Appendix 5

Greater Bunbury Region Scheme

Natural Area Assessment Sheets

Background

A summary assessment sheet is used to consider the natural values of sites in the Greater Bunbury Region Scheme against the criteria to identify regionally significant natural areas in the EPA's Natural Area Strategy (Appendix 3). This sheet was developed from a sheet used to consider natural areas in the Perth Metropolitan Region against the *Bush Forever* criteria.

The assessment process considered all known available information relevant to the application of the criteria. Information came from both regional datasets in the table below and area specific survey. The regional datasets are not referenced in each sheet. These references are listed in the Bulletin reference list (Appendix 16) and the Natural Area Strategy (Appendix 3). The sources of specific area information are referenced in the Assessment sheets. However unless a source is specifically quoted the information is summarised from several sources. These references are listed in the Bulletin reference list.

National and Regional Information Sets for the Swan Coastal Plain (after table prepared by DEP Conservation Branch in 1997).

LANDFORM AND SOIL

(various sources)

VEGETATION AND FLORA

Vegetation Types (Beard 1979a, b&c, Beard 1981; Smith 1973 & 1974 and Hopkins *et al.* 1996)*
Vegetation Complex (Heddle *et al.* 1980 and CALM)
Floristic Community Types (Gibson *et al.* 1994, DEP 1996)

WETLANDS

Wetland Types (Hill *et al.* 1996a&b and as updated periodically by WRC)
Consanguineous suite (Hill *et al.* 1996a&b)
Wetland Management Objective (after Hill *et al.* 1996a&b, Semeniuk 1998 and as updated periodically by WRC)
Lake's EPP (Government of WA 1992)

THREATENED ECOLOGICAL COMMUNITIES

after English and Blyth 1997 and as updated periodically by CALM

THREATENED SPECIES

CALM current Declared Rare and Priority Flora and Fauna Lists, reports, specific area survey

INTERNATIONAL AND NATIONAL SIGNIFICANCE

Reference to international treaties, Commonwealth Environment Protection and Biodiversity Act 1999, listing on the register of the National Estate etc.

*Not applied in Government of WA (2000a&b), see Appendix 2 for description of the dataset.

Sheet Numbers	ASSESSEMENT SHEETS FOR NEW ZONES AND RESERVES
Urban and Urban Deferred	
1.	Reserve 35061 Paris Road, Australind - Decommissioned Waste Water Treatment Plant (Urban Deferred), Lots 27, 150, 151, 1 and 21 Paris Road (north), Australind (Urban Deferred) and Lot 3 Paris Road (south), Australind
2.	Part Lot 1 Washington Ave, part lots 3, 4 and 8 Bussell Hwy, Loc 632 Parade Road, and part lots 302 and 303, South Bunbury, City of Bunbury
3.	Dalyellup Beach Estate
4.	Lots 313-317 south of Harewoods Rd, South Dalyellup
5.	Reserve 31012 Harewoods Road, Dalyellup (Urban Deferred zone)
6.	Part Lot 201 Gray Road, Part Lot 4402, Part Lot 97, Lot 139 Armstrong Street, Lots 1a, 4a, 66 and Part Lot 138 Timperley Road, Boyanup
7.	Lot 35 Spurr Street, Capel (west)
Industrial	
8.	Reserve 670, Lots 1 and Pt Lot 5 North Boyanup Road, Davenport
9.	Lot 15 North Boyanup Road
Primary Regional Road and Rail Reserves	
10.	Boyanup Bypass Road
Regional Open Space Reserve	
11.	Locations 7 and 14 Buffalo Rd, Binningup
12.	Twin Rivers - Pt Lot 211 Barnes Avenue, Australind
13.	College Grove - Lot 1000 Bussell Highway
14.	Muddy Lakes-Minninup Rd, Capel
15.	Port Access Road (PAR) Areas 9, 10 and 11 and adjacent linking areas

RESERVE 35061 AND LOTS 3, 27, 28, 150, PARIS ROAD, AUSTRALIND

INFORMATION	COMMENT
Background Information	
Area Name	**WASTEWATER TREATMENT PLANT (Reserve 35061) AND ADJACENT BUSHLAND**
Location	Reserve 35061 and Lots 3, 27, 28, 150, Paris Road, Australind
Size (ha)	Approximately 55ha native remnant vegetation
Reason for assessment	Proposed urban lands

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	-
Groundwater Source Protection Area	-
Existing System 6 area	-
Adjacent System 6 Area	Adjacent to C67 Brunswick, Collie and Wellesley Rivers
Submission System 6 Update (6)	No
Others	

Environmental Considerations - Natural Attributes	
Landforms	
Vegetated Bassendean Sands upland and vegetated wetland	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	Tauss (1996). Survey undertaken in adjacent bushland in spring 1996, 6 permanent 100m2 study sites were established DEP (2002): foot transects WWTP area March 2002 and edge inspection all Lots March and September 2002 HGM (2002): survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; three plots 10X10m (1.1, 1.2, 1.3)
Summary of findings	**Vegetation:** Uplands: Bassendean Sands (Qpb: S8) *Banksia attenuata* Low Woodland; *Eucalyptus marginata/E. calophylla* Open Woodland; *Eucalyptus calophylla, E. marginata* subsp. *marginata, Banksia attenuata* and *Banksia ilicifolia* Open Woodland over *Kunzea glabrescens* Tall Open Scrub; *Kunzea glabrescens* Tall Closed Scrub *Eucalyptus marginata* subsp. *marginata, E. calophylla, Banksia attenuata* and *Banksia ilicifolia* Woodland over *Allocasuarina humilis* and *Xanthorrhoea brunonis* subsp. *brunonis* Shrubland Wetlands: *Kunzea glabrescens* Closed Tall Scrub with emergent *Melaleuca preissiana* and *Eucalyptus calophylla* **Area native remnant vegetation/Vegetation Condition:** 25% Excellent, 25% Very Good, 20% Degraded, 30% Completely Degraded (HGM 2002); Lot 28 70% Very Good to Excellent, 30% Degraded (DEP 2002) Tauss (1996) commented that the bushland within the area of the wastewater treatment plant is in very good condition **Total Flora:** 97 native taxa, 18 weed taxa (estimated >70% expected flora HGM 2002, compare with 117 native taxa after Tauss 1996)

	Significant Flora: *Acacia flagelliformis* (P4), *Acacia semitrullata* (P3), *Caladenia speciosa* (P4), *Jacksonia sparsa* (P4)
Vegetation & Flora Survey Limitations	Sufficient survey to place regionally but no vegetation condition mapping
Regional	
Vegetation Complex	**Bassendean Dunes:** Bassendean Complex – Central and South (27% remaining on SCP, 2% of this in secure tenure) **Pinjarra Plain:** Swan Complex mapped but no vegetation typical of this complex
Vegetation types (Beard/Smith/Hopkins)	Mosaic: Medium Forest; Jarrah/Marri Low Woodland; Banksia Low Woodland (Beard draft)
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** not inferred **Supergroup 3: Uplands centred on Bassendean** *21a Central *Banksia attenuata – Eucalyptus marginata* woodlands *21c Low lying *Banksia attenuata* woodlands or shrublands
National/International Significance	
Fauna	
Area Specific	
Fauna Survey	HGM (2002): opportunistic vertebrate survey undertaken during 6 days in September 2002 Foot transects WWTP area DEP March 2002 and edge inspection of all Lots DEP March 2002 and DEP April 2003
Summary of findings	Birds 25 species (HGM 2002); 16 species (DEP 2002/03); total 33 species. Significant bird species: Australasian Shoveller, Little Eagle (breeding record), Common Bronzewing, Grey Shrike-thrush, Splendid Fairy-wren, White-cheeked Honeyeater and Yellow-rumped Thornbill Amphibians 2 species, reptiles 2 species, native mammals 1 species (HGM 2002)
Fauna Survey Limitations	Limited vertebrate survey HGM, limited opportunistic survey DEP
Regional	
National/International Significance	
Linkage Values	
Bushland linkage to west to river and north. Good condition vegetation of the area is adjacent to bushland to the west. This site represents an eastern extension of Wardandi Reserve that forms a link to Brunswick River (C67)	
Wetlands, Creeklines, Rivers, Estuaries	
Type	palusplain
Management Category	Multiple Use
Suite	**Pinjarra Plain:** Keysbrook (P.1)
Conclusions from survey	Not consistent with database (WRC 2003), dampland area located in Lot 28 and Lot 150, majority of area upland, not as mapped. As naturally vegetated wetland, contiguous with upland areas it is expected that this wetland would be best described as Conservation category
Other Attributes	
-	
Further field survey	
Comprehensive fauna survey required and further flora survey required to record all plant species as HGM 2002 estimated only 70% of flora species were recorded	

Consideration Against Criteria	**Criterion Met**

Representation of Ecological Communities **YES (not to a degree that it would be considered regionally significant on this criterion alone)**	
Regional vegetation representation	
Vegetation Complexes	Characteristic of upland and damp Bassendean Complex – Central and South in the Bunbury area. Within the Constrained Area 20.2% remains, 2.3% currently identified as proposed and existing ROS.
Floristic Community types	2, possibly 3 in area
Uplands and Wetlands	Mostly upland, small area wetland
Habitats	
Size and Shape: naturally vegetated area reasonable size (55ha) but contiguous Wardandi Reserve that forms a link to Brunswick River (C67)	
Vegetation Condition: Similar condition to C71, Very Good	
Relationship/proximity to:	
Naturally vegetated areas	Contiguous to west with Wardandi Reserve that forms a link to Brunswick River (C67), lots to north form discontinuous link to bushland contiguous northern section Brunswick River (C67)
Protected areas	Protected area west (Wardandi Reserve)
Other regionally significant naturally vegetated areas	Contiguous with Wardandi Reserve then to Brunswick River (C67), together form part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River Ecological Linkage
Comment: The majority of the naturally vegetated area of the WWTP and a portion of the northern lots centred on Lot 28 (see Map) is regionally significant due to its: • quality and type; and • location by which it consolidates the Wardandi Reserve to form a significant stepping stone of bushland area in the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River Ecological Linkage	
Diversity **YES**	
Landforms	Together with contiguous natural areas contains a series of landforms from river to upland, dampland
Flora	relatively diverse for type, with 97 native taxa recorded on limited survey
Fauna	Not completely known but likely to be diverse with 33 bird species, 2 amphibian species, 2 reptile species and 1 native mammal species recorded on limited survey
Comment:	
Maintaining Ecological Processes and Natural Systems **YES**	
Relationship/proximity to:	
Regional Ecological Link	Contributes to the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River Ecological Linkage in several ways, being contiguous with Brunswick River (C67) to west and together with bushland to the north forms a series of stepping stones to the Brunswick River (C67) to the north. By consolidating this area to the Wardandi Reserve contributes a significant area of natural vegetation to the Ecological Linkage
Creekline/River/Estuary	Through Wardandi Reserve contiguous with Brunswick River (C67)
Contains areas suitable for ecological restoration	It is recommended that the entire area of the WWTP be included in the area recommended for protection. The degraded part of the WWTP could be restored to reduce the edge to area ratio and increase the size of the area and adjacent lots to greater than 60ha for protection of conservation values Lots 27, 28, 150 should be proposed for protection
Comment: contributes significantly to the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River Ecological Linkage	

Scientific or Evolutionary Importance	**NOT KNOWN**
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**
Comment: Small area wetland proposed to be retained, contributes diversity units	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The area as depicted on Appendix 9 meets 4 criteria, being: *Representation of Ecological Communities, Diversity, Maintaining Ecological Processes and Natural Systems, General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. The natural attributes that contribute to meeting these criteria are listed below:

- Substantial representative area of upland and wetland natural vegetation of Bassendean Complex – Central and South
- Contains a wetland likely to be included within the Conservation category classification
- Relatively diverse for its type containing a diverse flora (estimated over 120 taxa in area), including four priority taxa being *Acacia flagelliformis* (P4), *Acacia semitrullata* (P3), *Caladenia speciosa* (P4), *Jacksonia sparsa* (P4)
- The remnant vegetation consolidates the Wardandi Reserve to form a significant stepping stone of bushland area in two Ecological Linkages
- It is part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River Ecological Linkage in several ways, being contiguous with Brunswick River (C67) to west and together with bushland to the north forms an important node in the ecological linkage across the river bend in the Brunswick River (C67)

Summary Comment in Relation to the Proposal

The naturally vegetated area of the WWTP Reserve and the adjacent vegetated lots are regionally significant as they are part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River Ecological Linkage.

PART LOT 1 WASHINGTON AVENUE, PART LOTS 3, 4 AND 8 BUSSELL HIGHWAY, LOC 632 PARADE ROAD, AND PART LOTS 302 AND 303, SOUTH BUNBURY, CITY OF BUNBURY

INFORMATION	COMMENT
Background Information	
Area Name	Shearwater Forest – Parade Road Bushland
Location	Part Lot 1 Washington Ave, part lots 3, 4 and 8 Bussell Hwy, Loc 632 Parade Road, and part lots 302 and 303, South Bunbury, City of Bunbury
Size (ha)	62.9ha (ca 36ha native remnant vegetation)
Reason for assessment	Determine regional significance of vegetation

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	No
Groundwater Source Protection Area	-
Existing System 6 area	No
Adjacent System 6 Area	C70 The Maidens
Submission System 6 Update	
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Spearwood Dune System (Sands derived from Tamala Limestone **–** Qts) **Yoongarillup** (Qha alluvium and Qhw swamp deposits mainly peaty sands)	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	Bischoff (1999): consolidated vascular plant species list includes reference to work by 11 studies between 1990 - 1999 Alan Tingay and Associates (2000): South Bunbury & Brook Village Structure Plan Review. Environmental Assessment. Report for the Ministry of Housing. Report No. 2000/21 Ecoscape (2001): collation information and some new information for management plan. HGM (2002): survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; three plots 10X10m (10.1, 10.2, 10.3) located in the area DEP (2002): Foot traverses, June 2002
Summary of findings	**Vegetation:** Spearwood Dune System (Sands derived from Tamala Limestone – Qts)*Eucalyptus gomphocephala, Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* Open Forest over Low Woodland dominated by *Banksia attenuata, Banksia grandis, Agonis flexuosa* var. *flexuosa* and *Xylomelum occidentale* and combinations of these (approximately equivalent to EgAfBa, EgBa, EmBaBg, BgCcBa and CcEm, ATA Environmental 2001b; and "Woodland of *Banksia attenuata*, Marri and Tuart", Ecoscape 2001); *Eucalyptus gomphocephala*, Open Forest over *Agonis flexuosa* var. *flexuosa* Low Open Forest (approximately equivalent to EgAf (ATA Environmental 2001b) and "Woodland to tall open forest of Tuart and Peppermint with

	Jarrah and *Banksia attenuata* on Spearwood dunes" (Ecoscape 2001)) Wetlands: *Melaleuca rhaphiophylla* and *Melaleuca teretifolia* Low Open Forest with emergent *Eucalyptus rudis* subsp. *rudis* (approximately equivalent to Mr (ATA Environmental 2001b) and "Woodland of *Melaleuca rhaphiophylla* on poorly drained areas" (Ecoscape 2001)) and *Melaleuca rhaphiophylla* High Shrubland to Low Forest **Area native remnant vegetation/Vegetation Condition:** Whole area: 50% Very Good, 35% Degraded to Completely Degraded and 15% Cleared.Wetlands Good. Wetlands are highly disturbed, but the remnant wetland vegetation is considered important **Total Flora:** 146 native taxa, 62 weed taxa (HGM 2002, ATA Environmental 2001b) (estimated >80% expected flora). 106 native taxa (Bishoff 1999 for Usher i.e. Loc 632 Parade Road) **Significant Flora:** *Caladenia speciosa* (P4), *Jacksonia sparsa* (P4), *Lasiopetalum membranaceum* (P3) (HGM 2002)
Vegetation & Flora Survey Limitations	Limited survey but adequate for information for the assessment of regional significance of vegetation, however no vegetation condition mapping and only one visit in spring
Regional	
Vegetation Complex	Karrakatta Complex Central and South and Yoongarillup Complex
Vegetation types (Beard/Smith/Hopkins)	-
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *11 Wet forests and woodlands *18 Shrublands on calcareous silts (area within Site boundary degraded, not suitable to be identified as threatened ecological community) **Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes** *25 Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands
National/International Significance	Not known
Fauna	
Area Specific	
Fauna Survey	HGM (2002): Limited survey for birds, reptiles and mammals Reconnaissance survey DEP April 2003 Alan Tingay and Associates (1998): Detailed bird, reptile and mammal survey for Site 1 is equivalent to this area Bow (1999): Systematic trapping programme over a year for reptiles, amphibians and mammals
Summary of findings	Birds total 30 species, native mammals 3 species, reptiles 10 species, frogs 3 species There are a number of species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance. Eleven species of conservation significance in the area include Scarlet Robin, Splendid Fairy-wren, Weebill, Broad-tailed Thornbill, Painted Button-quail One Schedule 1 species (Western Ringtail Possum)
Fauna Survey Limitations	The fauna surveys were restricted to the lots west of Parade Road so did not include the wetland area to the east
Regional	

