

ENVIRONMENTAL ASSESSMENT REPORT

Lots 746–750 and 545 Baldvis Road, Baldvis





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Lots 746–750 and 545 Baldivis Road, Baldivis

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SUMMARY

Introduction

The Mirvac Local Structure Plan (LSP) (the site) includes Lots 746, 747, 748, 749, 750 and the neighbouring Lot 545. The site is bound by Kwinana Freeway to the east, Baldivis Road to the west and is located approximately 42 kilometres (km) south of the Perth Central Business District (Figure 1). The site extends over an area of approximately 37 hectares (ha) which is inclusive of Lot 545 (Figure 2).

Lot 545 Baldivis Road is not owned by Mirvac. Subsequently it will be developed by a separate party. However, for drainage and engineering purposes and consistency with the LSP design, Lot 545 has been included within this document.

Historically, the site has been extensively cleared for agricultural purposes; it therefore consists largely of grassed paddocks devoid of native vegetation. Horses are currently being kept Lot 545.

Historical Planning and Environmental Assessment Context

State Approval Background

In 2009, a Metropolitan Region Scheme (MRS) Amendment rezoned approximately 383 ha in Baldivis (including the site) from “Rural” to “Urban Deferred”. This rezoning was endorsed by the Western Australian Planning Commission (WAPC) and subsequently promulgated by parliament.

The Environmental Protection Authority (EPA) assessed the MRS Amendment in 2006. The EPA advised that the appropriate level of assessment was “Scheme Not Assessed – Advice Given”. The EPA in its assessment did provide advice in relation to wetlands.

East Baldivis District Structure Plan

A District Structure Plan (DSP) for the 383 ha area was prepared to provide further definition of the intended land uses, urban design and environmental management against the zonings set out in the MRS (Figure 3).

A District Water Management Strategy (DWMS) (Parsons Brinckerhoff 2007) was prepared in October 2007 in support of the DSP. The DWMS defined the water management objectives at the district level for the East Baldivis DSP. The DWMS was approved by the Department of Water (DoW) in November 2007. The management objectives from the DWMS have been incorporated into the site specific Local Water Management Strategy (LWMS) supporting the LSP.

Local Structure Plan

The LSP design is shown in Figure 3. The LSP design promotes the following land uses:

- residential
- movement network
- Public Open Space (POS)
- primary school site.

Engineering Philosophy

The proposed engineering methodology consists of using compaction of the existing site and then pre-loading the majority of the site with engineering fill. The engineering drainage design involves using subsoil drains which directs groundwater to POS areas and a piped system linking areas of POS with water discharged into the Sub H and Sub F drains. The purpose of this methodology is to provide the following outcomes:

- Provide the required separation from groundwater and clearance from predicted flood levels.
- Manage the potential impacts from acid sulfate soils and achieve the required building site classification for residential housing.
- Meet Better Urban Water Management guideline stormwater design and water quality objectives.

Purpose of this Report

The City of Rockingham Town Planning Scheme (TPS) No. 2 requires a LSP to be prepared and submitted for “Residential Development Zones” prior to granting and/or recommending approval of any development within this zone.

The purpose of this Environmental Assessment Report (EAR) is to address the following:

1. The key factors outlined in the EPA assessment of the MRS Amendments.
2. Facilitate the approval of the LSP with the City of Rockingham.

EAR Objectives

This EAR describes the relevant environmental characteristics of the site and presents management and mitigation strategies in response to potential environmental impacts. These management and mitigation strategies aim to minimise the potential impact on the environmental values within the site.

Key Environmental Issues

Consistent with the EPA’s assessment of the MRS Amendment, the following were considered the key environmental factors which required further consideration and management as part of the structure plan and subdivision process:

- Acid Sulfate Soils
- Water Management
- Vegetation and Flora
- Fauna
- Site Contamination
- Noise
- Fire Management.

Key Environmental Outcomes

The key environmental outcomes of the proposed LSP include:

- providing an improvement in groundwater and surface water quality through residential development and implementation of water sensitive urban design and best stormwater drainage management practices
- landscaping and enhancing the existing vegetation within the Tramway Reserve
- implementation of management measures to reduce potential noise impacts on future residences.

Management Commitments

Table I summarises the key environmental issues and the proposed management commitments.

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Table I: Summary of Key Potential Environmental Impacts and Proposed Management Measures

Environmental Issue	Objective	Potential Impacts	Management Mechanism	Timing
Acid Sulfate Soils (ASS)	To ensure that ASS are not disturbed during earthworks and construction activities.	According to existing DEC mapping, the risk of ASS occurring within 3 m of the surface is moderate to low.	As outlined in the 'Engineering Philosophy' the final fill levels and subsequent excavation requirements will determine if an ASS and Dewatering Management Plan will be prepared to the satisfaction of the Department of Environmental Regulation (DER).	Prior to subdivision.
Site Contamination	To ensure previous land uses within and surrounding the sites do not impact on proposed development of the site.	The majority of the site has been used for grazing and agricultural purposes and there is very little likelihood of any potential contamination.	The site has historically been used for agricultural purposes. Prior to the subdivision preliminary site assessment in accordance with <i>Contaminated Sites Act 2003</i> will be undertaken.	Prior to clearance of title.
Water Management	To maintain the quantity and quality of water so that existing and potential environmental values, including ecosystem function, are protected. To ensure stormwater run-off is adequately contained within the development, so as not to impact on the Peel-Harvey Catchment.	<ul style="list-style-type: none"> Change in hydrological regime as a result of changed landforms (from earthworks), which may alter natural flows. Discharge of stormwater, which may affect water quality and alter the natural keyhole surface topography and landform. 	<ul style="list-style-type: none"> The LWMS details the integrated water management strategies to facilitate future urban water management planning. The LWMS will achieve integrated water management through the following design objectives <ul style="list-style-type: none"> Effectively manage the risk to property damage and environmental degradation from water contamination, flooding and waterlogging. Maintain and if possible improve water quality (surface and groundwater) within the development in relation to pre-development water quality. Reduce potable water consumption within both public and private spaces through the use of practical and cost-effective measures. Promote infiltration of surface water to minimise the risk of further water quality degradation in the Peel Harvey Catchment. Implement best management practices in regards to stormwater management. Incorporate where possible, low maintenance, cost-effective landscaping and stormwater treatment systems. 	LWMS: at local structure plan stage. UWMP: Prior to subdivision approval.
Vegetation and Flora	To maintain the abundance, species diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	Clearing	<ul style="list-style-type: none"> Vegetation will be retained within the Tramway Reserve, with single access crossings to facilitate retention and natural regeneration of vegetation within the Tramway Reserve. Use of native species in areas of Public Open Space All site staff should participate in site inductions informing them about the Environment, Health and safety aspects of the site. The induction should include, but not be limited to <ul style="list-style-type: none"> significant fauna species on the site reporting procedures for environmental incidents. 	Subdivision design. Construction
Fauna	To maintain the abundance, diversity, geographic distribution and productivity of native fauna at the species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	Clearing	<ul style="list-style-type: none"> All site staff should participate in site inductions informing them about the Environment, Health and safety aspects of the site. The induction should include, but not be limited to <ul style="list-style-type: none"> significant fauna species on the site reporting procedures for environmental incidents. 	Subdivision design. Construction
Fire	To reduce the risk of bushfire to people, property and infrastructure in accordance with Draft SPP 3.7: <i>Planning for Bushfire Risk Management</i> (WAPC 2014).	People, property and infrastructure situated within the site being impacted by potential bushfires from areas of remnant bushland, e.g. Tramway Reserve.	Fire Management Strategy will be prepared to support this LSP. A Fire Management Plan will be prepared and implemented at subdivision.	Fire Management Plan to be prepared at subdivision stage.
Kwinana Freeway (Noise)	To ensure surrounding land uses do not impact future development of the site.	Freeway Noise	Noise received at residences located adjacent to the Kwinana Freeway and Baldivis Road in the year 2025 will exceed the "Noise Limits" as outlined in the WAPC Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning". However, the level of exceedance would only be minor i.e. up to 2 dB(A), therefore reduction of noise received by residences can be reduced so that it is compliant with Planning Policies "Noise Limits" by the implementation of noise walls.	Subdivision design.

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TABLE OF CONTENTS**Page**

SUMMARY	i
1.0 INTRODUCTION.....	1
1.1 Background.....	1
1.1.1 MRS Amendment 1128/41 Baldivis Urban Area Expansion - Area 2.....	1
1.2 Current Zoning	2
1.2.1 Metropolitan Region Scheme	2
1.2.2 East Baldivis District Structure Plan.....	2
1.3 Purpose of this Report	3
1.3.1 EAR Objective	3
1.4 Associated Reports.....	3
2.0 LOCAL STRUCTURE PLAN	5
2.1 Description.....	5
2.2 Environmental Aspects of LSP Design.....	5
2.3 Engineering Philosophy.....	6
2.4 LSP Site	6
2.4.1 Land Use	6
2.4.2 Surrounding Land Uses	7
3.0 LEGISLATION AND REGULATION	9
3.1 Legislation and Regulations.....	9
3.1.1 Applicable Guidelines and Standards	9
4.0 EXISTING ENVIRONMENT	11
4.1 Topography, Soils and Geology	11
4.1.1 Topography	11
4.1.2 Geology	11
4.1.3 Acid Sulfate Soils (ASS)	12

4.2	Hydrology.....	12
4.2.1	Regional.....	12
4.2.2	Local.....	13
4.2.3	Surface Water Drainage	14
4.2.4	Flood Plain	14
4.2.5	Wetlands.....	14
4.3	Vegetation and Flora.....	15
4.3.1	Protected Flora	15
4.3.2	Tramway Reserve.....	15
4.4	Fauna	15
4.5	Contamination	17
4.6	Social Surroundings.....	17
4.6.1	Noise.....	17
4.6.2	Heritage.....	17
4.6.3	Fire.....	18
5.0	CITY OF ROCKINGHAM RELEVANT ENVIRONMENTAL POLICIES AND GUIDELINES.....	19
5.1	Environmental Guidance Documents	19
5.1.1	City of Rockingham Local Bushland Strategy.....	19
5.1.2	Baldivis Tramway Master Plan.....	21
6.0	POTENTIAL ENVIRONMENTAL IMPACTS AND MANAGEMENT MEASURES.....	23
6.1	Acid Sulfate Soils	23
6.1.1	Environmental Objective	23
6.1.2	Policy and Standards	23
6.1.3	Potential Impacts.....	23
6.1.4	Management Response.....	23
6.1.5	Predicted Outcome.....	24
6.2	Water Management	24
6.2.1	Relevant Policies, Guidelines and Standards.....	24
6.2.2	Potential Impacts.....	27
6.2.3	Environmental Management and Mitigation.....	28
6.2.4	Predicted Outcome.....	29

6.3	Flora and Vegetation.....	30
6.3.1	Applicable Policies, Guidelines and Standards.....	30
6.3.2	Potential Impacts.....	30
6.3.3	Environmental Management and Mitigation.....	31
6.3.4	Predicted Outcome.....	31
6.4	Fauna	31
6.4.1	Applicable Policies, Guidelines and Standards.....	31
6.4.2	Potential Impact	31
6.4.3	Environmental Management and Mitigation.....	32
6.4.4	Predicted Outcome.....	32
6.5	Site Contamination	33
6.5.1	Applicable Policies, Guidelines and Standards.....	33
6.5.2	Potential Impact	33
6.5.3	Environmental Management and Mitigation.....	33
6.6	Noise.....	33
6.6.1	Kwinana Freeway.....	33
6.7	Fire	34
6.7.1	Environmental Objectives.....	34
6.7.2	Policy and Standards	34
6.7.3	Potential Impacts.....	34
6.7.4	Management Response.....	34
6.7.5	Predicted Outcome.....	34
7.0	MANAGEMENT COMMITMENTS AND CONCLUSIONS.....	35
8.0	REFERENCES.....	37

TABLES

(contained within report text)

Page

Table 1:	Summary of Key Potential Environmental Impacts and Proposed Management Measures	v
Table 2:	Key State and Commonwealth Legislation and Regulations.....	9
Table 3:	Applicable EPA Standards, Guidelines and State Planning Policies.....	9
Table 4:	Compliance of the LSP Baldivis Tramway Master Plan Precinct 2 Objectives	21

FIGURES

(compiled at rear of report)

Figure 1:	Site Location
Figure 2:	East Baldivis District Structure Plan
Figure 3:	Proposed Local Structure Plan
Figure 4:	Surrounding Land Uses
Figure 5:	Topography and Geology
Figure 6:	Acid Sulfate Soils
Figure 7:	Surface Drainage and Flood Mapping
Figure 8:	Wetlands

PLATES

(contained within report text)

Page

Plate A:	Paddocks and Fencing	7
Plate B:	Existing Vegetation and Indicative Engineering Fill.....	16

APPENDICES

APPENDIX 1:	EPA Assessment and Advice
APPENDIX 2:	Database Searches

I.0 INTRODUCTION

The Mirvac Local Structure Plan (LSP) (the site) includes Lots 746, 747, 748, 749, 750 and the neighbouring northern Lot 545. The site is bound by Kwinana Freeway to the east, Baldivis Road to the west and is located approximately 42 kilometres (km) south of the Perth Central Business District (Figure 1). The site extends over an area of approximately 37 hectares (ha) which is inclusive of Lot 545 (Figure 2).

Lot 545 Baldivis Road is not owned by Mirvac.

Lot 545 will be developed separately. However, for drainage and engineering purposes and consistency with the LSP design, it has been included within this document.

Historically, the site has been extensively cleared for agricultural purposes; it therefore consists largely of grassed paddocks, devoid of native vegetation. Horses are currently being kept on Lot 545.

I.1 Background

I.1.1 MRS Amendment 1128/41 Baldivis Urban Area Expansion - Area 2

Following initiation, the Western Australian Planning Commission (WAPC) referred the three original Metropolitan Region Scheme (MRS) Amendments (Amendment No 1127/41, 1128/41 and 1129/41 – East Baldivis) to the Environmental Protection Authority (EPA) in 2006 for its consideration. The EPA advised that following consideration of the information provided, it set the level of assessment at “Scheme Not Assessed – Advice Given”.

The EPA advised the following key environmental factors required further consideration and management as part of the structure plan and subdivision process:

- wetlands
- noise
- acid sulfate soils (ASS)
- water management
- vegetation and flora
- potential land use conflict
- site contamination
- high-pressure natural gas pipeline.

The EPA’s assessment and advice in relation to the three MRS Amendments is provided in Appendix I.

1.2 Current Zoning

1.2.1 Metropolitan Region Scheme

In January 2007, the WAPC combined Amendment 1128/41 with MRS Amendments 1127/41 and 1129/41 which related to land parcels in Baldivis located to the north and south of the Amendment 1128/41 land for advertising. In June 2009 the landholdings subject to the MRS amendments were subsequently rezoned in a modified form, from “Rural” to “Urban”.

