Noted.

---

**Submission:** 12

**Submitted by:** Urban Bushlands Council, WA.

**Nature of Interest:** Conservation Group

**Summary of Submission:**

General Comments.

1. Urban Bushlands Council, WA is concerned about sprawl and unsustainable development, Alkimos - Eglinton is another example.
2. Urban Bushlands Council, WA is not convinced that proposed development is more sustainable as it extends the urban footprint, requires substantial public investment in infrastructure and removes over 1,800 ha of bushland.
3. Alkimos - Eglinton is out of step with 'Dialogue with the City'.
4. Amendment does address some of the sustainability issues but falls short on biodiversity.
5. Urban Bushlands Council, WA is not happy that there is only a net gain of 25.3 ha of Parks and Recreation reserve.
6. Urban Bushlands Council, WA is concerned that remnant bushland in the Parks and Recreation Reserve will be cleared for recreation. Also, discrepancy of 25.3 ha (P56) does not fit with 19.15 ha on (P49).

Specific Comments:

1. Addition to Bush Forever Site 289 - Areas 1 and 2, Urban Bushlands Council, WA support these additions but state that they still fall short of the ideal.
2. Deletion Bush Forever Site 289 - Area 3, Urban Bushlands Council, WA strongly opposes deletion of 56.7 ha of Quindalup and Spearwood Dune vegetation from Parks and Recreation.
3. Addition to Bush Forever Site 397 - Area 4, Urban Bushlands Council, WA supports the addition of 20.4 ha.
4. Deletion of part Bush Forever Site 397 - Area 5, Urban Bushlands Council, WA strongly opposes the deletion of 38.2 ha. of vegetation of the Quindalup and Spearwood Dune Complexes.
5. Addition of GWTP buffer - Area 6, Urban Bushlands Council, WA supports the addition of vegetation of the Spearwood complex but they are not sure how it is to be managed.
6. Reduction in Foreshore Reserve/Bush Forever Site 397 - Area 7, Urban Bushlands Council, WA strongly opposed the reduction of the width of the foreshore reserve.
7. Carnaby's Black Cockatoo, Urban Bushlands Council, WA believes that the clearing of over 1,800 ha of vegetation will have a significant impact on the Carnaby's Black Cockatoo.



8. Waste Water Treatments Works, Urban Bushlands Council, WA is concerned about the reduction of the width of the buffer zone owing to potential for odour problems.
9. Landforms, the Environmental Review Report does not explain how the dune ridge will be managed. The impact of the proposed Eglinton Marina will also need to be assessed.

**Planning Comment:**

**General:**

1. The Alkimos-Eglinton area is currently zoned urban. The amendment does not propose the extension of the urban zoning; it simply proposes the rearrangement of some zone boundaries and reservations within the district. See also the 2<sup>nd</sup> planning comment at Submission 3.
2. See 1 above. Also, the alternative of housing 50,000 people in high rise development (approximately 160 twenty storey tower buildings) at points of high amenity, such as the city, Scarborough and Cottesloe, and in 'brownfields' redevelopment, such as the old marshalling yards at Leighton Beach is something that is not automatically more sustainable than the current proposal, nor does it yet have a high level of community support.
3. See 1 above. Also, while *Dialogue with the City* is a high level strategic document it is not a statutory document and does not supersede the Metropolitan Region Scheme.
4. Noted.
5. Noted.
6. The City of Wanneroo should be requested to conduct a recreation needs analysis and advise the planners preparing the District Structure Plan of the outcomes of that study so that suitable areas for active recreation can be identified and properly considered by the relevant agencies (eg DoE and DS&R) and interested parties such as this submitter.

**Specific:**

1. Noted.
2. See the 2<sup>nd</sup> planning comment to Submission 11.
3. See planning comments 5 to 8 to Submission 46.
4. See the 4<sup>th</sup> planning comment to Submission 11.
5. Noted.
6. See the 6<sup>th</sup> planning comment to Submission 11.
7. Significant areas of bushland, including the Yanchep National Park, the Neerabup National Park, Willbinga Nature Reserve, and the Ningana Bushland, have been retained in order to provide sufficient habitat for an ecologically sustainable population of Carnaby's Black Cockatoo. These actions could be enhanced by the Commission and the local government adopting strategies to ensure that street trees and the landscaping in parks and reserves consist of species that are appropriate to the natural habitat of this and other avian species endemic to the area.
8. The concerns regarding the WWTW and the possible odour emissions are noted. The MRS expresses the Commission's intent, the actual buffer will be set by the EPA.
9. These matters are not relevant to this amendment. They should be addressed as part of the District Structure planning process.

**Determination:**

General Comments.

1. Noted.
2. Noted.
3. Noted.
4. Noted.
5. Noted.
6. Noted.

Specific Comments:

1. Noted.
  2. Noted.
  3. Not supported (see WAPC *Response to Environmental Submissions*, issue 3, Area 4).
  4. Upheld (see WAPC *Response to Environmental Submissions*, issue 3, Area 5).
  5. Noted.
  6. Upheld in part (see WAPC *Response to Environmental Submissions*, issue 3, Areas 7a and 7b).
  7. Noted.
  8. Noted.
  9. Noted.
- 

**Submission:** 16

**Submitted by:** Quinns Rocks Environmental Group Inc.

**Nature of Interest:** Environmental Group

**Summary of Submission:**

1. Concern about sprawl, sustainability and the possibility of an urban growth boundary.
2. Elements of the master plan are an improvement on the development pattern to the south.
3. Concerned about the loss of biodiversity through land clearing.
4. Concerned about regionally significant land in Bush Forever. Most of the bushland in the Alkimos - Eglinton area will be cleared ie. 1,850 ha out of 2,100 ha.
5. Concern that regional open space will be a mix of uses not just conservation.

6. Quinns Rocks Environmental Group Inc. would like to see a bushland corridor from the coast to Yanchep National Park. The Amendment proposes removal of coastal heath (56.7ha.) and addition of Banksia Woodland (49.4ha.) a net loss of 7.3ha. The addition is supported and the removal opposed.
7. The Amendment proposes removing land at Alkimos from the coastal reserve opposed.
8. Concerned that relocation of the WWTW will merely maximise development opportunities near the coast. Concern that buffer is minimised and could lead to odour problems in the future.

