



LOT 99 PORTCULLIS DRIVE & 130 WOODTHORPE DRIVE WILLETTON

Infill Housing Development August 2016

Prepared for:



This structure plan is prepared under the provisions of the City of Canning Local Planning Scheme No.40

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON: 28 September 2016

Signed for and on behalf of the Western Australian Planning Commission

an officer of the Commission duly authorised by the Commission pursuant to Section 16 of *the Planning and Development* Act 2005 for that purpose, in the presence of:

Janpalen 28 september 2016 Witness Date

Date of Expiry: 28 September 2026

DOCUMENT STATUS

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TABLE 1: TABLE OF AMENDMENTS

Amendment No.	Summary of the Amendment	Amendment Type	Date Approved by the WAPC

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Local Structure Plan (LSP) is prepared to facilitate the coordinated development of Lots 99 Portcullis Drive and 130 Woodthorpe Drive, Willetton hereafter referred to as the 'structure plan area' or 'subject site'.

The subject site is located within the Central Sub-Region of the Perth Metropolitan Area within the municipality of the City of Canning, some 10km south of the Perth Central Business District, 4km southwest of the Cannington Strategic Metropolitan Centre, and 4km east of the Murdoch Specialist Activity Centre.

The subject site presently comprises vacant, unused land. The LSP proposes development of the land for 'Residential' purposes at densities ranging between R30-R50, plus associated public reserves, predominantly open space in the form of a southward expansion of an existing reserve.

Item	Data	Section number referenced within the Structure Plan Report
Total Structure Plan Area	7.8887 hectares	1.2.3 CT's / Appendix A
Area of each Land Use proposed Zones Residential Reserves Public Open Space Public Purposes	7.0998 hectares 0.7889 hectares 0.0100 hectares (+ Existing Trunk Main)	3.1 Local Structure Plan Map 3.3 Local Structure Plan Map
Estimated Lot Yield	257 Survey Strata Lots within up to 4 Parent Freehold Lots	3.1 & 3.6.1 Development Concept / Figure 8
Estimated Number of Dwellings	257 dwellings	3.1 Development Concept / Figure 8
Estimated Residential Density Dwellings per gross hectare (As per Directions 2031) Dwellings per site hectare (As per Liveable Neighbourhoods) 	32.6 dwellings per gross hectare 36.2 dwellings per site hectare	3.1
Estimated Population	668 people @ 2.6 people/household	3.1
Amount of Public Open Space:	0.7889 hectares or 10% POS	3.3 Development Concept / Figure 8 POS Schedule / Figure 9
Composition of Public Open Space Local Parks 	0.7889 hectares 100%	3.3 POS Concept / Figure 10

TABLE 2: STRUCTURE PLAN SUMMARY TABLE

Agency	Date of Consultation	Method of Consultation	Summary of Outcome
	July-August 2013	Telephone & Email	Confirm technical content, relevant policies and fees assoicated with TPS Amendment
	16/8/2013	Meeting	Feedback on Initial Design. In Principal Officer support for straight Residential Re-Zoning
	September 2013	Various Emails	 City Planners amd Engineers confirmed: Support for Principal Shared Path connection across WC land. No objection to shortening of Woodthorpe Drive; Existing traffic generation low – no need for further detailed analysis; & Want full 10% POS – no cash-in-lieu of smaller provision. Provision of general advice on now-superseeded design.
	November 2013	Telephone & Email	Testing of various aspects of a now-superseeded design.
	December 2013	Telephone & Email	Application placed on hold due to withdrawal of landowner consent.
	February 2014	Telephone & Email	Confirmed Nicheliving has reached agreement with EDC to acquire both Lot 99 Portcullis & Lot 130 Woodthorpe Drives. City preference for thwo sites to be processed as one TPS Amendment.
Local Government	9/5/2014	Meeting	Feedback on expanded design. Confirmed necessary supporting reports. In Principal Officer support for straight Residential Re-Zoning
	June-July 2014	Telephone & Email	Confirmation of general servicing information and requirements with City Engineers.
	October 2014	Telephone & Email	Confirmation of Ownership Details
	November 2014	Telephone & Email	 Confirm highly degraded nature of remnant vegetation and engineering matters that form the basis of Developer's objection to potential movement of POS. Confirm housing variety to address affordability, no specific intention to include social housing. Discussion on zoning anomalies and agreement to retain estranged corner as zoned Mixed Business. Opportunity to revisit post-advertising if WC issues can be resolved.
	December 2014	Telephone & Email	 Discussion on the merits or otherwise of Commissioner proposed Development zone. In princpal agreement that simplest, most cost and officertime efficient outcome to proceed as initially proposed. Confirmation by City Planning Director that if Commissioners decide to pursue Development Zone and Structure Plan, existing technical information was sufficient.

TABLE 3: PRE-LODGEMENT CONSULTATION

Agency Date of Consultation		Method of Consultation	Summary of Outcome
	March 2015	Email	Confirmation of EPA decision – Scheme Not Assessed, No Advice provided.
Local Government	July - August 2015	Meeting & Emails	Negotiation of mdofications to the LSP extent, arranagement and residential densities in response to public submissions received.
(cont.)	June 2016	Meeting	General acceptance to further Development Concept modifications relating to Busfhire Management, enhanced protection of the Serpentine Trunk Main and interface to Woodthorpe Drive.
	August 2013	Telephone & Email	Identification of issues regarding creation of pedestrian connection accross WC land.
	May-June 2014	Telephone & Email	Identification of issues/limitations relating to Serpentine Trunk Main within Lot 64 that severs the eastern corner of Lot 130. Future second main to be inserted within Lot 64.
Water Corporation	29/1/2015	Meeting	Identification of issues relating to estranged Triangle and potential means to overcome.
	March-August 2015	Telephone & Email	General acceptance of civil engineering arrangements to cross the trunk main.
	20/10/2015	Meeting	Discussion to inform terms of Lease Arrangement including granting of an additional 2m easement.
	Dec. 2015 - July 2016	Exchange of Letters	Progression and finalisation of Lease Arrangement.
Department of Water	September 2013	Telephone & Email	Discussion on Draiange Approach. Confirmation that no DWMS or LWMS is required. Lot 99 meets exemptions set out in Better Urban Water Management Policy.
	June 2014	Telephone & Email	Confirmation that no DWMS or LWMS are required. Expanded site continues to meet exemptions set out in Better Urban Water Management Policy.
Department of Aboriginal Affairs	14/1/2014	Email	Confirmation of 18 December 2013 Aboriginal Cultural Material Committee decision to remove DAA site 4313 from The Aboriginal Heritage Register.
Main Roads WA	July 2014	Telephone & Email	Confirmed estimated traffic volumes along Roe Highway for use in Acoustic Study.
ATCO Gas Australia	July 2014	Email	Confirmation of servicing capacity, inputs and requirements.
Western Power	July 2014	Telephone & Email	Confirmation of servicing capacity, inputs and requirements.
Telstra	July 2014	Telephone & Email	Confirmation of servicing capacity, inputs and requirements.

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3.6.9 TELEPHONE & NBN

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PART ONE STATUTORY SECTION

1 STRUCTURE PLAN AREA

This Structure Plan shall apply to Lot 99 Portcullis Drive and Lot 130 Woodthorpe Drive, Willetton; being the land contained within the inner edge of the line denoting the Structure Plan boundary on the Structure Plan Map.

2 STRUCTURE PLAN CONTENT

This Structure Plan comprises the following:

(i) Part One – Statutory Section

This section contains the Structure Plan Map and any textual provisions, standards or requirements that require statutory effect.

(ii) Part Two – Explanatory Section (Non-Statutory)

This section provides the planning context and justification for the Structure Plan Map and the textual provisions, standards or requirements contained in Part One of the Structure Plan. Part Two is to be used as a reference to guide interpretation and the implementation of Part One.

(iii) Appendices

Includes all specialist consultant reports and documentation used in the preparation of and to support the land use outcomes of the Structure Plan.

3 INTERPRETATION AND RELATIONSHIP WITH TPS NO.40

3.1	Terms and Interpretations	Unless otherwise specified in this part, the words and expressions used in this Structure Plan shall have the respective meanings given to them in the City of Canning Town Planning Scheme No. 40 ('Scheme') including any amendments gazetted thereto.
3.2	Relationship of the Structure Plan with Town Planning Scheme No.40	This Structure Plan has been prepared under Part XI of the Scheme as the subject land is zoned 'Development' and contained within Development Area No. 4 which is shown on the Scheme Map and contained within Appendix No.9.
		The Structure Plan Map outlines the Land Use, Zones and Reserves applicable within the Structure Plan Area. The Zones and Reserves designated under this Structure Plan apply to the land within it as if the Zones and Reserves were incorporated into the Scheme.
3.3	Provisions, Standards or Requirements	The provisions, standards or requirements specified under Part One of this Structure Plan shall have the same force and effect as if it were a provision, standard or requirement of the Scheme.
		Pursuant to Clause 11.12.2 of the Scheme, in the case of any inconsistency between the Scheme and any provisions, standards or requirements specified under Part One of this Structure Plan, the Scheme prevails to the extent of the inconsistency.
		Any other provision, standard or requirement of Part One of the structure Plan that is not otherwise contained in the Scheme, shall apply to the structure plan area as through it is incorporated into the Scheme, and shall be binding and enforceable to the same extent as if part of the Scheme; and
		Part Two of this Structure Plan and all appendices are to be used as reference only and clarify and guide interpretation and implementation of Part One.