National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Linkage Values	
The Shearwater Forest – Parade Road Bushland is part of the Maidens/Preston River Ecological Linkage. Shearwater Forest – Parade Road Bushland is particularly significant in this Ecological Linkage as it contains both tall Tuart forest and Melaleuca wetlands in close proximity	
Wetlands, Creeklines, Rivers, Estuaries	
Type	Dampland
Management Category	Conservation, Resource Enhancement and Multiple Use
Suite	Big Swamp (Qu.6)
Conclusions from survey	Consistent with database (WRC 2003)
Other Attributes	
-	
Further field survey	
Further vegetation surveys at appropriate seasons required to document entire plant species list and other significant plant species, comprehensive faunal survey required for wetland part of area	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities **that it would be considered regionally significant on this criterion alone)**	**YES (not to a degree**
Regional vegetation representation	
Vegetation Complexes	Within the Constrained Area 53.2% Karrakatta Central and South Complex remains, 11.0% currently identified as proposed and existing ROS. 28.5% Yoongarillup Complex remains, 5.9% currently identified as proposed and existing ROS.
Floristic Community types	not known
Uplands and Wetlands	Approximately 2/3^{rds} of the site is upland and 1/3rd wetland
Size and Shape: A large remnant contiguous with adjacent ROS bushland	
Vegetation Condition: Upland area Very Good condition and wetland area Good to Completely Degraded. The upland area is one of the best condition areas of its type south of Bunbury.	
Relationship/proximity to:	
Naturally vegetated areas	to south, west and north
Protected areas	to west System 6 area C70 through ROS, to the south is the Shearwater Forest ROS and to north is Hay Park Bushland and to the east is College Grove Bushland
Other regionally significant naturally vegetated areas	C70, Shearwater Forest, Hay Park Bushland and College Grove area regionally significant.
Contains areas suitable for ecological restoration	Yes those areas highlighted in HGM 2002 as degraded would provide a valuable buffer to the wetland vegetation and could be restored to a similar condition to the remainder of the wetland area
Comment: Part of one of the best representations of Tuart Forrest of Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (FCT 25)	
Diversity	**YES**
Landforms	2
Vegetation Complexes	2
Floristic Community Types	not known
Vegetation units	not known
Flora	at least 160 native taxa
Fauna	high bird diversity with at least 30 species of birds in upland part of site
Comment:	
Rarity	**YES**
Vegetation Complex <10% remaining	

Threatened Ecological Communities	not known
Flora	Two Priority 4 species and one Priority 3 species
Fauna	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Comment:	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	The Shearwater Forest – Parade Road Bushland is part of the Maidens/Preston River Ecological Linkage
Creekline/River/Estuary	-
Contains areas suitable for ecological restoration	yes see above
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**
Comment: Contains areas of Conservation category wetland which are located in a large area of wetland. The large wetland contains areas of threatened ecological community (in the hay park Bushland, north of Washington Ave.). The wetland area in the site is significant in connecting the site to the portion of the larger wetland north of Washington Ave.	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The area meets 4 criteria, being: *Representation of Ecological Communities, Diversity, Rarity, Maintaining Ecological Processes and Natural Systems.* The natural attributes that contribute to meeting these criteria are listed below:

- Substantial representative area of bushland of Spearwood Dune vegetation of Karrakatta Complex Central and South Vegetation (Location 632 and Lots 302&303);
- area of native vegetation of Yoongarillup Complex Vegetation (Lots 1&8) and wetland (lots 1,8,4&3) which is significant as part of the Maidens/Preston River Ecological Linkage and in providing wetland fauna habitat;
- Representative of the southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (floristic community type 25) which is a significant representation of this FCT in the Maidens/Preston River Ecological Linkage;
- Contains vegetation in Very Good condition with significant tall habitat trees (Tuart);
- Includes fauna listed under the EPBC Act (1999) and WA Wildlife Conservation Act 1950 and subsequent amendments;
- Area of native vegetation (>20ha) is of compact shape and is contiguous with other natural areas to west, south, north and east;
- The Maidens/Preston River Ecological Linkage is the only known sequence of this type on the Plain; and
- This area is critical in the Maidens/Preston River Ecological Linkage containing significant areas of its type

Summary Comment in relation to the proposal

It is recommended that the areas as identified in Appendix 9 be protected. This includes the two areas identified as degraded (HGM 2002) which should be rehabilitated to provide additional wetland area and some buffer. This also includes a contiguous area to the north-east which will broaden the linkage across Washington Ave to Hay Park Bushland to the north

DALYELLUP BEACH ESTATE TOURIST PRECINCT

INFORMATION	COMMENT
Background Information	
Area Name	Dalyellup Beach Estate
Location	Lot 1
Size (ha)	ca 10ha (ha native remnant vegetation)
Reason for assessment	Proposed rezoning determine regional significance

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	None
Groundwater Source Protection Area	
Existing System 6 area	No
Adjacent System 6 Area	No
Submission System 6 Update	
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Quindalup Dunes (Qhs and Qhsm)	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	Alan Tingay and Associates (1991 and 1998): Vegetation mapped for the Usher-Stratham Environmental Study Edge Inspection DEP April 2003
Summary of findings	**Vegetation:** Uplands: **Quindalup Dunes** (Qhs and Qhsm) *Eucalyptus gomphocephala* and *Agonis flexuosa* Forest; *Acacia cochlearis* and *Jacksonia furcellata* Heath; *Scaevola crassifolia, Diplolaena dampieri* and *Hemiandra pungens* Heath and *Agonis flexuosa* Scrub **Area native remnant vegetation/Vegetation Condition:** Predominantly Very Good. Identified as in Natural Condition (trees and understorey largely intact) Alan Tingay and Associates (1991). **Total Flora:** not known **Significant Flora:** not known
Vegetation & Flora Survey Limitations	Vegetation mapped and site visits for vegetation condition over a broader area. No floristic survey
Regional	
Vegetation Complex	Quindalup complex and a very small area of Vasse Complex
Vegetation types (Beard/Smith/Hopkins)	-
Floristic Community Types (FCT) *type inferred	Not known
National/International Significance	Not known
Fauna	
Area Specific	

Fauna Survey	Alan Tingay and Associates (1998): Site No's. 4 and 5 are equivalent to this area Reconnaissance survey DEP April 2003
Summary of findings	Birds 26 species (Alan Tingay and Associates 1998) 16 species (DEP 2003), total 29 species. Native mammals 3 species, reptiles 7 species, frogs 2 species (Alan Tingay and Associates 1998) The area has a rich and diverse bird assemblage. This distinctiveness is further emphasised by the number of species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury, and the number of species that are of regional conservation significance. Species of conservation significance in the area include Splendid Fairy-wren, White-browed Scrubwren, Weebill, Broad-tailed Thornbill, Golden Whistler, Painted Button-quail. Significant reptile species Bardick (*Echiopsis curta*) found on coastal dune site One Schedule 1 species (Western Ringtail Possum), one Priority 4 species (Quenda) recorded
Fauna Survey Limitations	All surveys are Autumn only. Surveys at other times would add additional species
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Linkage Values	
Contiguous with bushland to south and west Part of the Maidens/Muddy Lake/Ludlow Coastal Ecological Linkage and part of the Dalyellup/Gelorup/Crooked Brook Ecological Linkage	
Wetlands, Creeklines, Rivers, Estuaries	
Type	-
Management Category	-
Suite	Big Swamp (Qu.6) and Minninup (Qu.7)
Conclusions from survey	Consistent with database (WRC 2003)
Other Attributes	
Immediately south of Dalyellup Road the vegetation quality is very high and there are outstanding examples of the major coastal vegetation associations including Tuart/Peppermint forests in the eastern components of the dunes, Alan Tingay and Associates (1991)	
Further field survey	
Surveys at other times would add additional species. A comprehensive list of native flora and floristic community types is required	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Quindalup complex and a small area of Vasse Complex
Floristic Community types	Not known
Uplands and Wetlands	
Size and Shape Consolidates the compact size and shape of the adjacent ROS, South Dalyellup bushland and the Dalyellup Road to the north provides a hard edge to facilitate management.	
Vegetation Condition Vegetation quality is very high	
Relationship/proximity to:	

Naturally vegetated areas Protected areas Other regionally significant naturally vegetated areas	Contiguous with bushland to south and west Proposed ROS
Contains areas suitable for ecological restoration	
Comment:	
Diversity	**YES**
Landforms	Vegetated Quindalup Dune
Vegetation Complexes	2
Floristic Community Types	Not known
Vegetation units	4
Flora	Not known
Fauna	Has a good assemblage of Tuart woodland birds
Comment:	
Rarity	**YES**
Vegetation Complex <10% remaining	
Threatened Ecological Communities	Not known
Flora	None identified
Fauna	One Schedule 1 species (Western Ringtail Possum), one Priority 4 species (Quenda) recorded
Comment:	
Maintaining Ecological Processes and Natural Systems	**NO**
Relationship/proximity to: Regional Ecological Link Creekline/River/Estuary	 NA
Contains areas suitable for ecological restoration	
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NO**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**NO**
Comment:	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The site meets three criteria, being: *Representation of Ecological Communities*, *Diversity* and *Rarity*. The natural attributes of the site that contribute to meeting the criteria are listed below. Some of these natural attributes are shared with the Dalyellup/Minninup Swamp Natural Area

- Contains an area of vegetated Quindalup Dunes which is which is part of the largest most southern area of vegetated parabolic Quindalup Dunes remaining on the Swan Coastal Plain
- Representative area of natural vegetation in Excellent to Good condition of the Quindalup Complex.
- High number of other significant vertebrate species:
  - The area has a rich and diverse bird assemblage. This distinctiveness is further emphasised by the number of species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury, and the number of species that are of regional conservation significance. Species of conservation significance in the area include Splendid Fairy-wren, White-browed Scrubwren, Weebill, Broad-tailed Thornbill, Golden Whistler, Painted Button-quail.
  - Significant reptile species Bardick (*Echiopsis curta*) found on coastal dune site
- One Schedule 1 species (Western Ringtail Possum), one Priority 4 species (Quenda) recorded
- Part of two ecological linkages: Dalyellup/Gelorup/Crooked Brook and Maidens/Muddy Lakes/Ludlow Ecological Linkages

Summary Comment in relation to the proposal

Reserving the area south of Dalyellup Road will consolidate the ROS and enable better management with a hard edge. The eastern portion of the area is a high ridge and is a significant visible area for migrating birds from ROS areas to the south and south-east. It also has significant old habitat trees which provide nesting sites for bird species that feed in adjacent areas.

LOTS 313-317 SOUTH OF HAREWOODS ROAD, SOUTH DALYELLUP

INFORMATION	COMMENT
Background Information	
Area Name	South Dalyellup
Location	Wellington Location 41, Lots 313-317
Size (ha)	116.4 (75.1 remnant native vegetation) (HGM 2002)
Reason for assessment - area being assessed	Naturally vegetated proposed urban land between two conservation areas, identified in regional ecological linkage

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	NA
Groundwater Source Protection Area	
Existing System 6 area	
Adjacent System 6 Area	Adjacent to C71
Submission System 6 Update (6)	No
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Spearwood Dune System Sands derived from Tamala Limestone (Qts: S7) Vegetated Spearwood Dune	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	Alan Tingay and Associates (1991): Vegetation map prepared from 1:10000 aerial photography and ground survey of different vegetation types during June 1991. No details on how the ground survey was undertaken DEP (2002): edge inspection March and September 2002 HGM (2002): survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; two plots 10X10m (2.1, 2.2) located in the area Vegetation mapping for the area is known from Alan Tingay and Associates (1991) and HGM (2002)
Summary of findings	**Vegetation:** Spearwood Dune System Upland: Tuart (*Eucalyptus gomphocephala*) and Peppermint (*Agonis flexuosa* var. *flexuosa*) Open Forest to Woodland with associated scattered to Open woodland of Jarrah (*E. marginata*) and Candlestick Banksia (*Banksia attenuata*) sub-dominant Wetland: (dampland): *Melaleuca rhaphiophylla* Open Woodland over pasture **Area native remnant vegetation/Vegetation Condition:** <40% Very Good, >60% Completely Degraded, with areas of severe localised disturbance (HGM 2002) **Total Flora:** 44 native taxa, 24 weed taxa (estimated >70% expected flora, HGM 2002) **Significant Flora**: none recorded
Vegetation & Flora Survey Limitations	Limited survey to this date. Future survey limited as much of the native vegetation in the area has been removed
Regional	

Vegetation Complex	**Spearwood Dunes** Karrakatta Complex – Central and South
Vegetation types (Beard/Smith/Hopkins)	-
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *11 Wet forests and woodlands **Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes** *25 Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands
National/International Significance	None recorded
Fauna	
Area Specific	
Fauna Survey	DEP (2002): reconnaissance visit 1-3 October 2002 HGM (2002): opportunistic bird survey undertaken during 6 days in September 2002
Summary of findings	18 bird, 1 reptile, 1 mammal species. Schedule 1 species Baudin's Cockatoo. Conservation significant species listed as coastal plain declining species in *Bush Forever* (Government of WA 2000) include Splendid Fairy-wren, Yellow-rumped Thornbill, Scarlet Robin Tuart and Peppermint Open Forest to Woodland with associated scattered to Open woodland of Jarrah provides significant breeding habitat for bird species utilizing tall trees or hollows and species of wetland birds that feed in adjacent wetlands. Likely to have significant habitat value for arboreal mammals including bats
Fauna Survey Limitations	Surveys are opportunistic in spring only. Intensive surveys would add additional species. Many of the vertebrate species recorded in nearby Tuart woodlands by Alan Tingay and Associates (1998) are likely to occur here
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, Baudin's Cockatoo
Linkage Values	
Adjacent bushland to the north (subdivision approval), west and east. Contiguous with bushland to west and east: • to west is the northern portion of the Dalyellup/Minninup Swamp Natural Area which is the proposed Dalyellup ROS and • to east is ROS in the System 6 area C71 (Dalyellup Reserves). Only undeveloped part of the Dalyellup/Gelorup/Crooked Brook Ecological Linkage between Dalyellup/Minninup Swamp Natural Area to the west and Tuart/Marri/Banksia woodlands to the east in C71	
Wetlands, Creeklines, Rivers, Estuaries	
Type	dampland
Management Category	Multiple Use
Suite	**Quindalup Dunes** Big Swamp (Qu.?4)
Conclusions from survey	Consistent with database (WRC 2003)
Other Attributes	
Provides bushland corridor between the coast and the Dalyellup Reserves (C71) (Peter Hanley, pers. comm. in HGM 2002)	
Further field survey	
Limited survey to this date. Future survey limited as much of the native vegetation in the area has been removed	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Karrakatta Complex Central and South (30% remaining on the SCP, 9% of this in secure tenure)
Floristic Community types	Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (FCT 25) which is the only substantial representation of this FCT in the Dalyellup/Gelorup/Crooked Brook Ecological Linkage (small area in C71)
Size and Shape A large area of native vegetation (57ha, >20ha) of compact shape, contiguous with other natural areas to east and west	
Vegetation Condition <40% Very Good, >60% Completely Degraded, with areas of severe localised disturbance	
Relationship/proximity to:	
Other regionally significant natural areas	Contiguous area of regionally significant bushland to west and east
Protected areas	To west is the northern extent area of the proposed Dalyellup ROS portion of the Dalyellup/Minninup Swamp Natural Area; adjacent bushland to east is ROS in the System 6 area C71 (Dalyellup Reserves).
Naturally vegetated areas	Adjacent naturally vegetated areas to the north (subdivision approval), west and east
Contains areas suitable for ecological restoration	Recent activity (removal of native vegetation for geological survey and other purposes) have altered natural vegetation in the area. Past aerial photography (1990) and Alan Tingay and Associates (1991) indicate that the area was equivalent to the vegetation north of Harewoods Road. The recent nature of the alteration in vegetation and the condition recorded by HGM (2002) indicate that if grazing and further vegetation removal ceased there would be regeneration of significant numbers of native species. The area retains a Woodland to Open woodland dominated by Tuart and Peppermint with elements of Jarrah and Banksia.
Comment: The Spearwood Dune vegetation of Karrakatta Complex Central and South Vegetation Complex. Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (FCT 25) which is the only representation of this FCT in the Dalyellup/Gelorup/Crooked Brook Ecological Linkage: Large area of native vegetation (57ha) of compact shape is contiguous with other natural areas to east and west	
Diversity	**NOT KNOWN**
Landforms	vegetated Spearwood Dune
Vegetation Complexes	1
Floristic Community Types	2
Vegetation units	
Flora	
Fauna	Likely to have good assemblage of Tuart woodland birds
Comment: In sufficient data on fauna.	
Rarity	**NO**
Vegetation Complex <10% remaining	No further clearing
Threatened Ecological Communities	None identified
Flora	None identified
Fauna	Schedule 1 species Baudin's Cockatoo. Conservation significant species, listed as coastal plain declining species in *Bush Forever* (Government of WA 2000), include Splendid Fairy-wren, Yellow-

	rumped Thornbill, Scarlet Robin
Comment:	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regionally significant link	Only undeveloped part of the Dalyellup/Gelorup/Crooked Brook Ecological Linkage between Minninup Swamp to the west and Tuart, Marri and Banksia woodlands to the east in C71. Part of the Maidens/Muddy Lake/Ludlow Coastal Ecological Linkage
Creekline/River/Estuary	NA
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment: This area is critical in the Dalyellup/Gelorup/Crooked Brook Ecological Linkage as it contains the only area of its type (FCT 25) in the linkage	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal vegetation	**NO**
Comment: Wetland of a type and quality that does not meet the criterion for regional significance	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The South Dalyellup area is considered to be a regionally significant natural area meeting two criteria, being: *Representation of Ecological Communities* and *Maintaining Ecological Processes and Natural Systems*. The natural attributes that contribute to meeting these criteria are listed below:

- Substantial representative area of natural vegetation of Spearwood Dune vegetation of Karrakatta Complex Central and South Vegetation Complex (57ha mapped as native vegetation)
- Representative of the southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (floristic community type 25) which is the only substantive area of this floristic community type in the Dalyellup/Gelorup/Crooked Brook Ecological Linkage
- Contained a core area of vegetation in Very Good condition until recent activity removed many of the low trees and understorey as well as some tall habitat trees
- Large area of native vegetation of compact shape contiguous with very significant natural areas to east and west and is part of the Maidens/Muddy Lake/Ludlow Coastal Ecological Linkage. To west is the northern extent area of the Dalyellup/Minninup Swamp Natural Area identified as the Dalyellup ROS portion in the GBRS, and to the east is ROS in the System 6 area C71 (Dalyellup Reserves)
- This area is critical in the Dalyellup/Gelorup/Crooked Brook Ecological Linkage containing the only area of its type in the linkage not already developed for housing or with subdivision approval. Decreasing the extent of the linkage would reduce the habitat function
- Contains Tuart and Peppermint Open Forest to Woodland which is significant breeding habitat for bird species utilizing tall trees or hollows and species of wetland birds that feed in adjacent wetlands and significant habitat for animals moving between the different habitats of the Dalyellup/Gelorup/Crooked Brook Ecological Linkage

Summary Comment in Relation to the Proposal

As a consequence of the regional significance of the natural areas of the area it is proposed that a suitable area of South Dalyellup, Lots 315, 316 and 317, be identified for retention and protection for its natural values. This area has the following specific attributes.