**Planning Comment:**

1. This has been superseded by submission no. 44.

**Determination:** Noted.

**Submission:** 17

**Submitted by:** Dept. of Conservation and Land Management

**Nature of Interest:** Government Agency

**Summary of Submission:**

General Comments and Concerns:

1. Concern about only 6.4% of the total area is to be reserved for Parks and Recreation.
2. Concern about development of this area constitutes a major impact on clearing of remnant vegetation.
3. Concern about justification for Amendment is changes of planning practises but little of sustainability or biodiversity.
4. Concern that Amendment seeks to change Bush Forever boundaries.
5. Retention of native vegetation for conservation purposes and level of provision of active recreational space is inadequate.

Specific Comments:

1. Changes to reservations, relate to Environmental Review.
2. Benefits of Amendment are arguable. An increase of 25ha. of Parks and Recreation reserves is not a significantly better outcome for the environment.
3. The methodology and rationale for the sustainability appraisal should be fully documented.
4. Data used in Environmental Review is out of date and previous studies were not undertaken at the appropriate time of the year, ie. spring.
5. An overall review of regionally significant vegetation should have been undertaken.
6. Bush Forever site 397 was reserved as Parks and Recreation in 1993 to form buffer and to protect near coastal limestone heath vegetation, it now to be discarded, as it is no longer in the buffer.

Assessment of Proposed Regional Open Space Amendments.

Area 1: Floristic Community Types (FCT) can not be considered as being formally protected within UCL. (Not supported)

Area 3: Deletion of Quindalup and Spearwood dune vegetation (Not supported)

Area 4: Long term conservation value is difficult to determine (Not determined).

Area 5: Deletion of Regional Open Space in WWTW buffer. Concern that conservation values of buffer are being overlooked in relocation. (Not supported).

Area 6: Discrepancy in report ie. Parks and Recreation given as 45.7ha and 60ha.

Area 7: Reduction of foreshore reserve (Not supported).

Area 8: Public Purposes to Urban. Presence of priority flora not confirmed. (Not supported).

**Planning Comment:**

1. This has been superseded by submission no. 47.

**Determination:** Noted.

---

**Submission:** 18

**Submitted by:** Water Corporation

**Nature of Interest:** Government Agency

**Summary of Submission:**

**General Comments:**

1. Consult elders (Nyungah) before plans/amendments are proposed. There are a number of unresolved issues to do with the Alkimos WWTW. Odour management is the most important.
2. Water Corporation operating areas, granted by the Office of Water Regulation does not cover the entire area.

**Wastewater Comments**

1. Water Corporation's agreement to relocate the Alkimos WWTW to the advertised site is based on the development covering costs of relocation.
2. The current Alkimos WWTW as advertised in the Amendment is an acceptable option.
3. It is critical that the Marmion Avenue and Connolly Drive alignments are finalised.
4. The site will need to be secure prior to the odour buffer study being finalised.
5. Water Corporation does not support the statement "Corporation proposes to manage the WWTP and WTP buffer area for conservation and selective recreation purposes".
6. The statement that the dunes within the buffer are to be retained in their natural state will not be achievable.
7. Four 52m tall stacks will be required to vent residual odours to atmosphere. These will be visible to the surrounding communities.

**Water Comments**

1. The Eglinton ground water treatment plant will require a 300m chlorine hazard buffer and a 500m evacuation buffer.
2. There is an opportunity to combine the Alkimos WWTW and Eglinton WTP on the same site to utilise combined buffers.

3. The following statement is misleading “proposed (Water Corporation) to manage the buffer area for conservation and recreation purposes in association with the adjacent Alkimos town park”.

**Drainage Comments**

1. The following statement is no longer supported “ need to make provision for planning of urban development areas for possible arterial drainage links between wetlands, east of Wanneroo Road and the coast”. The total water cycle management study, to be commenced shortly by the Corporation, will address this matter.

**Planning Comment:**

1. This has been superseded by submission no. 37.

**Determination:** Noted.

---

**Submission:** 20

**Submitted by:** Dept. of Heath

**Nature of Interest:** Government Agency

**Summary of Submission:**

1. No objection to the Amendment subject to compliance with:
  - Government Sewage Policy - Perth Metropolitan Area.
  - Buffer distance between residential developments and WWTW and GWTP being acceptable to the Dept. of Environment.

**Planning Comment:**

1. This has been superseded by submission no. 49.

**Determination:** Noted.

---

**Submission:** 21

**Submitted by:** WR Carpenter Landholdings Pty Ltd.  
(Masterplan Consultants Pty Ltd)

**Nature of Interest:** Landowner Developer

**Summary of Submission:**

1. Land affected by 5 proposals in Amendment.
2. No objection to 4 of the 5 proposals ie.
  - rezoning of an area at the south - west corner from Urban Deferred and Parks and Recreation to Urban.
  - rezoning an area at the central south boundary from Central City Area to Urban.
  - realignment of Marmion Avenue, and
  - realignment of Alkimos Drive road reserve.

3. Owners of Lot M1482 strongly object to the proposed rezoning of 20.3 ha. of land at the north - west corner of the property from Urban to Parks and Recreation reserve.
4. The proposed Area 4 rezoning from Urban to Parks and Recreation will double the area allocated for this purpose within the land
5. Area 4 is a prime development area zoned Urban with a capacity to provide for development in excess of 200 lots. If this land is lost the developers will pursue compensation.
6. There appears to be a lack of rationale for rezoning Area 4 from Urban to Parks and Recreation.

**Planning Comment:**

1. This has been superseded by submission no. 46.

**Determination:** Noted.

---

**Submission:** 22

**Submitted by:** Dept. for Planning and Infrastructure

**Nature of Interest:** Government Agency

**Summary of Submission:**

1. Harbour planning has been omitted from the planning process.
2. The proposed coastal setbacks are not generally in accordance with the WAPC State Coastal Planning Policy SPP 2.6. They are the setbacks proposed in 1998. The Department is concerned about the minimal setbacks in the southern development node. The Department proposes that the setbacks be recalculated along the lines of SPP 2.6.
3. No consideration has been taken of the planning of the boat harbour. There are two potential boat harbour locations ie. behind Eglinton Reef and Alkimos Reef. The small private harbour at the Eglinton Resort is not adequate to serve future public boat launching and pen needs. Projections suggest that one harbour with 8 boat ramps and 250 mooring pens will be needed by 2021, with an additional similar harbour by 2051. The suggestion on page 8 that boating needs can be provided in conjunction with a sewerage outfall is not appropriate.
4. Any proposal for a marine or harbour development will require tenure to be issued under the Land Administration Act 1997 and ultimately purchase of the sea bed at market value.