1.2.2 East Baldivis District Structure Plan

The site is located within the northern portion of the East Baldivis District Structure Plan (DSP) which comprises approximately 383 ha (Figure 2).

The East Baldivis DSP was endorsed by the City of Rockingham as a strategic planning instrument in February 2014.

RPS prepared an Environmental Assessment Report (EAR) for the DSP (RPS 2010). The DSP EAR addressed the key environmental factors and provided management commitments in accordance with local, state and federal environmental policies and guidelines.

1.2.2.1 DSP Key Commitments

1. An ASS investigation will be undertaken across the DSP site, and a subsequent management plan will be prepared (if required) to the satisfaction of the Department of Environmental Regulation (DER) prior to ground disturbing activities.
2. Local Water Management Strategies (LWMS) and Urban Water Management Plans (UWMP) will be prepared at appropriate planning and development stages in accordance with Better Urban Water Management Guidelines (WAPC 2008).
3. Native vegetation will be retained where possible across the site. Additionally, vegetation will be retained within the Tramway Reserve, with limited access crossings into the DSP area to allow retention and natural regeneration of vegetation within the Tramway Reserve.
4. If warranted, due to historical land uses, undertake a Preliminary Site Investigation (PSI) to confirm the presence/absence of contamination at the site prior to ground disturbing activities.

1.3 Purpose of this Report

The City of Rockingham Town Planning Scheme (TPS) No. 2 requires a LSP to be prepared and submitted for “Residential Development Zones” prior to granting and/or recommending approval of any development within this zone.

The purpose of this EAR is to address the following:

1. The key factors outlined in the EPA assessment of the MRS Amendments.
2. Facilitate the approval of the LSP with the City of Rockingham.

1.3.1 EAR Objective

The objective of the EAR is to describe the relevant environmental characteristics of the site and present management and mitigation strategies in response to potential environmental impacts. These management and mitigation strategies aim to minimise the potential impact on the environmental values within the site.

1.4 Associated Reports

Previous reports produced for the site (and adjacent landholdings) include:

- East Baldivis District Water Management Strategy (DWMS) by Parsons Brinckerhoff (October 2007). This report defined the water management strategy at the district level for the East Baldivis Structure Plan area
- draft Environmental Assessment Report – Baldivis East District Structure Plan (RPS 2010)
- Local Water Management Strategy (LWMS). The LWMS details the integrated water management strategies which will be implemented at the site and demonstrates that the land is capable of facilitating urban development whilst achieving sustainable, water and environmental outcomes
- Detailed Acid Sulfate Soil Investigation (RPS 2014)
- Bushfire Management Strategy (Emerge 2014)
- Noise Assessment (Herring Storer 2014).

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2.0 LOCAL STRUCTURE PLAN

2.1 Description

The LSP has been developed to guide the subdivision and development of approximately 37 ha of undeveloped land within the East Baldivis DSP. The LSP for the site is shown in Figure 3.

The LSP promotes the following land uses:

- residential
- movement network
- Public Open Space (POS)
- primary school site.

This EAR identifies the measures proposed to mitigate and manage the environmental features of the site, and focuses on the natural areas to be retained within the LSP. This is discussed in more detail in the following sections.

2.2 Environmental Aspects of LSP Design

The site does not have a high level of ecological integrity as it was historically cleared of vegetation and used for agricultural purposes.

From an environmental perspective the key influences of the LSP were:

- water management / drainage
- the Tramway Reserve
- noise from the freeway.

A central engineering and water management design component of the LSP necessitates approximately two metres (m) fill requirement across the site in order to provide an appropriate separation distance from the maximum groundwater levels to the future residential dwellings.

In this context, the LSP has been designed to meet the following key environmental objectives:

- incorporate best practice water management into the urban design
- managing ASS in accordance with DER ASS guidelines.

The following values have been accounted for as part of the process of identifying POS areas in the LSP:

- recreation opportunities
- using native trees in POS and the Tramway Reserve.

2.3 Engineering Philosophy

The proposed engineering methodology consists of using compaction of the existing site and then pre-loading the majority of the site with engineering fill (approximately 2 m). The engineering drainage design involves using subsoil drains which directs groundwater to POS areas and a piped system linking areas of POS with water discharged into the Sub H and Sub F drains. The purpose of this methodology is to provide the following outcomes:

- Provide the required separation from groundwater and clearance from predicted flood levels.
- Manage the potential impacts from acid sulfate soils and achieve the required building site classification for residential housing.
- Meet Better Urban Water Management guideline stormwater design and water quality objectives.

2.4 LSP Site

2.4.1 Land Use

There is very little native vegetation within the site (approximately a small stand of flooded gum trees located in the low-lying area of the site). The majority of the site is cleared horse paddocks and dams (Plate A).

A review of historical aerial photography from 1953 to 2014 shows that the site has been cleared of native vegetation since 1953 (or before) and used for agriculture / broad-scale farming.



Plate A: Paddocks and Fencing

2.4.1.1 Lot 545

The current land use of Lot 545 is similar to the neighbouring site with two large horse paddocks. The key native vegetation is the planted rows of flooded gums adjacent to the open Sub H branch drain.

2.4.2 **Surrounding Land Uses**

The site is bound on the east by the Kwinana Freeway and to the west by the Tramway Reserve, which is reserved under the MRS for “Parks and Recreation” (Figure 4).

2.4.2.1 Peel Main Drain

The Peel Main Drain (PMD) is located on the eastern side of the Kwinana Freeway. The drain flows in a north to south direction prior to discharging into the Serpentine River. A portion of the main drain is protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy Approval Order 1992* and contained within the boundary of Bush Forever Site No. 418: *Folly Pool, Baldivis* (Figure 4).

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3.0 LEGISLATION AND REGULATION

3.1 Legislation and Regulations

Urban development within the site, and Lot 545, is required to comply with environmental legislation and regulations. A summary of the key state and Commonwealth legislation and regulations is listed in Table 2.

Table 2: Key State and Commonwealth Legislation and Regulations

State Legislation	
<i>Aboriginal Heritage Act 1972</i>	<i>Heritage of Western Australia Act 1950</i>
<i>Conservation and Land Management Act 1984</i>	<i>Land Administration Act 1997</i>
Conservation and Land Management Regulations 2002	<i>Planning and Development Act 2005</i>
<i>Environmental Protection Act 1986</i>	<i>Rights in Water and Irrigation Act 1914</i>
<i>Contaminated Sites Act 2003</i>	<i>Wildlife Conservation Act 1950</i>
Environment Protection Regulations 1987	
<i>Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992</i>	
Environmental Protection (Noise) Regulations 1997	
Commonwealth Legislation	
<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	Environment Protection and Biodiversity Conservation Regulations 2000

3.1.1 Applicable Guidelines and Standards

Development of the site, and Lot 545, is required to comply with applicable guidelines and standards developed by the EPA. These guidelines and standards assist proponents and the general public to understand the minimum requirements for the protection of elements of the environment that the EPA expects to be met during the assessment process. Table 3 details the key EPA standards, guidelines and state planning policies relevant to the site.

Table 3: Applicable EPA Standards, Guidelines and State Planning Policies

EPA Position Statements
Position Statement No. 2: <i>Environmental Protection of Native Vegetation in Western Australia</i>
Position Statement No. 3: <i>Terrestrial Biological Surveys as an Element of Biodiversity Protection</i>
EPA Environmental Assessment Guidelines
Environmental Assessment Guideline No. 8: <i>Environmental factors and objectives</i>
Environmental Assessment Guideline No. 9: <i>Application of significance framework in the environmental impact assessment process</i>

EPA Guidance Statements
Guidance Statement No. 33: <i>Environmental Guidelines for Planning and Development</i>
Guidance Statement No. 41: <i>Aboriginal Heritage Assessment</i>
Guidance Statement No. 51: <i>Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia</i>
Guidance Statement No. 56: <i>Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia</i>
Environmental Protection Policies
<i>Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992</i>
State Planning Policies
State Planning Policy 2.1: <i>Peel – Harvey Coastal Plain Catchment</i>
State Planning Policy 5.4: <i>Road and Rail Transport Noise</i>
State Planning Policy No. 3.7: <i>Planning for Bushfire Risk Management</i>

4.0 EXISTING ENVIRONMENT

4.1 Topography, Soils and Geology

4.1.1 Topography

The topography of the site, and Lot 545, is generally flat with a gradual decline from west to east. The western boundary of the site is approximately 9.5 metres Australian Height Datum (m AHD) and gradually declines to be above 3.5 m AHD on the in the site's central portion, forming a localised basin (Figure 5).

Site topography has been modified by constructing open drains across the site to manage drainage. The Sub F drain runs generally north to south through the low-lying centre of Lots 748, 749 and 750.

4.1.2 Geology

4.1.2.1 Regional Mapping

Department of Industry and Resources (DoIR) geology mapping (DoIR 1999) indicates the eastern two-thirds of the site is underlain by brown clay of the Guildford Formation. The Bassendean sand is exposed along a north to south ridge near the western edge of the site. It is a light grey, fine to medium-grained sand of eolian origin.

Regionally, the Tamala limestone is exposed at the western part of the model domain and is a hard crème limestone of eolian origin. The Spearwood sand, which is derived from the Tamala limestone, is exposed along the centre and southern areas of the model domain and it typically overlies the Tamala Limestone at depth. It is a pale yellowish brown, medium to coarse-grained sand. The Bassendean sand is exposed along a thin band through the eastern part of the model domain. Brown clays and silts of the Guildford Formation occupy a north to south band adjacent to the Peel Main Drain. Regional surficial geology mapping is shown on Figure 5.

4.1.2.2 Local Investigations

Structerre (2014) carried out a Geotechnical Investigation across Lots 746 to 750 on 1 and 2 April 2014. The work consisted of:

- six electric friction cone penetrometer tests (EFCPT) to a maximum depth of 6.2 m for material assessment and soil profiling
- 10 excavated test pits to a depth of up to 3.0 m for material assessment and soil profiling

- two dissipation tests to determine the coefficient of permeability and consolidation of the clayey materials
- 10 dynamic cone penetrometer tests (DCPT) to a depth of 3.0 m for evaluation of relative densities of the upper layers.

Local geological information has been obtained from twenty soil borings (C01 to C20) completed as part of acid sulfate soil investigations (RPS 2014). The depths of these soil bores ranged from 5 to 7 metres below ground level (mbgl), and four were converted to groundwater monitoring bores.

Interpretation of the test pits, soil bores and monitoring bores (30 locations on site) indicates the eastern flood plain is underlain by a thin veneer of sandy silt, which overlies sandy clays of the Guildford Formation. The western ridge is underlain by Bassendean sand to a depth of at least 7 mbgl.

4.1.3 Acid Sulfate Soils (ASS)

The ASS risk mapping indicates that the entire extent of the site and Lot 545 is mapped as “Moderate to Low” risk of ASS occurring within 3 m of the natural soil surface (Figure 6).

A Detailed ASS Site Assessment has been undertaken in 2014. This assessment concluded acidity (actual, potential and retained) was detected across the majority of the site. Pyritic acidity was identified mainly in deeper soils with actual and retained acidity present in the upper profile (RPS 2014). This is mostly likely due to the upper soils being in a wetting and drying cycle due to the high water table and drainage channel, thus leading to oxidation and release of potential acidity and in some occasions precipitation of sulfate species. Noting the homogeneity of soil associations across Lot 545, it is expected that a similar ASS risk would be present.

As outlined in the “Engineering Philosophy” the final fill levels and subsequent excavation requirements (e.g. for sewer lines / engineering services) will determine if an ASS and Dewatering Management Plan is required to be prepared prior to subdivision.

4.2 Hydrology

4.2.1 Regional

According to regional information provided by Davidson (1995), the site lies between the Stakehill and Jandakot Mounds. The regional groundwater contours in May 2003 (the end of summer) provided by DoW (2014a) show that groundwater migrates to the west and is at an elevation of approximately 3 mAHD beneath the site.

The site is located within the Stakehill Groundwater Area and more specifically the Tamworth Swamp and Stakehill Confined sub-areas. The aquifers within each respective groundwater sub-area comprise the Superficial Swan (Tamworth Swamp), and the Cattamarra, Leederville and Yarragadee North Aquifers (Stakehill Confined).

The nearest Public Drinking Water Source Protection Area (PDWSA) is the Jandakot Underground Water Pollution Control Area, located approximately 9 km to the north-north-east (DoW 2014a).

4.2.2 Local

4.2.2.1 Monitoring Program

Groundwater levels have been monitored as follows:

- six bores in the landholding immediately south from May 2012 to April 2013, capturing the 2012 annual high
- four on-site bores that were installed as part of the ASS investigations, on April 2013 and July 2014
- seven bores immediately north and one bore immediately south (of the site). Monitoring was undertaken from September 2005 to February 2007, capturing annual high groundwater levels in 2005 in 2006. Sampling was also undertaken from these bores in October 2010
- sampling by DoW from three regional bores; from 1975 to 2013 (two bores) and 1975 to 2008 (one bore)
- Peel Main Drain elevations as interpreted from Folly Pool monitoring data from 2002 to 2013.

The monitoring bore locations are shown on in the LWMS and the Groundwater Model (RPS 2015).

The Maximum Groundwater Level (MGL) and Average Annual Maximum Groundwater Level (AAMGL) have been calculated using July 2014 on-site monitoring, correlated to adjacent bores that have two winter highs of monitoring data.

The AAMGL is calculated to range from approximately 4.5 mAHD at the south-west corner of the site to 3.6 mAHD along the eastern boundary, with groundwater migrating to the east-north-east towards the Peel Main Drain.

The local groundwater elevation is significantly higher than regional monitoring shows and the local flow direction is towards the east, not the west as is indicated in the regional mapping (DoW 2014a). This is due to local groundwater mounding, with discharge being particularly impeded to the east due to the presence of low permeability soils adjacent to the Peel Main Drain.

The engineering response detailed in the LSP outlines groundwater levels will be controlled by a combination of fill and subsurface drainage.

4.2.3 Surface Water Drainage

The site is located within the Peel Estuary–Serpentine River Catchment. The PMD is situated east of the freeway and the site which drains stormwater run-off from the East Baldivis catchment into the Serpentine River and ultimately the Peel Inlet-Harvey Estuary.

The drainage on the site is managed through the Sub H and Sub F drains (Figure 7). Stormwater run-off flows into the Sub H and F drains which then flows out of the site via a culvert beneath the freeway to Folly Pool and ultimately the PMD.

4.2.4 Flood Plain

The *Serpentine River Floodplain Management Study, Floodplain Management Strategy* (SKM 2010) for the Serpentine, Baldivis, Karnup and Keralup recommends floodplain management strategies to ensure proposed development in flood prone areas are acceptable with regard to major flooding. The recommended flood plain management strategies for the Serpentine River flood plain are as follows:

- Flood mapping provided by Department of Water (DoW) indicates the 100 year ARI flood plain level at the site is approximately 3.75 mAHD. Habitable floor levels will need to provide a minimum separation of 0.5 m AHD above the 100 year flood level.
- Proposed development located within the floodway is considered obstructive to major flows and is not acceptable, as it would increase flood levels upstream. No new buildings are acceptable in the floodway.