- Contains the area of Spearwood Dune vegetation of Karrakatta Complex Central and South Vegetation Complex in best condition, predominantly Very Good (HGM 2002)
- Provides adequate linkage opportunity between proposed Dalyellup ROS portion of the Dalyellup/Minninup Swamp Natural Area and adjacent bushland to east is ROS in the System 6 area C71 (Dalyellup Reserves)
- Provides an adequate area of Tuart and Peppermint Open Forest to Woodland which is significant breeding habitat for bird species utilizing tall trees or hollows and species of wetland birds that feed in adjacent wetlands

The identification of this area is consistent with the recommendations in HGM (2002)

RESERVE 31012 HAREWOODS ROAD, DALYELLUP

INFORMATION	COMMENT
Background Information	
Area Name	Harewoods Rd, Dalyellup
Location	Reserve 31012 Rubbish Depot (from Usher, Gelorup & Dalyellup DSP), Dalyellup, Shire of Capel
Size (ha)	
Reason for assessment	To determine regional significance

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	-
Groundwater Source Protection Area	-
Existing System 6 area	-
Adjacent System 6 Area	Adjacent (west) to C71 Reserves near Dalyellup
Submission System 6 Update (6)	No
Others	

Environmental Considerations - Natural Attributes	
Landforms	
Spearwood Dune System Sands derived from Tamala Limestone (Qts: S7) Vegetated Spearwood Dune	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	DEP (2002): transects of the native vegetation in the reserve Gibson *et al.* (1994): Four floristic plots were located in C71 two plots in bushland immediately adjacent to the east.
Summary of findings	**Vegetation:** Sands derived from Tamala Limestone (Qts: S7) *Eucalyptus calophylla* Woodland over *Agonis flexuosa*, *Banksia attenuata* and *B. ilicifolia* scattered to Low Woodland with scattered and patches of *Melaleuca preissiana.* Northwest corner dominated by *Eucalyptus rudis* Woodland over scattered *Banksia littoralis* (this unit of vegetation extends adjacent area of the Dalyellup Estate, contiguous area appears to be sumpland). **Area native remnant vegetation/Vegetation Condition:** Approximately 50% reserve is naturally vegetated being in Very Good condition, with severe localised disturbance associated with the building in the NW corner. Remainder of reserve has been cleared, excavated and filled. **Total Flora:** Within C71 124 native taxa, 16 weed taxa (from 4 plots located for Gibson *et al*. (1994) estimated >70% expected flora) **Significant Flora:** none observed Note: large canopy trees in reserve, uncommon in C71 due to selective deaths 15 - 20 years previously, *Eucalyptus rudis* not recorded in C71
Vegetation & Flora Survey Limitations	Limited survey of C71 and subject land. Survey aimed to establish condition and vegetation type, sufficient information to establish the naturally vegetated area is of a quality and type to be a good example of its type.

Regional	
Vegetation Complex	Karrakatta Complex Central and South
Vegetation types (Beard/Smith/Hopkins)	medium woodland; tuart
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *11 Wet forests and woodlands **Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes** *21a Central *Banksia attenuata - E. marginata* woodlands
National/International Significance	Not assessed
Fauna	
Area Specific	
Fauna Survey	Brief day transect survey and spotlighting DEP April 2003
Summary of findings	20 species of vertebrate fauna: 2 native mammals, 16 birds (7 significant species), 2 reptiles. There are a number of species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance. Seven species of conservation significance in the area include Yellow Robin, Scarlet Robin, Weebill, Broad-tailed Thornbill. One Schedule 1 species (Western Ringtail Possum) Note: Tree species including *Banksia littoralis, Melaleuca preissiana, Eucalyptus gomphocephala* and *E.calopylla* together with the understorey provide significant fauna habitat
Fauna Survey Limitations	Reconnaissance only. More comprehensive surveys would add additional species
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Linkage Values	
Contiguous (over the drain) with C71 bushland, small naturally vegetated area to west. C71 contiguous with Dalyellup/Minninup Swamp Natural Area through South Dalyellup area; being contiguous with C71 is part of the Dalyellup/Gelorup/Crooked Brook Ecological Linkage.	
Wetlands, Creeklines, Rivers, Estuaries	
Type	Reserve is low lying falling towards a sumpland to the west, dampland areas in NE area of C71, Reserve can be considered transitional, patches of dampland
Management Category	inferred Conservation for wetland areas
Suite	Big Swamp
Conclusions from survey	Not consistent with database (WRC 2003) none of the wetlands are mapped
Other Attributes	
Part of best quality vegetation in or adjacent to C71, this 'section' of C71 was considered as the best condition area being of 'natural condition' (Alan Tingay and Associates 1991)	
Further field survey	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Characteristic of damp Spearwood Dune flat vegetation of the Bunbury area Karrakatta Complex Central and South, an uncommon vegetation

	unit. Within the Constrained Area 53.2% Karrakatta Central and South Complex remains, 11.0% currently identified as proposed and existing ROS.
Floristic Community types	Intergrade between wetland and upland types
Uplands and Wetlands	see above
Size and Shape: naturally vegetated area of small size (<20ha) but contiguous with C71, consolidates northern section of the long narrow C71.	
Vegetation Condition: Similar condition to C71, Very Good	
Relationship/proximity to:	
Naturally vegetated areas	Contiguous (over the drain) with C71 bushland, small naturally vegetated area to west
Protected areas	Protected area C71 to east, there appears to be a protected area to west (wetland area) and as a reserve the site has some existing protection.
Other regionally significant naturally vegetated areas	Contiguous (over the drain) with C71 bushland and small naturally vegetated area to west. C71 contiguous with Dalyellup/Minninup Swamp Natural Area through South Dalyellup area; being contiguous with C71 is part of the Dalyellup/Gelorup/Crooked Brook Ecological Linkage.
Comment: The naturally vegetated area of the Reserve is of a quality and type that makes it a significant contribution to the C71 conservation area and to the broader Dalyellup/Gelorup/Crooked Brook Ecological Linkage.	
Diversity	**NOT KNOWN**
Landforms	
Vegetation Complexes	
Floristic Community Types	
Vegetation units	
Flora	
Fauna	
Comment:	
Rarity	**YES**
Vegetation Complex <10% remaining	
Threatened Ecological Communities	
Flora	
Fauna	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Comment:	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	Part of the Dalyellup/Gelorup/Crooked Brook Ecological Linkage between Minninup Swamp to the west and Tuart, Marri and Banksia woodlands to the east in C71
Creekline/River/Estuary	
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**

Comment: The naturally vegetated area of the Reserve has wetland characteristics and is of a quality and type that designates the wetland areas as Conservation. Few wetland areas in C71 (one small area to east of this land, not mapped)

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The area meets 4 criteria, being: *Representation of Ecological Communities, Rarity, Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. The natural attributes of Reserve 31012 that contribute to meeting these criteria are listed below:

- Characteristic of damp Spearwood Dune flat vegetation of the Bunbury area Karrakatta Complex Central and South. Within the constrained area but this vegetation unit is uncommon;
- Contains populations of at least one species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (Western Ringtail Possum);
- The naturally vegetated area of the Reserve is of a quality and type that makes it a significant contribution to the C71 conservation area and to the broader Dalyellup/Gelorup/Crooked Brook Ecological Linkage; and
- The naturally vegetated area of the Reserve has wetland characteristics and is of a quality and type that designates the wetland areas as Conservation category.

Summary Comment in relation to the proposal

The naturally vegetated area of the Reserve is of a quality and type that it makes a significant contribution to the C71 conservation area and to the broader Dalyellup/Gelorup/Crooked Brook Ecological Linkage.

Note: The area of bushland in C71 and immediately adjacent (eastern road reserve) has been systematically reduced, this addition compensates to some extent for these losses

- location for one rare species of fauna - Western Ringtail Possum. This species is recognised by the State and is subject to protection under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
- this ‘section’ of C71 was considered by Tingay (1991) as the best condition area being ‘natural condition’
- this area contains the only wetland area in C71, see Tingay (1991)-unit H and this report

Part Lot 201 Gray Road, Part Lot 4402, Part Lot 97, Lot 139 Armstrong Street, Lots 1, 4, 66 and Part Lot 138 Timperley Road, Boyanup

INFORMATION	COMMENT
Background Information	
Area Name	Boyanup (east) urban deferred zone
Location	Part Lot 201 Gray Road, Part Lot 4402, Part Lot 97, Lot 139 Armstrong Street, Lots 1, 4, 66 and Part Lot 138 Timperley Road, Boyanup
Size (ha)	total 233.9 ha (35.5 remnant native vegetation) (HGM 2002)
Reason for assessment	Determine regional significance of vegetation

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	No
Groundwater Source Protection Area	-
Existing System 6 area	No
Adjacent System 6 Area	No
Submission System 6 Update	
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Whicher Scarp Cartis (Cs) **Swan Coastal Plain – Fluviatile Deposits** Guildford Formation (Qpry)	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	Hart, Simpson and Associates Pty Ltd (2001): adjacent area, Joshua Brook Subdivision Rare Flora. Report prepared for Iluka Resources. Survey undertaken 29/11/01, flora and vegetation examined during extensive foot traverses, vegetation type and flora recorded. Identified in accordance to Gibson *et al.* (1994). Vegetation condition scale after Keighery (1994). DEP (2002): edge inspection HGM (2002): Survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; four plots 10X10m (3. 1- 4) located in the area
Summary of findings	**Vegetation** Four remnants of bushland in the area. Upland: Remnant 1 (Part Lot 201. Kingia Vegetation Complex) *Eucalyptus marginata* subsp. *marginata* and *E. haematoxylon* Woodland over *Xanthorrhoea preissii* Open Shrubland Remnant 2 (Lots 1, 4, 66, 139 and Part Lots 97 and 138. Cartis Vegetation Complex): *Banksia attenuata, Eucalyptus marginata* subsp. *marginata* and *Xylomelum occidentale* Low Open Woodland over *Melaleuca thymoides, Kunzea glabrescens, Hypocalymma robustum* and *Adenanthos meisneri* Shrubland; *Eucalyptus marginata* subsp. *marginata* and *E. calophylla* Woodland over *Banksia grandis* Low Open

	Woodland Remnant 3 (Part Lot 4402. Guildford Vegetation Complex): *Eucalyptus marginata- E. calophylla* Woodland over *Banksia grandis* Low Woodland; *Banksia attenuata* Low Woodland with scattered *Eucalyptus marginata* (HGM 2002) *Eucalyptus marginata- E. calophylla* Woodland over *Banksia grandis* Low Woodland; *Banksia attenuata* Low Woodland with scattered *Eucalyptus marginata* (Hart 2001) Wetland: Remnant 4 (Part Location 4402. Swan Vegetation Complex): *Eucalyptus calophylla* Open Forest over *Agonis flexuosa* var. *flexuosa* Low Open Forest (HGM 2002*); Eucalyptus rudis* Open Woodland with scattered *Agonis flexuosa* (Hart 2001) **Area native remnant vegetation/Vegetation Condition:**: > 60% Very Good to Excellent, < 40% Degraded to Good (Hart 2001); 15% Good, 65% Completely Degraded, 20% rehabilitated (HGM 2002) **Total Flora:** 123 native taxa, 35 weed taxa (HGM 2002, estimated >70% expected flora) **Significant Flora:** *Acacia flagelliformis* (P4), *Acacia semitrullata* (P3), *Caladenia speciosa* (P4), *Drosera marchantii* subsp. *marchantii* (P4), *Jacksonia sparsa* (P4); *Acacia pulchella* var. *goadbyi*, *A. urophylla*, *Johnsonia lupulina*, *Styphelia tenuiflora*, *Kennedia coccinea*, *Adiantum aethiopicum* only location of *Eucalyptus haematoxylon* within the present study areas.
Vegetation & Flora Survey Limitations	Limited survey but adequate for information for the assessment of regional significance of vegetation, however no vegetation condition mapping and only one visit in spring.
Regional	
Vegetation Complex	**Blackwood Plateau:** Kingia Complex **Whicher Scarp:** Cartis Complex **Pinjarra Plain:** Swan Complex, Guildford Complex
Vegetation types (Beard/Smith/Hopkins)	-
Floristic Community Types (FCT) *type inferred	**Supergroup1: Foothills/Pinjarra Plain** *1a *Eucalyptus haematoxylon – E. marginata* woodlands on Whicher foothills **Supergroup 2: Seasonal Wetlands** Type not inferred **Supergroup 3: Uplands centred on Bassendean Dunes** *21b Southern *Banksia attenuata* woodlands
National/International Significance	
Fauna	
Area Specific	
Fauna Survey	HGM (2002): opportunistic bird survey undertaken during 6 days in September 2002 Reconnaissance and edge inspection of part of the lots DEP March 2002, April 2003
Summary of findings	28 bird species. There are a number of species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance. Eight species of conservation significance in the area include Western Yellow Robin, Broad-tailed Thornbill, Western Thornbill, Yellow-rumped Thornbill, and Splendid Fairy Wren. Two Schedule 1 species (Baudin's Cockatoo, Western Ringtail Possum)

Fauna Survey Limitations	More comprehensive surveys would add additional species
Regional	
National/International Significance	Contains populations of at least two species listed under the EPBC Act 1999, Western Ringtail Possum and Baudin's Cockatoo
Linkage Values	
Contiguous with Joshua Creek bushland through to the Preston River to the south. Part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and part of the Capel/Boyanup Ecological Linkage Remnant 2 linkage to bushland south to Joshua Brook, then west (to Preston River) and east (to Plateau, discontinuous between Brook and native vegetation) along Joshua Brook	
Wetlands, Creeklines, Rivers, Estuaries	
Type	Creek (Remnant 4)
Management Category	Not applicable
Suite	Not applicable
Conclusions from survey	Database (WRC 2003) not applicable
Other Attributes	
-	
Further field survey	
Comprehensive fauna and flora survey required	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Guildford Complex; Cartis Complex
Floristic Community Types	2 (FCT's not established for creeklines)
Uplands and Wetlands	yes
Habitats	
Size and Shape: Remnant 1 is small and Remnants 3 and 4, while contiguous with each other through a regionally significant naturally vegetated area are also relatively small and of elongate shape. Remnant 2 is the largest and by itself the most suitable area for protection.	
Vegetation Condition: All Remnants in the study area are either small or edges of a large bushland area and have a level of disturbance related to this and are generally described as being in good condition.	
Relationship/proximity to:	
Naturally vegetated areas	Remnants 2, 3 and 4 are contiguous with bushland however this bushland is urban zoned
Protected areas	see above
Other regionally significant naturally vegetated areas	The urban zoned land contiguous with Remnants 2, 3 and 4 is regionally significant
Contains areas suitable for ecological restoration	Remnant 2 contains areas in need of restoration
Comment: All of native vegetation in the study area is significant, some remnants are small (Remnant 1) and Remnants 2, 3 and 4, while contiguous with each other through a regionally significant naturally vegetated area this area is urban zoned. Vegetated creeklines of this quality with contiguous upland area rare on the Swan Coastal Plain/Foothills/Plateau interface.	
Diversity	partial **YES**
Landforms	creekline, foothills, plateau and
Vegetation Complexes	4 in close proximity
Floristic Community Types	2 (fct's not established for creeklines)
Vegetation units	4
Flora	Diversity of significant flora: *Acacia flagelliformis* (P4), *Acacia semitrullata* (P3), *Caladenia speciosa* (P4), *Drosera marchantii* subsp. *marchantii* (P4), *Jacksonia sparsa* (P3); *Acacia pulchella* var. *goadbyi*,

	A. urophylla, Johnsonia lupulina, Styphelia tenuiflora, Kennedia coccinea, Adiantum aethiopicum only location of *Eucalyptus haematoxylon* within the present study sites.
Habitats	
Fauna	
Comment:	
Rarity	**YES**
Vegetation Complex <10% remaining	Vegetated creeklines of this quality with contiguous upland areas rare on the Swan Coastal Plain/Plateau interface.
Threatened Ecological Communities	
Flora	large number of significant flora
Habitats	
Fauna	Contains populations of at least two species listed under the EPBC Act 1999, Western Ringtail Possum and Baudin's Cockatoo
Comment: The location of the bushland on the Plain/Foothills/ Plateau interface with a vegetated creekline at its core, large number of significant flora and rare fauna	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	Joshua Brook forms one of the two linkage opportunities to the Plateau and is part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and part of the Capel/Boyanup Ecological Linkage
Creekline/River/Estuary	Joshua Brook flows into the Preston River, contributing to a Ecological Linkage between Creekline/River/Estuary
Contains areas suitable for ecological restoration	yes
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NO**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**
Comment: Creekline conservation category on vegetation type and condition	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The Boyanup (east) bushland remnants are considered to be regionally significant natural areas meeting four criteria, being: *Representation of Ecological Communities*, *Rarity*, *Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*; and partially meets *Diversity*. The natural attributes that contribute to meeting these criteria are listed below.

- Contains areas of vegetation representative of Kingia, Swan, Guildford and Cartis Complexes
- All of native vegetation in the study area is significant, some remnants are small (Remnant 1) and Remnants 2, 3 and 4, are contiguous with each other through a regionally significant naturally vegetated area. Vegetated creeklines of this quality with contiguous upland area rare on the Swan Coastal Plain/Foothills/Plateau interface.
- Diversity of significant flora: *Acacia flagelliformis* (P4), *Acacia semitrullata* (P3), *Caladenia speciosa* (P4), *Drosera marchantii* subsp. *marchantii* (P4), *Jacksonia sparsa* (P3); *Acacia pulchella* var. *goadbyi*, *A. urophylla*, *Johnsonia lupulina*, *Styphelia tenuiflora*, *Kennedia coccinea*, *Adiantum aethiopicum.* Only location of *Eucalyptus haematoxylon* within the present study sites
- This area is significant in the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and Capel/Boyanup Ecological Linkage containing the only area of its type known to occur in the linkage not already developed for housing or with subdivision approval.
- Contains significant habitat for bird species which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance.
- Significant linkage value for species moving between the different habitats of the Capel/Boyanup Ecological Linkage and the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage.