**Planning Comment:**

1. This has been superseded by submission no. 38.

**Determination:** Noted.

---

**Submission:** 23

**Submitted by:** Eglinton Estates  
(Development Planning Strategies).

**Nature of Interest:** Landowner Developer

**Summary of Submission:**

1. Amendment responds to more detailed site analysis and urban design changes.
2. Major component is relocation of WWTW and GWTP to the east.
3. Water Corporation require 600m buffer around WWTW.
4. Eglinton Estates and Landcorp support a more easterly location of the WWTW and GWTP be implemented.
5. The Amendment proposes an additional 25 ha of Parks and Recreation reserve and will deliver improved environmental outcomes in line with Bush Forever.
6. The proposed reduction in the City Centre Zone from 550 ha to 230 ha is supported.

**Planning Comment:**

1. This has been superseded by submission no. 35.

**Determination:** Noted.

---

**LATE SUBMISSIONS**

**Submission:** 24

**Submitted by:** Heritage Council of WA

**Nature of Interest:** Government Agency

**Summary of Submission:**

1. Amendment area does not include any places currently on the State Register of Heritage Places. Neither are there any places under consideration as part of the Heritage Council's backlog program or current assessment program.
2. There are 3 places in the vicinity that lie outside the Amendment boundary:
  - P9495 Aubrey Gibbs House (73 Pippidinnny Road, Eglinton).
  - P9523 Eglinton Wreck Site (Eglinton Rocks, Alkimos)
  - P14294 Alkimos Ship Wreck (Foreshore, Alkimos).

**Planning Comment:**

1. This has been superseded by submission no. 33.

**Determination:** Noted.

---

**MRS Amendment 1029/33**

**Alkimos - Eglinton**

**Summary of Submissions**

**2. Part 2: 11 March 2005 – 13 May 2005**

---

**Submission:** 30

**Submitted by:** City of Wanneroo

**Nature of Interest:** Local Government

**Summary of Submission:** Supports Amendments subject to modifications

1. Further modification to south of amendment area to include revised alignment of Marmion Avenue into Lot 8 Butler to a point where it connects with the existing reservation. (Alternatively process via minor amendment).
2. Reduce current standard of Romeo Road and replace with other Regional Road further north through Alkimos Regional Centre.
3. Reiterate 8 specific points of comment/concern from Council's 16 December 2004 resolution i.e.
  - (1) Inconsistencies between Amendment and Butler-Jindalee District Structure Plan.
  - (2) Moving WWTP site inland has merit. Location of public purposes reservation represents barrier and City would support WWTP moving further east.
  - (3) Concerned that detailed, site specific, odour modelling has not been finalised.
  - (4) Relocated ground water treatment plant should be provided with an appropriate chlorine buffer to the satisfaction of the EPA.
  - (5) Arrangements need to be entered into regarding the ongoing long-term management of the coast. (MOU?)
  - (6) Parks and Recreation have good to very good quality vegetation and therefore appear to be intended for conservation of remnant vegetation. Site, 75 to 100 hectare for recreation needs to be identified.
  - (7) Concerned about proposals to reduce road widths of regional road reserves.
  - (8) Design Marmion Avenue as a direct through road until freeway is built to Eglinton Avenue.

**Planning Comment:**

1. It is acknowledged that the subject amendment creates a lateral discontinuity in the alignment of Marmion Avenue at the boundary between Lot 3 Alkimos and Lot 9021 Butler. MRS Amendment 1097/33A has been commenced in order to correct the discontinuity.
2. It is acknowledged that the Other Regional Road that was previously to follow the alignment of Romeo Road is now proposed to be constructed on a different alignment. However, the new alignment is dependent upon a review of its intersection with the future Mitchell Freeway and, following that review, a new design. Until that work is completed it is not appropriate to remove the existing reservation.



3. (1) It is understood that the only inconsistencies are the Marmion Avenue and Romeo Road issues discussed at 1 and 2 above.
- (2) Noted
- (3) Noted
- (4) It is understood that if the ground water treatment plant is to be located within the site of the WWTW that the chlorine buffer will fit within the WWTW buffer.
- (5) A matter to be addressed as part of the District Structure Plan.
- (6) A matter to be addressed as part of the District Structure Plan.
- (7) The widths of other regional roads have been subjected to a higher level of design than occurred previously. This has enabled some land savings without impacting on the functionality of the roads. The only section where the reduction in width is significant is at Alkimos Town Centre. The reduction in width for this section reflects the different urban form intended for this length of road.
- (8) This refers to the road for Marmion Avenue north of Alkimos Drive to be posted at 90kph until urbanisation at which time it will be reduced to 70 or 80kph. The proposed alignment will enable this to occur.

**Determination:**

1. Noted.
2. Noted.
3.
  - (1) Noted.
  - (2) Not supported (see WAPC *Response to Environmental Submissions*, issue 1).
  - (3) Noted.
  - (4) Noted.
  - (5) Noted.
  - (6) Noted.
  - (7) Noted.
  - (8) Noted.

---

**Submission:** 33

**Submitted by:** Heritage Council of WA

**Nature of Interest:** Government Agency

**Summary of Submission:** Ambivalent subject to comment

1. Three sites in general vicinity but none within amendment boundary.

**Planning Comment:**

1. No sites known along the proposed alignment of Marmion Avenue or in the vicinity of the WWTW.
2. Further investigation will occur as part of the District Structure Planning process.

**Determination:** Noted.

---

**Submission:** 34

**Submitted by:** Landcorp

**Nature of Interest:** Government Agency

**Summary of Submission:** Supports Amendment subject to modifications

1. Amendment does not connect Marmion Avenue between Lot 3 Alkimos and Lot 8 Butler.
2. Romeo Road, agreed alignment through Alkimos Regional Centre. Delete other Regional Roads connection.
3. Repeat of previous submission re:
  - (i) AWWTP buffer – proposed amendment supported subject to future investigations into treatment technologies, etc. designed to reduce the buffer;
  - (ii) Park and Recreational Reserves – agreed until more detailed environmental survey and analysis can be conducted; and
  - (iii) City Centre Zone – fully supported.