Flood mapping indicates a large portion of the site is within the flood plain of the PMD during major river flows (Figure 7).

4.2.5 Wetlands

The low-lying areas of the site are part of a larger multiple use management category Palusplain (UFI 15785). The nearest Conservation Category Wetland (CCW) is Folly Pool, located a minimum of 120 m east of the site. Folly Pool is also classed as an Environmental Protection Policy wetland. Currently, stormwater run-off flows from the Sub H and F drains and subsequently into Folly Pool (Figure 8).

4.3 Vegetation and Flora

Due to historical land uses, particularly agricultural activities, the site and Lot 545 have been extensively cleared of native vegetation. There is a scattering of flooded gums predominately located in the northern area of Lots 746 and 750 (Plate B).

Within Lot 545, the key remnant vegetation is the planted rows of flooded gum trees either side of the Sub H Drain.

The vegetation condition within the site is “Completely Degraded” due to historical clearing and agricultural land uses.

4.3.1 Protected Flora

A search of the Department of Parks and Wildlife (DPaW) *NatureMap* database using 5 km buffer located centrally within the site recorded one priority flora species (*Dodonaea hackettiana* (Hackett’s hopbush)) within the search area (Appendix 2).

Acknowledging the extensive historical clearing and ongoing use as horse paddocks/livestock grazing, it is considered highly unlikely any Priority or protected flora will be located within the site or Lot 545.

4.3.2 Tramway Reserve

The Tramway Reserve traverses parallel to Baldivis Road along the western boundary of the site and Lot 545.

The vegetation within the Tramway Reserve consists of patches of *Eucalyptus rudis* with *Corymbia calophylla*. There are groups of trees particularly in the northern end of the Tramway Reserve in “Good” condition; however, the Tramway is also dominated by large open areas supporting weed growth.

The City of Rockingham has requested the number of access points through the reserve to be limited with the objective of minimising potential impacts to the vegetation within the reserve. The LSP has a single access road through the reserve (Figure 4).

4.4 Fauna

The majority of the site has been historically and extensively cleared and as a consequence significant fauna habitat has been removed.

A search of the Commonwealth Department of the Environment website for Matters of National Environmental Significance (MNES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) highlighted a number of listed fauna species that potentially may utilise the small amount of remaining habitat.

Of this list, the key species that could potentially be impacted through development of the site, (based on the fauna habitats remaining) are listed below:

Scattered stands of or individual *Eucalyptus rudis* trees within the site:

- forest red tailed black cockatoo (*Calyptorhynchus banksii naso*)
- Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*)
- Baudin's black cockatoo (*Calyptorhynchus baudinii*).

The remnant trees may be utilised opportunistically by native fauna species moving through the Baldivis landscape. Given the trees occur independently of any surrounding native vegetation extents it is considered unlikely that the trees are utilised by native fauna species on a permanent basis.

Potential habitat on the site for black cockatoo species comprises of less than 0.5 ha (and approximately 1 ha in Lot 545) of poor foraging quality *Eucalyptus rudis* trees (Plate B). There is no roosting or breeding habitat within the site. An assessment of the loss of the stand of flooded gum trees (located in the low lying area of the site) was made against the Commonwealth's referral guidelines for black cockatoos. In summary the removal of trees within the site is considered not to be at variance with the criteria in accordance with the Commonwealth's Significant Impact Guidelines 1.1 for Black Cockatoos.

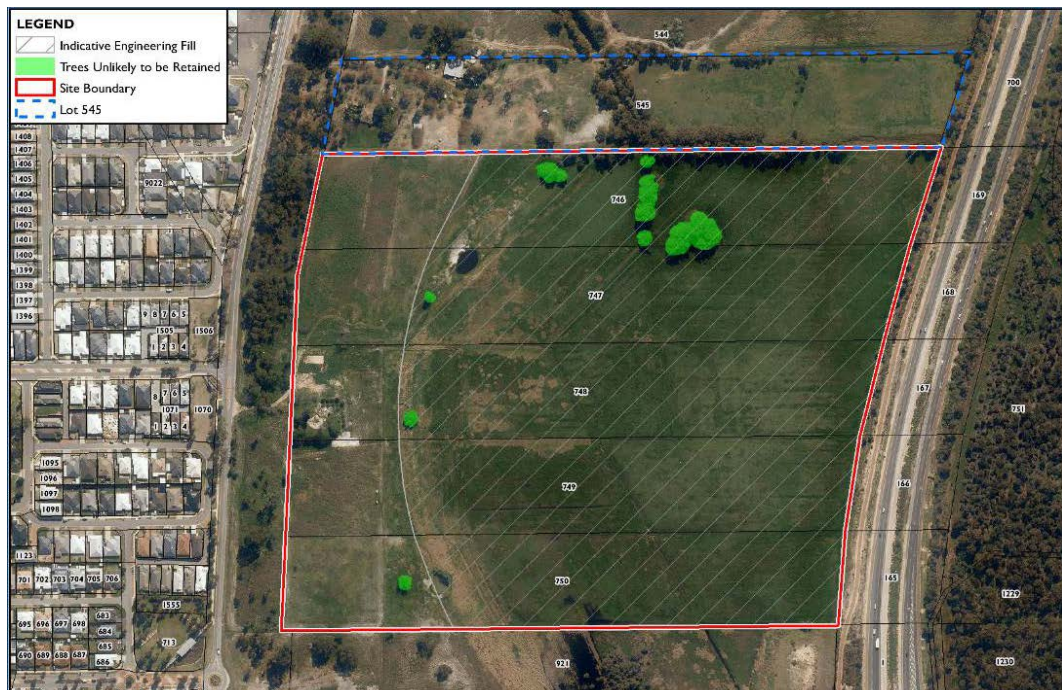


Plate B: Existing Vegetation and Indicative Engineering Fill

4.5 Contamination

A review of the DER's Contaminated Sites Database determined there are no registered contaminated sites within the site or Lot 545.

However, prior to subdivision further investigations may be required on Lot 545 to confirm there is no potential contamination on the site.

4.6 Social Surroundings

4.6.1 Noise

An Acoustic Assessment for the East Baldivis DSP project area (Herring Storer Acoustics 2009), which included the site and Lot 545, was undertaken due to the project area's proximity to the Kwinana Freeway and local arterial routes of Mundijong and Baldivis Roads.

The results of the acoustic assessment indicate that noise received at residences located adjacent to the Kwinana Freeway and Baldivis Road in the year 2025 will exceed the "Noise Limits" as outlined in State Planning Policy 5.4: *Road and Rail Transport Noise and Freight Considerations in Land Use Planning* (WAPC 2009). However, the level of exceedance would only be minor, i.e. up to 2 dB (A).

Given the possible level of exceedance, Herring Storer Acoustics (2009) concluded that compliance with the WAPC (2009) "Noise Limits" can be achieved through a combination of construction of noise walls, building design and notification on titles.

A more detailed Traffic Noise Assessment has been prepared by Lloyd George Acoustics in support of this LSP, and is included as a separate report.

4.6.2 Heritage

4.6.2.1 Aboriginal Heritage

A search of the Department of Aboriginal Affairs' Aboriginal Heritage Inquiry System was undertaken on 20 March 2014 and no matches were recorded for the site or Lot 545.

4.6.2.2 European Heritage

A search of the Heritage Council's inHerit database and the City of Rockingham's Municipal Heritage Inventory (City of Rockingham 2012) was undertaken on 20 March 2014 with no matches found for the site or Lot 545.

4.6.3 Fire

There are a number of vegetated areas which require consideration in terms of future bushfire hazards; these have been comprehensively addressed in the Fire Management Strategy (Emerge Associates 2014) prepared for the site. Vegetation within and surrounding the site has been classified according to AS 3959 Construction of Buildings in Bushfire-prone Areas (Standards Australia 2009). Hazard ratings have been based on the vegetation classifications which in turn define necessary responses within the LSP and for future development.

Vegetation that is to be permanently retained surrounding the site will pose permanent bushfire hazard considerations. In the same way, vegetation that is to be cleared for future urban purposes in the short to medium term will pose only temporary bushfire management considerations. Remnant vegetation within the site is limited in extent, and is intended to be largely cleared for urban development, and therefore does not require consideration in terms of posing future bushfire hazards.

All areas within 100 m of the site boundary have been assessed for vegetation classification and bushfire hazard rating levels. It has been determined that all proposed future dwellings arising from the LSP will fall within the acceptable level of risk. Based on the East Baldivis DSP, urban development is planned for landholdings directly adjacent to the northern and southern boundaries of the site. Therefore, vegetation within these lots will pose only temporary bushfire management considerations within the LSP area until such a time as the areas are cleared or managed as part of the development process.

Permanent bushfire hazard considerations are posed by the remnant vegetation within the Tramway Reserve adjacent to the western boundary of the site, and by vegetation within the Kwinana Freeway road reserve adjacent to the eastern boundary of the site.

Future management of the Tramway Reserve and Kwinana Freeway reserve may alter the hazard ratings associated with these areas of vegetation (should fuel loads be increased or decreased) and mitigation responses may need to be revisited during subdivision application stage. Ongoing discussions with the City of Rockingham and Main Roads regarding the management of fuel loads within the Tramway Reserve and Freeway reserve respectively aim to ensure a long term “Low Threat” interface with development within the site. Therefore detailed Fire Management Plans will be prepared for areas within 100 m of classified vegetation (referred to as Bushfire Prone Areas) as part of subdivision.

A Bushfire Management Strategy has been prepared for this LSP and is included as a separate appendix.

5.0 CITY OF ROCKINGHAM RELEVANT ENVIRONMENTAL POLICIES AND GUIDELINES

5.1 Environmental Guidance Documents

5.1.1 City of Rockingham Local Bushland Strategy

The City of Rockingham's Planning Policy 7.2 – Local Bushland Strategy aims to:

Provide Council with guidance in the assessment of proposals to rezone, subdivide and develop land in the City where remnant bushland is present.

The policy guides the assessment of the ecological value of remnant bushland on the subject site to assist in determining the suitability of development over the land proposed to be developed. In line with the policy directives, the bushland on site has been assessed in accordance with the Policy's following criteria:

5.1.1.1 Presence of Rare Species or Threatened Ecological Communities

The site has very limited remnant vegetation, with the only example of pre-European vegetation within the site consisting of scattered pockets of native trees. In addition, remnant understorey across the site has been cleared, indicating a very low likelihood for any rare flora species or threatened ecological communities being present on the site.

5.1.1.2 Rarity of the Vegetation Complex Present (i.e. is the Complex Present One of Those Where Less Than 10% Remains in Secure Conservation Reserves, Either in a Regional or Locally Representative Context)

The remnant vegetation is mapped by Heddle et al. (1980) as belonging to the Serpentine River Complex and Bassendean Complex – Central and South. However, the basic vegetation structures typically associated with the mapped regional complexes have been severely impacted from the historical clearing and agricultural land use; in particular there has been high disturbance to the understory vegetation.

The Serpentine River Complex is described as closed scrub of *Melaleuca* spp. and fringing woodland of *E. rudis* – *M. raphiophylla* along streams (Heddle et al. 1980). The Bassendean Complex – Central and South is described as vegetation ranging from woodlands of *Eucalyptus marginata* – *Casuarina fraserana* – *Banksia* spp. to low woodland of *Melaleuca* spp. and sedgelands on the moister sites.

Bush Forever (Government of Western Australia 2000) shows 9% of the Serpentine River Complex exists in the Perth Metropolitan Region of the Swan Coastal Plain. Approximately two per cent of the original Serpentine River Complex extent is located in areas with existing protection (e.g. Parks and Recreation Reserves).

The Bassendean complex meets the state's target of at least 10% of the original extent proposed for protection.

5.1.1.3 Vegetation Diversity

Remnant vegetation has been vastly cleared due to historical agricultural activities, with limited diversity in the vegetation remaining, which primarily consists of very few scattered flooded gum trees and a "Completely Degraded" (pasture) understorey.

5.1.1.4 Vegetation Condition (Level of Degradation, Structure Retained)

The vegetation condition is "Completely Degraded" due to its agricultural history.

5.1.1.5 Connectivity as a Wildlife Corridor

Review of aerial photography and through undertaking a site visit indicates that surrounding landholdings contain very limited ecological value. The landholdings to the south and north have been historically used for agriculture and are in similar degraded condition to the LSP site.

Retention of the vegetation within the Tramway Reserve will be undertaken, in accordance with the City of Rockingham's objectives. Access points to the subdivision will also be minimised to prevent adverse impacts on the connectivity of the Tramway Reserve for transient fauna.

5.1.1.6 Significant because it is Isolated and is the only Remaining Bushland in that Area (Particularly Important in Developed Areas)

The remnant vegetation on the site is very limited. There are properties and Bush Forever sites within less than 2 km that contain more intact areas of native vegetation that better represent the bushland locally.

5.1.1.7 Social Value (e.g. Educational Resource, Recreational Area, Locally Admired for Rural or Visual Amenity)

The site has historically and is currently being used for small-scale agricultural activities and does not represent a significant social value in respect to the environmental values of the site.

5.1.1.8 Acts as a Buffer Between Potentially Conflicting Land Uses

The vegetation within the site does not contain any value as a buffer to conflicting land uses.

5.1.1.9 Impact from Removal or Modification on Other Parts of the Environment

Given the limited environmental value attributed to the remaining vegetation on site, there will likely be negligible impacts to other parts of the environment.

5.1.1.10 Other Significant Attributes

Given the limited ecological value of the remnant vegetation on site, and in consideration of the responses to each of the criteria outlined above, the LSP design and management commitments outlined in this document meet the City of Rockingham's objectives for bushland retention as outlined in the Planning Policy 7.2 – *Local Bushland Strategy*.

5.1.2 Baldivis Tramway Master Plan

The LSP is located within Precinct Two of the Baldivis Tramway Master Plan (City of Rockingham 2014). The master plan sets out management objectives for Precinct Two. Table 4 below summarises these objectives and details how those portions of the LSP abutting the Tramway are in accordance with relevant objectives.

Table 4: Compliance of the LSP Baldivis Tramway Master Plan Precinct 2 Objectives

Precinct 2 Management Objectives	LSP details
Maintain and protect all existing vegetation, utilising firebreak for dual use paths where possible to minimise fragmentation	The City of Rockingham has requested minimal access through the Tramway Reserve. Consequently, only a single access road is proposed through the reserve.
Manage priority weed species	No POS is proposed to be located adjacent to the Tramway reserve. An approximate 20 m development setback including a road is proposed between the development and Tramway reserve. Consequently, the proposed development is unlikely to impact the weed management activities within the Tramway.
Focus revegetation of native species in key feature nodes and primary access points	Environmental outcomes of the LSP include using native vegetation in POS areas where possible and maintaining the existing vegetation within the Tramway Reserve. The use of native species in both the POS areas is in accordance with this objective.
Utilise designated offset areas for future revegetation of native species to improve landscape connectivity	NA
Provide potential solutions to manage the interface between the Tramway and residential development	No development will be located immediately adjacent to the Tramway Reserve due to the road interface.
Ensure adequate fire safety measures, such as breaks and slashing	No development will be located immediately adjacent to the Tramway due to the road interface. Therefore, bushfire risk from the proposed development is low.
Establish an integrated dual use path network	NA
Provide a safe pedestrian detour around the Safety Bay Road intersection	NA

Precinct 2 Management Objectives	LSP details
Create a Heritage Concept Area adjacent to old Baldivis School site with unique interactive and interpretive play-scapes based on settlement era period	NA

6.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MANAGEMENT MEASURES

The key environmental factors are considered applicable to the site include:

- ASS
- water management
- vegetation and flora
- fauna
- site contamination
- noise
- fire management.