4 OPERATION

4.1	Operation Date	In accordance with Clause 11.12.1 of the Scheme, this structure plan shall come into when it is either certified by the Western Australian Planning Commission (WAPC) pursuant to clause 11.10.2 of the Scheme or adopted, signed and sealed by the Council pursuant to clause 11.9.1 of the Scheme, whichever is the latter.
4.2	Change or Modification from Structure Plan	Clause 11.14 of the Scheme outlines the manner in which a change to or departure from a Structure Plan is determined.

5 LAND USE AND SUBDIVISION

5.1	Structure Plan Map	The subdivision and development of land is to generally be in accordance with the Structure Plan and any associated provisions contained in Appendix No.9.
5.2	Residential Density	Residential densities applicable to the Structure Plan Area shall be those residential densities shown on the Structure Plan Map.
5.3	Public Open Space	Integration of drainage from adjoining development within the Public Open Space reservation shall be permitted, where continued compliance with the 10% POS land area requirement is suitably demonstrated, having regard for the POS crediting arrangements outlined in Liveable Neighbourhoods.
5.4	Movement Network	Roads internal to the Structure Plan shall be private streets maintained by the Strata Company within common property.

6 SUBDIVISION/DEVELOPMENT

6.1	Noise Wall	A Noise Attenuation Wall is to be constructed, generally as shown on the face of the Structure Plan Map, in accordance with the recommendations of a Acoustic Assessment and the requirements of State Planning Policy 5.4.
6.2	Notifications on Title	In respect of applications for the survey-strata subdivision of the land, the Council shall recommend to the Western Australian Planning Commission that a condition be imposed on the grant of approval for a notification to be placed on the Certificate(s) of Title(s) of affected lots, advising of the following: -
		Bushfire Attack Level (BAL) Contour Assessment contained within <i>Appendix B</i> ;
		 Building setbacks and construction standards required to achieve a Bushfire Attack Level 29 or lower in accordance with Australian Standards (AS3959- 2009): Construction of Buildings in Bushfire Prone Areas.
		3. Lots affected by noise levels exceeding the noise target as per State Planning Policy 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning.

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PART TWO EXPLANATORY INFORMATION

1 PLANNING BACKGROUND

1.1 INTRODUCTION AND PURPOSE

Local Structure Plans are forward-planning documents that resolve regional and/or localised issues concerning land use and infrastructure and are often prepared as a precursor to extensive subdivision and development.

The purpose of this Structure Plan is to facilitate and guide future development of the Project Area, principally for residential purposes, following the City's December 2014 decision to initiate Scheme Amendment No. 206, which seeks to rezone the land from '*Mixed Business*' (accommodating a variety of commercial and light industrial activities) to a '*Development*' Zone. Through the use of graphics and supporting technical data, the Structure Plan recommends the preferred:

- pattern of land use;
- network and hierarchy of roads;
- public open space network; and the
- necessary servicing strategy for the precinct.

The Structure Plan has been prepared in accordance with:

- Part XI of the City of Canning Town Planning Scheme No.40; &
- the WAPC's 'Structure Plan Preparation Guidelines' (August 2012);

The plan is supported by a range of technical reports including environmental, heritage, acoustic and servicing analysis that can be found as Appendices to this report. Once endorsed, the LSP will become the reference document for all future subdivision and development within the subject site.

The Project Team responsible for preparing the information contained within this report (in consultation with the City of Canning and relevant Service Authorities) include the following:

PROJECT ROLE	COMPANY
Town Planning:	Taylor Burrell Barnett
Architecture & Design:	Luigi Di Rosso Architects
Civil Engineering:	Tadros Dixon / Calibre Consulting
Environment:	360 Environmental
Landscape Design:	Urban Landscaping
Acoustics:	Lloyd George
Bushfire Management	Rural Fire Risk Consultancy (RUIC)



LOCATION PLAN

Lot 99 Portcullis Drive & Lot 130 Woodthorpe Drive, Willetton A Niche Living Project





1.2 LAND DESCRIPTION

1.2.1 LOCATION

The LSP covers two landholdings, being Lots 99 Portcullis and 130 Woodthorpe Drives, Willetton. Hereafter referred to as the *'Project Area'*, the combined site lies 10km south of the Perth Central Business District, 4km southwest of the Cannington Strategic Metropolitan Centre, and 4km east of the Murdoch Specialist Activity Centre within the Central Sub-Region of the Perth Metropolitan Area. Roe Highway lies a short distance to the south with Willeri Drive (a short drive to the east) providing convenient access to the highway and regional road network beyond (*refer Figure 1*).

1.2.2 AREA AND LAND USE

The combined site measures 7.8887 hectares in area, consisting entirely of highly disturbed, undeveloped land.

The surrounding area contains a wide variety of existing land uses. To the west of the site is the established low density residential suburb of Willetton.

Immediately to the north-west, on the opposite side of Woodthorpe Drive is a small park, a Buddhist learning centre and a small number of service commercial type businesses set well back from the road due to an easement protecting an existing Western Power high voltage overhead power line.

To the north-east lies an existing Private School (Woodthorpe School), opposite a church and adjacent a small collection of office, food and Beveridge and convenience retail outlets that form the basis of a local activity centre.

In addition to the Serpentine Trunk Main, along the south-eastern boundary lies a narrow Water Corporation owned lot encompassing a waste water pipeline running parallel with Roe Highway, which then separates the land from the Canning Vale Strategic Industrial Area (refer *Figure 2*).







1.2.3 LEGAL DESCRIPTION AND OWNERSHIP

The property details and tenure of the land the subject of this application are described in the table below. Copies of the Certificates of Title are attached as **Appendix A**.

Lot No.	Volume	Folio	Diagram	Area (ha)	Owner
99	1970	820	P2903	3.9225	Geraldton Project Wells Pty Ltd (Nicheliving)
130	2526	49	DP34511	3.9662	Freedom Willetton Pty Ltd (Nicheliving)



CONTEXT PLAN Lot 99 Portcullis Drive & Lot 130 Woodthorpe Drive, Willetton

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1.3 PLANNING FRAMEWORK

1.3.1 ZONING AND RESERVATIONS

METROPOLITAN REGION SCHEME

The Metropolitan Region Scheme (MRS) provides the statutory framework for land use within the Perth Metropolitan Region. *Figure 3* identifies the current zoning of the *Project Area* as being '*Urban*' in the MRS, consistent with that of all surrounding land north of Roe Highway.

Roe Highway itself is reserved as '*Primary Regional Road*' befitting its status in the Perth Metropolitan Regional Road and associated Freight Network. Land south of Roe Highway is zoned '*Industrial*', reflective of its development and ongoing use as the Canning Vale Strategic Industrial Area.

CITY OF CANNING TOWN PLANNING SCHEME NO. 40

The City of Canning Town Planning Scheme No.40 (TPS40) refines the MRS, outlining permissible land uses and relevant standards pertaining to development within each of its various identified zones. *Figure 4* identifies the *Project Area* as currently being zoned *'Mixed Business'*, the purpose and intent of which is defined in *Clause 6.3.3* of TPS40 as being to:

"provide a suitable planned environment to accommodate a wide range of light industrial and service commercial uses together with small-scale enterprises that are not readily accommodated in existing Commercial Centres."

Having been zoned for this purpose since prior to the adoption of TPS40 in February 1994, the take up of this and surrounding land has been extremely slow, reflective of a clear market preference to locate within nearby industrial estates that are not subject to the same land use limitation and/or potential buffer implications. Directly opposite the Project Area, on the opposite side of the Woodthorpe Drive road reservation is a small park reserved under TPS40 for *'Public Open Space'*. This is part of a chain of POS areas spread along Portcullis Drive (including Portcullis Park) that ensure the area is well provided for in terms of local active and passive recreational opportunities.

Convenience retail facilities are also available within the immediate area in the form a *'Commercial'* zoned service station inclusive of an *'Additional Use'* right to operate a *'Convenience Store'* at the intersection of Collins Road and Willeri Drive. Elsewhere, surrounding land north of Roe Highway is zoned 'Residential' (including properties adjacent the southwest boundary of the site) with a predominant base residential coding of R17.5 (571m² ave.) interspersed with small isolated pockets of R30 (300m² ave.) development. To the south, land is either reserved or zoned directly in accordance with the MRS.

AMENDMENT NO. 206

At its meeting on the 16th December 2014, the City of Canning resolved to initiate Amendment No.206 to TPS40 which seeks to rezone the land from '*Mixed Business*' to '*Development*' in order to accommodate development of the land primarily for residential purposes, generally in accordance with a Concept Plan contained there-in. A copy of the proposed Scheme Amendment Map is included as *Figure 5*.