**Planning Comment:**

1. See Submission 30, first planning comment.
2. See Submission 30, second planning comment.
3. The AWWTP buffer will not be fully required until the works are at full capacity (understood to be about 25 years from now). Obviously, during this time improved technology may allow the buffer to be reduced. It is agreed that this is a matter for the future. The additional environmental survey has been completed and analysis of the findings is underway. The outcomes of the analysis will inform the preparation of the District Structure Plan that is about to be prepared (and which will be based on the already agreed District Concept Plan). The city centre still requires more detailed design but it is appropriate to show a realistic area of city centre zone and the location of the centre of this zone (the future main street) has been considered in detail.

**Determination:**

1. Noted.
  2. Noted.
  3.
    - (i) Upheld in part (see WAPC *Response to Environmental Submissions*, issue 1).
    - (ii) Noted.
    - (iii) Noted.
-

**Submission:** 35

**Submitted by:** Eglinton Estates

**Nature of Interest:** Private Developer

**Summary of Submission:** Supports Amendment subject to modifications

1. Amendment does not connect Marmion Avenue between Lot 3 Alkimos and Lot 8 Butler.
2. Romeo Road, agreed alignment through Alkimos Regional Centre. Delete other Regional Roads connection.
3. Repeat of previous submission (i) AWWTP buffer, (ii) Park and Recreational Reserves, (iii) City Centre Zone.

**Planning Comment:**

1. See Submission 30, first planning comment.
2. See Submission 30, second planning comment.
3. See Submission 34, third planning comment.

**Determination:**

1. Noted.
2. Noted.
3.
  - (i) Upheld in part (see WAPC *Response to Environmental Submissions*, issue 1).
  - (ii) Noted.
  - (iii) Noted.

---

**Submission:** 36

**Submitted by:** Alkimos Developments Pty Ltd.

**Nature of Interest:** Private Developer

**Summary of Submission:** Supports Amendment subject to modifications

1. Amendment does not connect Marmion Avenue between Lot 3 Alkimos and Lot 8 Butler.
2. Romeo Road, agreed alignment through Alkimos Regional Centre. Delete other Regional Roads connection.
3. Repeat of previous submission (i) AWWTP buffer, (ii) Park and Recreational Reserves, (iii) City Centre Zone.

**Planning Comment:**

1. See Submission 30, first planning comment.
2. See Submission 30, second planning comment.
3. See Submission 34, third planning comment.

**Determination:**

1. Noted.
2. Noted.
3.
  - (i) Upheld in part (see WAPC *Response to Environmental Submissions*, issue 1).
  - (ii) Noted.
  - (iii) Noted.

---

**Submission:** 37

**Submitted by:** Water Corporation

**Nature of Interest:** Government Agency

**Summary of Submission:** Supports Amendment subject to modifications

1. Buffer of 600m is now required.
2. Urban Deferred ring should be Public Purposes WSD.
3. Odour ponding may affect buffer size. Buffer may need to be greater than 600m to west and northwest. (Possibly to 800m.) Consultants to complete report in June 2005.
4. Water Corporation will revert to Site A if Site B is unacceptable. (Water Corporation has agreement with Landcorp and Eglinton Estates).
5. Water Corporation has referred (EPA S38 process) for evaluation. PER to be determined by mid 2006.

**Planning Comment:**

1. This is based on current technology applied to a plant that will be constructed many years into the future.
2. It is understood that current modelling shows that parts of this area are not required for buffer purposes and therefore the land should remain Urban Deferred until the buffer requirements have been finalised.
3. It is understood that this problem will only be manifested at full construction (approx 25 years time), further investigation is to be under taken with a view to determining the best way to mitigate the problem of odour ponding. This revised buffer, if any, will need to be shown in the District Structure Plan and the boundary of the reservation can be adjusted at a later time.
4. Should the three parties agree to revert to Site A before this amendment is presented to the Governing Executive Council then this amendment may, on the recommendation of the Commission and with the approval of the Minister, be modified to remove the proposed reservation for Public Purpose WSD. The existing reservation (i.e. Site A) will then remain. Any additional buffer requirements can be dealt with during the DSP process (see 3 above). Should the three parties agree to revert to Site A after the amendment has been presented to the Governor in Executive Council then Watercorp (which owns Lot 101) will need to submit to the City of Wanneroo a Development Application for the plant.
5. Noted.

**Determination:**

1. Not supported (see WAPC *Response to Environmental Submissions*, issue 1).
2. Not supported (see WAPC *Response to Environmental Submissions*, issue 1).
3. Not supported (see WAPC *Response to Environmental Submissions*, issue 1).
4. Noted.
5. Noted.

---

**Submission:** 38

**Submitted by:** Department of Planning and Infrastructure (New Coastal Assets)

**Nature of Interest:** Government Agency

**Summary of Submission:** Supports Amendment subject to comments

1. Harbour planning omitted from the planning process.
2. Small private harbour shown on MRS at the Eglinton Resort is not adequate to serve the needs of the future population.
3. Any proposals for a marina/harbour will require tenure to be issued under Land Administration Act 1997 and purchase of the seabed at market value.

**Planning Comment:** The above matters are beyond scope of the present amendment process but may be dealt with as part of a future amendment.