6.1 Acid Sulfate Soils

6.1.1 Environmental Objective

To maintain the integrity, ecological functions and environmental values of the soil.

6.1.2 Policy and Standards

- Assessment Levels for Soil, Sediment and Water (DER 2010).
- Acid Sulfate Soils Guideline Series. Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes (DER 2011).
- Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (DER 2013).

6.1.3 Potential Impacts

ASS soils are stable when left undisturbed, but when they are exposed to air, during excavation or dewatering, this can set off a reaction resulting in acidity (sulfuric acid) being produced.

The potential impacts relate to the potential for oxidation of excavated or in situ ASS generating acidic conditions, and possibly releasing metals into groundwater and surrounding freshwater environment of the PMD / Folly Pool.

6.1.4 Management Response

As outlined in the “Engineering Philosophy” the final fill levels and engineering service excavation requirements will determine if an ASS and Dewatering Management Plan is required to be prepared prior to subdivision.

However, if required, the ASSDMP will outline the soil management measures, the groundwater and dewatering effluent monitoring measures and the contingency management measures required to minimise any environmental impacts.

6.1.5 Predicted Outcome

The excavation of ASS and dewatering during the construction phase of the project will be managed in accordance with the engineering design, and excavation requirements. If required the ASSDMP will be prepared to the satisfaction of DER.

6.2 Water Management

The EPA water management objectives include:

- to maintain the quantity of water (surface and ground) so that existing and potential environmental values are protected
- to ensure that the quality of water emissions (surface and ground) do not adversely affect environmental values or the health, welfare and amenity of people and land uses, and meets statutory requirements and acceptable standards.

6.2.1 Relevant Policies, Guidelines and Standards

The key water and nutrient management policies are outlined below.

6.2.1.1 Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992

The objective of the *Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992* (Peel–Harvey EPP) is to reduce the input of nutrients, particularly phosphorus, into the Peel Inlet–Harvey Estuary System through a number of means including appropriate land management by landowners in the policy area.

6.2.1.2 Statement of Planning Policy 2.1 (Peel–Harvey Coastal Plain Catchment) 2003

The objectives of Statement of Planning Policy (SPP) 2.1 reflect the environmental objectives of the Peel–Harvey EPP and aim to ensure that changes to land use within the catchment are controlled so as to avoid and minimise environmental damage.

The SPP contains a number of general and specific policy provisions relating to drainage. The policy states that subdivision proposals shall make provision for a drainage system which maximises the consumption and retention of drainage on site. Biological wetland filters or other means of drainage water retention or treatment approved by the EPA are to be incorporated into drainage designs, possibly by amendment of the soils in drainage basins or by the provision of wetland filters with nutrient-retentive soil amendments.

6.2.1.3 Peel–Harvey Water Sensitive Urban Design (WSUD) Local Planning Policy

The Peel–Harvey WSUD Local Planning Policy (Peel Development Commission 2006) was developed through the federal government's Coastal Catchments Initiative Project and endorsed by the EPA. It aims to assist local government in integrating catchment management objectives with land and resource planning in urban landscapes.

This policy identifies broad objectives against which strategic and statutory proposals can be assessed. WSUD principles in order of priority are provided to:

- Provide protection to life and property from flooding that would occur in a 100-year Average Recurrence Interval (ARI) flood event.
- Manage rainfall events to minimise run-off as high in the catchment as possible. Use multiple low cost “in-system” management measures to reduce run-off volumes and peak flows (for example, maximise infiltration from leaky pipes and stormwater pits installed above pollutant retentive material).
- Retain and restore existing elements of the natural drainage system, including waterway, wetland and groundwater features and processes, and integrate these elements into the urban landscape, possibly through a multiple use corridor.
- Minimise pollutant inputs through implementation of appropriate non-structural source controls (such as town planning controls, strategic planning controls, pollution prevention procedures, education and participation programs and regulatory controls) and structural controls (that manage the quantity and quality of stormwater run-off and prevent or treat stormwater pollution).
- Maximise water use efficiency, reduce potable water demand, and maximise the reuse of water harvested from impermeable surfaces.

Water quantity management principles and objectives are provided based on post-development discharges being maintained relative to predevelopment levels. Criteria are provided for both ecological protection (1 in 1 year events), and flood protection (1 in 100 year events). Water quality management principles and objectives are based on maintaining or improving water quality relative to existing conditions.

Specific water quality guidelines are provided in the document including limitations on developments where average input rates of nutrients exceed 15 kg/phosphorus/ha per annum or 150 kg/nitrogen/ha per annum.

In addition, stormwater management is stated as having to provide (as compared to a development that does not actively manage stormwater quality):

- at least 80% reduction of total suspended solids

- at least 60% reduction of total phosphorus
- at least 45% reduction of total nitrogen
- at least 70% reduction of gross pollutants.

The policy is consistent with the *Decision Process for Stormwater Management in WA* (DoE and SRT 2005) which is appended to the policy, and is consistent with the objectives of the Peel Inlet–Harvey Estuary EPP.

6.2.1.4 Water Quality Improvement Plan for the Rivers and Estuary of the Peel–Harvey System

The development of the *Water Quality Improvement Plan (WQIP) for the Rivers and Estuary of the Peel–Harvey System* (WQIP) (EPA 2008) is a result of the Commonwealth Government's Coastal Catchments Initiative (CCI). Seven CCI projects contributed to and assisted in the preparation of the draft WQIP.

These CCI projects were as follows and their reports are included as appendices in the WQIP:

- Decision Support System for Water Quality Protection
- Support System for the Phosphorus Reduction Decisions
- Water Quality Monitoring Program
- Water Sensitive Urban Design
- Regulation/ Licensing Review
- Targeted Assistance to Intensive Agricultural Industries
- Stock Exclusion from Catchment Waterways.

The aim of the draft WQIP is to improve water quality by changing land use planning, agricultural and urban practices in order to reduce phosphorus being discharged from the catchment.

The draft WQIP identifies the following:

- current status of phosphorus loads
- identifies the environmental values of water bodies
- the water quality objectives that will protect the environmental values and identifies a set of management measures and control actions to achieve and maintain those environmental values and water quality objectives.

The Water Quality Objective of the WQIP is:

- median loadings of total phosphorus to estuarine waters should be less than 75 tonnes per annum in an average year

- the median load of total phosphorus flowing in the estuary from the Serpentine River being less than 21 tonnes
- the median load of total phosphorus flowing in the estuary from the Murray River being less than 16 tonnes
- the median load of total phosphorus flowing in the estuary from the Harvey River being less than 38 tonnes.

In order to meet this water quality objective, the WQIP proposes the following management measures and control actions across the coastal section of the Peel Inlet – Estuary Harvey Catchment:

1. Use a slow-release, low water soluble fertiliser, applied after the break of season, preferably in spring and at reduced rates, on sandy soils in rural areas.
2. Undertake soil amendment on sandy soils in rural areas.
3. Use low water soluble fertiliser in urban areas.
4. Connect all existing homes to infill sewerage.
5. Zero discharge from licensed agricultural premises.
6. Improve other agricultural practices to reduce phosphorus discharges.
7. Undertake strategic reforestation of agricultural land.
8. Connect to sewerage all homes and properties for new urban developments.
9. Undertake soil remediation in all new urban developments with sandy soils.
10. Implement Local Planning Policies, Strategies and Planning Conditions that incorporate Best Management Practices where applicable.
11. Incorporate water sensitive urban design in all new developments.
12. Improve the agricultural and urban drainage system.

6.2.2 Potential Impacts

The identified key potential impacts include:

- Groundwater at the site flows towards the PMD which then drains into Folly Pool which is an environmentally sensitive receptor (Parsons Brinckerhoff 2008). Therefore, impacts to groundwater quality on site may also impact sensitive receptors downstream.

6.2.3 Environmental Management and Mitigation

6.2.3.1 Overview

A number of management/design measures will be implemented to reduce the impact of the development on groundwater flows, levels or quality, the function and environmental values of the site, or its interconnected areas. Management measures relevant to construction and the residential-living phase are described under the relevant headings below.

6.2.3.2 Urban Water Management

The LWMS has been prepared in accordance with East Baldivis DWMS and has been developed with reference to the following guidance documents:

- Serpentine River Floodplain Management Study and Modelling Report (SKM 2010)
- Interim: Developing a Local Water Management Strategy (Department of Water 2008a)
- Better Urban Water Management (WAPC 2008)
- District Water Management Strategy East Baldivis (Parsons Brinkerhoff 2007)
- Western Australian State Water Plan (Government of Western Australia 2007)
- Stormwater Management Manual for Western Australia (Department of Water 2004–2007)
- Liveable neighbourhoods (2nd Edition) (WAPC 2000)
- Water Quality Improvement Plan for the Rivers and Estuary of the Peel – Harvey system – Phosphorus Management. (EPA 2008).

The LWMS details the integrated water management strategies to facilitate future urban water management planning. The LWMS will achieve integrated water management through the following design objectives:

- Effectively manage the risk to human life, property damage and environmental degradation from water contamination, flooding and waterlogging.
- Maintain and if possible improve water quality (surface and groundwater) within the development in relation to pre-development water quality.
- Reduce potable water consumption within both public and private spaces using practical and cost-effective measures.

- Promote infiltration of surface water on site to minimise the risk of further water quality degradation in the Peel Harvey Catchment.
- Implement best management practices in regards to stormwater management.
- Incorporate where possible, low maintenance, cost-effective landscaping and stormwater treatment systems.

6.2.3.3 Stormwater Management

The LVMS has incorporated the following structural Best Management Practices (BMPs) will be used to address water quality for the LSP:

- A conceptual drainage strategy demonstrates that the land is capable of retaining the 100 ARI event, while providing an indicative location of stormwater detention.
- Structural and non-structural controls will be used to improve stormwater quality, as compared to a development that does not actively manage stormwater.
- Rainfall from 1 year ARI (Annual Recurrence Interval) events will be retained and infiltrated as close to the source as possible.
- All residential lots will confine run-off from roofs and paving within the property boundary.
- Large rainfall events (10 ARI to 100 ARI) will be conveyed and retained through a network of roads, drainage reserves and POS within each catchment.
- It is anticipated that there will be no impacts from stormwater run-off to downstream ecosystems.

6.2.4 **Predicted Outcome**

It is expected that development of the site will have a positive impact on groundwater quality through BMPs and the treatment of stormwater prior to infiltration, as discussed below:

- Effectively manage the risk to property damage and environmental degradation from water contamination, flooding and waterlogging.
- Maintain and if possible improve water quality (surface and groundwater) within the development in relation to pre-development water quality.
- Reduce potable water consumption within both public and private spaces using practical and cost-effective measures.

- Promote infiltration of surface water to minimise the risk of further water quality degradation in the Peel Harvey Catchment.
- Implement best management practices in regards to stormwater management.
- Incorporate where possible, low maintenance, cost-effective landscaping and stormwater treatment systems.

The management of stormwater and nutrients is in accordance with State Planning Policy No. 2.1: Peel Harvey Coastal Plain Catchment, WQIP for the Rivers and Estuary of the Peel–Harvey System – Phosphorus Management and Better Urban Water Management practices. Based on the investigations undertaken and the management measures proposed, it is not expected that any changes to groundwater flows, levels or quality will have an adverse impact on the function and environmental values of the site.

6.3 Flora and Vegetation

The EPA flora and vegetation objective is:

- to maintain the abundance, diversity, geographic distribution and productivity of flora at the species and ecosystem levels through the avoidance or management of adverse impacts and through improvement in knowledge.

6.3.1 Applicable Policies, Guidelines and Standards

EPA Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia provides an overview of the EPA position on the clearing of native vegetation in Western Australia.

City of Rockingham Planning Policy 7.2 – Local Bushland Strategy.

6.3.2 Potential Impacts

The site's historical use for agriculture and grazing has completely degraded the vegetation on site and reduced the native vegetation cover to minimal areas containing scattered trees including those located along fence lines, with no or very limited native understorey.

Consequently, it is anticipated that the proposed development would have very little impact on native vegetation.

6.3.3 Environmental Management and Mitigation

The following management measures have been developed and incorporated into the LSP to reduce the likelihood of impacts to vegetation and flora. These measures have been developed with the aim of retaining the key existing biological values of the site:

- vegetation will be retained within the Tramway Reserve, with single access crossings to facilitate retention and natural regeneration of vegetation within the Tramway Reserve
- use of native vegetation species in areas of POS.

6.3.4 Predicted Outcome

The proposal is very unlikely to have any impact on flora or vegetation due to the lack of native vegetation within the site. Any potential impacts will be reduced through the following:

- Retention and replanting of areas of POS and if agreed with the City within the Tramway Reserve will be undertaken, in accordance with the City of Rockingham's objectives. This will be detailed in a future Landscape Plan.

6.4 Fauna

EPA fauna objective is outlined below.

- To maintain the abundance, diversity, geographic distribution and productivity of native fauna at the species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

6.4.1 Applicable Policies, Guidelines and Standards

For the LSP site, the key EPA policies and guidelines relating to the identification and management of potential impacts on fauna are:

- EPBC Act 1999
- Guidance Statement No 33: Environmental Guidance for Planning and Development
- City of Rockingham Planning Policy 7.2 – Local Bushland Strategy.

6.4.2 Potential Impact

However, noting the majority of the site has been historically cleared and as a result, fauna habitat has largely been removed. The only potentially significant fauna habitat on site is:

- Potential habitat on the site for black cockatoo species comprises of less than 0.5 ha (and approximately 1 ha in Lot 545) of poor foraging quality *Eucalyptus rudis* trees within the site. There is no known breeding habitat within the site.

Due to the average range of fill required on the site (approximately 2 m) for groundwater clearance and engineering purposes, it is unlikely that any of these trees will be retained.

In regards to black cockatoos, criteria have been provided in two documents published by the Commonwealth to assist proponents of an action to decide whether an action should be referred to the Department of the Environment under EPBC Act:

1. Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (Commonwealth of Australia 2009¹).
2. EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Black-Cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii* and forest red-tailed black cockatoo *Calyptorhynchus banksii naso* (Commonwealth of Australia 2012²) (Table 2).