Summary Comment in relation to the proposal

The Boyanup (east) bushland remnants are considered to be regionally significant natural areas and suitable for retention. HGM (2002) recommended that Remnants 2 and 4 be retained but report Remnants 1 and 3 could be developed. While Remanants 1 and 3 are small all such remnants are of value and both are contiguous with other bushland areas. The significance of Remanants 2, 3 and 4 would be much greater if the bushland area to the south/east of these remnants could be protected, particularly the vegetated creekline.

LOT 35 SPURR STREET, CAPEL

INFORMATION	COMMENT
Background Information	
Area Name	Spurr Street Bushland, Capel (west, urban deferred)
Location	Lot 35 (includes vegetated road reserve to south east)
Size (ha)	ca 4ha native remnant vegetation
Reason for assessment	To determine natural values of site

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	No
Groundwater Source Protection Area	-
Existing System 6 area	No
Adjacent System 6 Area	No
Submission System 6 Update	
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Bassendean Dunes/Pinjarra Plain Bassendean Sands over Guildford Formation (Qpb/Qpa: S10) **Pinjarra Plain** Guildford Formation (Qpa: Msg4 and M) Vegetated Bassendean Dunes and Pinjarra Plain upland and sumpland	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	DEP (2002): edge inspection September 2002
Summary of findings	**Vegetation:** Vegetation units are not distinguished on the landform/soil units. Uplands: *Banksia attenuata* and *B. ilicifolia* Low Open Forest over *Melaleuca thymoides* Shrubland; *Agonis flexuosa* Woodland over *Kunzea glabrescens* Tall shrubland over *Phlebocarya ciliata* Herbland; *Agonis flexuosa* Woodland over *Kunzea glabrescens* and *Melaleuca thymoides* Closed Heath. Wetlands: Scattered emergent *Melaleuca preissiana* and *Agonis flexuosa* over *Kunzea glabrescens* Tall Shrubland and *Aotus gracillima* Closed Heath; *Eucalyptus calophylla* and *Melaleuca preissiana* Woodland to Open Forest over *Hypocalymma angustifolium* and *H. ericifolium* Open Low Heath with patches of Sedgeland **Area native remnant vegetation/Vegetation Condition:** Very Good to excellent with small patches of severe localised disturbance **Total Flora:** expected flora approx. 150 taxa, similar to Capel Nature Reserve (Keighery *et al.* 1996) **Significant Flora:** *Jacksonia sparsa* (P3); *Hypocalymma ericifolium, Astartea* sp "Brixton"
Vegetation & Flora Survey Limitations	Adequate for information for the assessment of regional significance of vegetation, however only one inspection from the edge in spring with no plots, vegetation mapping or vegetation condition mapping.
Regional	

Vegetation Complex	Southern River Vegetation Complex
Vegetation types (Beard/Smith/Hopkins)	Medium Forest; Jarrah-Marri/Low woodland Banksia
Floristic Community Types (FCT) *type inferred (DEP 2002)	**Supergroup 2: Seasonal Wetlands** *4 *Melaleuca preissiana* damplands **Supergroup 3 - Uplands, centred on Bassendean Dunes** *21b Southern *Banksia attenuata* woodlands Possible small areas **Supergroup 1 - Foothills/Pinjarra Plain** *1b Southern *Eucalyptus calophylla* woodlands on heavy soils
National/International Significance	-
Fauna	
Area Specific	
Fauna Survey	Brief day transect survey DEP April 2003
Summary of findings	10 species of vertebrate fauna: 3 native mammals, 7 birds (2 significant species). There are a number of bird species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance, including Broad-tailed Thornbill. One Schedule 1 species (Western Ringtail Possum) One Conservation Dependent species (Quenda)
Fauna Survey Limitations	Reconnaissance only. More comprehensive surveys would add additional species
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Linkage Values	
It is a remnant within the Capel/Boyanup Ecological Linkage and the Capel River Ecological Linkage	
Wetlands, Creeklines, Rivers, Estuaries	
Type	sumpland
Management Category	Resource Enhancement > 50%
Suite	Jandakot (B.3)
Conclusions from survey	Not consistent with database (WRC 2003), the area of vegetated wetland in the study area is Conservation Category
Other Attributes	
-	
Further field survey	
Further work would add additional species	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Southern River Vegetation Complex
Floristic Community types	at least two, possibly three
Uplands and Wetlands	contiguous vegetated areas of wetland and upland
Size and Shape: a small remnant (<20ha) however it is of compact shape and is very intact for its size; is one of the few good remnants in the town of Capel, it is linked other natural areas and is part of the Capel/Boyanup Ecological Linkage and Capel River Ecological Linkage.	
Vegetation Condition: Very Good with patches of severe localised disturbance	
Relationship/proximity to:	
Naturally vegetated areas	bushland over the road to north and east
Protected areas	?protected (?local government reserve)

Other regionally significant naturally vegetated areas	bushland over the road to north and east predominantly wetland likely to contain TEC's as an area of clay soil wetland
Contains areas suitable for ecological restoration	bushland over the road to north and east
Comment: The Bassendean Dune/Pinjarra Plain interface vegetation is a very good representation of its type (Southern River Vegetation Complex) containing upland and wetland vegetation units typical of this vegetation complex and the study area is a natural area in the Capel/Boyanup Ecological Linkage and Capel River Ecological Linkage.	
Diversity	**NO**
Landforms	wetland and upland
Vegetation Complexes	
Floristic Community Types	
Vegetation units	
Flora	
Fauna	
Comment:	
Rarity	**YES**
Vegetation Complex <10% remaining	
Threatened Ecological Communities	-
Flora	The area supports three significant flora (*Jacksonia sparsa* (P3), *Hypocalymma ericifolium, Astartea* sp "Brixton")
Fauna	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Comment:	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link Creekline/River/Estuary	It is a remnant within the Capel/Boyanup Ecological Linkage and Capel River Ecological Linkage
Contains areas suitable for ecological restoration	Adjacent cleared areas to the south-west and south located within the Capel/Boyanup Ecological Linkage connect the study area to the ROS
Size and Shape , Uplands and Wetlands & Vegetation Condition - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**
Comment: The vegetated wetland in the study area is Conservation Category.	

SUMMARY NATURAL VALUES
Regional Significance - Assessment against the Criteria
The site meets 4 criteria, being: *Representation of Ecological Communities*, *Rarity*, *Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. The natural attributes that contribute to meeting these criteria are listed below: • Representative area of natural vegetation of the Southern River Vegetation Complex (on the Bassendean Dune/Pinjarra Plain interface) • Containing upland and wetland vegetation units, the wetland area being of a quality and type to be recognised as a Conservation Category wetland; • Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum • Contains populations of three significant flora (*Jacksonia sparsa* (P3), *Hypocalymma ericifolium*, *Astartea* sp "Brixton"); • A natural area in the Capel/Boyanup Ecological Linkage and Capel River Ecological Linkage.
Summary Comment in relation to the proposal
The Spurr Street Bushland, Capel is considered to be a regionally significant natural area and should be protected. As the site is part of the Capel/Boyanup Ecological Linkage and Capel River Ecological Linkage consideration should be given in any future subdivision design to enhance ecological linkage values.

RESERVE 670 NORTH BOYANUP ROAD, DAVENPORT

INFORMATION	COMMENT
Background Information	
Area Name	Davenport Industrial Area
Location	Part Lots 1 and 5, Location 267 and Reserve 670 North Boyanup Road, Davenport, City of Bunbury
Size (ha)	41.6 (27.9 ha native remnant vegetation) (HGM 2002)
Reason for assessment	Determine regional significance of vegetation

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	-
Groundwater Source Protection Area	-
Existing System 6 area	-
Adjacent System 6 Area	-
Submission System 6 Update (6)	No
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Bassendean Dunes/Pinjarra Plain Bassendean Sands over Guildford Formation (Qpb/Qpa: S10) **Pinjarra Plain** Guildford Formation (Qpa: Msg4 and M) **Alluvial Deposits (Qhay:Sm1)** Vegetated Bassendean Dunes and Pinjarra Plain sumpland and palusplain	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	DEP (2002): edge inspection March and September 2002 HGM (2002): survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; two plots 10X10m (4 1-6) located in the area
Summary of findings	**Vegetation:** Vegetation units are not distinguished on the landform/soil units. Wetlands: *Eucalyptus calophylla* and *Agonis flexuosa* var. *flexuosa* Open Forest (Lot 1); *Agonis flexuosa* var. *flexuosa* Closed Forest (Lot 1 and 5); *Melaleuca preissiana* and *Agonis flexuosa* var. *flexuosa* Low Open Forest (Lot 5 and Res 670); *Melaleuca rhaphiophylla* Low Open Forest (Res 670); *Eucalyptus calophylla* and *E. marginata* subsp. *marginata* Open Woodland over Tall Shrubland dominated by *Melaleuca preissiana, Banksia littoralis, Agonis flexuosa* var. *flexuosa* and *Kunzea glabrescens* and combinations of these (Res 670); *Eucalyptus rudis* subsp. *rudis* and *Agonis flexuosa* var. *flexuosa* Open Forest (Lot 1). **Area native remnant vegetation/Vegetation Condition:** 100% Degraded to Completely Degraded with areas of severe localised disturbance but good canopy especially along the river **Total Flora:** 33 native taxa, 60 weed taxa (HGM 2002, estimated >70% expected flora); 59 native taxa (Bischoff 1998) **Significant Flora:** *Jacksonia sparsa* (P4); *Acacia pulchella* var.

	goadbyi
Vegetation & Flora Survey Limitations	Limited survey but, sufficient survey to place regionally. No vegetation condition mapping.
Regional	
Vegetation Complex	**Combinations of Bassendean Dunes/Pinjarra Plain** Southern River Complex **Pinjarra Plain** Swan Complex
Vegetation types (Beard/Smith/Hopkins)	Mosaic; medium forest; jarrah- marri/low woodland; banksia
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *4 *Melaleuca preissiana* damplands Additional type not inferred
National/International Significance	
Fauna	
Area Specific	
Fauna Survey	HGM (2002): opportunistic bird survey undertaken during 6 days in September 2002 Reconnaissance from edge DEP March 2002 Brief transect survey DEP 2003
Summary of findings	Birds 28 species (HGM 2002), 8 species (DEP 2003), total 30 species. Native mammals 1 species, reptiles 1 species (DEP 2003). There are a number of species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance. Significant bird species: Inland Thornbill, Splendid Fairy-wren, Yellow-rumped Thornbill, Scarlet Robin and New Holland Honeyeater. The area provides good frog breeding habitat in winter
Fauna Survey Limitations	Surveys are opportunistic and limited in season. Intensive surveys would add additional species.
Regional	
National/International Significance	
Linkage Values	
Adjacent bushland to southwest and north; the southern and eastern portions of this site form part of the riparian corridor of Maidens/Preston River Ecological Linkage and McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage	
Wetlands, Creeklines, Rivers, Estuaries	
Type	sumpland, palusplain
Management Category	Conservation (11.6ha), Multiple Use
Suite	Bennet Brook (BP.4)
Conclusions from survey	Not consistent with database (WRC 2002)
Other Attributes	
Open water sumpland with *Eucalyptus rudis* subsp. *rudis* of excellent height and good condition adjacent to Preston River (Eleanor Bennett, pers. comm.)	
Further field survey	
Comprehensive fauna survey and vegetation condition mapping required	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES (not to a degree that it would be considered regionally significant on this criterion alone)**
Vegetation Complexes	Within the Constrained Area 32.3% Southern River Complex remains

	but less than 10% (currently 7.6%) currently identified as proposed and existing ROS
Floristic Community types	>2 (because impacted by disturbance they are not allocated to Floristic Community Types)
Uplands and Wetlands	Mostly wetlands, uplands are mainly cleared
Size and Shape: The partly fragmented area is an irregular shape but is the only vegetation remaining in the area	
Vegetation Condition Degraded, but this is not uncommon for this type of vegetation and size (i.e. riverine and narrow in Lots 1 and 5 and eastern side of the Plain wetland in Res 670). However in this location is the best of its type remaining and it provides significant fauna habitat	
Relationship/proximity to:	
Naturally vegetated areas	Manea Park/Airfield bushland to south of Location 267 and west of Lot 5 (over road) and bushland north of Reserve 670
Protected areas	Manea Park
Other regionally significant naturally vegetated areas	Located in the Maidens/Preston River Ecological Linkage (Res 670 and Lot 5) and McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup (Lots 1 and 5) Ecological Linkage
Contains areas suitable for ecological restoration	Yes, especially areas of severe localised disturbance, should be kept and restored so the entire site functions better as part of the Ecological Linkage
Comment: A degraded, but representative area ,of fringing river and eastern side of the Plain wetlands vegetation.	
Diversity	**NOT KNOWN**
Landforms	
Vegetation Complexes	
Floristic Community Types	
Vegetation units	Diversity of wetland types/vegetation units
Flora	
Fauna	30 bird species is diverse for this vegetation type and includes significant insectivorous bird assemblage
Comment:	
Rarity	**NOT KNOWN**
Vegetation Complex <10% remaining	
Threatened Ecological Communities	
Flora	
Fauna	
Comment:	

Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	Part of the Maidens/Preston River Ecological Linkage and McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage
Creekline/River/Estuary	
Contains areas suitable for ecological restoration	see above
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**
Comment: Conservation Category Wetland	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The site meets 3 criteria, being: *Representation of Ecological Communities*, *Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. The natural attributes that contribute to meeting these criteria are listed below:

- a representative but degraded area of fringing river and eastern side of the Plain wetlands vegetation from the Southern River Vegetation Complex;
- the native vegetation (in particular the intact canopy) and river provide significant fauna habiat;
- Contains wetland areas recognised as a Conservation Category wetland;
- Contains populations of two significant flora (*Jacksonia sparsa* (P3) and*Acacia pulchella* var. *goadbyi)*;
- the only natural area in this section of the Maidens/Preston River (Res 670 and Lot 5) and McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup (Lots 1 and 5) Ecological Linkages

Summary Comment in relation to the proposal

It is recommended that all the areas (Part lots 1, 5, and Reserve 670 North Boyanup Road, Davenport) identified in Appendix be protected as they form a regionally significant natural area primarily in related to sites value as fauna habitat and part in the Maidens/Preston River and McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkages. The area recognised for retention includes the areas identified by HGM (2002) as degraded to ensure the conservation values of the riverine portion of the linkage are protected. The northern portion of Part Reserve 670 together with the vegetated portions of Lot 3 South Western Highway (which is outside the current MRS amendment) provide an important additional link to the Preston River

LOT 15 NORTH BOYANUP ROAD

INFORMATION	COMMENT
Background Information	
Area Name	Lot 15 North Boyanup Road
Location	Lot 15 North Boyanup Road
Size (ha)	ca 14ha native remnant vegetation (total area 72ha)
Reason for assessment	To assess significance of remnant vegetation

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	NA
Groundwater Source Protection Area	NA
Existing System 6 area	NA
Adjacent System 6 Area	NA
Submission System 6 Update	
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Bassendean Sands - low rounded dunes Qpb (majority of site) **Guildford formation** - mainly alluvial sandy clay Qpa	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	DEP (2002): edge inspection GDH (2002): proposed road reserve
Summary of findings	**Vegetation:** Bassendean Sands, low rounded dunes (Qpb) Uplands: Low Open Forest to Woodland dominated by *Eucalyptus marginata, Banksia grandis, B.attenuata* and *Agonis flexuosa* with scattered *Persoonia longifolia* **Area native remnant vegetation/Vegetation Condition:** generally Good to Degraded condition, some Completely Degraded. Canopy layer intact and dense, the understorey is heavily grazed but some understorey shrubs present and regeneration was evident. **Total Flora:** not known **Significant Flora:** not known
Vegetation & Flora Survey Limitations	Limited habitat assessment only comprehensive survey required to determine flora present
Regional	
Vegetation Complex	Southern River Complex
Vegetation types (Beard/Smith/Hopkins)	
Floristic Community Types (FCT) *type inferred	not inferred
National/International Significance	Not known
Fauna	
Area Specific	
Fauna Survey	Edge survey for fauna habitat assessment DEP April 2003.
Summary of findings	5 bird species, 1 native mammal

	One Schedule 1 species (Western Ringtail Possum)
Fauna Survey Limitations	More comprehensive surveys would add additional species
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Linkage Values	
This site together with the adjacent bushland to the west forms part of the Maidens/Preston River Ecological Linkage. Also part of McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage	
Wetlands, Creeklines, Rivers, Estuaries: none identified	
Conclusions from survey	Consistent with database (WRC 2003)
Other Attributes	
This small naturally vegetated dune is a significant landscape feature at the south eastern entrance to Bunbury (Bischoff pers. comm.)	
Further field survey	
Comprehensive fauna and flora survey required	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**NOT KNOWN**
Regional vegetation representation	
Vegetation Complexes	Southern River
Floristic Community types	Not known
Uplands and Wetlands	upland
Size and Shape: Compact shape less than 20 ha	
Vegetation Condition: intact tree canopy provides significant habitat for fauna	
Relationship/proximity to:	
Naturally vegetated areas Protected areas Other regionally significant naturally vegetated areas	Bushland/Manea Park to west (over road) Manea Park Located in the Maidens/Preston River Ecological Linkage and McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage
Contains areas suitable for ecological restoration	Yes, should be kept and restored so the entire site functions better as part of the ecological linkage
Comment: Currently this area is not of a suitable condition to meet this criterion. However the native vegetaion provides significant canopy.	
Diversity	**NOT KNOWN**
Landforms	
Vegetation Complexes	
Floristic Community Types	
Vegetation units	
Flora	
Fauna	
Comment:	
Rarity	**YES**
Vegetation Complex <10% remaining	Not applicable
Threatened Ecological Communities	Not known
Flora	Not known
Fauna	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Comment: Meets for fauna	
Maintaining Ecological Processes and Natural Systems	**YES**

Relationship/proximity to:	
Regional Ecological Link	Forms part of the Maidens/Preston River Ecological Linkage and part of McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage
Creekline/River/Estuary	
Contains areas suitable for ecological restoration	See above
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment: By providing significant habitat this area functions as part of the Ecological Linkage	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**NO**
Comment:	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The site meets 2 criteria, being: *Rarity* and *Maintaining Ecological Processes and Natural Systems*. The natural attributes of the site that contribute to meeting these criteria are listed below:

- Characteristic of upland vegetation of the Bunbury area Southern River vegetation complex in Good to Degraded condition providing significant fauna habitat;
- Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
- Contains populations of at least one species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (Western Ringtail Possum);
- Forms part of the Maidens/Preston River Ecological Linkage and part of McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage

Summary Comment in relation to the proposal

The area is identified as a significant part of the Maidens/Preston River Ecological Linkage and part of McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and supports a population of at least one species listed under the EPBC Act 1999, Western Ringtail Possum. It is recommended that the vegetated portion of Lot 15 be retained.