**Determination:** Noted.

---

**Submission:** 41

**Submitted by:** Butler Joint Venture

**Nature of Interest:** Private Developer

**Summary of Submission:** Supports Amendment subject to comment

1. Concern at alignments for Marmion Avenue and Connolly Drive in view of Butler-Brighton District Structure Plan.

**Planning Comment:**

1. See Submission 25, first planning comment.
2. See Submission 30, first planning comment.

**Determination:** Noted.

---

**Submission:** 42

**Submitted by:** Urban Bushland Council of WA

**Nature of Interest:** Conservation Group

**Summary of Submission:** Concerned about environmental impact. Comments on issues

1. Original comments January 2004, re-advertised version does not address issues raised.
2. Inadequate flora and fauna surveys. There are 4 areas included in the Bushland Assessment Report by D. Pike, 2004 that are in close proximity to the Amendment Area and he also lists significant species not listed in the Environmental Review for the Amendment (see p29-33). Two species of Threatened Ecological Communities might also be present but will be cleared if the future freeway extension follows the proposed alignment. UBC wants detailed survey before final plans approved.
3. AWWTP location proposed without Environmental Review Report of landforms of site. Quotes Lemmon et al (1979). That whole dune system be preserved. UBC recommends assessment before final decisions on locations are made.
4. Reduction of coastal foreshore Parks and Recreation reservation. UBC strongly oppose any intentions to reduce the already narrow reservation of coastal vegetation. Foreshore reserve also provides a buffer to the cusped forelands recognised as internationally significant geo heritage areas.
5. UBC strongly opposes the rezoning of Area 5 (Parks and Recreation) to Urban as this area contains vegetation in better condition than the proposed Area 4.
6. UBC supports the proposed Environmental Conditions that require Odour Study to be conducted prior to consideration of rezoning the Urban Deferred Zoning to Urban.

**Planning Comment:**

1. See below.
2. A major flora and fauna survey of the entire Alkimos-Eglinton district was conducted in late 2004 by ATA Pty Ltd on behalf of the landowners. It is understood that the Department of Environment has accepted the accuracy of the survey and is now working with ATA to assess the data and determine areas of significance. This issue will be addressed when the amendment is referred to the EPA.
3. The WWTW has been carefully sited at the lowest point of a natural basin within the dune system. Landform within the basin may require modification but external to the site and within the buffer no significant modification will be required.
4. The proposed reductions to the coastal foreshore Parks and Recreation reservations are small and have the intent of concentrating beach access at key points in order to encourage sustainable public transport and transit oriented development of these points.
5. See submission 46, Planning Comments 5 to 8. The intention is to preserve similar quality bushland within the WWTW buffer.
6. The Urban Deferred ring around the WWTW site will remain until this issue is resolved.

**Determination:**

1. See determination of Submission 12.
2. Noted.
3. Noted.
4. Upheld in part (see WAPC *Response to Environmental Submissions*, issue 3, Areas 7a and 7b).
5. Upheld (see WAPC *Response to Environmental Submissions*, issue 3, areas 4 and 5).

6. Noted.

---

**Submission:** 43

**Submitted by:** Mr. Robert Bropho

**Nature of Interest:** Spokesperson for Indigenous Groups and Native Title Claimants

**Summary of Submission:** Concerned about lack of consultation

1. Consult (Nyungah) elders before plans/amendments are proposed.
2. Anthropological/archaeological reports to be done.
3. Amendment prepared without consultation.
4. Ask that WAPC meet and consult.
5. There is a "lot" of their culture and Heritage in the Alkimos area.

**Planning Comment:**

1. DPI is preparing a report proposing improved consultation procedures with the Nyungah community so that they are given every opportunity to be involved during the plan making process.
2. See Submission 33.
3. Noted.
4. Noted.
5. Aboriginal culture and heritage, after these declared sites, should be commemorated and the Nyungah community supported be appropriate facilities and interpretative materials. This should happen as part of District and Level Structure planning and will be addressed in the policy referred to at 1 above.

**Determination:** Noted.

---

**Submission:** 44

**Submitted by:** Quinns Rocks Environmental Group

**Nature of Interest:** Conservation Group

**Summary of Submission:** Concerned about environmental impact. Comments on issues

1. QREG commented on original amendment in January 2004.
2. Comments still relevant i.e. sustainability and development/changes to the Parks and Recreation Reserve including Bush Forever sites.
3. Changes to habitat corridor from Eglinton coast to Yanchep National Park and reduction of width of coastal reserve.
4. Amendment area includes large parabolic dune. Significance of landforms not adequately covered on the Environmental Review report.

5. Amendment proposes changing the location of the wastewater and groundwater treatment plants and reducing the area reserved for Parks and Recreation in the buffer zone to allow urban development close to coast.
6. The importance of the Alkimos area in recording the evolution of the coast was recognised in 1979 and recommended protecting the dune complex here as a geological monument of national and world significance. More recent work has not been made public. Under the amendment much of the dune complex would be lost to urban development and warrants greater consideration.
7. Changes to the location of the wastewater and groundwater plants should consider public safety and amenity. Odour has been a problem at Beenyup WWTP.

**Planning Comment:**

1 & 2 are general comments regarding the planning of Metropolitan Perth.

3. The proposed amendment narrows the Ningana Bushland in some places and widens it at others. At its narrowest it is currently about 500 metres but the amendment proposes a narrowest point of 650 metres. The changes have been prepared as a result of more detailed environmental investigation and are detailed at page 11 of the landowners Environmental Review Summary submitted in support of the amendment.
4. The District Concept Plan highlights the major ancient dune blowout (Spearwood dunal system) and proposes appropriate development and/or preservation as some form of parklands be investigated in order to ensure that the dune face is preserved.
5. Only a short length of coastline is affected and it is near one of the best swimming beaches along this part of the coast.
6. The submission does not have regard to the scale of the subject amendment. The land is, in the main, already zoned 'Urban'. The amendment simply proposes to change some details of that zoning and the related reservations for parks and recreation and infrastructure to meet improved design responses to many of the general sustainability issues raised in this and their earlier submission (No. 16).
7. Intense investigation into the Watercorp proposal to increase the buffer to include the Urban Deferred 'ring' is underway.

**Determination:**

1. Noted.
2. Noted.
3. Noted.
4. Noted.
5. Noted.
6. Noted.
7. Noted.

---

**Submission:** 45

**Submitted by:** Woodsome Management Pty Ltd

**Nature of Interest:** Private Developer

**Summary of Submission:** Supports Amendment subject to modifications



1. Is critical to finalise the amendment in order to
  - Complete District Structure Plan.
  - Construct Marmion Avenue to Yanchep.
  - AWWTP can be constructed by the Water Corporation to meet the demands of expanding the northwest corridor.
  - Permit an orderly extension of the urban fabric.

2. Realigned Marmion Avenue.

New alignment agreed by all stakeholders in August 2004 and this is now reflected in modified Amendment 1029/33.