The removal of the flooded gums trees in the low-lying areas within the Mirvac owned landholdings is considered not to be at variance with the criteria in the Significant Impact Guidelines 1.1 and is considered not to be at variance with the criteria in the EPBC Act Referral Guidelines.

6.4.3 Environmental Management and Mitigation

The following management measures have been developed and incorporated into the LSP to reduce the likelihood of impacts to native fauna:

- Regional fauna corridors will be retained through the Tramway Reserve.

6.4.4 Predicted Outcome

The proposal may result in minimal disturbance, which is not likely to impact any individual animals, (given the historically cleared nature of the site) and in particular black cockatoos. Based on the Commonwealth's referral guidelines and the minimal impacts expected, the proposal has not been referred to the Commonwealth Department of Environment for assessment.

¹Commonwealth of Australia. 2009. Matters of National Environmental Significance: Significant Impact Guidelines 1.1. Canberra: Australian Capital Territory.

²Commonwealth of Australia. 2012. EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Black-Cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii* and forest red-tailed black cockatoo *Calyptorhynchus banksii naso*. Canberra: Australian Capital Territory.

6.5 Site Contamination

EPA objective:

- To ensure previous land uses within and surrounding the site, do not impact on proposed development of the site.

6.5.1 Applicable Policies, Guidelines and Standards

The applicable Contaminated Sites policies and standards include:

- *Contaminated Sites Act 2003*.

6.5.2 Potential Impact

The site has been used for grazing and agricultural purposes and there is very little likelihood of any potential contamination. However, there is potential for contamination on Lot 545 due to historical land use.

6.5.3 Environmental Management and Mitigation

Prior to the subdivision a contamination assessment in accordance with *Contaminated Sites Act 2003* may be required on Lot 545.

6.6 Noise

6.6.1 Kwinana Freeway

The EPA in its assessment of the proposed MRS amendment for the East Baldivis area identified noise impacts from the adjacent Kwinana Freeway as a potential constraint to future development of the site.

Herring Storer Acoustics undertook an assessment of freeway noise and proposed future residential development within the Baldivis East DSP area. The results of the acoustic assessment indicates that noise received at residences located adjacent to the Kwinana Freeway, Mundijong and Baldivis Road in the year 2025 will exceed the “Noise Limits” as outlined in the WAPC Planning Policy 5.4 “Road and Rail Transport Noise and Freight Considerations in Land Use Planning”. However, the level of exceedance would only be minor, i.e. up to 2 dB (A).

Given the possible level of exceedance, Herring Storer concluded in their assessment that compliance with the Planning Policies “Noise Limits” can be achieved by the implementation of earth bunding or noise walls.

6.6.1.1 Environmental Management and Mitigation

LSP design has accommodated the following noise management measures (for the first row of houses within the development adjacent to the freeway only):

- construction of a noise wall or other mitigation measures e.g. bund along the length of the LSP site adjacent to the freeway.

Subdivision controls include:

- implementation of a “Quiet House” design for those houses adjacent to the freeway
- Notifications on Title are placed on those houses located adjacent to the freeway regarding likely vehicle noise.

6.7 Fire

6.7.1 Environmental Objectives

To reduce the risk of bushfire to people, property and infrastructure.

6.7.2 Policy and Standards

Draft SPP 3.7: *Planning for Bushfire Risk Management* (WAPC 2014).

6.7.3 Potential Impacts

The implementation of the LSP will result in an increased risk to people, property and infrastructure being impacted by potential bushfires in the Tramway Reserve.

6.7.4 Management Response

In accordance WAPC (2014) a Fire Management Plan will be required to be prepared at subdivision stage.

6.7.5 Predicted Outcome

The proposed development will have the appropriate level of bushfire protection, relative to the surrounding land use context, to manage the risk to people, property and infrastructure posed by bushfire.

7.0 MANAGEMENT COMMITMENTS AND CONCLUSIONS

Table I in the Executive Summary details the key environmental issues and the proposed management commitments. These include:

- ASS
- water management
- vegetation and flora
- fauna
- site contamination
- noise
- fire management.

The proposed LSP recognises the importance of the key environmental and landscape attributes of the area, and incorporates these in an urban form, that creates an environmentally responsive urban development that meets the EPA and City of Rockingham's environmental requirements. Consequently the environmental outcomes of the proposed LSP are considerable and include:

- providing an improvement in groundwater and surface water quality through residential development and implementation of water sensitive urban design and best stormwater drainage management practices
- landscaping use native species (where currently there is very little native species and diversity) in areas of POS and maintaining the existing vegetation within the Tramway Reserve
- limiting access points through the tramway reserve to the subdivision to prevent adverse impacts particularly for transient fauna
- implementation of management measures to reduce potential noise impacts from the adjacent freeway on future residences.

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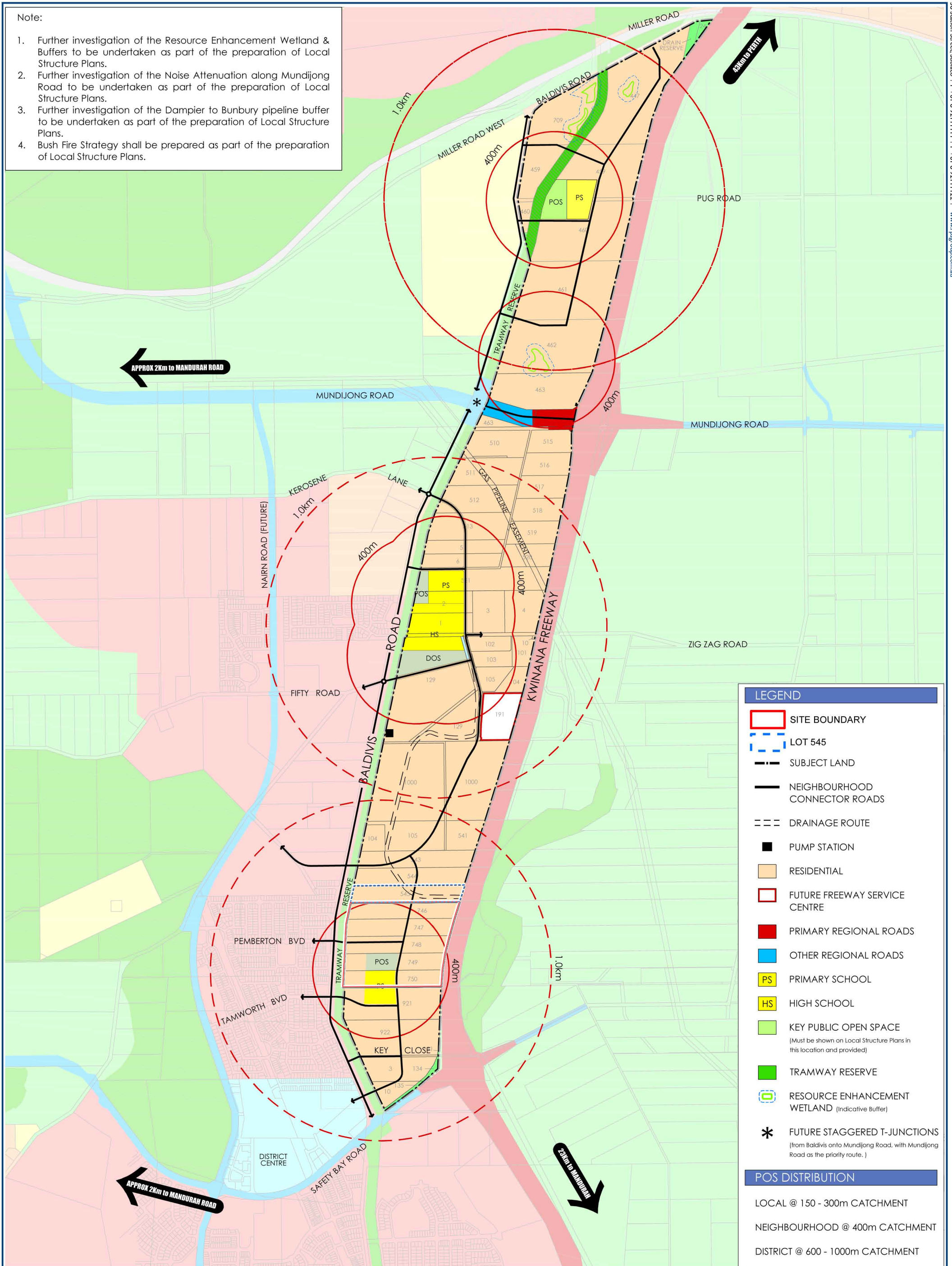
Western Australian Planning Commission. 2014. State Planning Policy No. 3.7: Planning for Bushfire Risk Management. Perth: Western Australia.

FIGURES



Note:

1. Further investigation of the Resource Enhancement Wetland & Buffers to be undertaken as part of the preparation of Local Structure Plans.
2. Further investigation of the Noise Attenuation along Mundijong Road to be undertaken as part of the preparation of Local Structure Plans.
3. Further investigation of the Dampier to Bunbury pipeline buffer to be undertaken as part of the preparation of Local Structure Plans.
4. Bush Fire Strategy shall be prepared as part of the preparation of Local Structure Plans.



LEGEND

- SITE BOUNDARY
- LOT 545
- SUBJECT LAND
- NEIGHBOURHOOD CONNECTOR ROADS
- DRAINAGE ROUTE
- PUMP STATION
- RESIDENTIAL
- FUTURE FREEWAY SERVICE CENTRE
- PRIMARY REGIONAL ROADS
- OTHER REGIONAL ROADS
- PRIMARY SCHOOL
- HIGH SCHOOL
- KEY PUBLIC OPEN SPACE
(Must be shown on Local Structure Plans in this location and provided)
- TRAMWAY RESERVE
- RESOURCE ENHANCEMENT WETLAND (Indicative Buffer)
- FUTURE STAGGERED T-JUNCTIONS
(from Baldvis onto Mundijong Road, with Mundijong Road as the priority route.)

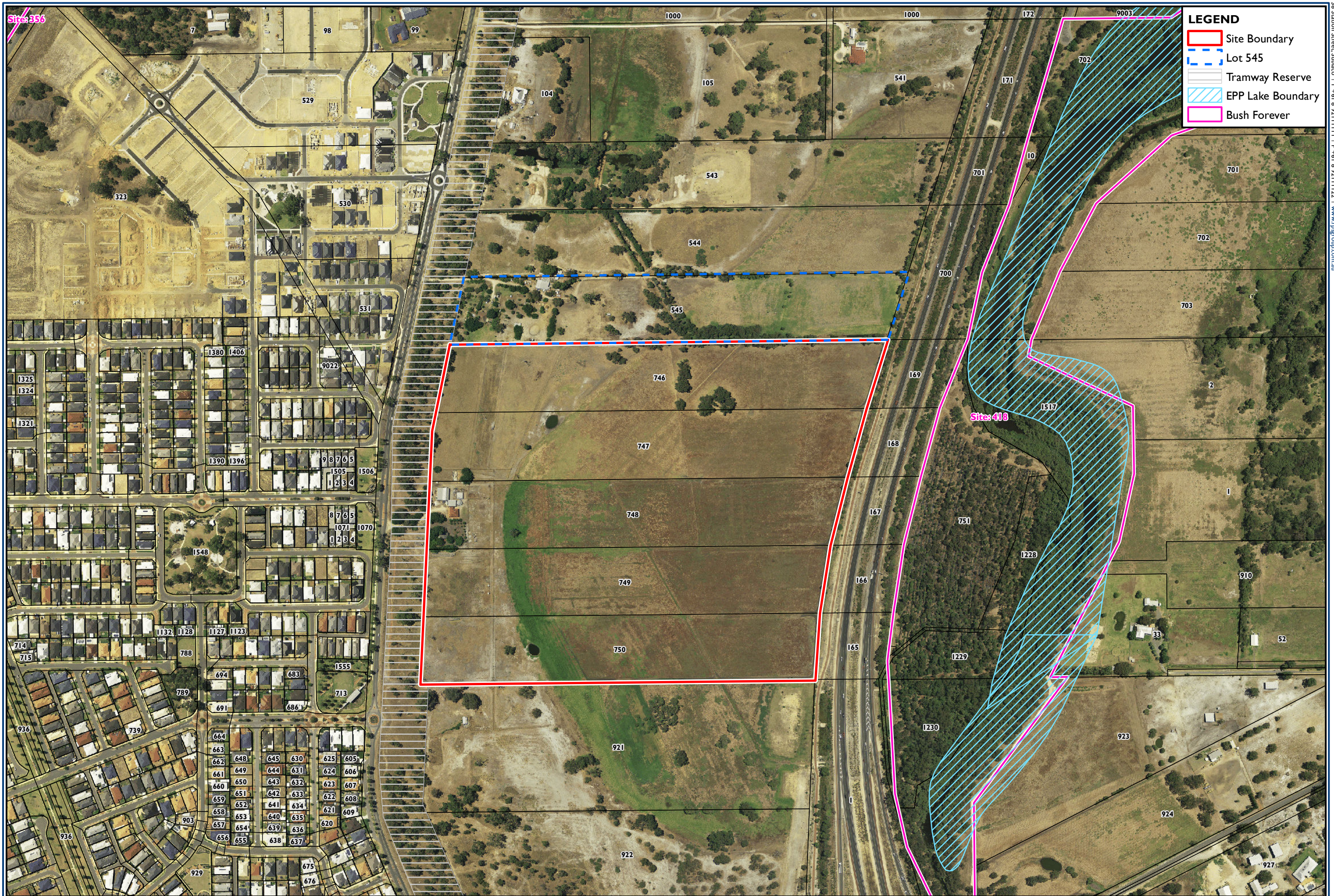
POS DISTRIBUTION

- LOCAL @ 150 - 300m CATCHMENT
- NEIGHBOURHOOD @ 400m CATCHMENT
- DISTRICT @ 600 - 1000m CATCHMENT



This plan is an indicative land use concept depicting one hypothetical development scenario for the land and is prepared for illustrative purposes only. It has no formal endorsement or approval status. Any lot boundaries, areas, road networks, public open space or any other land use detail depicted should be considered notional and will be subject to change as part of any subsequent formal planning approval processes. This plan remains the property of CLE.