At the same time the City resolved to accept the Scheme Amendment Request report (and associated Concept Plan) as the basis of a future Structure Plan (this document), that is to be reviewed by the City's Planning Department prior to being advertised concurrent with the Scheme Amendment in accordance with Clause 11.8 of TPS40.



MRS AND TPS40 EXTRACTS

Lot 99 Portcullis Drive & Lot 130 Woodthorpe Drive, Willetton

03-04



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AMENDMENT No. 206 Lot 99 Portcullis Drive & Lot 130 Woodthorpe Drive, Willetton

figure 05

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1.4 PLANNING STRATEGIES

1.4.1 DIRECTIONS 2031 AND BEYOND

Published in August 2010, Directions 2031 and Beyond: Metropolitan Planning Beyond the Horizon "is a high level spatial framework and strategic plan that establishes a vision for future growth for the metropolitan Perth and Peel region...". It "provides a framework to guide the detailed planning and delivery of housing, infrastructure and services necessary to accommodate a range of growth scenarios."

In addition to providing broad strategic guidance on accommodating Perth's population into the future, *Directions* 2031 divides the metropolitan area into sub-regions, and discusses how growth should be accommodated within these specific geographic units. The subject site located within the central metropolitan sub-region, where an additional 121,000 dwellings are anticipated as being required to accommodate a projected additional population of 205,000 (creating a total population of around 910,000) by 2031. Based on the preferred 'connected city' pattern, this growth is to be achieved through a combination of infill and green field development, with a particular emphasis on infill and higher densities within the Central sub-region due to it containing an expansive range of services and employment opportunities.

1.4.2 CENTRAL METROPOLITAN PERTH SUB-REGIONAL STRATEGY

Sub-Regional strategies provide a framework for delivering the objectives of Directions 2031. They identify a strategic plan of actions, stakeholder responsibilities and timeframes for delivery. Importantly, they also express dwelling targets for each of the local governments within the sub-region based on a proportional take-up of the anticipated growth, in doing so striving to improve land efficiency and counter the trend towards urban sprawl.

For the City of Canning, the *Draft Central Metropolitan Perth Sub-Regional Strategy* (2010) identifies a target of 9,000 additional dwellings being required by 2031, of which some 5,780 are to be delivered through small scale incremental development. Rezoning of this site to residential will assist the City in meeting its obligations under this document.

1.4.3 CITY OF CANNING LOCAL PLANNING STRATEGY

The City of Canning is understood to presently be in the early stages of preparing a Local Planning Strategy in anticipation of undertaking a comprehensive review of TPS40. In 2014, the City released its Draft Local Housing Strategy, however due to the existing *'Mixed Business'* zoning of the land the study did not contemplate redevelopment of the land for residential purposes.

Of importance to this proposal however, the City's Housing Strategy (September 2014) recognises the need for existing low density inner metropolitan suburbs such as Willetton, which boast access to an abundance of local and regional level services, to diversify in order to become more efficient in terms of dwellings per urban hectare, and to provide important opportunities for local residents to age-in-place.

1.5 RELEVANT PLANNING POLICIES

1.5.1 STATE PLANNING POLICIES

SPP 3.7 - PLANNING IN BUSHFIRE PRONE AREAS

SPP 3.7 sets out a range of matters that need to be addressed at various stages of the planning process, to provide an appropriate level of protection to life and property from bush fires, and avoid inappropriately located or designed land use, subdivision and development on land where a bush fire risk is identified. Bushfire considerations have influenced the final Development Concept, as outlined in *Section 2.2* of this report and the Bushfire Attack Level (BAL) Contour Assessment attached at *Appendix B*.

SPP 4.1 - INDUSTRIAL BUFFERS

SPP 4.1 seeks (in part), to protect industry, infrastructure and special uses from the encroachment of incompatible land uses, and to provide for the safety and amenity of land uses surrounding industry.

Due to the manner in which land uses have been arranged within the Canning Vale Strategic Industrial Area, no offsite buffer is currently in existence that would impact on the proposed change of use, or density of development proposed within the *Project Area*. With respect to light and service industry (such as the existing and approvable uses within the Mixed Business zone on the opposite side of Woodthorpe Drive), the policy specifies that uses be required to retain all emissions and hazards on-site.

Notwithstanding the above, in addition to the separation created by the alignment of the high voltage power line easement, housing opposite the remnant mixed business precinct has been deliberately orientated away from existing businesses, with a landscaped fencing treatment proposed where the private internal road wraps around adjacent the public road reservation.

SPP 5.4 - TRANSPORT NOISE CONSIDERATIONS IN LAND USE PLANNING

SPP 5.4 seeks (in part), to minimise the adverse impact of transport noise, without placing unreasonable restrictions on noise-sensitive residential development. This Policy is applied (amongst other cases) where the proposal includes a proposed new noise-sensitive development in the vicinity of an existing or future major road, rail or freight handling facility (as is the case in this instance).

A Transportation Noise Assessment prepared by Lloyd George Acoustics is included at **Appendix C**. The report assesses the current and likely future noise impacts emanating from Roe Highway (a critical element of the States Strategic Freight Network) and confirms the need for mitigation measures to be adopted for future noise sensitive (residential) development of the site.

In conclusion, the report outlines two options by which the development can be made to comply with the requirements of SPP 5.4, based on the construction of a noise wall of differing heights along the site's boundary with Roe Highway (2.8m vs 3.6m), and the use of facade packages (incorporating Quiet House Design Standards) for nearby dwellings, whose extent differs depending on the size of the wall ultimately constructed.

1.5.2 LOCAL PLANNING POLICIES

It is understood that the land is affected by the City's Guided Development Scheme No.24, which requires prior to implementing subdivision or strata title approval for this site payment of a contribution towards public open space, local centre and scheme costs in accordance with Clauses 29A, 40, 45 and 49 of the Scheme respectively. Otherwise there are no specific local planning policies of note, that directly relate to the *Project Area*. Upon successful completion of Amendment No.206 and this associated Local Structure Plan, the Residential Design Codes (R-Codes) will guide development of the land for residential purposes in a manner that complements and does not detract from surrounding development.



AERIAL PHOTOGRAPH Lot 99 Portcullis Drive & Lot 130 Woodthorpe Drive, Willetton

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2 SITE CONDITIONS AND CONSTRAINTS

2.1 BIODIVERSITY, LANDFORM AND HYDROLOGY

An Environmental Assessment Report (including a review of two 2005 detailed ENV vegetation surveys), prepared by 360 Environmental appears at **Appendix D**. A summary of the key findings appears below.

The site (refer *Figure 6*) is undulating, having formed the subject of historic top soil removal and sand extraction. The site is also predominantly cleared, with remaining vegetation in a degraded condition due to continued disturbance of the site by occupants and visitors of the surrounding locality. Due to the isolated nature of the site, the vegetation is considered to hold limited habitat value.

Other key findings of the EAR report of relevance to this proposal include:

- The site is not affected by any surface or groundwater protection areas; &
- Surrounding use does not pose an impact or preclude residential development of the site.

In terms of matters requiring further consideration as development proceeds, the EAR identifies:

- A 'low' to 'medium' risk that the underlying earth contains of Acid Sulphate Soils;
- The potential for pockets of uncontrolled dumping to be discovered; &
- > The likely need to ameliorate noise impacts from Roe Highway.

2.2 BUSHFIRE MANAGEMENT

A Bushfire Attack Level Contour Assessment prepared by Rural Fire Risk Consultancy (RUIC) appears at **Appendix B**. Prepared in response to the lands partial identification as being Bushfire Prone on Department of Fire and Emergency Services, the report identifies vegetation within the Roe Highway reservation as posing some risk to future development of the Project Area. The report concludes that this concern can be readily addressed however, via the application of minor building setbacks and the imposition of higher building standards for all future dwellings within 100m of the reserve. Alteration to the internal road network introducing a road along the majority of the Project Area's interface with Roe Highway (refer **Figure 8**) has significantly reduced this area of concern.

2.3 HERITAGE

There are no areas of European Heritag significance, however the *Project Area* was previously identified on the Department of Aboriginal Affairs Heritage Register as Site No. 4313 (Beasley Road), an artifacts scatter site identified back in 1974. A detailed review of the site (by Snappy Gum Heritage Services in May 2013 - refer *Appendix E*) however, revealed that the hill on which Site 4313 was thought to be located has long been removed (most likely as a result of historic sand extraction), the artefactual material removed, and consequently concluded that the site should no longer be considered a place of importance or significance under *Section 5(a) or (c)* of the *Aboriginal Heritage Act 1972*.

A formal request to update the Register to reflect this work was submitted to the Department of Aboriginal Affairs by Ethnosciences in July 2013. In August 2013 the Department of Aborignal Affairs responded by advising that the Registrar supports the view that the site has been previously disturbed, that development of the site involves no impact on heritage values, and that a recommendation will be presented to the Aboriginal Cultural Material Committee for Site 4313 to be reassessed at its next available sitting (refer *Appendix E*). The Aboriginal Cultural Material Committee subsequently met on the 18th December 2013, with Site 4313 being formally delisted as a registered site following Committee ratifiction of the December meeting minutes on the 12th February 2014. A copy of email correspondence between the City's then CEO and the Executive Officer of the Aboriginal Cultural Material Committee confirming this outcome is attached at *Appendix E*. The outcome is further confirmed in the results of the desktop heritage assessment within the Environmental Assessment Report included as *Appendix D*.