WAPC will need to facilitate necessary land exchanges and subdivision of the new alignment.

Amendment does not address connection of Marmion Avenue between Lot 3 Alkimos and Lot 8 Butler. Either modify amendment or prepare separate amendment to finalise.

3. East West Other Regional Road.

Refined alignments for Alkimos and Eglinton Avenue are supported.

Romeo Road amendments are supported in the report but not on the plan. This needs to be rectified. Other Regional Road reservation for the existing portions of Romeo Road within Lot 102 and Lot 3 needs to be actioned by this Amendment Plan attached.

4. Alkimos Waste Water Treatment Plant.

Relocated positions of the AWWTP fully supported and accept improved outcomes from Site B.

**Planning Comment:**

1. Agreed.
2. Agreed. MRS Amendment 1097/33A addresses the lateral discontinuity at the boundary between Lot 3 Alkimos and Lot 8 buffer.
3. See Submission 25, planning comment.
4. Noted.

**Determination:**

1. Noted.
2. Noted.
3. Noted.
4. Noted.
5. Noted.

---

**Submission:** 46

**Submitted by:** WR Carpenter Holdings Pty Ltd.

**Nature of Interest:** Private Developer

**Summary of Submission:** Supports aspects of Amendment but objects to others

Supports:

1. South west sector of Lot 1482 currently shown as Parks and Recreation Reserve and Urban Deferred Zone proposed to be rezoned to Urban.
2. South Central boundary of Lot M 1482 currently zoned Central City area to be rezoned to Urban.
3. Marmion Avenue proposed realignment as per re-advertised Amendment.
4. Alkimos Drive proposed realignment as per modified Amendment.

Strongly objects to:

5. The proposed reservation of approximately 20 hectares of currently zoned Urban land for Parks and Recreation in the northwest part of Lot 1482.

Further comments on the above:

6. Readvertised MRS Amendment provides no further justification or additional information.
7. Proposal to reserve this land for Parks and Recreation does not reflect current District Structure Planning.

Independent environmental consultants were brought in from the east coast of Australia by the Department of Planning and Infrastructure to provide specific input into this exercise. The conclusion was that there is no justification to support the proposed reservation for Park and Recreation purposes in the north west part of Lot M 1482. There is therefore no basis to substantiate the proposed Parks and Recreation Reservation.

8. Additional environmental investigations in Spring of 2004 by ENV Australia concluded that there were no declared rare flora, endangered or vulnerable species or threatened ecological communities identified in the subject area. There is therefore no genuine environmental justification for the Parks and Recreation Reserve.

Supportive documents attached.

**Planning Comment:**

1. Noted.
2. Noted.
3. Noted.
4. Noted.

5 to 8. The Environment Review Summary notes at pages 11 and 12: "An area of 20ha is proposed for reservation and parks and recreation on the northern boundary of Lot M1482 adjacent to the coast. The environmental approval for the proposed Eglinton Marina and golf course includes the transfer to the crown of a foreshore and dune reserve on the southern boundary of Lot 11, in exchange for land transfer ???, as shown in Figure 6. To provide an appropriate interface to this proposed reserve an addition to the Parks and Recreation reservation is proposed adjacent on Lot M1482."

It appears that the submitter has a good case to have this Park and Recreation reserve either reduced in extent or not proceed with. It is recommended that this aspect of the proposed

amendment be removed and the proposal be amended to ensure that the interface between future development lot M1482 and the proposed Eglinton Marina golf course to the north be fully evaluated and a comprehensive design solution is completed with proper justification, into the District Structure Plan that is about to be prepared. The Commission will then be able to re-evaluate this matter when the next amendment for this area is prepared (likely to be for the rail alignment and amendments consequent to the DSP). Should the owner not satisfactory address the issue, then the concept proposed can be reinstated at that time.

**Determination:**

1. Not supported (see WAPC *Response to Environmental Submissions*, issue 3, Areas 5).
2. Noted.
3. Noted.
4. Noted.
5. Upheld (see WAPC *Response to Environmental Submissions*, issue 3, Areas 4).

---

**Submission:** 47

**Submitted by:** CALM

**Nature of Interest:** Government Agency

**Summary of Submission:** Supports Amendment subject to comments

1. Realignment of north section of Marmion Avenue would reduce the impact on native vegetation on the Bush Forever Site 289.
2. As CALM has not been provided with information regarding the biodiversity values impacted by the two alignments the Department is not able to provide definitive advice on this proposal. CALM, however, does not have any in-principle objections.
3. CALM noted that further environmental assessment is currently being conducted and will have an interest on the results.

**Planning Comment:** Liaise with CALM once environmental assessment is available.

**Determination:** Noted.

---

### 3. LATE SUBMISSIONS

**Submission:** 48

**Submitted by:** Department of Industry and Resources

**Nature of Interest:** Government Agency

**Summary of Submission:** Supports Amendment

**Determination:** Noted

---

**Submission:** 49

**Submitted by:** Department of Health

**Nature of Interest:** Government Agency

**Summary of Submission:** Supports Amendment subject to modification

1. Buffer of 600m is noted. It will need to be demonstrated that this buffer is adequate.

**Planning Comment:** Department of Health will have full opportunity to address these issues as part of the separate EPA environmental assessment processes that the WWTW will have to undergo.

**Determination:** Noted.

---

## **Appendix 11**

### **Recommended Environmental Conditions**

## RECOMMENDED ENVIRONMENTAL CONDITIONS

Statement No.

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

#### ALKIMOS-EGLINTON METROPOLITAN REGION SCHEME AMENDMENT 1029/33

**Scheme Purpose:** To amend reservations and zonings in the Metropolitan Region Scheme consistent with the Alkimos-Eglinton Structure Plan.