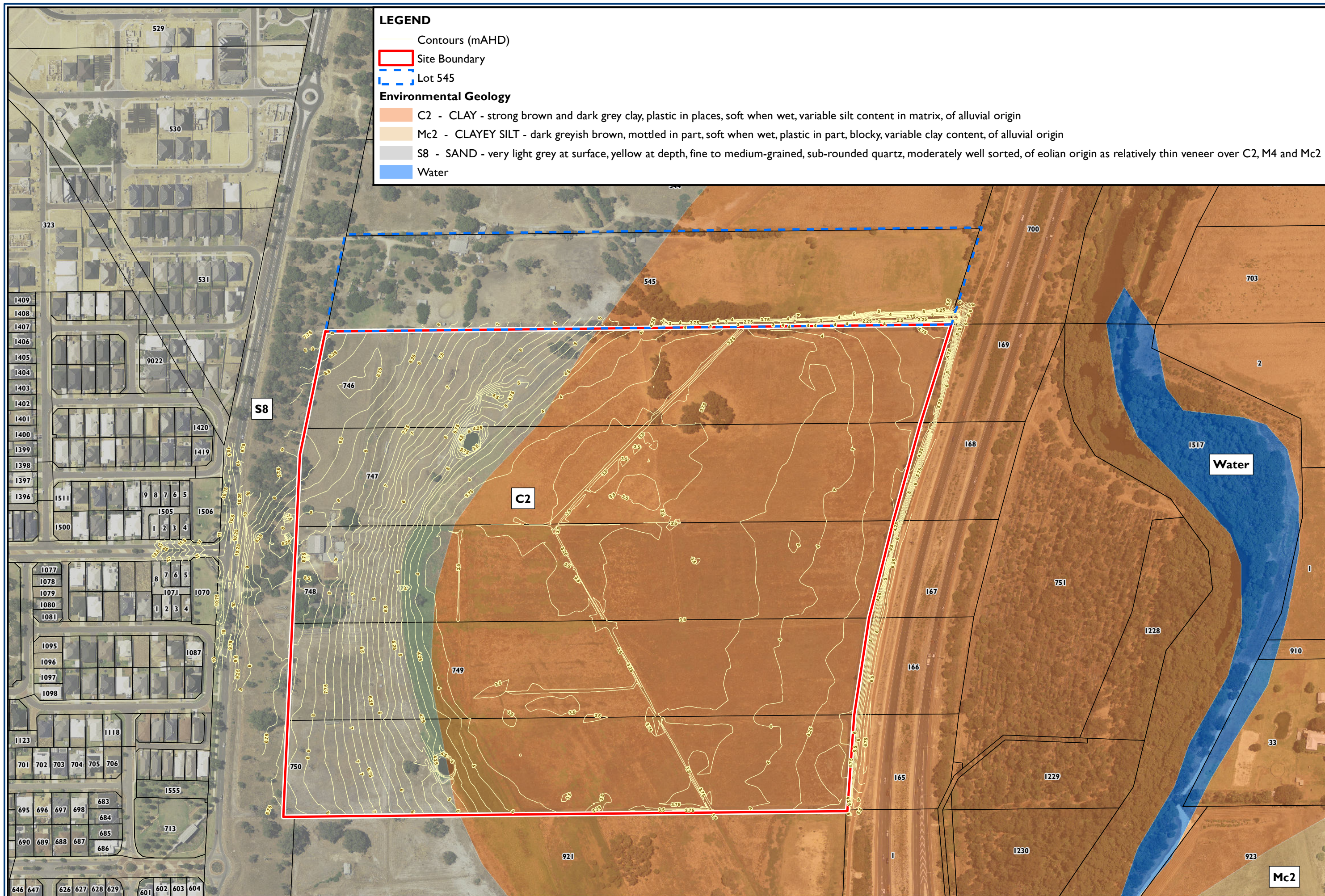




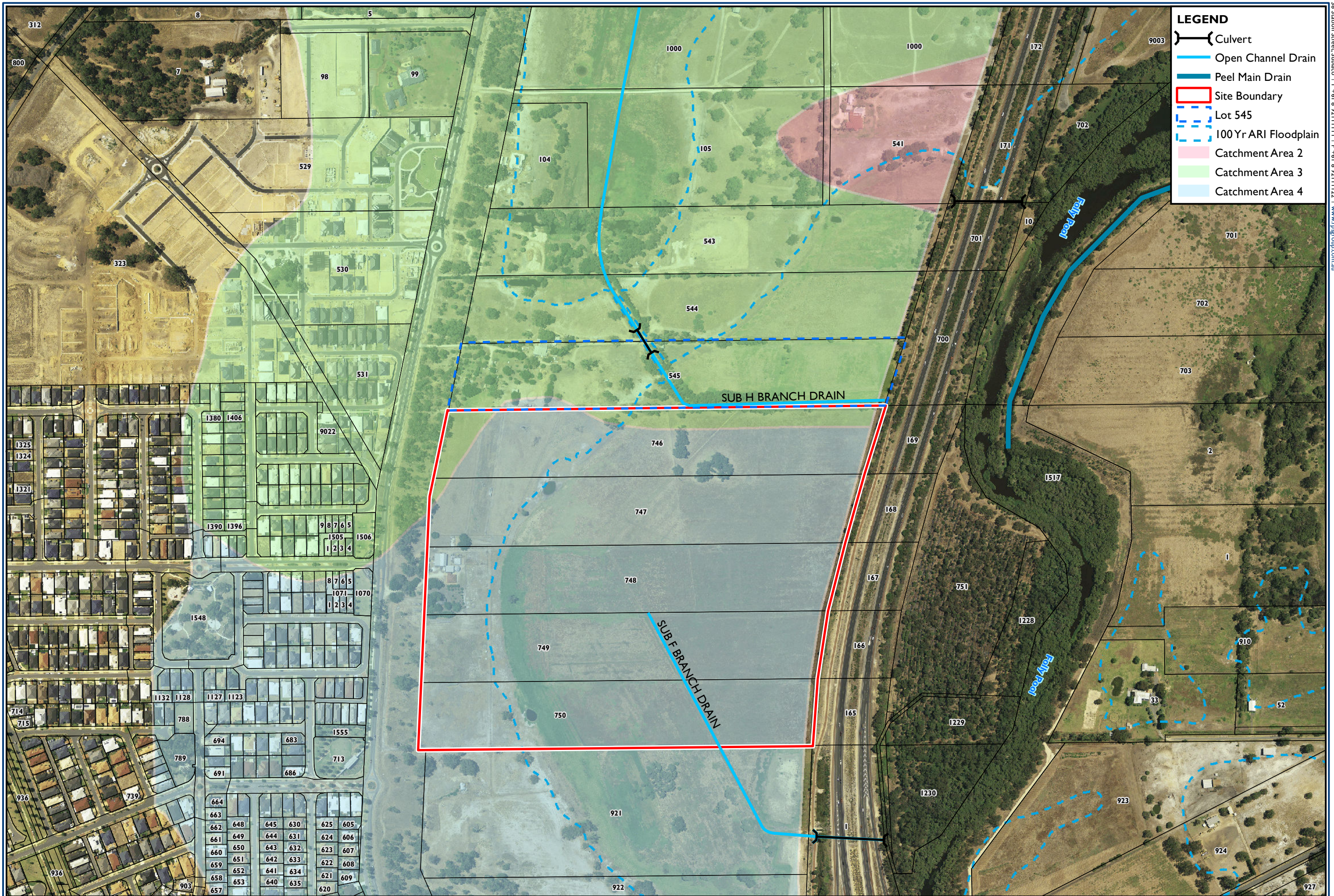
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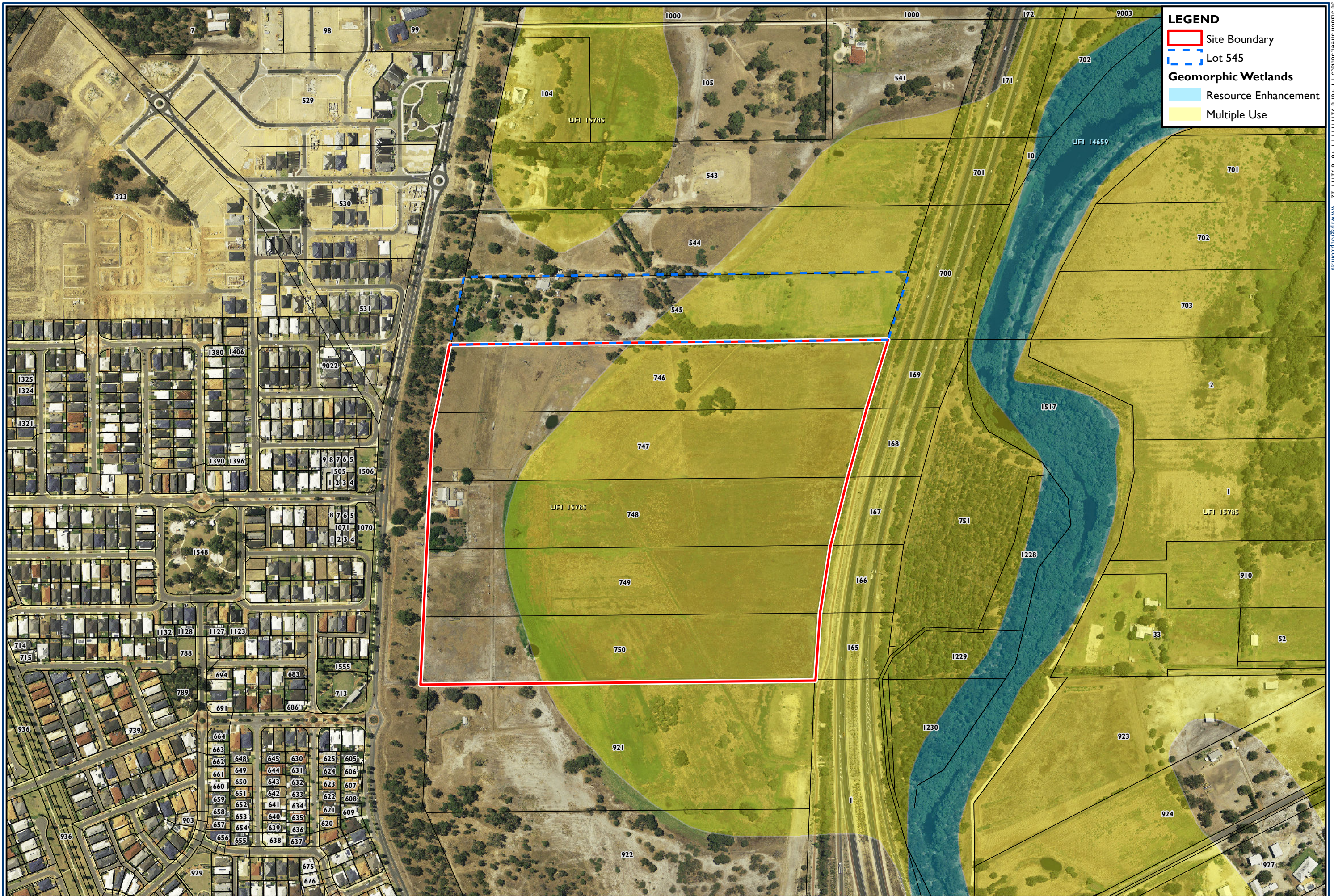
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APPENDIX I

EPA Assessment and Advice



Environmental Protection Authority

The Atrium,
Level 8, 168 St Georges Terrace,
Perth, Western Australia 6000.
Telephone: (08) 6364 6500. Facsimile: (08) 6364 6522.

Postal Address: PO Box K822,
Perth, Western Australia 6842.
Website: www.epa.wa.gov.au

Secretary
Western Australian Planning Commission
469 Wellington Street
PERTH WA 6000

Our Ref CRN220603
Enquiries Glen McLeod-Thorpe

SCHEME AMENDMENT TITLE:	MRS Amendment 1128/41 Baldivis Urban Area Expansion - Area 2
SCHEME AMENDMENT LOCATION:	Lots 104 & 105, 532-538, 540 & 541, 543-545, 746-750, 921 & 922 Baldivis Road
LOCALITY:	Baldivis
RESPONSIBLE AUTHORITY:	Western Australian Planning Commission
LEVEL OF ASSESSMENT:	Scheme Amendment Not Assessed - Advice Given Under Section 48a(1)(A) (no appeals)

Thank you for your letter of 26 September 2006 referring the above proposed scheme amendment.

After consideration of the information provided by you, the Environmental Protection Authority (EPA) considers that the proposed scheme amendment should not be assessed under Part IV Division 3 of the *Environmental Protection Act 1986* (EP Act) but nevertheless provides the following advice and recommendations.

ADVICE AND RECOMMENDATIONS

1. Environmental Issues

- Noise
- Acid Sulfate Soils
- Water Management
- Vegetation and Flora
- Potential Land Use Conflict
- Site Contamination
- High Pressure Natural Gas Pipeline

2. Advice and recommendations regarding Environmental Issues

Noise

The subject site abuts the Kwinana Freeway and future noise-sensitive land uses may be subject to excessive noise levels. Noise issues should be addressed at the subsequent stages of planning through compliance with the WAPC's *Draft Statement of Planning Policy Road and Rail Transport Noise* and *Draft Statement of Planning Policy Metropolitan Freight Network*.

It is also expected that appropriate studies be carried out to determine noise insulation requirement within future mixed use zones or residential zones adjacent to commercial and/or transport nodes. It should be noted that the accepted methodology for prediction of noise impacts and attenuation due to noise barriers is currently under review by Main Roads WA, and studies should be carried out in accordance with their new guidelines expected to be issued in 2006.

Acid Sulfate Soils

According to the Western Australian Planning Commission's (WAPC) *Planning Bulletin No. 64 - Acid Sulfate Soils* the subject land is mapped as having a moderate to low risk of Actual Acid Sulfate Soils and Potential Acid Sulfate Soils at depths greater than 3 metres. Regardless of the generic mapping provided, please note that investigation of local site characteristics is needed, and if these lead to the view that there is a risk of disturbing acid sulfate soils, then more detailed site investigations and management in accordance with *Planning Bulletin No. 64* and the DEC's *Acid Sulfate Soils Management Series* are appropriate.

Water Management

A large portion of the subject site is identified as a Multiple Use wetland on the DEC's Geomorphic Wetlands Swan Coastal Plain dataset and is relatively low-lying and subject to seasonal inundation.

The subject land is within the Peel-Harvey catchment and the provisions of the *Environmental Protection (Peel Inlet-Harvey Estuary) Policy 1992* and the *Statement of Planning Policy No 2.1 - The Peel-Harvey Coastal Plain Catchment* shall apply. Careful management of stormwater, nutrients, other contaminants and retention of native vegetation is expected consistent with these policies. There shall not be any direct stormwater discharge into any rural drains or wetlands. Stormwater management should be consistent with the DEC's *Stormwater Management Manual for Western Australia*.

Water management is an important issue for the locality, and the broader Peel-Harvey catchment, and the subject site contains areas of low lying land. It is recommended that site planners keep abreast of the initiatives to protect water quality in the Peel-Harvey catchment and the urban water management framework being developed for the Perth metropolitan area. The next stages of planning should be accompanied by water management plans/strategies based on adequate site monitoring and modelling consistent with the urban water management framework and advice of the DEC. In particular, it is expected that there will be negligible nutrient export. There is also an expectation that the site can be serviced by reticulated sewer.

Vegetation and Flora

Aerial photography of the site indicates the subject land is sparsely vegetated. Existing vegetation, including mature trees, of good condition should be retained within the proposed development where possible. As discussed, the subject land is located within the Peel Harvey Catchment where remaining areas of native vegetation are very important for protecting water quality and biodiversity. Under the provisions of the *Statement of Planning Policy No 2.1 - The Peel-Harvey Coastal Plain Catchment*, the proponent is encouraged to retain all areas of native vegetation and to protect them from further degradation.