BOYANUP BYPASS ROAD

INFORMATION	COMMENT
Background Information	
Area Name	Boyanup Bypass Road
Location	Lot 100 South West Highway
Size (ha)	Approximately 3.5 ha native remnant vegetation
Reason for assessment	To determine significance of vegetation in location of proposed bypass road

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	-
Groundwater Source Protection Area	
Existing System 6 area	No
Adjacent System 6 Area	
Submission System 6 Update	
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Cartis (Cs) Gently sloping fringe to Blackwood Plateau	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	HGM (2002): survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; one plot 10X10m (6.1) located in the area
Summary of findings	**Vegetation:** Cartis, grey or yellow sands with some gravels Uplands: *Eucalyptus marginata* subsp. *marginata* and *E. calophylla* over *Xanthorrhoea preissii*, *Acacia pulchella* and *Acacia flagelliformis* Open Shrubland **Area native remnant vegetation/Vegetation Condition:** Mostly Very good **Total Flora:** 72 native taxa, 3 weed taxa (HGM 2002, estimated >70% expected flora) **Significant Flora:** *Caladenia speciosa* (P4); *Acacia flagelliformis* (P4)
Vegetation & Flora Survey Limitations	Adequate for information for the assesment of regional significance of vegetation, however no vegetation condition mapping and only one visit in spring.
Regional	
Vegetation Complex	Cartis Complex
Vegetation types (Beard/Smith/Hopkins)	
Floristic Community Types (FCT) *type inferred	**Supergroup1: Foothills/Pinjarra Plain** *1a *Eucalyptus haemotoxylon – E. marginata* woodlands on Whicher foothills
National/International Significance	
Fauna	
Area Specific	

Fauna Survey	HGM (2002): opportunistic bird survey undertaken during 6 days in September 2002 Reconnaissance transect DEP April 2003
Summary of findings	17 bird species, 2 native mammal species, 1 reptile species. One Schedule 1 species (Western Ringtail Possum)
Fauna Survey Limitations	More comprehensive surveys would add additional species
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Linkage Values	
Part of the McLarty/Kemerton/Twin Rivers/Gwindinup Ecological Linkage. Provides a direct linkage between the Preston River and the Reserve to south and west. The bushland to the west is proposed to be used as an offset for a sand mining proposal	
Wetlands, Creeklines, Rivers, Estuaries: none identified	
Conclusions from survey	Consistent with database (WRC 2003)
Other Attributes	
-	
Further field survey	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Cartis Complex
Floristic Community types	1
Uplands and Wetlands	upland
*Size and Shape:*A small area (<20ha) but contiguous with a much larger area (>20ha)part of which is protected and part proposed to be protected. Protected area being managed by the local community. This larger area is part of the McLarty/Kemerton/Twin Rivers/Gwindinup Ecological Linkage.	
Vegetation Condition: The study area is in very good condition and is part of a larger area in Very Good to Excellent condition.	
Relationship/proximity to:	
Naturally vegetated areas	Bushland to the west and south
Protected areas	Protected bushland to the west
Other regionally significant naturally vegetated areas	Bushland to the west and south is regionally significant
Contains areas suitable for ecological restoration	not applicable
Comment: The Foothills vegetation is a very good representation of its type (Cartis Complex) and is contiguous with a signifcant area of vegetation of the Cartis Complex located in the McLarty/Kemerton/Twin Rivers/Gwindinup Ecological Linkage.	
Diversity	**NOT KNOWN**
Landforms	
Vegetation Complexes	
Floristic Community Types	
Vegetation units	
Flora	Diverse flora, 72 native taxa identified in the plot from a single visit.
Fauna	
Comment:	
Rarity	**YES**
Vegetation Complex <10% remaining	
Threatened Ecological	

Communities	
Flora	The area supports two significant flora *Caladenia speciosa* and *Acacia flagelliformis*, both Priority 4.
Fauna	Contains populations of at least one species listed under the EPBC Act 1999, Western Ringtail Possum
Comment:	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link Creekline/River/Estuary	Part of the McLarty/Kemerton/Twin Rivers/Gwindinup Ecological Linkage
Contains areas suitable for ecological restoration	not applicable
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**NO**
Comment:	

SUMMARY NATURAL VALUES
Regional Significance - Assessment against the Criteria
The Lot 100 Boyanup Bypass Road bushland is considered to be a regionally significant natural area meeting three criteria, being: *Representation of Ecological Communities*, *Rarity* and *Maintaining Ecological Processes and Natural Systems*. The natural attributes that contribute to meeting these criteria are listed below: • A very good representation of Foothills vegetation of the Cartis Complex containing a diversity of species and two priority flora species (*Caladenia speciosa* and *Acacia flagelliformis)*; • Contiguous with a significant area of vegetation of the Cartis Complex, few such large area of Cartis Complex remaining on the Swan Coastal Plain; • Located in the McLarty/Kemerton/Twin Rivers/Gwindinup Ecological Linkage. There are few such large area of Cartis Complex remaining on the Swan Coastal Plain.
Summary Comment in relation to the proposal
Part of Lot 100 Boyanup Road bushland is considered to be a regionally significant natural area and suitable for retention as recommended in HGM (2002).

LOC 7 AND 14 BUFFALO ROAD, BINNINGUP

INFORMATION	COMMENT
Background Information	
Area Name	Loc 7 and 14 Buffalo Rd
Location	Loc 7 and 14 Buffalo Rd, Binningup, Shire of Harvey
Size (ha)	253 (82.5 remnant vegetation, HGM 2002) (note remnant vegetation mapping does not reflect HGM 2002 mapping)
Reason for assessment	To comment on the appropriateness of the ROS boundary

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	NA
Groundwater Source Protection Area	NA
Existing System 6 area	Northern portion of C66 Leschenault Inlet (entire area of Lot 7and 14 – spans area between coast and hwy)
Adjacent System 6 Area	NA
Submission System 6 Update	NA
Others	

Environmental Considerations - Natural Attributes	
Landforms	
Vasse Alluvium (Qha) **Yoongarillup** Lagoonal Deposits (Qg)	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	DEP (2002): edge survey March 2002 HGM (2002): survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; three plots 10X10m (7B. 1, 2 &3) located in the area, permission to enter Lot 7 not given, information inferred
Summary of findings	**Vegetation:** mapping (HGM 2002) Wetlands (Vegetation units are not distinguished on the landform/soil units): *Melaleuca rhaphiophylla* and *Melaleuca viminea* subsp. *viminea* Low Open Forest; Closed Sedgeland dominated by *Juncus kraussii* subsp. *australiensis, Triglochin huegelii, Baumea juncea* and **Juncus oxycarpus* and combinations of these; *Halosarcia lepidosperma, Halosarcia indica* subsp. *bidens* and *Juncus kraussii* subsp. *australiensis* Open Low Heath and inferred from aerial photography *Agonis flexuosa* unit **Area native remnant vegetation/Vegetation Condition:** 10% Excellent, 90% Degraded to Completely but "southern two thirds of Lot 7 and 14 support stands of *Melaleuca*, inundated sedges and samphire…" (HGM 2002) **Total Flora:** 21 native taxa, 34 weed taxa (Appendix C, HGM 2002) (Estimated >70% expected flora) **Significant Flora:** none identified
Vegetation & Flora Survey Limitations	Limited survey - DEP 2002 (survey from edge); HGM 2002 (plots, flora list and vegetation map) Entire site not surveyed, or adjacent lands surveyed
Regional	

Vegetation Complex	Quindalup, Vasse and Yoongarillup, remaining native vegetation predominantly Vasse
Vegetation types	Shrublands; scrub heath
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *16 Highly saline seasonal wetlands *17 *Melaleuca rhaphiophylla – Gahnia trifida* seasonal wetlands
National/International Significance	
Fauna	
Area Specific	
Fauna Survey	HGM (2002): opportunistic bird and frog survey undertaken during 6 days in September 2002 Limited survey from edge DEP March 2002
Summary of findings	Bird 21 species, frog 3 species, mammal 1 species. Remnant trees are habitat for several bird species
Fauna Survey Limitations	Limited surveys, additional survey would record more species
Regional	
National/International Significance	
Linkage Values	
Adjacent bushland to south and west (C66); direct linkage to the Leschenault Peninsula Conservation Park (LPCP); forms part of the Leschenault Estuary System 6 area (C66) The Buffalo Road proposed ROS is part of the Yalgorup/Myalup/Leschenault Coastal Ecological Linkage and the Leschenault/Kemerton Ecological Linkage	
Wetlands, Creeklines, Rivers, Estuaries	
Type	Estuary (Boundary approx. follows proposed GBRS boundary of the ROS, HGM mapping indicates wetland goes beyond proposed ROS)
Management Category	Conservation Category
Suite	Leschenault Inlet
Conclusions from survey	Appears to be generally consistent with database (WRC 2003)
Other Attributes	
GBRS Subm.- Steep unstable primary dune incorporating good quality Tuart woodland (outside current proposed ROS) HGM (2002) - The samphire associations at the southern portion are uncommon in the South West Botanical District (Trudgen 1984). - This site is part of the Leschenault Estuary System 6 area (C66) - The samphire flats area north of Buffalo Road is recognised as an important waterbird habitat (WRC and LIMA 1997, WAPC 2000) and a buffer against lateral movement of nutrients from intensive horticultural areas in to the Parkfield Drain that feeds into the Leschenault Estuary (WAPC 2000)	
Further field survey	
Sufficient survey to address vegetation issues on the area of proposed ROS but not adequate to address regional significance of the remainder of the Leschenault Estuary System 6 area (C66) and boundaries of the wetland unclear	

Consideration Against Criteria	
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Quindalup, Vasse and Yoongarillup, remaining native vegetation predominantly Vasse
Floristic Community types	2
Uplands and Wetlands	Area as identified is virtually all wetland The *Halosarcia lepidosperma, Halosarcia indica* subsp. *bidens* and *Juncus kraussii* subsp. *australiensis* Open Low Heath (unit 7B.3) on

	wetlands of the Vasse/Yoongarillup Complexes on the northern flats of the Leschenault Estuary constitutes approximately 60ha. Approximately 85 ha of this unit (DEP figures from mapping after Trudgen 1984) is in LPCP. The addition of 60ha is significant as this vegetation type is becoming increasingly restricted and is important habitat for birds. The significance of these flats was also highlighted by Trudgen (1984) and Pen (1992) Wetland Buffers: These have not been addressed in HGM conclusion
Size and Shape: It is a large compact remnant which is >20ha. The area is linked to adjacent bushland to south and west	
Vegetation Condition: 10% Excellent, 90% Degraded to Completely Degraded (HGM 2002)	
Relationship/proximity to:	
Naturally vegetated areas	To south and west
Protected areas	Adjacent bushland to south and west (C66); direct linkage to the Leschenault Peninsula Conservation Park (LPCP); forms part of the Leschenault Estuary System 6 area (C66)
Other regionally significant naturally vegetated areas	
Contains areas suitable for ecological restoration	Yes, changes to surface water flow by road to south has impacted on health of samphire vegetation resulting in considerable weed invasion. Restoring tidal water flow would reduce weed invasion
Comment: Vasse Complex is majority of estuarine area, important habitat areas. Vasse unit contains estuarine to freshwater areas, e.g. Peel-Harvey reserves are predominantly fresh except for margins, see comment above	
Diversity	**NOT KNOWN**
Landforms	
Vegetation Complexes	
Floristic Community Types	
Vegetation units	
Flora	
Fauna	
Comment:	
Rarity	**NOT KNOWN**
Vegetation Complex <10% remaining	
Threatened Ecological Communities	
Flora	Not known
Fauna	Not known
Comment:	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	Buffalo Road is part of the Yalgorup/Myalup/Leschenault Coastal Ecological Linkage and the Leschenault/Kemerton Ecological Linkage. Adjacent bushland to south and west (C66); direct linkage to the Leschenault Peninsula Conservation Park (LPCP); forms part of the Leschenault Estuary System 6 area (C66)
Creekline/River/Estuary	Forms part of the Leschenault Estuary System 6 area
Contains areas suitable for ecological restoration	Yes, changes to surface water flow by road to south has impacted on health of samphire vegetation resulting in considerable weed invasion. Restoring tidal water flow would reduce weed invasion
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	

Scientific or Evolutionary Importance	**YES**
Comment: Met: with respect to relatively intact part of Leschenault Estuary	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**
Comment: All Conservation Category wetland and is predominantly naturally vegetated	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

Buffalo Road is considered to be a regionally significant natural area meeting four criteria, being: *Representation of Ecological Communities, Maintaining Ecological Processes and Natural Systems, Scientific or Evolutionary Importance* and *General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal vegetation*. The natural attributes that contribute to meeting these criteria are listed below:

- contains areas of vegetation representative of the Vasse Complex
- is part of the Leschenault Estuary System 6 area (C66)
- the 60ha area of samphire flats (*Halosarcia lepidosperma, Halosarcia indica* subsp. *bidens* and *Juncus kraussii* subsp. *australiensis* Open Low Heath)
    - is a vegetation type that is becoming increasingly restricted on the Swan Coastal Plain;
    - are recognised as an important waterbird habitat
    - makes a significant addition to the habitat area in the Leschenault Peninsula Conservation Park and
    - forms a buffer against lateral movement of nutrients from intensive horticultural areas in to the Parkfield Drain that feeds into the Leschenault Estuary (WAPC 2000)

  (The values of these samphire flats have been highlighted in a series of reports including Trudgen 1984, Pen 1992, WRC and LIMA 1997, WAPC 2000 and HGM 2002)
- a large compact remnant linked to adjacent bushland to south and west
- contiguous with the Leschenault Peninsula Conservation Park
- forms part of the Leschenault Estuary System 6 area (C66)
- is part of the Yalgorup/Myalup/Leschenault Coastal and the Leschenault/Kemerton Ecological Linkages
- predominantly naturally vegetated Conservation Category wetland.

Summary Comment in relation to the Proposal

The area of proposed ROS appears to reflect the boundaries of the mapped Conservation Category wetland within the System 6 area C66 north of Buffalo Road. Ground truthing of this boundary is incomplete as HGM (2002) mapping surveyed within the proposed ROS boundary within Lot 14. This broad area meets sufficient criteria for identification as regionally significant natural area. However, it appears that within Lot 14 the boundary as mapped does NOT buffer the entire wetland areas, it is assumed that western boundary reflects wetland

Issues that need to be noted, but possible to defer

- agreed boundaries of wetland north of Buffalo Road within C66
- adequate buffers wetland
- area of Leschenault Estuary outside the proposed ROS mapped as Conservation Category wetland extends north of the proposed northern boundary of the ROS
- values of the area of C66 outside proposed ROS, especially the western Quindalup Dune area (these are retained as rural at present) and Yalgorup/Myalup/Leschenault Coastal and Leschenault/Kemerton Ecological Linkages.