**Responsible Authority:** Western Australian Planning Commission

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

**Assessment Number:** 1365

**Report of the Environmental Protection Authority:** Bulletin 1207

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

#### **1 Additional Land to be Reserved**

1-1 All or portions of the following sites shall be reserved, in accordance with the requirements set out in Attachment 1 of the Minister for the Environment's "Statement that a Scheme may be Implemented" No. (insert number) published on (date):

- 1) Public Purpose reserve surrounding the WasteWater Treatment Plant
- 2) Parks and Recreation Reserve north of Ningana Bushland
- 3) Parks and Recreation Reserves south of Ningana Bushland
- 4) Parks and Recreation Reserve north of the Waste Water Treatment Plant
- 5) Town park immediately north of the Alkimos Regional Centre
- 6) Rationalisation and reductions to the coastal foreshore Regional Open Space reservation
- 7) East-west parabolic dune linkage

Published on

**STATEMENT THAT A SCHEME MAY BE IMPLEMENTED –  
METROPOLITAN REGION SCHEME AMENDMENT 1029/33**

**SPECIFICATIONS FOR RELOCATION OF THE WASTE WATER TREATMENT  
PLANT AND ADDITIONAL LAND TO BE RESERVED**

**1 Additional Land to be Reserved**

Prior to finalisation of the scheme the following land shall be reserved:

**1-1 Public Purpose Reserve surrounding the Waste Water Treatment Plant**

A 600 metre-wide buffer measured from the boundary of the Waste Water Treatment Plant shall be reserved for public purposes to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for complementary purposes.

**1-2 Parks and Recreation Reserve north of Ningana Bushland**

A portion of Lot M1503, Eglinton shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

**1-3 Parks and Recreation Reserve south of Ningana Bushland**

A portion of Lot M1503, Eglinton (Areas 2a and 2b as detailed in attached Figure 2) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

**1-4 Parks and Recreation Reserve south of Ningana Bushland**

A portion of Lots M1503 and 11, Eglinton (Area 3a as detailed in attached Figure 2) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

**1-5 Parks and Recreation Reserve north of the Waste Water Treatment Plant**

A portion of Lots M1482 and 102, Alkimos (Areas 5a and 5d as detailed in attached Figure 1) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

**1-6 Town Park immediately north of the Alkimos Regional Centre**

A portion of Lot 102, Alkimos (Area 6c as detailed in attached Figure 2) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

**1-7 Rationalisation and reductions to the coastal foreshore Regional Open Space reservation**

A portion of Lot 102, Alkimos (Areas 7b and 7c as detailed in attached Figure 2) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

**1-8 East-west parabolic dune linkage**

A portion of Lots 101 and 102, Alkimos (Area 9 as detailed in attached Figure 2) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.



## **Appendix 12**

### **References**

(Note: Some references listed here are not referenced in this Bulletin. They are included in this list because they were used in compiling information for the assessment sheets for individual sites. # indicates the mapping information in these studies is available in a GIS format)

Alan Tingay & Associates and Feilman Planning Consultants (1993). *Alkimos – Eglinton District Study- Definition of the foreshore reserve boundary and environmental assessment of the proposed alignments of Marmion Av and the Mitchell Freeway*. Unpublished report prepared for Landcorp et al.

Alan Tingay & Associates (1996). *Alkimos – Eglinton Vertebrate Fauna Survey, October 1996*.

Alan Tingay & Associates (1997). *Alkimos – Eglinton Environmental Report*. Unpublished report prepared for Landcorp et al.

Armstrong P. G. (1996) *Vegetation Condition and Conservation Values. Lots 8 and 11, Eglinton, City of Wanneroo, WA*. Unpublished report prepared for Landcorp and Alan Tingay and Associates.

ATA Environmental (2003a). *Alkimos Eglinton MRS Amendment 1029/33 Environmental Review*. Western Australian Planning Commission, Government of Western Australia.

ATA Environmental (2003b). *Alkimos Eglinton MRS Amendment 1029/33 Environmental Review Summary*. Western Australian Planning Commission, Government of Western Australia.

ATA Environmental (2003c). *Alkimos Eglinton MRS Amendment 1029/33 Planning Context*. Western Australian Planning Commission, Government of Western Australia.

ATA Environmental (2003d). *Alkimos Eglinton MRS Amendment 1029/33 Transport & Engineering Infrastructure*. Western Australian Planning Commission, Government of Western Australia.

ATA Environmental (2003e). *Alkimos Eglinton MRS Amendment 1029/33 Coastal Planning Strategy*. Western Australian Planning Commission, Government of Western Australia.

ATA Environmental (2005). *Alkimos – Eglinton Flora, Vegetation and Fauna Baseline Information*. Western Australian Planning Commission, Government of Western Australia.

Beard J.S. (1979a). *Vegetation Survey of Western Australia, 1 : 250 000 Series. The Vegetation of the Perth Area*. Vegmap Publications, Applecross.

Beard J.S. (1979b). *Vegetation Survey of Western Australia, 1 : 250 000 Series. The Vegetation of the Pinjarra Area*. Vegmap Publications, Applecross.

Beard J.S. (1979c). *Vegetation Survey of Western Australia, 1 : 250 000 Series. The Vegetation of the Moora and Hill River Areas*. Vegmap Publications, Applecross.

#Beeston, G.R., Hopkins, A.J.M. and Shepherd, D.P. (eds) (2001). *Land-use and Vegetation, Western Australia*. Unpublished Report. Department of Agriculture Western Australia, South Perth and National Land and Water Resources Audit, Canberra, ACT. NOTE: This was provided to DEP by the National Land and Water Resources Audit and has been modified to remove plantation datasets.

Commonwealth of Australia (1996). *National Strategy for the Conservation of Australia's Biological Diversity*.

Commonwealth of Australia (2001). *National Objectives and Targets for Biodiversity Conservation 2001-2005*. Environment Australia, Department of Environment and Heritage, Canberra, Australian Capital Territory.

Department of Conservation and Environment (1983a). *Conservation Reserves for Western Australia. The Darling System - System 6. Parts 1 and 2. Report 13*. Department of Conservation and Environment, Perth, Western Australia.

Department of Conservation and Environment (1983b). *Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority. The Darling System - System 6. Part II: Recommendations for Specific Localities. Report 13*. Department of Conservation and Environment. Perth, WA.

Department of Environmental Protection (1996). *System 6 and Part System 1 Update Programme*. Unpublished bushland plot and area records and analysis.

Department of Planning and Urban Development (1990). *Metroplan - A Planning Strategy for the Perth Metropolitan Region*. Department of Planning and Urban Development. Perth, WA.

#English, V. and Blyth, J. (1997). *Identifying and Conserving Threatened Ecological Communities in the South West Botanical Province*. Unpublished report for the Department of Conservation and Land Management to Environment Australia.