All native vegetation should be preserved so far as practicable during and after clearing for site works and services to accommodate the proposed subsequent urban development. Measures should be taken to ensure the identification, protection and management of any significant vegetation on site worthy of retention prior to the commencement of site works. It is noted that the proponent proposes to maintain existing hollow-bearing trees as potential habitat for the Carnaby's Black Cockatoo.

Potential Land Use Conflict

It is noted that the site is located in close proximity to several potentially conflicting land uses including a poultry farm and nursery. It is considered that the resolution of potential land use conflicts is a key planning issue that planning authorities are best positioned to resolve, having regard for local planning directions and knowledge and the results of accredited technical studies, on advice from appropriate government agencies. In the absence of site specific technical studies, the EPA's *Guidance Statement No. 3 Separation Distances Between Industrial and Sensitive Land Uses* should be utilised as a guide for generic separation distances.

It is noted that the subject site is located within the generic separation distances for both the poultry farm and the nursery. With regard to managing potential adverse impacts from the poultry farm, the WAPC's *Statement of Planning Policy No 4.3 - Poultry Farms Policy* should be utilised. Assumptions regarding the size and intended operations of the poultry farm should not be relied upon however, and an assessment should be carried out to demonstrate that any potential impacts can be managed. It is considered that any potential impacts from the nursery can be adequately managed and addressed at the next stages of planning.

Site Contamination

A previously submitted report regarding the subject land indicates that there may be a possibility of soil and/or groundwater contamination as a result of historical land use. It is noted that

a Preliminary Site Investigation (PSI) has been carried out which indicates that samples from the site contain zinc at concentrations greater than the environmental investigation levels and petroleum hydrocarbons at a concentration greater than the human health investigation levels. Accordingly, the proponent should be advised to liaise with the DEC's Land and Water Quality Branch and a Site Remediation and Validation Report should be produced in consultation with the DEC's Land and Water Quality Branch.

Preliminary and detailed site investigation and subsequent management plans should be prepared and implemented in accordance with the DEC's *Contaminated Sites Management Series* and to the satisfaction of the DEC's Land and Water Quality Branch.

High Pressure Natural Gas Pipeline

It is noted that the Dampier to Bunbury high pressure natural gas pipeline is located in close proximity to the subject land. Further advice should be sought from the Department of Consumer and Employment Protection, who is the lead agency for the consideration of public risk.

3. General Advice

- For the purposes of Part IV of the EP Act, the scheme amendment is defined as an assessed scheme amendment. In relation to the implementation of the scheme amendment, please note the requirements of Part IV Division 4 of the EP Act.
- There is no appeal right in respect of the EPA's decision on the level of assessment of scheme amendments.
- A copy of this advice will be sent to the relevant authorities and will be available to the public on request.

Yours faithfully



W H Tacey
A/Director
Environmental Impact Assessment

23 October 2006

cc: Department for Planning & Infrastructure

APPENDIX 2

Database Searches

NatureMap Species Report (5km)

Created By Guest user on 12/06/2014

Current Names Only Yes

Core Datasets Only Yes

Method 'By Circle'

Centre 115°49' 22" E, 32°19' 18" S

Buffer 5km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	30032	<i>Acacia saligna</i> subsp. <i>saligna</i>			
2.	24260	<i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
3.	24261	<i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
4.	24262	<i>Acanthiza inornata</i> (Western Thornbill)			
5.	24560	<i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
6.	25535	<i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
7.	25536	<i>Accipiter fasciatus</i> (Brown Goshawk)			
8.	24282	<i>Accipiter fasciatus</i> subsp. <i>fasciatus</i> (Brown Goshawk)			
9.	25755	<i>Acrocephalus australis</i> (Australian Reed Warbler)			
10.	41323	<i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
11.	4582	<i>Adriana quadripartita</i> (Bitter Bush)			
12.	184	<i>Aira caryophyllea</i> (Silvery Hairgrass)	Y		
13.	1728	<i>Allocasuarina fraseriana</i> (Sheoak, Kondil)			
14.	-12228	<i>Aname mainae</i>			
15.	-13162	<i>Aname tepperi</i>			
16.	24312	<i>Anas gracilis</i> (Grey Teal)			
17.	24315	<i>Anas rhynchotis</i> (Australasian Shoveler)			
18.	24316	<i>Anas superciliosa</i> (Pacific Black Duck)			
19.	24561	<i>Anthochaera carunculata</i> (Red Wattlebird)			
20.	24562	<i>Anthochaera lunulata</i> (Western Little Wattlebird)			
21.	202	<i>Anthoxanthum odoratum</i> (Sweet Vernal Grass)	Y		
22.	1117	<i>Aphelia cyperoides</i>			
23.	25554	<i>Apus pacificus</i> (Fork-tailed Swift)		IA	
24.	24285	<i>Aquila audax</i> (Wedge-tailed Eagle)			
25.	25558	<i>Ardea ibis</i> (Cattle Egret)		IA	
26.	41324	<i>Ardea modesta</i> (Eastern Great Egret)		IA	
27.	24341	<i>Ardea pacifica</i> (White-necked Heron)			
28.	25566	<i>Artamus cinereus</i> (Black-faced Woodswallow)			
29.	24353	<i>Artamus cyanopterus</i> (Dusky Woodswallow)			
30.	7851	<i>Asteridea pulverulenta</i> (Common Bristle Daisy)			
31.	17240	<i>Austrostipa flavescens</i>			
32.	234	<i>Avena fatua</i> (Wild Oat)	Y		
33.	24318	<i>Aythya australis</i> (Hardhead)			
34.	1800	<i>Banksia attenuata</i> (Slender Banksia, Piara)			
35.	1819	<i>Banksia grandis</i> (Bull Banksia, Pulgarla)			
36.	1830	<i>Banksia littoralis</i> (Swamp Banksia, Pungura)			
37.	1834	<i>Banksia menziesii</i> (Firewood Banksia)			
38.	32077	<i>Banksia sessilis</i> var. <i>cygnorum</i>			
39.	32080	<i>Banksia sessilis</i> var. <i>sessilis</i>			
40.	740	<i>Baumea arthropphylla</i>			
41.	743	<i>Baumea juncea</i> (Bare Twigrush)			
42.	24319	<i>Biziura lobata</i> (Musk Duck)			
43.	3710	<i>Bossiaea eriocarpa</i> (Common Brown Pea)			
44.	42381	<i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
45.	244	<i>Briza maxima</i> (Blowfly Grass)	Y		
46.	245	<i>Briza minor</i> (Shivery Grass)	Y		
47.	249	<i>Bromus diandrus</i> (Great Brome)	Y		
48.	24359	<i>Burhinus grallarius</i> (Bush Stone-curler)		P4	
49.	25715	<i>Cacatua roseicapilla</i> (Galah)			
50.	25716	<i>Cacatua sanguinea</i> (Little Corella)			
51.	24729	<i>Cacatua tenuirostris</i> (Eastern Long-billed Corella)	Y		
52.	25598	<i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
53.	42307	<i>Cacomantis pallidus</i> (Pallid Cuckoo)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
54.	1276	<i>Caesia micrantha</i> (Pale Grass Lily)			
55.	2854	<i>Calandrinia granulifera</i> (Pygmy Purslane)			
56.	2856	<i>Calandrinia liniflora</i> (Parakeelya)			
57.	24779	<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		IA	
58.	24784	<i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
59.	24788	<i>Calidris ruficollis</i> (Red-necked Stint)		IA	
60.	25717	<i>Calyptrorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
61.	24731	<i>Calyptrorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black-Cockatoo)		T	
62.	24734	<i>Calyptrorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
63.	2957	<i>Cassytha racemosa</i> (Dodder Laurel)			
64.	6542	<i>Centaurium tenuiflorum</i>	Y		
65.	1125	<i>Centrolepis drummondiana</i>			
66.	1129	<i>Centrolepis glabra</i> (Smooth Centrolepis)			
67.	2889	<i>Cerastium glomeratum</i> (Mouse Ear Chickweed)	Y		
68.	24186	<i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
69.	1280	<i>Chamaescilla corymbosa</i> (Blue Squill)			
70.	24376	<i>Charadrius rubricollis</i> (Hooded Plover)		P4	
71.	24377	<i>Charadrius ruficapillus</i> (Red-capped Plover)			
72.	24321	<i>Chenonetia jubata</i> (Australian Wood Duck, Wood Duck)			
73.	24833	<i>Cincloramphus cruralis</i> (Brown Songlark)			
74.	24288	<i>Circus approximans</i> (Swamp Harrier)			
75.	24774	<i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
76.	25675	<i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
77.	24399	<i>Columba livia</i> (Domestic Pigeon)	Y		
78.	4555	<i>Comesperma integerrimum</i>			
79.	4564	<i>Comesperma virgatum</i> (Milkwort)			
80.	1418	<i>Conostylis aculeata</i> (Prickly Conostylis)			
81.	25568	<i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
82.	25592	<i>Corvus coronoides</i> (Australian Raven)			
83.	7945	<i>Cotula coronopifolia</i> (Waterbuttons)	Y		
84.	24671	<i>Coturnix pectoralis</i> (Stubble Quail)			
85.	25595	<i>Cracticus tibicen</i> (Australian Magpie)			
86.	25596	<i>Cracticus torquatus</i> (Grey Butcherbird)			
87.	3137	<i>Crassula colorata</i> (Dense Stonecrop)			
88.	3140	<i>Crassula glomerata</i>	Y		
89.	30893	<i>Cryptoblepharus buechananii</i>			
90.	25020	<i>Cryptoblepharus plagiocephalus</i>			
91.	25027	<i>Ctenotus australis</i>			
92.	25039	<i>Ctenotus fallens</i>			
93.	6663	<i>Cuscuta epithymum</i> (Lesser Dodder, Greater Dodder)	Y		
94.	24322	<i>Cygnus atratus</i> (Black Swan)			
95.	30901	<i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
96.	7454	<i>Dampiera linearis</i> (Common Dampiera)			
97.	3845	<i>Daviesia triflora</i>			
98.	1259	<i>Dianella revoluta</i> (Blueberry Lily)			
99.	1287	<i>Dichopogon capillipes</i>			
100.	-13407	<i>Dingosa serrata</i>			
101.	12939	<i>Diuris magnifica</i>			
102.	4763	<i>Dodonaea hackettiana</i> (Hackett's Hopbush)		P4	
103.	3095	<i>Drosera erythrorhiza</i> (Red Ink Sundew)			
104.	16244	<i>Drosera gigantea</i> subsp. <i>geniculata</i>			
105.	3106	<i>Drosera macrantha</i> (Bridal Rainbow)			
106.	13216	<i>Drosera menziesii</i> subsp. <i>penicillaris</i>			
107.	3131	<i>Drosera stolonifera</i> (Leafy Sundew)			
108.	347	<i>Ehrharta calycina</i> (Perennial Veldt Grass)	Y		
109.	349	<i>Ehrharta longiflora</i> (Annual Veldt Grass)	Y		
110.	24567	<i>Epthianura albifrons</i> (White-fronted Chat)			
111.	15446	<i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i>			
112.	24379	<i>Erythronys cinctus</i> (Red-kneed Dotterel)			
113.	5659	<i>Eucalyptus gomphocephala</i> (Tuart, Duart)			
114.	5708	<i>Eucalyptus marginata</i> (Jarrah, Djara)			
115.	5763	<i>Eucalyptus rudis</i> (Flooded Gum, Kulurda)			
116.	25622	<i>Falco cenchroides</i> (Australian Kestrel)			
117.	25623	<i>Falco longipennis</i> (Australian Hobby)			
118.	25624	<i>Falco peregrinus</i> (Peregrine Falcon)		S	
119.	24041	<i>Felis catus</i> (Cat)	Y		
120.	25727	<i>Fulica atra</i> (Eurasian Coot)			
121.	907	<i>Gahnia trifida</i> (Coast Saw-sedge)			
122.	25729	<i>Gallinula tenebrosa</i> (Dusky Moorhen)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
123.	25530	<i>Gerygone fusca</i> (Western Gerygone)			
124.	1518	<i>Gladiolus angustus</i> (Long Tubed Painted Lady)	Y		
125.	1520	<i>Gladiolus caryophyllaceus</i> (Wild Gladiolus)	Y		
126.	6587	<i>Gomphocarpus fruticosus</i> (Narrowleaf Cottonbush)	Y		
127.	3957	<i>Gompholobium tomentosum</i> (Hairy Yellow Pea)			
128.	24443	<i>Grallina cyanoleuca</i> (Magpie-lark)			
129.	2119	<i>Grevillea vestita</i>			
130.	12824	<i>Grevillea vestita</i> subsp. <i>vestita</i>			
131.	2175	<i>Hakea lissocarpha</i> (Honey Bush)			
132.	24293	<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)		IA	
133.	24295	<i>Haliastur sphenurus</i> (Whistling Kite)			
134.	3961	<i>Hardenbergia comptoniana</i> (Native Wisteria)			
135.	25410	<i>Heleioporus eyrei</i> (Moaning Frog)			
136.	3016	<i>Heliophila pusilla</i>	Y		
137.	25119	<i>Hemiergis quadrilineata</i>			
138.	5135	<i>Hibbertia hypericoides</i> (Yellow Buttercups)			
139.	5162	<i>Hibbertia racemosa</i> (Stalked Guinea Flower)			
140.	25734	<i>Himantopus himantopus</i> (Black-winged Stilt)			
141.	24491	<i>Hirundo neoxena</i> (Welcome Swallow)			
142.	6222	<i>Homaloscadium homalocarpum</i>			
143.	12859	<i>Hovea trisperma</i> var. <i>trisperma</i>			
144.	5216	<i>Hybanthus calycinus</i> (Wild Violet)			
145.	43384	<i>Hydrophis platurus</i> (Yellow-bellied Seasnake)			
146.	5817	<i>Hypocalymma angustifolium</i> (White Myrtle, Kudjid)			
147.	5825	<i>Hypocalymma robustum</i> (Swan River Myrtle)			
148.	8086	<i>Hypochaeris glabra</i> (Smooth Catsear)	Y		
149.	910	<i>Isolepis cernua</i> (Nodding Club-rush)			
150.	917	<i>Isolepis marginata</i> (Coarse Club-rush)	Y		
151.	919	<i>Isolepis oldfieldiana</i>			
152.	24153	<i>Isodon obesulus</i> subsp. <i>fusciventer</i> (Quenda, Southern Brown Bandicoot)		P5	
153.	25563	<i>Ixobrychus minutus</i> (Little Bittern)		P4	
154.	20454	<i>Juncus acutus</i> subsp. <i>acutus</i>	Y		
155.	1189	<i>Juncus pauciflorus</i> (Loose Flower Rush)			
156.	4044	<i>Kennedia prostrata</i> (Scarlet Runner)			
157.	5832	<i>Kunzea ericifolia</i> (Spearwood, Pondil)			
158.	28342	<i>Landoltia punctata</i> (Thin Duckweed)			
159.	1309	<i>Laxmannia squarrosa</i>			
160.	925	<i>Lepidosperma angustatum</i>			
161.	937	<i>Lepidosperma longitudinale</i> (Pithy Sword-sedge)			
162.	944	<i>Lepidosperma scabrum</i>			
163.	25147	<i>Lerista lineata</i> (Perth Slider, Lined Skink)		P3	
164.	6436	<i>Leucopogon propinquus</i>			
165.	25005	<i>Lialis burtonis</i>			
166.	25661	<i>Lichmera indistincta</i> (Brown Honeyeater)			
167.	4362	<i>Linum marginale</i> (Wild Flax)			
168.	7408	<i>Lobelia tenuior</i> (Slender Lobelia)			
169.	6515	<i>Logania vaginalis</i> (White Spray)			
170.	478	<i>Lolium rigidum</i> (Wimmera Ryegrass)	Y		
171.	1223	<i>Lomandra caespitosa</i> (Tufted Mat Rush)			
172.	1246	<i>Lomandra suaveolens</i>			
173.	1198	<i>Luzula meridionalis</i> (Field Woodrush)			
174.	1097	<i>Lyginia barbata</i>			
175.	24132	<i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
176.	85	<i>Macrozamia riedlei</i> (<i>Zamia</i> , <i>Djiridji</i>)			
177.	24326	<i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
178.	25654	<i>Malurus splendens</i> (Splendid Fairy-wren)			
179.	24583	<i>Manorina flavigula</i> (Yellow-throated Miner)			
180.	17747	<i>Meeboldina decipiens</i>			
181.	25758	<i>Megalurus gramineus</i> (Little Grassbird)			
182.	5952	<i>Melaleuca preissiana</i> (Moonah)			
183.	5959	<i>Melaleuca raphiophylla</i> (Swamp Paperbark)			
184.	5978	<i>Melaleuca teretifolia</i> (Banbar)			
185.	4084	<i>Melilotus albus</i>	Y		
186.	25184	<i>Menetia greyii</i>			
187.	24598	<i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
188.	955	<i>Mesomelaena pseudostygia</i>			
189.	485	<i>Microlaena stipoides</i> (Weeping Grass)			
190.	15419	<i>Microtis media</i> subsp. <i>media</i>			
191.	7085	<i>Misopates orontium</i> (Lesser Snapdragon)	Y		
192.	7410	<i>Monopsis debilis</i>	Y		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
193.	24184 <i>Mormopterus planiceps</i> (Southern Freetail-bat)			
194.	24223 <i>Mus musculus</i> (House Mouse)	Y		
195.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
196.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
197.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
198.	24798 <i>Numenius madagascariensis</i> (Eastern Curlew)		T	
199.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
200.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
201.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
202.	14292 <i>Oenothera stricta</i> subsp. <i>stricta</i>	Y		
203.	7348 <i>Opercularia hispidula</i> (Hispid Stinkweed)			
204.	18255 <i>Opercularia vaginata</i> (Dog Weed)			
205.	1372 <i>Ornithogalum arabicum</i> (Lesser Cape Lily)	Y		
206.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
207.	24328 <i>Oxyura australis</i> (Blue-billed Duck)			
208.	25679 <i>Pachycephala pectoralis</i> (Golden Whistler)			
209.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
210.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
211.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
212.	528 <i>Paspalum distichum</i> (Water Couch)	Y		
213.	1550 <i>Patersonia occidentalis</i> (Purple Flag, Koma)			
214.	30471 <i>Patersonia occidentalis</i> var. <i>angustifolia</i>			
215.	4346 <i>Pelargonium littorale</i>			
216.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
217.	2273 <i>Persoonia saccata</i> (Snottygobble)			
218.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
219.	2299 <i>Petrophile linearis</i> (Pixie Mops)			
220.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
221.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
222.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
223.	551 <i>Phalaris minor</i> (Lesser Canary Grass)	Y		
224.	552 <i>Phalaris paradoxa</i> (Paradoxa Grass)	Y		
225.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
226.	1478 <i>Phlebotomus ciliatus</i>			
227.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
228.	4675 <i>Phyllanthus calycinus</i> (False Boronia)			
229.	<i>Phytophthora cinnamomi</i>			
230.	5254 <i>Pimelea leucantha</i>			
231.	5261 <i>Pimelea rosea</i> (Rose Banjine)			
232.	7303 <i>Plantago lanceolata</i> (Ribwort Plantain)	Y		
233.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
234.	24842 <i>Platalea regia</i> (Royal Spoonbill)			
235.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
236.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
237.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
238.	8175 <i>Podolepis gracilis</i> (Slender Podolepis)			
239.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
240.	24681 <i>Polioccephalus poliocephalus</i> (Hoary-headed Grebe)			
241.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
242.	4691 <i>Poranthera microphylla</i> (Small Poranthera)			
243.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
244.	25732 <i>Porzana pusilla</i> (Baillon's Crake)			
245.	24771 <i>Porzana tabuensis</i> (Spotless Crake)			
246.	25511 <i>Pseudonaja affinis</i> (Dugite)			
247.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
248.	25271 <i>Ramphotyphlops australis</i>			
249.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
250.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
251.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
252.	1556 <i>Romulea rosea</i> (Guildford Grass)	Y		
253.	6483 <i>Samolus junceus</i>			
254.	13182 <i>Scaevola repens</i> var. <i>repens</i>			
255.	982 <i>Schoenus clandestinus</i>			
256.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
257.	8224 <i>Siloxerus filifolius</i>			
258.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
259.	30948 <i>Smicronis brevirostris</i> (Weebill)			
260.	7022 <i>Solanum nigrum</i> (Black Berry Nightshade)	Y		
261.	8231 <i>Sonchus oleraceus</i> (Common Sowthistle)	Y		
262.	1312 <i>Sowerbaea laxiflora</i> (Purple Tassels)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
263.	4828 <i>Spyridium globulosum</i> (Basket Bush)			
264.	2918 <i>Stellaria media</i> (Chickweed)	Y		
265.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
266.	25589 <i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
267.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
268.	7806 <i>Stylidium utricularioides</i> (Pink Fan Triggerplant)			
269.	2329 <i>Synaphea spinulosa</i>			
270.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
271.	24682 <i>Tachybaptus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
272.	24185 <i>Tadarida australis</i> (White-striped Freetail-bat)			
273.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
274.	15741 <i>Tamarix aphylla</i> (Athel Tree)	Y		
275.	24844 <i>Threskiornis molucca</i> (Australian White Ibis)			
276.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
277.	1319 <i>Thysanotus arenarius</i>			
278.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
279.	1339 <i>Thysanotus multiflorus</i> (Many-flowered Fringe Lily)			
280.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
281.	25207 <i>Tiliqua rugosa</i> subsp. <i>rugosa</i>			
282.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
283.	6266 <i>Trachymene coerulea</i> (Blue Lace Flower)			
284.	6280 <i>Trachymene pilosa</i> (Native Parsnip)			
285.	4383 <i>Tribulus terrestris</i> (Caltrop)	Y		
286.	39097 <i>Trichia decipiens</i>			
287.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
288.	1361 <i>Tricoryne elatior</i> (Yellow Autumn Lily)			
289.	4292 <i>Trifolium campestre</i> (Hop Clover)	Y		
290.	4295 <i>Trifolium dubium</i> (Suckling Clover)	Y		
291.	4313 <i>Trifolium subterraneum</i> (Subterranean Clover)	Y		
292.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
293.	24808 <i>Tringa nebularia</i> (Common Greenshank)		IA	
294.	8255 <i>Ursinia anthemoides</i> (Ursinia)	Y		
295.	38388 <i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	Y		
296.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
297.	8257 <i>Vellereophyton dealbatum</i> (White Cudweed)	Y		
298.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
299.	722 <i>Vulpia bromoides</i> (Squirrel Tail Fescue)	Y		
300.	724 <i>Vulpia myuros</i> (Rat's Tail Fescue)	Y		
301.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)		P4	
302.	1256 <i>Xanthorrhoea preissii</i> (Grass tree, Palga)			
303.	1049 <i>Zantedeschia aethiopica</i> (Arum Lily)	Y		
304.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