The two areas on the eastern boundary of the ROS (unit X HGM 2002) proposed to be changed to rural appear to have low environmental value in their own right but are a buffer to the wetland. This function needs to be recognised in any future planning

TWIN RIVERS – PT LOT 211 BARNES AVENUE, AUSTRALIND

INFORMATION	COMMENT
Background Information	
Area Name	Twin Rivers Bushland
Location	Pt Lot 211 Barnes Avenue Australind
Size (ha)	42.2 approximately 37 native remnant vegetation (HGM 2002))
Reason for assessment - area being assessed	To determine appropriate ROS boundary within the bushland area

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	-
Groundwater Source Protection Area	-
Existing System 6 area	-
Adjacent System 6 Area	Adjacent to C67 Brunswick, Collie and Wellesley Rivers
Submission System 6 Update (6)	No
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Spearwood Dune System (Sands derived from Tamala Limestone - Qts: S7) **Pinjarra Plain** (Alluvial Deposits - Qhao: Sm1) Open water, vegetated wetland, vegetated riverside sand cliff, vegetated upland	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	ATA Environmental (2001): Survey undertaken 8 January 2001, foot and vehicle traverses of the site. Search of CALM's DRF and Priority list. An additional spring survey was undertaken by ATA (11 October 2001) at DEP request. No detail on methods DEP (2000): brief transect survey March 2002 HGM (2002): survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; four plots 10X10m (8.1, 8.2, 8.3, 8.4) located in the area Vegetation mapping for the area is known from two studies: ATA Environmental (2001) and HGM (2002)
Summary of findings	**Vegetation:** Spearwood Dune System: Upland: *Eucalyptus calophylla* and *E. marginata* Open Woodland over *Agonis flexuosa* and *Banksia attenuata* or *Banksia grandis* Low Open Woodland; *A. flexuosa* and *B. attenuata* Low Open Woodland. *E. calophylla* and *E. marginata* Open Woodland over *A. flexuosa* and *Jacksonia furcellata* Low Open Woodland Pinjarra Plain: Wetland (floodplain): *Eucalyptus calophylla* and *E. rudis* Forest; *E. rudis* and *Melaleuca rhaphiophylla* Open Woodland; *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* Open Forest over *Melaleuca incana* subsp. *incana* Tall Open Scrub *M. rhaphiophylla* and *M. viminea* Scrub; *Casuarina obesa*, *E. rudis* and *M. rhaphiophylla* Low Forest; *E. rudis*, *M. rhaphiophylla*, *C. obesa* and *Kunzea glabrescens* Low Forest. **Area native remnant vegetation/Vegetation Condition:**

	ATA Environmental (2001): Western section in better condition than eastern section, but no clear indication in the text of condition rating. No vegetation condition map HGM (2002): 85% Very Good to Good, 5% Degraded, 10% Completely Degraded **Total Flora:** 136 native taxa, 53 weed taxa (HGM 2002, ATA Environmental 2001a, van der Moezel 2001b) (HGM 2002 estimated >80% expected flora) **Significant Flora:** *Diuris drummondii* (R); *Lasiopetalum membranaceum* (3); *Caladenia speciosa* (4); diversity of tree/shrub species in floodplain vegetation, unusual adjacent to Spearwood Dunes, *including: M. rhaphiophylla*, *M. viminea*, *M. incana* subsp. *incana*, *Astartea* aff. *fascicularis* and *Viminaria juncea* indicating unusual representation of intact floodplain vegetation
Vegetation & Flora Survey Limitations	Additional surveys would record more species. No vegetation condition mapping undertaken
Regional	
Vegetation Complex	**Spearwood Dunes -** Karrakatta Complex **Pinjarra Plain -** Swan Complex
Vegetation types (Beard/Smith/Hopkins)	Medium woodland; tuart
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *11 Wet forests and woodlands **Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes** *21a Central *Banksia attenuata – Eucalyptus marginata* woodlands
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999, *Diuris drummondii*
Fauna	
Area Specific	
Fauna Survey	ATA Environmental (2001): Survey undertaken, 14 January 2001, inspection of habitats and several hours of spotlighting with Paul de Tores from CALM. Search of CALM's Threatened Fauna database. Ecologia (2001): Survey undertaken 24-29 November and 7 December 2001. Trapping grid, (pit trap, Elliot box traps and cage traps). 'Set time period census' search for bird species. Microhabitat searching, spotlighting (2 hrs), Bat censuring with an ANABAT detector (2.5 hrs). Opportunistic sightings and secondary evidence such as tracks, diggings and burrows were recorded. Brief transect survey DEP March 2002 HGM (2002): opportunistic survey including point method bird census and ground fauna microhabitat searching during 6 days in September 2002 Local observations (2002): local resident recorded Western Ringtail Possum
Summary of findings	53 species of vertebrate fauna: 4 native mammals, 32 birds (6 significant species), 10 reptiles and four amphibians. Two Schedule 1 species (Western Ringtail Possum, Baudin's Black Cockatoo), two species protected under JAMBA/CAMBA treaties (Common Greenshank, Great Egret), one Priority 4 species (Quenda) recorded. Of the fauna known to be present in the region, 9 other priority species utilise habitats similar to those present in the study area.
Fauna Survey Limitations	It would be expected that more vertebrate species would be present in the study area with greater survey intensity and different sampling

	periods.
Regional	
National/International Significance	Contains populations of at least two species listed under the EPBC Act 1999, Western Ringtail Possum, Baudin's Black Cockatoo and two species protected under JAMBA/CAMBA treaties, Common Greenshank, Great Egret
Linkage Values	
Contiguous bushland to south and north is ROS. Twin Rivers is part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River and Collie River Ecological Linkages. This is the largest consolidated riverine remnant in these Linkages. The Collie, Brunswick and Wellesley Rivers are a System 6 area C67. Links to the Leschenault Estuary to west via adjacent bushland of the Australind Primary School.	
Wetlands, Creeklines, Rivers, Estuaries	
Type	Floodplain (adjacent to river)
Management Category	Conservation (0.8ha), Multiple Use (WRC GIS 2002) considered Conservation category by ATA Environmental (2001).
Suite	Brunswick
Other Attributes	
Further field survey	
Vegetation condition mapping not done, comprehensive faunal survey not done	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES (not to a degree that it would be considered regionally significant on this criterion alone)**
Regional vegetation representation	
Vegetation Complexes	Within the Constrained Area 21.4% Swan Vegetation Complex remains, 12.6% currently identified as proposed and existing ROS. 53.2% Karrakatta Central and South Complex remains, 11.0% currently identified as proposed and existing ROS.
Floristic Community types	2
Uplands and Wetlands	
Size and Shape A relatively large area (37ha, >20ha) of compact shape, close to other natural areas and adjacent to river. Forms part of a riverine corridor for fauna and contiguous habitat types for seasonal faunal movement.	
Vegetation Condition Over 80% upland Very Good to Good, areas of wetland in Excellent to Very Good condition (with patches of severe localised disturbance)	
Relationship/proximity to:	
Naturally vegetated areas	Contiguous naturally vegetated areas to north and south (then link to west)
Protected areas	Contiguous foreshore reserve (ROS) to north and south.
Comment: Representative of Swan Complex and Karrakatta Complex Central and South Vegetation Complexes, most of the remaining Swan is thin strip along rivers and significantly altered, this area with adjacent uplands and wetlands is one of the best remaining remnants. Riverine corridor and contiguous upland habitat types provides ecological linkages for fauna.	
Diversity	**YES**
Landforms	diversity of form - river flats to river sand cliffs, undulating vegetated upland
Vegetation Complexes	2
Floristic Community Types	2
Vegetation units	10 vegetation units (ATA Environmental 2001), 3 vegetation units (HGM 2002)
Flora	136 native taxa, diverse for vegetation types
Fauna	53 species of vertebrate fauna.
Comment: Relatively diverse for its type in respect to landforms, flora and fauna.	
Rarity	**YES**
Vegetation Complex <10% remaining	No further clearing
Threatened Ecological Communities	Not known
Flora	*Diuris drummondii* (R), *Lasiopetalum membranaceum* (3); *Caladenia speciosa* (4) (ATA Environmental 2002)
Fauna	High vertebrate diversity. Two Schedule 1 species (Western Ringtail Possum, Baudin's Black Cockatoo), two species protected under JAMBA/CAMBA treaties (Common Greenshank, Great Egret), one Priority 4 species (Quenda) recorded. Of the fauna known to be present in the region, 9 other priority species utilise habitats similar to those present in the study area (Ecologia 2001). Likely presence of Water Rat (*Hydromys chrysogaster*) (Priority 4) (CALM 2001 letter to MfP (CALM ref 922.4))
Comment: Subject to protection under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* for fauna (Western Ringtail Possum, Baudin's Black Cockatoo) and flora (*Diuris drummondii)*	

Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	Part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River and Collie River Ecological Linkages.
Creekline/River/Estuary	Largest consolidated naturally vegetated remnant on the Collie and Brunswick Rivers
Contains areas suitable for ecological restoration	While apparently cleared for a considerable period of time the cleared portions of the area are surrounded by bushland. This area has potential for significant recreational use (used currently but is private land) and these areas would be best left for intense human use and not revegetated
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**NOT KNOWN**
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal vegetation	**YES**
Comment: Contains Conservation Category wetland, diversity of tree/shrub species in floodplain vegetation, unusual adjacent to Spearwood Dunes, including*: M. rhaphiophylla, M. viminea, M. incana* subsp. *incana, Astartea* aff. *fascicularis* and *Viminaria juncea* indicating unusual representation of intact floodplain vegetation	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The Twin Rivers area meets five criteria, being: *Representation of Ecological Communities*, *Diversity*, *Rarity*, *Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal vegetation*. The natural attributes that contribute to meeting these criteria are listed below.

- Substantial representative vegetation of Swan and Karrakatta Complex Central and South Vegetation Complexes. This criterion is met to a limited extent, as area is located within the 'Constrained' area of the GBRS, where the criterion *Representation of Ecological Communities* is modified to reflect a >10% threshold for retention. The Karrakatta Complex Central and South Vegetation Complex does not meet this criterion. However it is considered that this criterion is met for the Swan Vegetation Complex as the remaining areas of this Complex closer to the 10% threshold and this vegetation is generally significantly altered from its natural condition. The area of Swan Complex in the area is one of the best examples of its type.
- Contains Conservation Category wetland with intact floodplain vegetation.
- In combination the area is diverse for its type in respect to landforms, flora and fauna.
- Largest consolidated naturally vegetated remnant on the Collie and Brunswick Rivers.
- Part of the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage and the Brunswick River and Collie River Ecological Linkages.
- Location for three rare species, Western Ringtail Possum, Baudin's Black Cockatoo and *Diuris drummondii*. These species are recognised by the State and are subject to protection under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999.*
- Location for other significant flora and fauna being:
  - Flora - *Lasiopetalum membranaceum* (Priority 3); *Caladenia speciosa* (Priority 4)
  - Fauna - two species protected under JAMBA/CAMBA treaties (Common Greenshank, Great Egret), one Priority 4 species (Quenda) recorded. Of the fauna known to be present in the region, 9 other priority species utilise habitats similar to those present in the study area.

Summary Comment in Relation to the Proposal
The Twin River area is a regionally significant natural area of high value. The entire site can be considered regionally significant. The values of the site are: • to include a significant area of upland; • retention of all vegetated wetland units; • configuration that allows for a width of at least 300m of upland vegetation adjacent to wetland (this is of particular significance adjacent to the river sand cliff); • provides sufficient habitat for the rare and significant flora and fauna; and • area of not less than 20ha

COLLEGE GROVE - LOT 1000 BUSSELL HIGHWAY

INFORMATION	COMMENT
Background Information	
Area Name	College Grove
Location	Pt Lot 1000, Cnr Somerville Drive and Bussell Highway, Bunbury, City of Bunbury
Size (ha)	136 ha
Reason for assessment	Determine appropriate area of ROS

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	-
Groundwater Source Protection Area	-
Existing System 6 area (inc. comparison with proposed ROS boundary)	no
Adjacent System 6 Area	C70 South Bunbury Coastal Land to the west, adjacent to System 6 Update area Manea Park (which is also recognised by the EPA as an area of "Threatened and Poorly reserved plant community in need of Interim protection"
Submission System 6 Update	No
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Spearwood Dune System Sands derived from Tamala Limestone (Qts: S7) Vegetated Spearwood Dune and vegetated wetland	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	Weston (2001): attached as an Appendix to BBG (2001), November 2000/Jan2001, 3 days in field, traverses driven and walked through area, observations recorded Bischoff (1999): consolidated vascular plant species list includes reference to work by 11 studies between 1990 - 1999 DEP (1996): foot traverse of southern section, one plot located
Summary of findings	**Vegetation**: Spearwood Dune System (Sands derived from Tamala Limestone - Qts: S7) Upland: *E. gomphocephala* Woodland; *Eucalyptus calophylla* /*E. marginata*/*Banksia attenuata* Open Forest; *B. attenuata*/ *E. marginata* Low Woodland to Open Forest; *B. attenuata*/ *Agonis flexuosa*/*E. gomphocephala* Open Forest to Low Open Forest Wetland: *Pericalymma ellipticum* Closed Heath **Area native remnant vegetation/Vegetation Condition:** > 80% Good to Excellent, < Good to Completely Degraded with areas of severe localised disturbance (Weston 2001) **Total Flora:** approx 140 native taxa (Bischoff 1999) **Significant Flora:** *Lasiopetalum membranaceum* (P2), *Jacksonia sparsa* (P4)
Vegetation & Flora Survey Limitations	Survey time was limited. Describes communities but does not include a species list.
Regional	

Vegetation Complex	Karrakatta Central and South and Yoongarillup indicated, no significant areas of Yoongarillup but area of Bassendean phase of the Southern River (not mapped)
Vegetation types (Beard/Smith/Hopkins)	medium woodland; tuart
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** type not inferred **Supergroup 3: Uplands centred on Bassendean Dunes** *21a – Central *Banksia attenuata – Eucalyptus marginata* Woodlands or, *21b – Southern *Banksia attenuata* Woodlands (or both) **Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes** 25 – *E. gomphocephala – Agonis flexuosa* Woodlands
National/International Significance	-
Fauna	
Area Specific	
Fauna Survey	Fauna section in (BBG 2001). No comprehensive survey, description of fauna habitat and a search of the CALM Threatened Fauna database. A search for Western Ringtail Possums in Jan/Feb 2001 (Jones 2001). Brief reconnaissance survey DEP May 2003, 1 day bird transect DEP June 2003
Summary of findings	25 birds species, 2 reptile, 3 mammal species (DEP 2003). There are a number of bird species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance. Nine species of conservation significance in the area include Yellow Robin, Scarlet Robin, Weebill, Grey Shrike Thrush, Splendid Fairy Wren, Broad-tailed Thornbill and Western White-naped Honeyeater. Jones (2001) estimated less than 20 individuals of Western Ringtail Possum and about 120 Brushtail Possums. Population estimates were mainly based on collection of faecal pellets. Western Ringtail Possums mostly in western part of ridgetop (Banksia/ Peppermint/Tuart forest) and a few in north eastern corner BBG (2001) suggest that 3 Schedule 1 species one Schedule 4 species and three Priority fauna species are likely to occur within the area The tall woodland provides significant breeding habitat for bird species utilizing tall trees or hollows including those that feed in adjacent areas. Has significant habitat value for arboreal mammals including bats
Fauna Survey Limitations	Reconnaissance only. More comprehensive surveys would add more species
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999
Linkage Values	
The College Grove Bushland is part of the Maidens/ Preston River Ecological Linkage[1]. College Grove Bushland is particularly significant in this ecological linkage as it contains the tallest area of Spearwood Dune (natural landscape feature), a variety of Spearwood Dune vegetation structural units and the vegetated interface between Bassendean and Spearwood Dune systems	

[1] The Maidens/Preston River Ecological Linkage has also been referred to as South Bunbury Bushland Corridor and Bunbury Ocean to Preston River Regional Park. This Ecological Linkage contains a contiguous sequence of vegetated landform elements - Quindalup/Spearwood/Marine deposits

Wetlands, Creeklines, Rivers, Estuaries	
Type	Dampland, ?paluslope
Management Category	Inferred Conservation from quality and type of vegetation
Suite	Bennett Brook (B/P.4)
Conclusions from survey	Not consistent with database (WRC 2003), wetland are not mapped
Other Attributes -	
Further field survey -	
Further vegetation surveys at appropriate seasons required to document entire plant species list and other significant plant species (Weston 2001), comprehensive vegetation condition mapping required, comprehensive faunal survey required	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Within the Constrained Area 53.2% Karrakatta Central and South Complex remains, 11.0% currently identified as proposed and existing ROS.
Floristic Community types	3 or 4
Uplands and Wetlands	mostly upland, small area wetland
Size and Shape A large area of native vegetation (>20ha) of compact shape, contiguous with other natural areas to east and west	
Vegetation Condition Over 80% in good condition	
Relationship/proximity to:	
Naturally vegetated areas	to south, east, west and north west
Protected areas	Manea Park to the east and the bushland to north centenary Road to west. Manea Park has also been recognised by the EPA as an area of "Threatened and Poorly reserved plant community" and contains areas of threatened ecological community
Other regionally significant naturally vegetated areas	Maidens/ Preston River Ecological Linkage links north to Hay Park
Contains areas suitable for ecological restoration	Cleared area in bushland, previously landfill area, possible contamination, possible revegetation area
Comment: Predominantly Spearwood Dune vegetation of Karrakatta Complex Central and South Vegetation Complex with a smaller area of Bassendean Dune vegetation and the interface between these two. Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (FCT 25) which is a significant representation of this FCT in the Maidens/ Preston River Ecological Linkage being on the only prominent Spearwood Dune in the ecological linkage. Interface between Bassendean and Spearwood Dune systems. Area of native vegetation (>20ha) is of compact shape and is contiguous with other natural areas to east and west	
Diversity	partial **YES**
Landforms	Single landform, but as part of Maidens/ Preston River Ecological Linkage only area of this landform in linkage

/Spearwood/Bassendean Dunes - Pinjarra Plain/River. This is a sequence is unusual on the Plain and does not appear to occur elsewhere. The area of Spearwood Dunes in the transect is also unusual on the Plain, being predominantly composed of deep sands of the Spearwood Dunes (ie no obvious Tamala Limestone) with these being divided into two principle components, the undulating flats of the Usher area and the 'College Grove dune'. Tuart is a dominant species in sections of both of these areas. While the 'College Grove dune' extends further south (to Gelorup area) the percentage of Tuart dominated vegetation gradually declines, the area in the 'College Grove dune' is the last undeveloped portion of this vegetation.