English, V. and Blyth, J. (1999). Development and application of procedures to identifying and conserve threatened ecological communities in the South West Botanical Province of Western Australia. *Pacific Conservation Biology* 5: 124 - 138.

Environmental Protection Authority (1990). *A guide to wetland management in Perth*. Environmental Protection Authority (Bulletin 374). Perth, WA.

Environmental Protection Authority (1991a). *Eglinton Beach Resort - Report and recommendations of the Environmental Protection Authority*. Environmental Protection Authority (Bulletin 500). Perth, WA.

Environmental Protection Authority (1991b). *Statement that a proposal may be implemented - Eglinton Beach Resort Ocean Dunes Pty Ltd*. Environmental Protection Authority (Statement 150). Perth, WA.

Environmental Protection Authority (1992). *Environmental Protection (Swan Coastal Plain Lakes) Policy Approval Order (1992)*, Government Gazette 18 December 1992. Perth, WA.

Environmental Protection Authority (1993a). *Strategy for the Protection of Lakes and Wetlands of the Swan Coastal Plain - Report of the Environmental Protection Authority (Bulletin 685)*. Environmental Protection Authority. Perth, WA.

Environmental Protection Authority (1993b). *A Guide to wetland management in the Perth and near Perth Swan Coastal Plain area - An update to EPA Bulletin 374 (Bulletin 686)*, Environmental Protection Authority. Perth, WA.

Environmental Protection Authority (1993c). *Metropolitan Region Scheme Amendment No. 932/33 - North West Corridor (Alkimos-Eglinton) (Bulletin 729)*, Environmental Protection Authority. Perth, WA.

# Environmental Protection Authority (1994). *Areas of Threatened and Poorly Reserved Plant Communities- GIS dataset* Environmental Protection Authority, WA.

Environmental Protection Authority (1997b). *Guidance for the assessment of environmental factors - Draft Guidance No. 3 Industrial Residential Buffer Areas*, Environmental Protection Authority. Perth, WA.

Environmental Protection Authority (1998a). *Guidance for the assessment of environmental factors - Interim Guidance No 2 Risk Assessment and Management: Off-site Individual Risk from Hazardous Industrial Plant*. Environmental Protection Authority. Perth, WA.

Environmental Protection Authority (1998b). *Guidance for the assessment of environmental factors - Draft Guidance No 8 Environmental Noise*. Environmental Protection Authority. Perth, WA.

Environmental Protection Authority (1999b). *Environmental Protection of Native Vegetation in Western Australia – Preliminary Position Statement No. 2*. Environmental Protection Authority. Perth, WA.

Environmental Protection Authority (2000). *Guidance Statement No. 2. Risk Assessment and Management Offsite individual risk from Hazardous Industrial Plant*. Environmental Protection Authority. Perth, WA.

Feilman Planning Consultants (1993a). *Alkimos – Eglinton District Structure Plan*. Unpublished report prepared for Landcorp et al.

Government of Western Australia (1992). *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*. Western Australian Government Gazette, 24 December, 1992, pp 6287-93.

Government of WA (2000a). *Bush Forever Volume 1: Policies Principles and Processes*. Government of Western Australia, Perth.

Government of Western Australia (2000b). *Bush Forever Volume 2 Part A*. Government of Western Australia, Perth.

Hill, A.L., Semeniuk, C.A., Semeniuk, V. and Del Marco, A. (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, Perth, Western Australia.

Hill, A.L., Semeniuk, C.A., Semeniuk, V. and Del Marco, A. (1996b). *Wetlands of the Swan Coastal Plain. Volume 2: Wetland Mapping, Classification and Evaluation – Wetland Atlas*. Prepared for the Water and Rivers Commission and the Department of Environmental Protection, Perth, Western Australia.

How, R. A. and Dell, J. (1993). Vertebrate fauna of the Perth Metropolitan Region: consequences of a changed environment. Pp 28-47 in: M. Hipkins (ed) *Urban Bushland Management*. Australian Institute of Urban Studies, Western Australia.

How, R. A. and Dell, J. (1994) The zoogeographic significance of urban bushland remnants to reptiles in the Perth region, Western Australia. *Pacific Conservation Biology* 1: 132 – 140.

How, R. A. and Dell, J. (2000). Ground vertebrate fauna of Perth's vegetation remnants: impact of 170 years of urbanisation. *Pacific Conservation Biology* 6: 198 – 217.

JAMBA (1981). *Agreement between the Government of Japan and the Government of Australia for the protection of migratory birds and birds in danger of extinction and their environment*.

Keighery, B.J. (1994). *Bushland Plant Survey. a Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc.), Nedlands, Western Australia.

Keighery, G.J. (1999). *Conservation Status of Vascular Flora of the Southern Swan Coastal Plain*. Unpublished report for Australian Nature Conservation Agency National Reserves System Cooperative Program Project: N710 and Department of Conservation and Land Management, Como, WA.

Lemmon, T. C., Gee, R. D., Morgan, W. R., Elkington, C. R (1979). *Important Geological Sites in the Perth and Southwestern Area of Western Australia – A report on their scientific significance and future protection*. Geological Society of Australia Incorporated Western Australia Division.

O'Connor, R., Quartermaine, G. and Bodney, C (1990). *Report on a survey of Aboriginal sites at the proposed Clarkson, Eglinton and Alkimos housing development, North West Corridor*. Unpublished report prepared for Landcorp.

Semeniuk, V & C, Research Group (2004). *Assessment of the Alkimos coastal area: Stage 1 – the onshore areas: August 2004*. Unpublished report prepared for Syrinx Environmental P/L, North Perth.

Trudgen & Keighery (1990a) *A Report on the Flora and Vegetation of the Alkimos Area and Conservation Issues Affecting It*. Unpublished report prepared for Landcorp.

Trudgen & Keighery (1990b) *A Report on the Flora and Vegetation of the Ningana Area and Conservation Issues Affecting It*. Unpublished report prepared for Landcorp.

Western Australian Planning Commission (1997a). *Statement of Planning Policy No 4 State Industrial Buffer Policy*. Western Australian Planning Commission. Perth, WA.

Western Australian Government (1997b). *Environmental Protection (Noise) Regulations 1997* Government of Western Australia. Perth, WA.