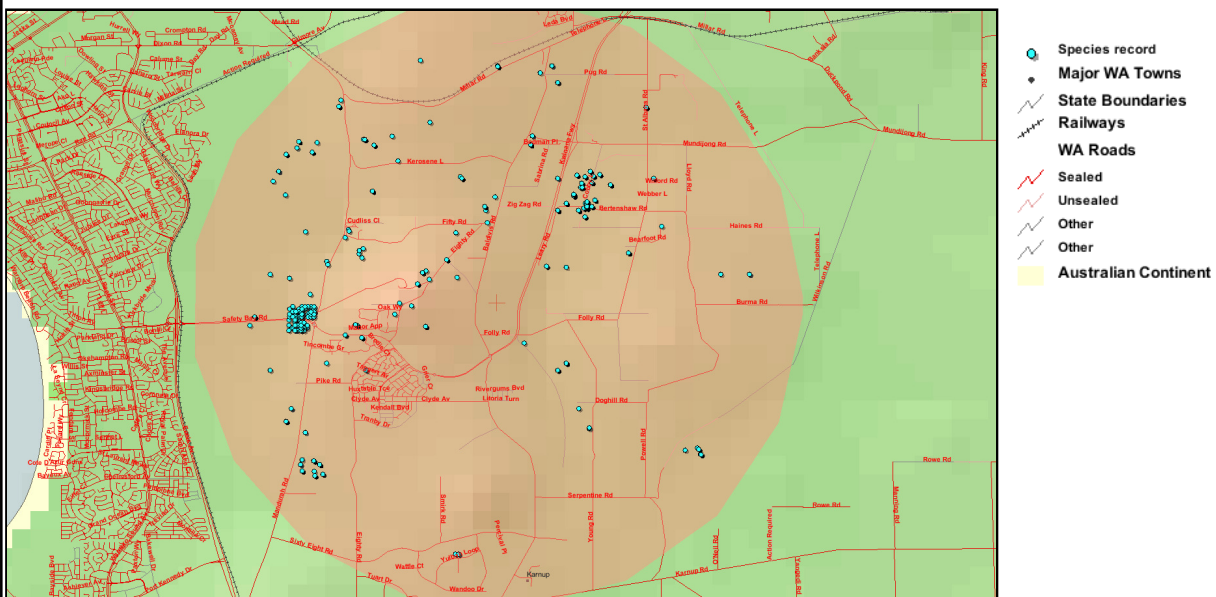
¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



NatureMap Search 5km

Printed by Guest user on 12/6/2014

Query details : Current Names Only=Yes; Core Datasets Only=Yes; Method='By Circle'; Centre=115°49' 22" E,32°19' 18" S; Buffer=5km;



Department of
Environment and Conservation



NatureMap is a collaborative project of the Department of Environment and Conservation, Western Australia, and the Western Australian Museum.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 13/06/14 12:07:24

[Summary](#)

[Details](#)

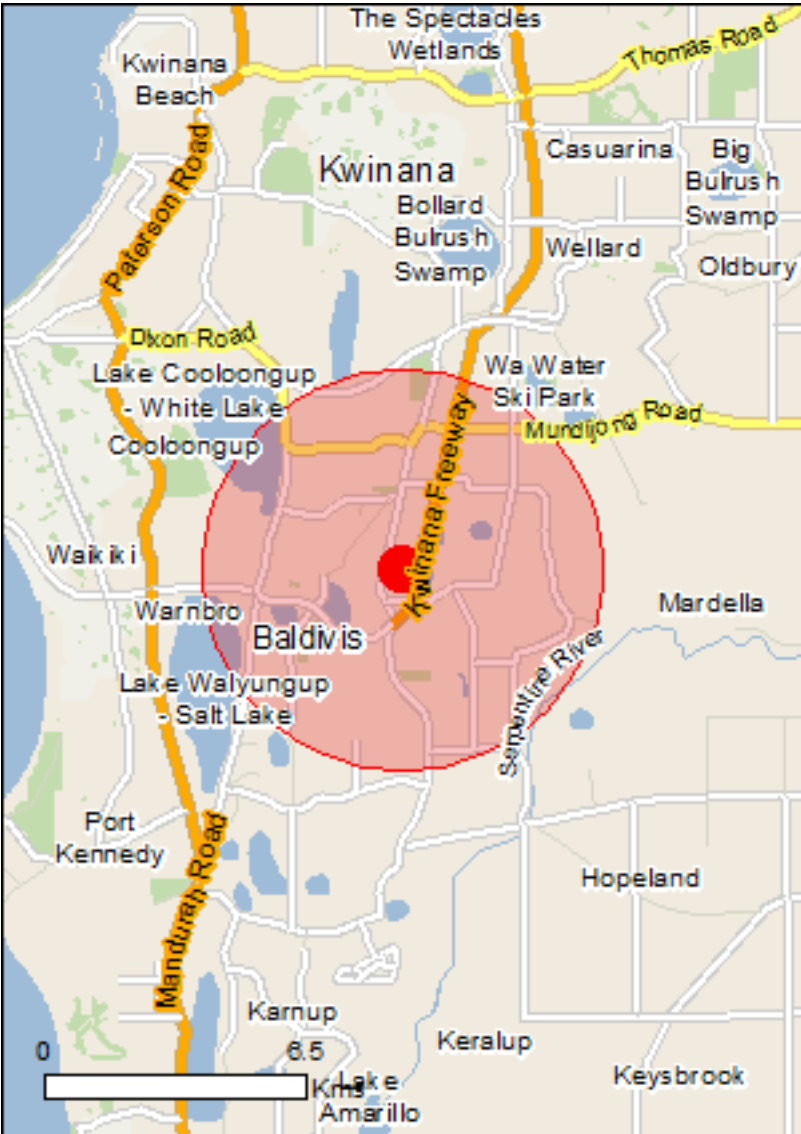
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 5.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	22
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	24
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	8
State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	36
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	[Resource Information]
Name	Proximity
Becher point wetlands	Within 10km of Ramsar
Peel-yalgorup system	Upstream from Ramsar

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community known to occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir [25911]	Vulnerable	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area
Darwinia foetida Muchea Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus balanites Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat likely to occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	Endangered	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land

[Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]		Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Black-winged Stilt [870]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Limosa limosa Black-tailed Godwit [845]	Endangered*	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Extra Information

Places on the RNE		[Resource Information]
Note that not all Indigenous sites may be listed.		
Name	State	Status
Natural		
Baldivis Swamp	WA	Indicative Place
Folly Pool	WA	Indicative Place
Leda Area	WA	Indicative Place
Maramanup Pool	WA	Indicative Place
Outridge Swamp	WA	Indicative Place
Tamworth Hill Swamp	WA	Indicative Place
Lakes Coo loongup and Walyungup and Surrounds	WA	Registered
Lowlands West Block	WA	Registered
State and Territory Reserves		[Resource Information]
Name	State	
Leda	WA	

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Tamarix aphylla		
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Coordinates

-32.32104 115.82326

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.