Vegetation Complexes	diversity of complexes
Floristic Community Types	diversity of Community Types
Vegetation units	-
Flora	Not adequate data however appears to have typical diversity
Fauna	Not adequate information
Comment: The location of the area at the interface of two major landform elements and the vegetated ridge in the ecological linkage are significant	
Rarity	**YES**
Vegetation Complex <10% remaining	not applicable
Threatened Ecological Communities	not determined
Flora	
Fauna	includes fauna listed under the EPBC Act (1999) and WA Wildlife Conservation Act 1950 and subsequent amendments
Comment: The Maidens/Usher/College Grove/Manea Park/Airport/Preston River Primary Ecological Linkage is the only known sequence of this type on the Plain	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	Part of the Maidens/ Preston River Ecological Linkage
Creekline/River/Estuary	Through Maidens/ Preston River Ecological Linkage
Contains areas suitable for ecological restoration	
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment: Only area of its type in the Maidens/ Preston River Ecological Linkage	
Scientific or Evolutionary Importance	
Comment: Not assessed	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	**YES**
Comment: Small area of Conservation category equivalent wetland	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against the Criteria

The area meets 4 criteria, being: *Representation of Ecological Communities*, *Rarity*, *Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. In addition it probably meets the *Diversity* criteria (more information required). The natural attributes that contribute to meeting these criteria being met are listed below:

- Substantial representative area of bushland of Spearwood Dune vegetation of Karrakatta Complex Central and South Vegetation
- Representative of the southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (floristic community type 25 which is a significant representation of this FCT in the Maidens/ Preston River Ecological Linkage being on the only prominent Spearwood Dune in the ecological linkage
- Contains bushland at the interface between Bassendean and Spearwood Dune systems
- Contains vegetation in Good to Very Good condition with significant tall habitat trees (Tuart)
- Includes fauna listed under the EPBC Act (1999) and WA Wildlife Conservation Act 1950 and subsequent amendments
- Contains 9 bird species listed as declining on the Swan Coastal Plain (Government of Western Australia 2000b)
- Area of native vegetation (>20ha) is of compact shape and is contiguous with other natural areas to west (Centenary Road North bushland) and east (Manea Park) in the Maidens/ Preston River Ecological Linkage. Both bushland areas have some protection
- The Maidens/ Preston River Ecological Linkage is the only known sequence of this type on the Plain
- This area is critical in the Maidens/ Preston River Ecological Linkage containing the only area of its type in the linkage not already developed for housing
- Small area of Conservation category equivalent wetland

MUDDY LAKES –MINNINUP ROAD, CAPEL

INFORMATION	COMMENT
Background Information	
Area Name	Muddy Lakes ROS (proposed)
Location	Lot 1 and Part Lot 394 Rich Rd, Minninup Beach, Lot 5, 6, 7 Minninup Rd, Stratham City of Bunbury
Size (ha)	191.9 (90.3 remnant vegetation) (after HGM 2002)
Reason for assessment	Comment on appropriate ROS boundary

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	EPP Lake (82.3ha after HGM 2002)
Groundwater Source Protection Area	-
Existing System 6 area (inc. comparison with proposed ROS boundary)	No
Adjacent System 6 Area	No
Submission System 6 Update (6)	Yes
Others	

Environmental Considerations - Natural Attributes	
Landforms	
Quindalup Dunes (Qhs) **Marine Deposits** Vasse (Qhw [interface between Quindalup and Spearwood Dunes – Qts]) Sandy coastline, Holocene vegetated coastal and parabolic dunes, vegetated wetland, open water	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	Alan Tingay and Associates (1991): Vegetation map prepared from 1:10000 aerial photography and ground survey of different vegetation types during June 1991. No details on how the ground survey was undertaken DEP (2002): Edge inspection March 2002, foot traverses over 1 day, June 2002 HGM (2002): Survey undertaken during 6 days in September allocated to 12 areas in GBR, foot and vehicle traverses of the area; four plots 10X10m (Map 9B: 9.4, 9.5, 9.6, 9.7 [shown as 9.8 on maps]) located in the area Vegetation mapping for the area is known from three studies: Alan Tingay and Associates (1991), Keighery *et al.* (2002) and HGM (2002). The first two studies map the full extent of the wetland system known as Minninup Swamp (see Map). The proposed Muddy Lake ROS encompasses approximately the southern half of the Swamp.
Summary of findings	**Vegetation:** Quindalup Dunes Uplands: *Agonis flexuosa* Low Forest to Open Forest, Low Woodland and Mallee; Open Low Heath dominated by *Scaevola crassifolia, *Pelargonium capitatum* and *Olearia axillaris*; Open Low Heath dominated by *Acanthocarpus preissii, Phyllanthus calycinus, Acacia cochlearis* and *Lepidosperma gracile* with emergent *Agonis flexuosa* var. *flexuosa*; *Acacia cochlearis* and /*Jacksonia furcellata* Heath Strand: Open Low Heath dominated by *Scaevola crassifolia,*

	Pelargonium capitatum* and *Olearia axillaris* Wetlands (damplands): *Agonis flexuosa* var. *flexuosa* Low Open Forest*; Banksia littoralis* Low Woodland over Tall Open Scrub dominated by *Xanthorrhoea preissii, Anthocercis littorea* and *Acacia saligna* Interface Quindalup and Spearwood Dunes: Wetlands (sumpland and lake - part Minninup Swamp): Closed Sedgelands dominated by *Lepidosperma* ?*effusum, L. gladiatum, Carex appressa, C. fasciculata, C. tereticaulis, Schoenoplectus pungens, Schoenoplectus validus* and/or **Typha orientalis* combinations of these with emergent *Acacia saligna, Banksia littoralis, Agonis flexuosa* var. *flexuosa* and *Melaleuca rhaphiophylla* dominated patches **Area natural vegetation/Vegetation Condition: The remnant vegetation mapping shows approx. half of the proposed ROS as remnant native vegetation. The area of sedgeland is not accurately mapped and is probably more extensive, however there are substantial degraded to completely degraded areas in the proposed ROS. These areas are either part of the sumpland or a buffer area to the west 100% Excellent to Good with occasional open areas; Natural Condition (trees and understorey largely intact) to Understorey Grazed (Alan Tingay and Associates 1991) **Total Flora:** 58 native taxa, 74 weed taxa (estimated >70% expected flora, HGM 2002) **Significant Flora:** *Calycopeplus oligandrus* (HGM 2002, Keighery *et al.* 2002), *Bromus arenarius, Bolboschoenus medianis* (listed in HGM, considered significant), *Jacksonia furcellata, Xanthorrhoea preissii, Lepidosperma* ?*effusum* (GJK & BJK 136) and *Lepidosperma* aff. *squamatum* (GJK & BJK 143) (Keighery *et al.* 2002)
Vegetation & Flora Survey Limitations	Alan Tingay and Associates (1991) study appeared to rely on mainly aerial photo interpretation. The area has a much more complex vegetation and wetland mosaic than shown in Tingay vegetation map (HGM 2002, Keighery *et al.* 2002). Tingay vegetation condition mapping scale not adequately explained. HGM (2002) and Keighery *et al.* (2002) limited duration, not sufficient field work to accurately map sumpland mosaic or vegetation condition
Regional	
Vegetation Complex	**Quindalup Dunes** - Quindalup Complex; **Marine Deposits** Vasse Complex; **Spearwood Dunes** - Karrakatta Complex (area not significant)
Vegetation types (Beard/Smith/Hopkins)	Shrublands; peppermint
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *17 *Melaleuca rhaphiophylla – Gahnia trifida* seasonal wetlands *19 Sedgelands in Holocene dune swales (see comment below) **Supergroup 4: Uplands centred on Quindalup Dunes** *29a Coastal shrublands on shallow sands *29b *Acacia* shrublands on taller dunes *30b Quindalup *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands
Threatened Ecological Communities	Keighery *et al.* (2002) and HGM (2002) consider that the communities of the Quindalup Dune damplands (see below), in particular the *Banksia littoralis* Low Woodland over Tall Open Scrub dominated by *Xanthorrhoea preissii, Anthocercis littorea* and *Acacia saligna*, is either FCT 19 or a rarer closely related ecological community. These dampland plant communities (extending north to Dalyellup and the

	Maidens) form a suite of wetland communities not known elsewhere on the Swan Coastal Plain (Keighery *et al.* 2002)
National/International Significance	Contains at least one Threatened Ecological Community listed under the EPBC Act 1999, FCT 19
Fauna	
Area Specific	
Fauna Survey	Alan Tingay and Associates (1991): Limited survey. Discusses previously compiled information, no on-ground survey. Provisional list of native animals compiled from general texts and anecdotal records from local people. HGM (2002): Survey undertaken during 25 - 30 September 2002 foot and vehicle traverses of the area; five trapping sites with pit traps, Elliott traps and cage traps for terrestrial vertebrates. Supplemented by opportunistic avifauna transects and microhabitat searching including spot lighting. Dell and Hyder-Griffiths (2002): 1-3 October 2002 a series of transects were walked and driven to assess habitat values and record all vertebrate fauna observed within the different plant communities, including spot lighting, dip netting for tadpoles and recording of frog calls. Seven broad vertebrate habitats were recognized as components of the damplands, sumplands, lakes and Quindalup Dunes as described by Keighery *et al.* (2002)
Summary of findings	Six frog species recorded and three other species likely to occur Thirteen species of reptile recorded 75 bird species recorded Six native mammal species recorded The area has a rich and diverse bird assemblage. This distinctiveness is further emphasised by the number of species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury, and the number of species that are of regional conservation significance. Species of conservation significance in the area include Splendid Fairy-wren, Southern Emu-wren, White-browed Scrubwren, Weebill, Broad-tailed Thornbill, Yellow-rumped Thornbill. The area also provides habitat for a large number of waterbirds. Three Schedule 1 species (Western Ringtail Possum, Quokka, Baudin's Black Cockatoo), two species protected under JAMBA/CAMBA treaties (Great Egret, White Ibis), two Priority 4 species (Water-rat, Quenda) recorded
Fauna Survey Limitations	All surveys are spring only and a single year. Surveys at other times would add additional species
Regional	
National/International Significance	Contains populations of at least three species listed under the EPBC Act 1999, Western Ringtail Possum, Quokka, Baudin's Black Cockatoo and two species protected under JAMBA/CAMBA treaties, Great Egret, White Ibis
Linkage Values	
Important part of the Wonnerup Estuary system. Part of Dalyellup/Gelorup/Crooked Brook and Maidens/Muddy Lakes/Ludlow/Coastal Ecological Linkages	
Wetlands, Creeklines, Rivers, Estuaries	
Wetland survey	Semeniuk (1998): Mapped wetland type, management category and suite for the area of the Swan Coastal Plain south of Mandurah
Type	Sumpland, Lake (WRC GIS 2002), survey identified substantial

	additional areas of dampland (Keighery *et al.* 2002, HGM 2002)
Management Category	All mapped wetland dampland areas from Keighery *et al.* (2002) and the contiguous sumpland/lake from WRC GIS (2002) are considered to be Conservation Category (Note: WRC GIS (2002) maps areas of Conservation (66.9ha HGM 2002) and Multiple Use). Over 82ha of the sumpland is recognised in an EPP lake. Areas of the sumpland are not currently naturally vegetated but as part of the wetland system are also considered to be Conservation Category and should be maintained and recognised as part of the whole wetland system
Suite	Big Swamp Minninup
Other Attributes	
Semeniuk (1998): The area of the proposed Muddy Lake ROS encompases the southern half of Minninup Swamp, which is the only wetland in the Minninup Consanguineous Suite. This Suite is recognised as a wetland of regional significance due to the following attributes: - Only wetland in the suite - Wetland processes representative of patterns within the suite - Coastal evolution - Avifauna use Alan Tingay and Associates (1991): Wetlands of the Upper-Stratham area have relatively high conservation value and should be conserved; Muddy Lakes should be incorporated into open space The remnant vegetation of the Vasse Complex has relatively high conservation value to water dependent fauna	
Further field survey	
Further detail is required on faunal assemblage and the extent of naturally vegetated sumpland and lake, detail of vegetation units in sumpland, information quality and type to identify floristic community types associated dampland area and location of any additional damplands in Quindalup Dunes	

Consideration Against Criteria	**Criterion Met**
Representation of Ecological Communities	**YES**
Regional vegetation representation	
Vegetation Complexes	Quindalup Complex; Vasse Complex
Floristic Community types	considered to be representative of vegetation complexes
Uplands and Wetlands	
Size and Shape: Much greater than 20ha (90.3ha). While not entirely naturally vegetated the non-vegetated areas are either part of the sumpland or the fringing dunes to the west to give a regular boundary to the west. Most of the eastern side of the sumpland is not buffered and small portions of the sumpland are not included in the proposed ROS. While elongate in shape, the size and width (mostly >300m) compensate for this. A range of upland and wetland communities/habitats is found in the area. Forms part of a wetland corridor for fauna and contiguous upland habitat types for seasonal faunal movement	
Vegetation Condition: Naturally vegetated areas are in Excellent to Good condition	
Comment: The largest most southern area of vegetated parabolic Quindalup Dunes on the Swan Coastal Plain. While >30% 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. Wetlands apparently unique. Vegetation of the Vasse Complex is highly variable, few sumplands of this type known elsewhere, <30% remaining vegetated. Wetlands and contiguous upland habitat types provides ecological linkages for fauna	
Diversity	**YES**
Landforms	diversity of form - vegetated coastline, coastal parabolic dunes, vegetated wetland swale damplands, sumplands
Vegetation Complexes	2
Floristic Community Types	5
Vegetation units	High diversity for vegetation units, related to complex of wetlands and

	uplands
Flora	Upland diversity typical, wetlands have an unusual diversity of sedges and shrubs/trees for Quindalup Dunes
Fauna	High diversity with 100 vertebrate species recorded
Comment: High diversity of Quindalup landform units and associated vegetation, diverse and wetland vegetation units. High vertebrate diversity is unique (100 vertebrate species recorded) on the southern Swan Coastal Plain	

Rarity	**YES**
Vegetation Complex <10% remaining	No complex at <10% remaining but note variability in Vasse
Threatened Ecological Communities	YES plant communities of Quindalup Dune damplands is either FCT 19 or a rarer closely related ecological community. These dampland plant communities (extending north to Dalyellup and the Maidens) form a suite of wetland communities not known elsewhere on the Swan Coastal Plain (Keighery *et al.* 2002)
Flora	7 significant taxa
Fauna	High vertebrate diversity. High number of conservation significant vertebrate species: three Schedule 1 species (Western Ringtail Possum, Quokka, and Baudin's Black Cockatoo), two species protected under JAMBA/CAMBA treaties (Great Egret, White Ibis), two Priority 4 species (Quenda and Water-rat) recorded. 17 conservation significant species listed as coastal plain declining species in *Bush Forever* (Government of WA 2000). Of the fauna known to be present in the region, other priority species utilise habitats similar to those present in the study area
Comment: Combination of vegetation units unique (together with northern area and Dalyellup proposed ROS), as well as associated habitats. 7 significant plant species. High vertebrate diversity is unique on the southern Swan Coastal Plain	
Maintaining Ecological Processes and Natural Systems	**YES**
Relationship/proximity to:	
Regional Ecological Link	Part of two ecological linkages: Dalyellup/Gelorup/Crooked Brook and Maidens/Muddy Lakes/Ludlow Ecological Linkages
Protected areas	Area proposed for protection since early 1990's
Naturally vegetated areas	Contiguous native vegetation to north and east
Creekline/River/Estuary	NA
Contains areas suitable for ecological restoration	Areas of the sumpland suitable, currently sedge growth controlled by burning and grazing, invasion by natives. Uplands restoration possible, *Agonis* readily colonises
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance	**YES**
Comment: Only known combination of vertebrate assemblage currently existing on the Swan Coastal Plain. The only remaining Quokka population on the Swan Coastal Plain.	
General Criteria for the Protection of Wetland, Streamline and Estuarine fringing Vegetation and Coastal vegetation	**YES**
Comment: Quality and type of vegetation of the damplands, sumplands and lake areas, and the habitat these provide for, places these as Conservation Category of regional significance. Coastal vegetation	

SUMMARY NATURAL VALUES

Regional Significance - Assessment against Criteria

The Muddy Lakes ROS is part of a larger natural area of outstanding regional significance, the Dalyellup/Minninup Swamp Natural Area. This area contains a very large consolidated vegetated area of Quindalup Dunes uplands and wetlands and the eastern predominantly vegetated sumplands and lake of the Minninup Swamp. Two areas of of proposed ROS are located in the Dalyellup/Minninup Swamp Natural Area, Muddy Lakes ROS and the Dalyellup ROS. These areas of proposed ROS are centred on two EPP Lakes - Dalyellup and Muddy Lakes. The central area of Dalyellup/Minninup Swamp Natural Area is not included in ROS (Appendix 9).The central area of Dalyellup/Minninup Swamp Natural Area is not identified in the ROS

The Muddy Lakes ROS is considered to be a regionally significant natural area meeting all six criteria, being: *Representation of Ecological Communities*, *Diversity*, *Rarity*, *Maintaining Ecological Processes and Natural Systems*, *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 the Muddy Lakes ROS that contribute to meeting these criteria are listed below. Some of these natural attributes are shared with the Dalyellup/Minninup Swamp Natural Area

- The largest most southern area of vegetated parabolic Quindalup Dunes remaining on the Swan Coastal Plain
- One of the few areas of Quindalup Dunes on the Plain with substantial wetland and upland area
- Substantial representative area of natural vegetation in Excellent to Good condition of the Quindalup and Vasse Vegetation Complexes
- The wetlands of the Vasse Vegetation Complex are highly variable, the sumplands of the Muddy Lake area (part of Minninup Swamp) are one of the few examples of its type, the most similar known being the sumpland/lakes of Yanchep National Park
- A highly diverse area with respect to diversity of Quindalup Dunes, wetlands, upland and wetland vegetation units, habitat and vertebrate diversity (100 vertebrate species recorded). The wetland and vertebrate diversity of the Dalyellup/Minninup Swamp Natural Area are considered unique on the southern Swan Coastal Plain
- The communities of the Quindalup Dune damplands are considered to be either a Threatened Ecological Community (floristic community type 19) or a rarer closely related ecological community. Floristic community type 19 is recognised by the State and is subject to protection under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
- Location for three rare species of fauna - Western Ringtail Possum, Quokka and Baudin's Black Cockatoo. These species are recognised by the State and are subject to protection under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
- Only remaining Quokka population on the Plain
- High number of other significant vertebrate species: two species protected under JAMBA/CAMBA treaties (Great Egret, White Ibis), two Priority 4 species (Quenda and Water-rat) recorded. 17 conservation significant species recognised as declining on the Swan Coastal Plain
- Contains wetlands, Conservation category damplands, sumplands and lake areas of regional significance
- Contains the area of the EPP Lake - Muddy Lake
- Part of two ecological linkages: Dalyellup/Gelorup/Crooked Brook and Maidens/Muddy Lakes/Ludlow Ecological Linkages

Summary Comment in Relation to the Proposal

The Muddy Lakes ROS is part of the Dalyellup/Minninup Swamp Natural Area regionally significant natural area of outstanding value. The Muddy Lakes ROS encompasses much of the southern portion of this area. The current configuration of the ROS is considered suitable to protect these values as it addresses the following issues:

- contains substantial areas of naturally vegetated upland and wetland from the Quindalup and Vasse Vegetation Complexes;
- encompases the vegetated wetland units, including the area of actual or potential threatened ecological community; and
- contains habitat for the rare and significant flora and fauna

Areas of degraded and completely degraded wetland vegetation are included in the boundary as they are an integral part of the Muddy Lake portion of the larger Minninup Swamp sumpland and lake natural wetland suite

The identification of this area is consistent with the recommendations in HGM (2002) and advice from the Water and Rivers Commission.