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2.4 EXISTING MOVEMENT NETWORK

2.4.1 ROAD NETWORK

Vehicle access is currently available to the site via both Portcullis and Woodthorpe Drives, which are deliberately disconnected in an apparent attempt to segregate existing residential traffic (to the west) from that associated with the Mixed Business zone. City Officers have indicated a desire to retain this arrangement.

In order to consider the validity of a number of comments that came through during public advertisement, Flyt were commissioned by the proponent to prepare a Transport Assessment Report in July 2015. A full copy of the report can be found at **Appendix F**. Relevant extracts from the report detailing the existing movement network appear below.



<u>Woodthorpe Drive</u>: is a cul-de-sac currently providing access to the mixed business zone. It is designated as an Access Street under Main Roads WA's (MRWA) Functional Road Hierarchy, which are intended to provide:

...access to abutting properties with safety aspects having priority over the vehicle movement function. In urban areas, these roads are bicycle and pedestrian friendly, with aesthetics and amenity also important.

Woodthorpe Drive is 9m wide and has a 50 kph speed limit. The City of Canning has no recent traffic counts for Woodthorpe Drive, however, as part of this traffic assessment peak hour turning counts were collected at the intersection of Woodthorpe Drive and Collins Road. These counts suggest Woodthorpe Drive is carrying less than 200 vehicles per day (vpd). MRWA Road Hierarchy criteria state that Access Roads can carry up to 3,000 vpd. Woodthorpe Drive intersects with Collins Road in a Give-Way controlled T-intersection.

<u>Portcullis Drive</u>: is a loop road starting and terminating at Collins Road, with the eastern intersection with Collins Road the closest to the subject site. It is designated as a Local Distributor under the Functional Road Hierarchy. Local Distributors are defined as roads:

...that carry traffic within a cell and link District Distributors or Primary Distributors at the boundary, to access roads. The route of Local Distributors should discourage through traffic so that the cell formed by the grid of higher order distributor roads, only carries traffic belonging to, or serving the area. Local Distributors should accommodate buses, but discourage trucks.

Portcullis Drive is 10m wide, however it includes on-street cycle lanes and a 2m painted median. It has a 50kph speed limit. The most recent traffic volumes for Portcullis Drive, collected by the City of Canning in July 2013, reveal it is carrying approximately 700 vpd west of Gloucester Court (immediately to the west of the western boundary of the subject site) and 1,600 vpd south of Collins Road (at the eastern intersection with Collins Road, closest to the subject site). As a Local Distributor, Portcullis Drive has the capacity to accommodate up to 6,000 vpd.

The T-intersection between Portcullis Drive and Collins Road closest to the subject site is a Give-Way controlled. The T-intersection further to the west is roundabout controlled.

<u>Collins Road</u>: provides a connection between Vahland Avenue and Willeri Drive. It is designated as a Distributor B. Distributors A and B are defined as follows:

Distributor A carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property.

Distributor B perform a similar function to type A District Distributors, but with reduced capacity due to flow restrictions caused by frequent property accesses and roadside parking in many instances. These are often older roads with a traffic demand in excess of that originally intended.

Collins Road is 12m wide, however it includes on-street cycle lanes and a 3m painted median. It has a 60kph speed limit. The most recent traffic counts for Collins Road, undertaken by MRWA in October 2008, reveal Collins Road carried 9,700 vpd to the west of Willeri Drive. This traffic count was undertaken in the school holidays, and therefore underestimated regular traffic volumes. The next most recent count, undertaken in February 2008 at the same location, revealed a volume of 11,200 vpd with 3.7% heavy vehicles. SCATS traffic data collected as part of this assessment and dated May 2015 show Collins Road is carrying 10,500 vpd to the east of Vahland Avenue. As a Distributor B, Collins Road can accommodate between 6,000 and 15,000 vpd.

Collins Road has a dual lane roundabout controlled intersection with Willeri Drive and a signalised T-intersection with Vahland Avenue.

Other roads which may be impacted by the Scheme Amendment include Arlington Drive and Turret Road, both Local Distributors with Give-Way controlled T-intersections at Vahland Avenue.

2.4.2 PUBLIC TRANSPORT

The project area is serviced by bus routes 506 and 507 which can be accessed via a 300-600 walk (depending on the location within the subject area) to Collins Road. Routes 98, 99 and 75 are within a 1km walking distance.

Route 506 is a peak period service between Bull Creek Station and Parkwood, travelling along Collins Road in the vicinity of the subject site. In the morning peak 90 minutes there are 7 services to Bull Creek and in the PM peak 90 minutes there are 9 services to Parkwood.

Route 507 is a service between Bull Creek Station and Cannington Station, travelling along Collins Road and then Rostrata Avenue. There are 67 weekday services from Cannington to Bull Creek, and 71 weekday services from Bull Creek to Cannington. Services run approximately every 15 minutes.

2.4.3 PEDESTRIAN & BICYCLE NETWORK

The area surrounding the project area has a high level of footpath and shared path connectivity, as shown in the graphic below:



Portculis Drive has a shared path along one side (the eastern side bewteen Collins Road and the subject site, switching to the northern side of the road after the bend) and has on-road cycle lanes. There is a 1.8m wide shared path along the northern side of Collins Road and a footpath along the southern side, as well as on-road cycle lanes.

The Roe Highway Principal Shared Path (PSP) runs along the southeast site boundary. The PSP provides high standard, grade-separated pedestrian and bicycle access to regional bicycle routes such as the Kwinana Freeway PSP and Armadale Train line PSP.

In addition there are shared paths along Willeri Drive and Vahland Avenue providing access to more local destinations.

2.5 SUMMARY OF CONTEXT AND LAND USE CONSTRAINTS

A succinct summary of the key issues and opportunities that relate to the site are listed below (and shown graphically on *Figure 7*):

- A readily serviceable, urban zoned, inner city location capable of being developed in a manner that will assist the City in meeting infill housing targets set in the State Strategic Planning Framework;
- The project provides opportunity to address the lack of housing diversity and create opportunities for first home buyers in the suburb they were raised, or for older existing residents to age-in-place;
- > The site enjoys immediate proximity to employment, educational, recreation and retail facilities;
- Development of the eastern corner is reliant on agreement being reached with the Water Coporation to install a vehicular crossing over the Serpentine Trunk Mains, a high pressure water pipeline corridor;
- Existing Public Open Space reservation could be made more attractive and usable, by placing the necessary additional reserve immediately adjacent;
- The POS reserve could be further enhanced by shortening the constructed length of Woodthorpe Drive and landscaping the portion that would otherwise divide the consolidated reserve;
- An abundance of reserves in the general locality presents the opportunity for POS contribution to be delivered in the form of a combination of land area and existing park improvements should the City be willing to entertain such a proposal;
- > Remaining vegetation on-site is degraded and of limited environmental significance;
- Remnant vegetation within the Roe Highway reservation requires future development to be setback and/or to be constructed to a higher standard in accordance with the requirements of AS 3959 – Building in Bushfire Prone Areas;
- > DAA Site No.4313 has been delisted and poses no restriction to future development of the site;
- The site enjoys excellent access to the regional road network, with connecting roads suitably designed and constructed to accommodate expected traffic generated by this development;
- Opportunity to supplement local access to the adjacent Principal Shared Path network is significantly constrained by virtue of the need for a noise wall to protect the development from Roe Highway, and the existence of a Water Corporation owned lot incorporating a sewer pipeline along the south eastern boundary of the site;
- Expected noise from Roe Highway requires abatement via construction of an acoustic wall in addition to the use of Quiet House Design building elements for nearby dwellings;
- Turning development such that it backs onto Woodthorpe Drive may be appropriate, given the existence of a a high voltage transmission line, in addition to the light industrial use and unsightly appearance of the majority of development on the northern side of Woodthorpe Drive;
- City Officers have expressed a preference for lower density, single storey development as a transitional edge to existing residential development along the south-west boundary of the site; &
- Transitional built form arrangements (such as the use of high level windows) will assist in minimising perceived impacts of development on operation of the adjacent Private School.


3 LAND USE & SUBDIVISION REQUIREMENTS

3.1 DESIGN PHILOSOPHY AND LAND USE COMPOSITION

The proposed Local Structure Plan proposes integrated development of Lots 99 and 130 in a manner that seeks to improve the diversity of local housing and assist the City in meeting the Dwelling Targets set in the Draft Central Perth Metropolitan Sub-Regional Strategy, having regard for the various design standards set out in the WAPC's Development Control Policies and Liveable Neighbourhoods.

In simple terms, the LSP identifies the land exclusively for medium density Grouped Housing residential development around a sizeable expansion of the adjacent existing POS reservation. Whilst precise lot yields can only be accurately determined at the strata-subdivision stage of development, the Development Concept Plan (refer *Figure 8*), identifies the LSP design as being capable of delivering up to 257 dwellings, including a range of housing typologies that match market desires and improve housing diversity in the Willetton locality.

This number equates to '32.6 dwellings per <u>gross urban zoned</u> hectare' and '36.2 dwellings per <u>site</u> hectare' in excess of the 15 and 26 targets set out in WAPC Policy, however those numbers quickly reduce below the relevant targets when the calculations take into account surrounding development. Based on a typical household size of 2.6 this identifies a potential for up to 668 residents to be accommodated within the combined *Project Area*.

3.2 DENSITY CODING & SITE LAYOUT

A range of medium residential densities ('R30' - 'R50') are proposed across the site, with their boundary typically aligned down the middle of internal access ways, so as to accommodate slight variances to the layout if necessary through the subsequent planning and building approval processes. In terms of the general arrangement of the densities proposed, the following matters have influenced the final outcome:

- The density and form of development have been significantly decreased from the original proposal in response to City Officer comment and feedback received during public advertisement;
- In particular, the lowest density (R30) has been allocated over the eastern corner and along the south west boundary of the site, so as to act as a transition zone between the core of the development, an existing Primary School and/or adjacent R17.5 coded housing; &
- > A reduced R40 density of development now encompasses the majority of the development, with R50 only retained where specifically required to accommodate the laneway precinct adjacent the POS reservation.

3.3 PUBLIC OPEN SPACE

WAPC policy requires an area equating to 10% of the *Project Area* be set aside for public recreation purposes where land is first zoned and/or developed for residential purposes. The proposal includes the creation of a large reserve midway along the north-west boundary of the site where it will form a natural, meaningful extension of an adjacent park. Notwithstanding the City's acceptance that an amount of drainage can be detained in a park basin, the size of the reserve equates exactly to 10% of the parent landholding so as to avoid any potential that the City would need to compensate the landowner for over provision of POS, pursuant to the City's *Town Planning Scheme No.24*.

An indicative concept outlining the intention to develop the reserve as a high quality civic space, inclusive of both passive and active recreational elements appears at *Figure 9*. The Schedule included at *Figure 10* outlines the development's compliance with its 10% requirement under TPS24. Where direct lot frontage is proposed along the south-western and south-eastern boundaries of the reserve, the following attributes form a key component of the proposed interface treatment:

- Lots will have low, semi-permeable fencing, and be retained at least 0.5m above the level of the adjacent reserve so as to create the perception of privacy within the front setback area; &
- Dwellings shall orientate towards and take primary pedestrian access from a public footpath located within the reserve, so as to maximise activity and surveillance within the reserve.

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3.4 RESIDENTIAL TYPOLOGIES

The Development Concept anticipates the production of four different lot and housing typologies, each containing a minimum of 3 x Bedrooms and 2 x Bathrooms, as generally described below. Pictorial examples are also provided to assist understanding of the potential building product that may emerge based on the residential density codings proposed and the Concept Plan included in this proposal:

Precinct	R-Coding	Typical Lot Dimensions	Typical Lot Areas	Building Height	Comments
SW	R30	14m x 20m	280m ²	Single-Storey	Transition zone between R50 core and existing adjacent low density residential development.
EAST Corner	R30	Varying	280m ² +	Double-Storey	Upper floor windows to minimise overlooking off Private School.
CORE	R40	8m x 23m 9m x 20m	184m ² 180m ²	Double-Storey	The predominant product within the proposed development. Higher building standards apply due to fire and noise considerations near Roe Highway.
POS	R50	6.5m x 25m	162.5m ²	Double-Storey	Laneway product taking advantage of POS orientation/direct frontage.

Precinct	R-Code		Pedestrian Access	Vehicular Access	Indicative Pictorial Examples
SW	R30	Single-Storey	Front	Front	
EAST Corner	R30	Double-Storey	Front	Front	
CORE	R40	Double-Storey	Front	Front	
POS	R50	Double-Storey	Front via Street or POS	Rear	







POS CONCEPT Lot 99 Portcullis Drive & Lot 130 Woodthorpe Drive, Willetton A Niche Living Project





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	PUBLIC OPEN SP	ACE SCHEDULE			
Gross Site Area					(ha)
Lot 99 Portcu	Illis Drive		3.92	25	
Lot 302 Zig Za	ag Road (Drainage Reserve)		3.96	62	
Nett Site Area					7.8887
Deductions					
Land to be tra	ansfered to the Water Corpor	ation	0.01	00	
Surplus Restr	icted Open Space				
Gross Subdivisble Area	а				7.8787
Creditable Public Oper	n Space Required @ 10%				0.7879
Investricted Public Or	nen Snace				
Public Open S	Space (as shown on Plan)				
	Reserve	Total Area	Easements (restricted)	Sub Total	
	POS Reserve	0.7889	0.0000	0.7889	
TOTAL Unrestricted					0.7889
Restricted Open Space	2				
Easements	3				
	POS Reserve			0.0000	
TOTAL Restricted				0.0000	
Maximum Pe	ermitted	The second s			
	20% of Original 10% Requirem	ent (prior to Restricted POS Deduction)	0.7879	0.1576	
TOTAL Restricted Cred	lited				0.0000
TOTAL Public Open Sp	ace Provision				0.7889
Unrestricted	POS			0.7889	
Restricted PC	DS			0.0000	
A			% of Provision		10.0%

DENSITY CALCULATIONS				
Gross Area	Dwellings	per Ha	Target	
7.8787	257	32.6	> 15	
Nett Area	Dwellings	per Ha	Target	
7.0898	257	36.2	> 26	

PUBLIC OPEN SPACE SCHEDULE Lot 99 Portcullis Drive & Lot 130 Woodthorpe Drive, Willetton A Niche Living Project

d: 05 Jul 2015 p: 13/046/011A

figure 10

3.5 MOVEMENT NETWORK

The LSP and associated Development Concept propose three access/egress points from the public road system, one located immediately south of the adjacent curve in Portcullis Drive, a middle entry at the shortened southern terminus of Woodthorpe Drive, and a final connection near the north-eastern boundary of the site.

All future dwellings will take vehicle access directly from the private internal road system with the majority of lots being front-loaded via a private street constructed within a typical 12m wide common property lot. Where lots directly abut and/or orientate towards the POS reserve, aspect opportunities have been maximised by redirecting vehicle access to the rear, via a typical 6m wide laneway.

Due to the difficulties in managing public access through the Grouped Housing Development site, and in managing acoustic concerns by virtue of creating an opening within the proposed noise wall, a supplementary connection to the Roe Highway PSP has not been accommodated Notwithstanding the above, Pedestrian access forms a fundamental element of the design, with the Development Concept Plan including a footpath on all internal roads (inclusive of connections to the broader public network), other than laneways in accordance with the Clause 5.3.6 deemed-to-comply provisions of the Residential Design Codes.

Based on a higher than anticipated average of eight vehicular trips per day and the 257 dwellings included on the Development Concept Plan, the Transport Study attached as **Appendix F** predicts that the development would generate approximately 2,056 vehicular trips per day, inclusive of just over 200 trips in each of the peak hours. With half of that traffic expected to leave the site using either entrance, and the southern volumes then exiting Portcullis Drive in either direction (80% to the north, 20% to the south), resultant volumes on the surrounding road network are well within the traffic carrying capacity of the existing road network and do not trigger any requirement to upgrade nearby roads or associated intersection treatments.

Sidra analysis of 2031 predicted traffic volumes for the intersection of Collins Road with both Portcullis and Woodthrope Drives has confimed that both intersections will continue to operate within capacity and with an acceptable Level of Service. Furthermore, development is not expected to have any adverse impact on the continued functionality and operation of the adjacent private school, or nearby halls of worship.

Visitor parking has been strategically positioned throughout the development (in accordance with the 1bay per 4 dwelling requirements of the Clause 5.3.6 deemed-to-comply provisions of the Residential Design Codes), including areas that are readily identifiable from both vehicular entrances.

Houses have been orientated internally, and a special fencing treatment is proposed, in order to mask the visual impact of existing businesses and the high voltage power line along Woodthorpe Drive.



EXISTING TRAFFIC VOLUMES (## VPD)

EXPECTED CHANGE IN TRAFFIC VOLUMES (+<## VPD)

3.6 INFRASTRUCTURE COORDINATION, SERVICING & STAGING

Tardros Dixon were engaged to prepare an Engineering Servicing Report examining the serviceability of site. The report (refer **Appendix G**) identifies all necessary utilities as being located within immediate proximity of the *Project Area*, with sufficient capacity to service the level of development indicatively shown on the Development Concept Plan. It also provides context in terms of the limitations the Serpentine Trunk Main poses in terms of coordinated development of the total landholdings. Key aspects of the report are outlined below.

3.6.1 STAGING

Despite the site being comprehensively planned as one development, it is intended to break the *Project Area* into two portions (or Parent Lots), roughly aligning with the existing lot boundary, aside from small differences relating to the internal road layout, sewer and other likely servicing catchments. Notwithstanding the above, the necessary Strata Management Statements will ensure coordinated management of the comprehensive *Project Area* as is typical for developments of this nature.