The following issues need to be noted, as they have not been addressed within current boundary ROS:

- areas of sumpland on eastern side of Muddy Lake are outside ROS;
- no wetland buffer is accounted for on eastern side wetland; and
- the contiguous regionally significant natural areas to the north of the proposed Muddy Lakes ROS (south and contiguous with the proposed Dalyellup ROS) is outside the ROS boundaries.

PORT ACCESS ROAD (PAR) AREAS 9, 10 AND 11 AND ADJACENT/LINKING AREAS

INFORMATION	COMMENT
Background Information	
Area Name	Ferguson River South Natural Area , Davenport, City of Bunbury
Location	Area 9: Part Lot/Location 5545, Lots 5 and 10 Key to parts of site distinguished in Area 9 WT = 'western triangle' part Location 5545 ET = 'eastern triangle' part Lot 10 WR = west proposed PAR Res Lot 5 ER = east proposed PAR Res Lot 5 EER = east proposed PAR Res Lot 5 and east of the sand dune: Area 10: Reserve 40522, Part Location 5545 Area 11: Ferguson River
Size (ha)	Approx 90 ha native remnant vegetation
Reason for assessment	Determine regional significance of vegetation

Environmental Considerations	
General Policy	
Environmental Protection Policies (eg. SCP Lakes)	-
Groundwater Source Protection Area	-
Existing System 6 area	-
Adjacent System 6 Area	-
Submission System 6 Update (6)	No
Others	-

Environmental Considerations - Natural Attributes	
Landforms	
Bassendean Dunes/Pinjarra Plain Bassendean Sands over Guildford Formation (Qpb/Qpa: S10) **Pinjarra Plain** **Guildford Formation (Qpa: Msg4 and M)**	
Vegetation & Flora	
Area Specific	
Vegetation & Flora Survey	HGM (2002a and 2002b): Broad mapping and description of remnants, no specific detail on individual remnants or apparent ground truthing of boundaries of the remnants GDH (2002): DEP (2002): Selected remnants were surveyed over one day in September 2002 to consider the adequacy of the description of the natural values in Halpern Glick Maunsell (2002a and 2002b) in relation to EPA's strategy for identifying regionally significant natural areas in it consideration of the GBRS. GHD (2002): Selected remnants were surveyed over 2 days in October 2002 to 'confirm vegetation type, assess their local and regional significance and search for Declared Rare Flora or Priority flora.' (page 2, GDH 2002). Bennett (2003a&b): Area 10 & part 9 (WT) surveyed over 1 day in May and Areas 11 and majority 9 and adjacent areas over 2 days in June,

	transects of areas, described each unit, particular attention to wetlands.
Summary of findings	**Vegetation:** mapping HGM (2002), Bennett (2003a&b) Uplands Area 9 - *Eucalyptus calophylla* Open Forest (9:WT); *Eucalyptus calophylla, E. marginata* and *Banksia attenuata* Open Forest over *Kunzea glabrescens* Tall Open Scrub (9:WT); *Banksia attenuata, B. ilicifolia* and *Eucalyptus marginata* Woodland over patches of *Kunzea glabrescens* Tall Shrubland or scattered *Agonis flexuosa* and/or *Kunzea glabrescens* (9:ET, 9:WR (small area), 9: ER) Area 10 - *Eucalyptus marginata* and *Banksia attenuata* Low Open Forest to Woodland Area 11 - *Eucalyptus calophylla* Open Forest to Woodland over *Agonis flexuosa, Banksia attenuata* and *Kunzea glabrescnes* Low Woodland Wetlands (generally on clay soils, more typical Pinjarra Plain) Area 9 - *Melaleuca rhaphiophylla, M. preissiana* and *Banksis littoralis* Low Closed Forest (9:WT); *Melaleuca rhaphiophylla* Low Open Woodland over *Melaleuca teretifolia* and *M. viminea* Closed Tall Scrub (9: WR, Bennett 3.1); *Melaleuca preissiana* Low Woodland (9: WR, Bennett 4.3); *Melaleuca rhaphiophylla, M. preissiana* and *M. viminea* Low Closed Forest (9: ER/WR, Bennett 3.2) *Melaleuca rhaphiophylla* and *M. preissiana* Low Open Woodland (9: WR (majority)/ER , Bennett 3.3); *Melaleuca preissiana* Low Woodland over *Astartea* aff. *fascicularis* Closed Heath (9: ER, Bennett 4.1); *Melaleuca preissiana* and *Agonis flexuosa* Low Open Forest over *Astartea* aff. *fascicularis* Open Heath (9: EER, Bennett 4.2); *Astartea* aff. *fascicularis* Closed Tall Scrubwith emergent *Melaleuca preissiana* and *Eucalyptus calophylla.* (9: ER, Bennett 5.3); *Melaleuca preissiana* and *M. rhaphiophylla* Low Open Woodland (9: EER, Bennett 6); *Eucalyptus calophylla* Open Forest over *Agonis flexuosa* Low Open Woodland (9: WR) Area 10 - *Melaleuca preissiana* Low Open Woodland over a mosaic of shrub, sedge and herb dominated units; *Pericalymma ellipticum* and *Hakea varia* Closed Heath**;** *Eucalyptus calophylla* Low Open Forest occurs on the damp margin of the wetland. Area 11 - *Eucalyptus calophylla, E. rudis* and *Melaleuca rhaphiophylla* Forest (river bed) **Area native remnant vegetation/Vegetation Condition:** Area 9: Uplands: 85% Good to Degraded with patches in Very Good and Completely Degraded Condition; 15% Excellent to Very Good . Wetlands: variable, 80% Degraded to Completely Degraded, 20% Good to Very Good, occasional Area 10: Upland: Very Good to Good,; wetland Excellent to Very Good Area 11 - 100% Degraded to Completely Degraded but very good canopy **Total Flora:** Area 9: 105 native taxa (50 from WT) (GDH 2002, DEP 2002, Bennett 2003) Area 10: 86 native taxa (GDH 2002, DEP 2002, Bennett 2003) Area 11: 39 native taxa (DEP 2002, Bennett 2003) **Significant Flora:** Area 9: *Jacksonia sparsa* (P4) and *Acacia flagelliformis* (Bennett 2003a&b) Area 10: *Jacksonia sparsa* (P4) and *Verticordia attenuata,* (Bennett 2003a&b), *Caladenia speciosa* (GDH 2002), *Schoenus brevisetis* (DEP 2003) and *Acacia flagelliformis* (GDH 2002, DEP 2002) Area 11: *Darwinia citriodora, Trymalium floribundum* and *Acacia*

	urophylla (DEP 2002)
Vegetation & Flora Survey Limitations	Limited survey but, sufficient survey to place regionally. No vegetation condition mapping.
Regional	
Vegetation Complex	**Combinations of Bassendean Dunes/Pinjarra Plain** Southern River Complex (Area 9 (western)&10) **Pinjarra Plain (not mapped, inferred)** Guildford Complex (Area 9 (eastern) Swan Complex (Area 11)
Vegetation types (Beard/Smith/Hopkins)	Mosaic; medium forest; jarrah- marri/low woodland; banksia
Floristic Community Types (FCT) *type inferred	**Supergroup 2: Seasonal Wetlands** *4 *Melaleuca preissiana* damplands *?7 Herb rich saline shrublands in clay pans * ?12 *Melaleuca teretifolia* and/or *Astartea* aff. *fascicularis* shrublands **Supergroup 3: Uplands centred on Bassendean Dunes** *21a Central *Banksia attenuata – Eucalyptus marginata* woodlands *21c Low lying *Banksia attenuata* woodlands or shrublands
National/International Significance	
Fauna	
Area Specific	
Fauna Survey	No comprehensive fauna survey has been conducted. 1/2 day habitat assessment and possum and bird survey by DEP July 2003
Summary of findings	22 bird species, 3 amphibian species, 4 native mammal species (DEP 2003). Western Ringtail Possum (listed under the EPBC Act (1999) and WA Wildlife Conservation Act 1950 and subsequent amendments) and Brushtail Possums were recorded in Areas 9, 10 and 11 and the Quenda (on CALM Priority fauna list) was recorded in Area 11. There are a number of bird species present which have declined elsewhere on the Swan Coastal Plain between Perth and Bunbury and are of regional conservation significance. Seven bird species of conservation significance in the area include Yellow Robin, Golden Whistler, Splendid Fairy Wren, Broad-tailed Thornbill, Yellow-rumped Thornbill, White-browed Scrubwren, and New Holland Honeyeater.
Fauna Survey Limitations	Surveys at appropriate seasons are required to document the fauna of the areas.
Regional	
National/International Significance	Contains populations of at least one species listed under the EPBC Act 1999
Linkage Values	
Adjacent native vegetation to west, southwest and east; this site forms a significant block in McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage	
Wetlands, Creeklines, Rivers, Estuaries	
Type	Dampland, sumpland, palusplain
Management Category	Conservation/Resource Enhancement (determined from vegetation survey), Multiple Use
Suite	Bennet Brook (BP.4)
Conclusions from survey	Not consistent with database (WRC 2002), areas of wetland with vegetation in good or better condition should be classed as Conservation and those with significant native vegetation cover, especially on clay based wetlands contiguous with areas in better condition and uplands should be Conservation and/or Resource Enhancement
Other Attributes	

Further field survey
Comprehensive fauna survey of these areas and more detailed condition mapping of upland vegetation of Area 9 is required.

Consideration Against Criteria **This is combined for Areas 9, 10 and 11**	**Criterion Met**
Representation of Ecological Communities	**YES**
Vegetation Complexes (constrained area retention level 10%)	Within the Constrained Area, 32.3% Southern River Complex remains but less than 10% (currently 7.6%) currently identified as proposed and existing ROS. 13.2% Guildford Complex remains, 0.4% currently identified as proposed and existing ROS. However as only 5% of the Guildford Complex remains on the whole of the southern Swan Coastal Plain it is essential to retain all existing Guildford Vegetation Complex.
Floristic Community types	5, however two types, 7and 12 are significantly impacted by disturbance they are provisionally allocated to these Floristic Community Types
Uplands and Wetlands	Variety of wetland units, all contiguous with substantial upland areas, especially in Area 9
Size and Shape: Areas 9 and 10 are contiguous forming a large(>20ha) unit of both wetland and upland	
Vegetation Condition: Condition is very variable, northern sections (WT&ET) are both relatively intact however remaining sections of Area 9 are significantly impacted by grazing. Area 11 is Completely Degraded, but this is not uncommon for this type of vegetation and size (i.e. riverine and narrow). It is the best known areas of its type remaining on the Ferguson River and it provides significant fauna habitat for tree-frequenting species.	
Relationship/proximity to:	
Naturally vegetated areas Protected areas Other regionally significant naturally vegetated areas	Area 9, together with Area 10, forms a consolidated bushland area Area 10 and part Area 9 are part of a CALM Miscellaneous Reserve, Area 11 connects to Area 10 through the Ferguson River ROS/proposed ROS
Contains areas suitable for ecological restoration	Yes, especially areas of severe localised disturbance, should be kept and restored so the entire site functions better as part of the ecological linkage. Removal of grazing over much of Area 9 should lead to improvement in condition.
Comment: A representative area of very significant size and diversity of contiguous upland and wetland units but variable condition.	
Diversity	**NOT KNOWN**
Landforms	
Vegetation Complexes	
Floristic Community Types	
Vegetation units	Diversity of wetland vegetation units
Flora	Area 11 is diverse for its type
Fauna	
Comment:	
Rarity **that it would be considered regionally significant on this criterion alone)**	**YES (not to a degree**
Vegetation Complex	Intact wetlands in Area 9 and 10 are most like wetlands on heavier soils of Pinjarra Plain and Area 11 is one of few remnants associated with Rivers in the GBR with some diversity of species
Threatened Ecological Communities	Condition of these units is such that they not considered good examples of their type.
Flora	Area 9: *Jacksonia sparsa* (P4) and *Acacia flagelliformis* (Bennett 2003a&b) Area 10: *Jacksonia sparsa* (P4) and *Verticordia attenuata,* (Bennett

	2003a&b), *Caladenia speciosa* (GDH 2002), *Schoenus brevisetis* (DEP 2003) and *Acacia flagelliformis* (GDH 2002, DEP 2002) Area 11: *Darwinia citriodora, Trymalium floribundum* and *Acacia urophylla* (DEP 2002)
Fauna	
Comment: while	
Maintaining Ecological Processes and Natural Systems **YES**	
Relationship/proximity to:	
Regional Ecological Link	McLarty/Kemerton/Twin Rivers/Preston River/Gwindinup Ecological Linkage
Creekline/River/Estuary	Ferguson River
Contains areas suitable for ecological restoration	see above
***Size and Shape**, Uplands and Wetlands & Vegetation Condition* - see Representation of Ecological Communities	
Comment:	
Scientific or Evolutionary Importance **NOT KNOWN**	
Comment:	
General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation **YES**	
Comment: Wetlands in Area 10, Area 9/WT and Conservation Category Wetland	

SUMMARY NATURAL VALUES

Regional Significance - Assessment area against the Criteria

Area 9 as part of this consolidated site is considered to be a regionally significant natural area as it meets three criteria, being: *Representation of Ecological Communities*, *Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. The natural attributes that contribute to meeting these criteria are listed below:

- Contains a series of upland and wetland vegetation units typical of vegetation of the Southern River vegetation complex in predominantly Good to Degraded condition with patches in Very Good to Excellent
- Contains a wetland area which supports a mosaic of vegetation units allied with Pinjarra Plain vegetation
- Contains a palusplain wetland area supporting patches of vegetation of a quality and type deserving of designation as a Conservation category wetland and a population of the priority species *Acacia flagelliformis*
- Is one of only two large remnants within the Constrained portion of the GBR in the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinnup Ecological Linkage (the other remnant is contiguous with Area 7 on the Bunbury Outer Ring Road reserve)
- Together with Area 10 forms a consolidated bushland area with a diversity of vegetation units and flora which provides a variety of habitats for fauna
- Includes fauna listed under the EPBC Act (1999) and WA Wildlife Conservation Act 1950 and subsequent amendments;
- Contains 7 bird species listed as declining on the Swan Coastal Plain (Government of Western Australia 2000b) and
- The upland and wetland habitats are likely to maintain a diverse bird assemblage with significant feeding and breeding areas

- canopy but in a generally Degraded condition
- Contains nearly 40 native species, a high diversity of plant species for its type
- Is the location of a series of significant species associated with riverine remnants on the SCP including, *Darwinia citriodora*, *Trymalium floribundum* and *Acacia urophylla*
- Includes fauna listed under the EPBC Act (1999) and WA Wildlife Conservation Act 1950 and subsequent amendments (Western Ringtail Possum);
- Contains 2 bird species listed as declining on the Swan Coastal Plain (Government of Western Australia 2000b);
- Is located in the Preston/Ferguson River Ecological Linkage

the area has some level of protection, being a reserve for Park, Recreation and Drainage

Area 10 is considered to be a regionally significant natural area as it meets four criteria, being: *Representation of Ecological Communities, Rarity, Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. The natural attributes that contribute to meeting these criteria are listed below:

- Contains a series of upland and wetland vegetation units typical of vegetation of the Southern River vegetation complex in predominantly Excellent to Good conditio;
- Contains a wetland area which supports a mosaic of vegetation units allied with Pinjarra Plain vegetation
- Contains a wetland area supporting vegetation of a quality and type deserving of designation as a Conservation category wetland
- Is the location of a series of significant species associated with wetlands of the Pinjarra Plain including, *Schoenus brevisetis* and *Acacia flagelliformis* which are both priority species;
- Is the location of *Caladenia speciosa* (GDH 2002) and *Verticordia attenuata*, a priority species
- Includes fauna listed under the EPBC Act (1999) and WA Wildlife Conservation Act 1950 and subsequent amendments
- Contains 2 bird species listed as declining on the Swan Coastal Plain (Government of Western Australia 2000b)
- Is located in the south McLarty/Kemerton/Twin Rivers/Preston River/Gwindinnup Ecological Linkage
- The area has some level of protection, being a CALM miscellaneous reserve

Area 11 is considered to be a regionally significant natural area as it meets five criteria, being: *Representation of Ecological Communities, Diversity, Rarity, Maintaining Ecological Processes and Natural Systems* and *General Criteria for the Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation*. The natural attributes that contribute to meeting these criteria are listed below:

Contains several vegetation units typical of vegetation of the Swan vegetation complex with intact

Summary Comment in relation to the proposal

The three areas are considered to be regionally significant individually and as a whole, forming a north south sequence of wetland and upland naturally vegetated units within the McLarty/Kemerton/Twin Rivers/Preston River/Gwindinnup Ecological Linkage. The proposed PAR Reserve would impact significantly on Areas 10 and 11 and would separate the western wetland area form the eastern upland in Area 9. As one of the largest natural areas in this Ecological Linkage it is considered advisable to locate the proposed PAR Reserve between the Ferguson River and X Road so that impact on Areas 9, 10 and 11 is avoided. Both GDH (2002) and Bennett (2003) considered Area 10 to be regionally significant and Bennett (2003) also identified Area 11 as being regionally significant (GDH did not consider Area 11). Avoiding impact on Area 10 and 11 would also limit impact on Area 9 allowing for the retention of a large natural area with contiguous wetland and upland areas. The conservation of suitable potions of Area 8, 9 and 10 needs to be addressed in the proposed 'Country Bush Forever'.

Additional references

Bennett Environmental Consulting Pty Ltd 2003a Vegetation and Flora Port Access Road Route off Boyanup – Picton Road. Reserve 40552, Location 5545. An unpublished report for Main Roads WA Bunbury

Bennett Environmental Consulting Pty Ltd 2003b Vegetation and Flora of Selected Sites Bunbury Outer Ring Road and Port Access Road. An unpublished report for Main Roads WA Bunbury.