3.6.2 GROUNDWATER, EARTHWORKS & FINISHED LEVELS

Groundwater levels are expected to be at least 1-2m below current surface level, despite no groundwater being encountered within any of the test pits undertaken as part of the Geotechnical Report included as **Appendix H**. This matter will be assessed in further detail during future stages of development.

Included in *Appendix G* is a *Conceptual Levels Plan* for the site based on an earlier concept design. The plan demonstrates that a cut and fill approach will be needed across the site, including the importation of up to $56,000m^3$ of fill, due principally to the undulating nature of the site, and sewer servicing grades required to connect to the existing mains in Portcullis and Woodthorpe Drives. When updating the design, careful attention will be applied to ensuring fill levels are coordinated with the lot and road level designs of surrounding development.

3.6.3 NOISE WALL

As indicated in Section 1.5.1 of this report, an acoustic wall will need to be constructed principally along the south east boundary of the site to protect future housing from noise generated by Roe Highway. The final height and alignment of this wall will form the subject of a subsequent report accompanying the detailed Development Application. Updated to reflect inclusion of the eastern corner within the development, extension across the Serpentine Trunk Main will involve the use of a bridging structure so as to keep weight loads on the underlying pipe to a minimum.

3.6.4 STORMWATER MANAGEMENT

The Department of Water has confirmed that for a development of this scale and nature, it is agreeable to stormwater drainage forming the subject of an Urban Water Management Plan prepared at the subsequent subdivision stage of development.

Notwithstanding the above, a **Conceptual Drainage Plan** detailing how stormwater (based on an earlier concept design), will be directed and distributed within the POS Reserve is also included at **Appendix G**. Very succinctly, stormwater will be accommodated via a mixture of underground storage facilities (located within areas of common property), with larger events overflowing via the private street network to a basin located within the POS reservation. The plan will be updated, and further detail provided at the development application and/or strata subdivision stage of development.

3.6.5 RETICULATED SEWER

The **Conceptual Services Plan** in **Appendix G** notionally identifies the *Project Area* being broken into two wastewater catchments, with approximately the southern half of the site connecting into an existing DN150PVC-U sewer main in Portcullis Drive, and the northern half connecting into an existing DN225VC sewer main Woodthorpe Drive.

3.6.6 WATER SUPPLY

The **Conceptual Services Plan** in **Appendix G** anticipates scheme water being provided via connection into an existing water main located within the continuous stretch of road reservation encompassing both Portcullis and Woodthorpe Drives. As with sewer, the Water Corporation has advised that sufficient capacity is available in the network to accommodate the development as proposed.

Post advertising, two notable changes have been adopted to the Development Concept Plan in order to enhance long term protection of the Serpentine Trunk Main. At the Water Corporation's request, the internal road network has been adjusted to include a private street along the majority of the western boundary of the Trunk Main (as opposed to properties backing onto this area), in addition to a 2m wide easement being identified adjacent the entire length of its western boundary. The purpose of both changes is to push housing construction further away from the pipeline, in particular any need for retaining walls that could place downward pressure on the existing pipeline.

These matters, in addition to future landscaping, ongoing management and the noise wall bridging requirements (noted in Section 3.6.3 above), are included in the private agreement entered into between the developer and Water Corporation that was necessary to facilitate a vehicle crossing of the trunk main and unlock the development potential of the eastern corner.

3.6.7 ELECTRICITY

An *Electrical Power Distribution and Telecommunications Infrastructure Servicing Report* prepared by Worrad Associates appears at the rear of *Appendix G*. The report identifies both high and low voltage lines existing within the adjoining Portcullis and Woodthorpe Drives road reservation.

As collective load demand for the development is expected to exceeds 1,000kVA, two 630kVA sub-stations are anticipated as being needed to service the *Project Area*. Approximate dimensions for the necessary sites are $6.2m \times 4m (24.8m^2)$. In terms of location, the sub-station servicing the southern half of the development is likely to be collocated within or adjoining the POS reservation, whilst for the northern half a site will need to be indentified within an area of common property.

A low voltage (LV) feeder will need to be installed between the LV kiosk of each substation and a Site Main Switchboard (SMSB) installed in close proximity. Each parent lot will have its own individual LV Distribution network from its respective SMSB. Provision would then be made within each development site for pillars that would supply the respective units.

3.6.8 RETICULATED GAS

ATCO Gas have confirmed that natural gas services exist within the reserve of the Portcullis & Woodthorpe Drives (in the form of a DN100 PVC1.5LP7kPa, connecting to a DN50 PVC 1.5MP 70Kpa), with sufficient capacity that can be readily extended to service this site.

3.6.9 TELEPHONE & NBN

Telstra services exist in the area along the western verge of Portcullis and Woodthrope Drive road reservations that can readily be extended to service the *Project Area*.

At present the Project Area does not fall within NBN Co's service area. Due to the relatively large number of dwellings included however, NBN Co. May accept the development for fibre reticulation. A Fibre Application will be submitted to NBN Co. Upon commencement of construction at which time it will be confirmed whether the development qualifies. If unsuccessful the development will initially be serviced with Telstra's standard pit and pipe infrastructure.

APPENDIX A CERTIFICATES OF TITLE

	(a)		899 Reg	STER NUMBER	
	12-51		DUPLICATE	DATE DUPLICA	TE ISSUED
WESTERN		AUSTRALIA		1/9/2	004
RECORD OF UNDER THE	CERTIFIC TRANSFER OF L	ATE OF TI AND ACT 1893	ГLE	volume 1970	FOLIO 820
The person described in the first schedule is the registered proprietor or reservations, conditions and depth limit contained in the original grant notifications shown in the second schedule.	of an estate in fee simple t (if a grant issued) and	e in the land described be to the limitations, intere	elow subject to the sts, encumbrances :	and	
		Ą	Jul		AT LA
		REGIST	RAR OF TITL	ES M	

LAND DESCRIPTION:

LOT 99 ON PLAN 2903

REGISTERED PROPRIETOR: (FIRST SCHEDULE)

GERALDTON PROJECT WELLS PTY LTD OF PO BOX 51, NORTHBRIDGE (T M609575) REGISTERED 15 APRIL 2014

> LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE)

THE LAND THE SUBJECT OF THIS CERTIFICATE OF TITLE EXCLUDES ALL PORTIONS OF THE LOT 1. DESCRIBED ABOVE EXCEPT THAT PORTION SHOWN IN THE SKETCH OF THE SUPERSEDED PAPER VERSION OF THIS TITLE. VOL 1970 FOL 820. 2.

MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 15.4.2014. *M609576

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

---- END OF CERTIFICATE OF TITLE-

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

NOTE 1:

DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING L624328





LANDGATE COPY OF ORIGINAL NOT TO SCALE Thu Aug 15 13:06:05 2013 JOB 42534044



LANDGATE COPY OF ORIGINAL NOT TO SCALE Thu Aug 15 13:06:05 2013 JOB 42534044

PLAN 2903 (2) 5 PT RESIMED 14AZ 24 1-54 DEDALATED TOWN PLANNING & DEAEFORMAN V. 1 SEC 50 (8) 237 4236 6.0103 ha 6.2979ho 10428 ·B. 32965 1856 Westert PLAN 7702 F.B. 20687 NOW P. IN. 3649 2501 DIA 3846 F.B. T.C (200

28275 62 Transfer 110/9/1962 (65500) Volume 1220 Folio 161



WESTERN AUSTRALIA.

INDEXED REGISTER BOOK. are JEE 1 116451 Vol. 1261 Fol. No 930

Gertificate of Title



under "The Transfer of Land Art, 1893" (56 vic., 14. Sen. 5)

<u>Minister of Water Supply Sewerage and Drainage</u> having its office at Saint George's Place Perth, is now the proprietor of an estate <u>in fee simple</u> subject to the easements and encumbrances notified hereunder in all that piece of land delineated and coloured green on the map hereon containing two roods twenty four and three-tenths perches or thereabouts, being <u>portion of Canning Location 21</u> and being perter the lend on Plan 7749.



Scale: 3 chains to an inch



Dated the twentieth day of June One thousand nine hundred and sixty-two.

PI Registrar of Titles.

Application F557510. The within land is vested in the Water Authority of Western Australia of 629 Newcastle Street, Leederville, pursuant to the Water Authority Vesting Order (No. 6) 1992.

23rd May, 1994



Application G163535. The registered proprietor is Water Concorstion of 629 Newcastle Street, Leddervilla, By virtue of the Water Agencies Restructure (Transitional and Consequential Provisions) Act 1995, Registered 30th April 1996 at 9.34 hours.

\$5375/\$/81-25.800-11/C

For encumbrances and other matters affecting the land see back.



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As to portion only : Caveat F557514. Lodged 23.5.1994 at 15.36 hrs.

1)



CERTIFICATE OF TITLE

Vol. 1261 Fol. Nº 930



LANDGATE COPY OF ORIGINAL NOT TO SCALE Thu May 15 10:48:41 2014 JOB 44665614









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UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 130 ON DEPOSITED PLAN 34511

REGISTERED PROPRIETOR: (FIRST SCHEDULE)

FREEDOM WILLETTON PTY LTD OF PO BOX 51, NORTHBRIDGE (T M782595) REGISTERED I OCTOBER 2014

> LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE)

*M782596 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 1.10.2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. * Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title. Lot as described in the land description may be a lot or location.

-- END OF CERTIFICATE OF TITLE-

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP34511.
PREVIOUS TITLE:	1967-971.
PROPERTY STREET ADDRESS:	LOT 130 WOODTHORPE DR, WILLETTON.
LOCAL GOVERNMENT AREA:	CITY OF CANNING.

NOTE 1: A000001A PENDING SURVEY PLAN 11629. NOTE 2: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING L624328





APPENDIX B BUSHFIRE ATTACK LEVEL CONTOUR ASSESSMENT



BUSHFIRE ATTACK LEVEL (BAL) CONTOUR ASSESSMENT

Lot 130, Woodthorpe Dr and Lot 99 Porticullis Dr, Willeton





DISCLAIMER AND LIMITATION

This report is prepared solely for **Freedom Willetton Pty Ltd** (the 'proponent') and future landowners, and is not for the benefit of any other person and may not be relied upon by any other person.

This Bushfire Attack Level (BAL) Contour Assessment is limited to the BAL Contour Map scope as identified in SPP 3.7 Guidelines for Planning in Bushfire Prone Areas Appendices, Appendix three (3). AS3959:2009 Methodology one (1) was used for the determination of the assessment. It is expressly stated that RUIC Fire and the writer do not guarantee that if such standards are complied with or if a property owner exercises prudence, that a building or property will not be damaged or that lives will not be lost in a bush fire.

Fire is an extremely unpredictable force of nature. Changing climatic factors (whether predictable or otherwise) either before or at the time of a fire can also significantly affect the nature of a fire and in a bushfire prone area it is not possible to completely guard against bushfire.

Further, the growth, planting or removal of vegetation; poor maintenance of any fire prevention measures; addition of structures not included in this report; or other activity can and will change the bushfire threat to all properties detailed in the report. Further, the achievement of the level of implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which RUIC Fire has no control. If the proponent becomes concerned about changing factors then a new Fire Risk Management Plan should be requested.

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DOCUMENT DETAILS

Project Number:	5292
Project Name:	Lot 130, Woodthorpe Dr & Lot 99 Porticullis Dr, Willeton
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Version:	1.0 FINAL ISSUE
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Final Approval Date: 25/06/2016

In signing the above, I declare the report is true and accurate to the best of my knowledge at the time of issue.

RUIC Fire is a trading name of Rural Fire Risk Consultancy Pty Ltd ABN: 48 151 451 713



EXECUTIVE SUMMARY

Rural Fire Risk Consultancy Pty Ltd, trading as RUIC Fire, was engaged by the proponent to prepare this Bushfire Attack Level (BAL) Contour Map to support the subdivision development of Lot 130 Woodthorpe Dr and Lot 99 Porticullis Dr, Willeton (Figures i and ii).

The BAL Contour Map was prepared in accordance with State Planning Policy 3.7 Guidelines for Planning in Bushfire Prone Areas (GPBPA), Appendix three (3). The BAL assessment was carried out in accordance with AS3959:2009 Detailed Procedure (Method 2) for all plots with classifiable vegetation.

Conclusions of the BAL Contour Map assessment are depicted in Figure iii:

- The maximum radiant heat impact applicable to any of the identified lots is >29 kW/m², which is equivalent to a BAL-40 and BAL-FZ rating, for the lots located on the east side of the easement;
- The remainder of the lots do not have a radiant heat impact > 29kW/m² as depicted in Figure ii;
- 3. With appropriate Asset Protections Zones within the affected lots, building setbacks are able to achieve a BAL-29 or lower rating and are not prohibitive of development, and
- 4. Future Class 1, 2, 3 and associated Class 10a buildings will be required to comply with the construction requirements of AS3959:2009 (where applicable) and will be subject to relevant bushfire related planning conditions.





Figure i: Site Location





Figure ii: Site Location





Figure iii: BAL Contour map



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1.0 Introduction

1.1 Purpose of Report

Rural Fire Risk Consultancy Pty Ltd, trading as RUIC Fire, was engaged by the proponent to prepare this BAL Contour Map to support the subdivision development within Lot 130 Woodthorpe Dr and Lot 99 Porticullis Dr, Willeton (Figures I and ii).

The purpose of this BAL Contour map is to:

- 1. Illustrate the potential radiant heat impacts and associated indicative BAL ratings in reference to any classified vegetation remaining within 100 meters of the assessment area after the development is complete
- 2. Determine whether the radiant heat impacts (post-development) will be prohibitive of future works.

This report is <u>not</u> a Bushfire Management Plan. Should a Bushfire Management Plan be required a separate report is required.

1.2 BAL Assessment

The site was inspected on the 20th of April 2016 and all vegetation within 100m of the site were assessed in accordance with AS3959-2009 Methodology 2 (detailed method).

Bushfire Attack Level is calculated for each identified vegetation threat in accordance with AS3959:2009 Methodology 2 using the RUIC BALc_v7f Bushfire Attack Level calculator (accuracy certified to AS3959:2009 Appendix B). Whilst radiant heat flux impact from all identified vegetation threats is calculated, the highest BAL rating is applicable to the dwelling site.

Standard inputs are identified in Table 1A. Specific threat scenario inputs and BAL ratings are identified in Table 1B.

Design Bushfire	Reference	
FDI:	80	AS3959:2009 Table 2.4.1
Heat of combustion	18600kj/kg	AS3959:2009 Table 2.4.1
Flame temperature	1090K	AS3959:2009 Table 2.4.1
Ambient temperature	308K	AS3959:2009 Table 2.4.1
Mean humidity	25%	AS3959:2009 Table 2.4.1

Table 1A: Standard inputs



Design Bushfire Input	Plot 5	Plot 6	Plot 7	Reference
Vegetation Classification:	Class B Woodland	Class B Woodland	Class D Scrub	A\$3959:2009 Table 2.3
Understory Fuel Load (t/ha)	15	15	25	AS3959:2009 Table B2
Total Fuel Load (t/ha)	25	25	25	A\$3959:2009 Table B2
Effective Slope (°)	0	1	1	Landgate Data & Site inspection
Site Slope (°)	0	0	0	Landgate data & Site Inspection
Flame width (m)	30	30	60	AS3959:2009

Table 1B: Plot specific inputs and BAL ratings

Determined Bushfire Attack Level (BAL)

The Determined Bushfire Attack Level (highest BAL) for the site / proposed development has been determined in accordance with clause 2.2.6 of AS 3959-2009 using the above analysis.

Determined Bushfire Attack Level	BAL – FZ

BAL vs separation distance tables, extracted from Methodology 2 Assessment, are provided within Tables 1A – 1C for all classifiable vegetation within 100m of the identified lots (excluding Low Threat Plots 1, 2, 3 & 4). The BAL rating for each vegetation threat was calculated with the highest BAL rating being applicable to each lot. Separation distance to classified vegetation includes roads, managed low threat areas and is measured from the lot boundaries to the edge of the classified vegetation.

Table 1A: BAL Assessment (Class B Woodland) Plot 5.

Vegetation	Effective Slope	Separation (m)	BAL
Class B Woodland	Flat/Upslope		
		Less than 10.5m	BAL-FZ
		10.5 to less than 13m	BAL-40
		13 to less than 17.5m	BAL-29
		17.5 to less than 22.5m	BAL-19
		22.5 to less than 100m	BAL-12.5
		Greater than 100m	BAL-LOW



Table 1B: BAL Assessment (Class B Woodland) Plot 6.

Vegetation	Effective Slope	Separation (m)	BAL
Class B Woodland	Downslope 1 ^o		
		Less than 11m	BAL-FZ
		11 to less than 13.5m	BAL-40
		13.5 to less than 18m	BAL-29
		18 to less than 23m	BAL-19
		23 to less than 100m	BAL-12.5
		Greater than 100m	BAL-LOW

Table 1C: BAL Assessment (Class D Scrub) Plot 7

Vegetation	Effective Slope	Separation (m)	BAL
Class D Scrub	Downslope 1 ^o		
		Less than 10m	BAL-FZ
		10 to less than 13.5m	BAL-40
		13.5 to less than 19.5m	BAL-29
		19 to less than 26.5m	BAL-19
		26.5 to less than 100m	BAL-12.5
		Greater than 100m	BAL-LOW

The highest BAL rating that applies to any lot within the development is **BAL-FZ**. APZs within the affected lots can ensure that the buildings are not exposed to greater than BAL-29.

1.3 Low Threat Exclusions

External to and within 100m of the site, low threat exclusions in accordance with AS3959:2009 have been identified as;

- Clause 2.2.3.2 (f) Managed vegetation areas, nature strips and parklands;
- Clause 2.2.3.2 (e) Non-vegetated areas;
- Clause 2.2.3.2 (d) Strips of vegetation <20m wide (measured perpendicular to the site) and not with 20m of the site or other each other or other vegetation being classified.



1.4 Plot Photographs

The following plates illustrate the classifiable vegetation structures per plot;



Plot 1 - Excluded 2.2.3.2 (e) and (f)



Plot 2 - Excluded AS3959:2009 c2.2.3.2(f)



Plot 3 - Excluded AS3959-2009 c2.2.3.2 (d)



Plot 1 – Excluded 2.2.3.2 (e) and (f)



Plot 2 - Excluded AS3959:2009 c2.2.3.2(f)



Plot 3 - Excluded AS3959-2009 c2.2.3.2 (d)

BUSHFIRE HAZARD LEVEL ASSESSMENT Lot 130 Woodthorpe Dr & Lot 99 Porticullis Dr, Willeton





Plot 4 – Excluded AS3959-2009 c2.2.3.2 (d)



Plot 5 – Class B Woodland



Plot 6 – Class B Woodland



Plot 7 – Class D Scrub



Plot 4 - Excluded AS3959-2009 c2.2.3.2 (d)



Plot 5 – Class B Woodland



Plot 6 – Class B Woodland



Plot 7 – Class D Scrub



1.5 Lot BAL Ratings

The eastern lots require an APZ to the distances indicated within Figure 1A to ensure that any future Class 1, 2 3 or associated 10a building is not located within an area greater than BAL-29.



Figure 1A: Eastern Corner Lots



1.6 Bushfire Attack Levels Explained

A Bushfire Attack Level (BAL) assessment is a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact in a bushfire event, and thereby determining the construction measures required for the dwelling.

The methodology used for the determination of the BAL rating, and the subsequent building construction standards, are directly referenced from Australian Standard *AS3959:2009 Construction of buildings in bushfire prone areas.*

The BAL rating is determined through identification and assessment of the following parameters;

- Fire Danger Index (FDI) rating; assumed to be FDI-80 for WA,
- All classified vegetation within 100m of the subject building,
- Separation distance between the building and the classified vegetation source/s, and
- Slope of the land under the classified vegetation.

AS3959:2009 has six (6) levels of BAL, based on the radiant heat flux exposure to the building, and also identifies the relevant sections for building construction, as detailed below;

Bushfire Attack Level (BAL)	Classified vegetation within 100m of the site and heat flux exposure thresholds	Description of predicted bushfire attack and levels of exposure	Construction Section (within AS3959)
BAL-LOW	See clause 2.2.3.2	There is insufficient risk to warrant specific construction requirements	4
BAL-12.5	≤ 12.5kW/m ²	Ember attack	3 & 5
BAL-19	>12.5kW/m ² to ≤19kW/m ²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3&6
BAL-29	>19kW/m² to ≤29kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3&7
BAL-40	>29kW/m² to ≤40kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux with the increased likelihood of exposure to flames	3 & 8
BAL-FZ	>40kW/m ²	Direct exposure to flames from fire front in	3 & 9



Figure 1B: BAL Overview

APPENDIX C TRANSPORTATION NOISE ASSESSMENT

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Transportation Noise Assessment

Lot 99 and 130 Portcullis Drive, Willeton

Reference: 13092535-01.docx

Prepared for: Niche Living



Member Firm of Association of Australian Acoustical Consultants
Report: 13092535-01.docx

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This report has been prepared in accordance with the scope of services described in the contract or agreement between Lloyd George Acoustics Pty Ltd and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client, and Lloyd George Acoustics Pty Ltd accepts no responsibility for its use by other parties.

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Date:	20 August 2014	

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- A Deemed-to-Satisfy Construction Standards
- B Terminology

1 INTRODUCTION

It is proposed to subdivide Lots 90 and 130 Portcullis Drive, Willeton into 263 residential lots. As the land is in close proximity to Roe Highway, being a major road, a noise assessment in relation to road traffic noise impacts is required and is the subject of this report.

The proposed subdivision is shown in *Figure 1-1* and its locality in relation to its surroundings is provided in *Figure 1-2*.



Figure 1-1 Proposed Subdivision Layout



Figure 1-2 Site Locality (Source: Google Earth)

Appendix B contains a description of some of the terminology used throughout this report.

2 CRITERIA

The criteria relevant to this assessment is the *State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning* (hereafter referred to as the Policy) produced by the Western Australian Planning Commission (WAPC). The objectives in the Policy are to:

- Protect people from unreasonable levels of transport noise by establishing a standardised set of criteria to be used in the assessment of proposals;
- Protect major transport corridors and freight operations from incompatible urban encroachment;
- Encourage best practice design and construction standards for new development proposals and new or redevelopment transport infrastructure proposals;
- Facilitate the development and operation of an efficient freight network; and
- Facilitate the strategic co-location of freight handling facilities.

The Policy's outdoor noise criteria are shown below in *Table 2-1*. These criteria applying at any point 1-metre from a habitable façade of a noise sensitive premises and in one outdoor living area.

Period	Target	Limit
Day (6am to 10pm)	55 dB L _{Aeq(Day)}	60 dB L _{Aeq(Day)}
Night (10pm to 6am)	50 dB L _{Aeq(Night)}	55 dB L _{Aeq(Night)}

Table 2-1 Outdoor Noise Criteria

Note: The 5 dB difference between the target and limit is referred to as the margin.

In the application of these outdoor noise criteria to new noise sensitive developments, the objectives of this Policy is to achieve -

- acceptable indoor noise levels in noise-sensitive areas (e.g. bedrooms and living rooms of houses); and
- a 'reasonable' degree of acoustic amenity in at least one outdoor living area on each residential lot.

If a noise sensitive development takes place in an area where outdoor noise levels will meet the *target*, no further measures are required under this policy.

In areas where the *target* is exceeded, but noise levels are likely to be within the 5 dB margin (i.e. less than the *limit*), mitigation measures should be implemented by the developer with a view to achieving the *target* levels in at least one outdoor living area on each residential lot. Where indoor spaces are planned to be facing any outdoor area in the *margin*, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces.

In areas where the *limit* is exceeded (i.e. above $L_{Aeq(Day)}$ of 60dB(A) or $L_{Aeq(Night)}$ of 55dB(A)), a detailed noise assessment is to be undertaken. Customised noise mitigation measures should be implemented with a view to achieving the *target* in at least one outdoor living area on each residential lot, or if this is not practicable, within the *margin*. Where indoor spaces are planned to be facing outdoor areas that are above the *target*, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces.

3 METHODOLOGY

Noise measurements and modelling have been undertaken in accordance with the requirements of the Policy as described below in *Sections 3.1 and 3.2*.

3.1 Site Measurements

Noise monitoring was undertaken on site, on the southern boundary of Lot 130 in order to:

- Quantify the existing noise levels;
- Determine the differences between different acoustic parameters ($L_{A10,18hour}$, $L_{Aeq(Day)}$ and $L_{Aeq(Night)}$); and
- Calibrate the noise model for existing conditions.

The instrument used was an ARL Type 316 noise data loggers (pictured in *Figure 3-1*), with the microphones 1.4 metres above ground level. The logger was programmed to record hourly L_{A1} , L_{A10} , L_{A90} , and L_{Aeq} levels. The instrument complies with the instrumentation requirements of *Australian Standard 2702-1984 Acoustics – Methods for the Measurement of Road Traffic Noise*. The logger was field calibrated before and after the measurement session and found to be accurate to within +/- 1 dB. Lloyd George Acoustics also holds current laboratory calibration certificate for the logger.



Figure 3-1 Noise Logger on Site

The noise data collected was verified by inspection and professional judgement.

3.2 Noise Modelling

The computer programme *SoundPLAN 7.3* was utilised incorporating the *Calculation of Road Traffic Noise* (CoRTN) algorithms, modified to reflect Australian conditions. The modifications included the following:

Vehicles were separated into heavy (Austroads Class 3 upwards) and non-heavy (Austroads Classes 1 & 2) with non-heavy vehicles having a source height of 0.5 metres above road level and heavy vehicles having two sources, at heights of 1.5 metres and 3.6 metres above road level, to represent the engine and exhaust respectively. By splitting the noise source into three, allows for less barrier attenuation for high level sources where barriers are to be considered. Note that corrections are applied to the exhaust of -8.0 dB (based on Transportation Noise Reference Book, Paul Nelson, 1987) and to the engine source of - 0.8 dB, so as to provide consistent results with the CoRTN algorithms for the no barrier scenario;

 An adjustment of -1.7 dB has been applied to the predicted levels based on the findings of An Evaluation of the U.K. DoE Traffic Noise Prediction; Australian Road Research Board, Report 122 ARRB – NAASRA Planning Group 1982.

Predictions are made at heights of 1.4 metres above ground floor level and at 1.0 metre from an assumed building façade (resulting in a + 2.5 dB correction due to reflected noise).

Various input data are included in the modelling such as ground topography, road design, traffic volumes etc. These model inputs are discussed below.

3.2.1 Ground Topography, Road Design & Cadastral Data

Topographical data was based on Google Earth and on-file Roe Highway survey information with the proposed subdivision overlayed.

Buildings have also been included as these can provide barrier attenuation when located between a source and receiver, in much the same way as a hill or wall provides noise shielding. Single storey buildings are assumed to be 4.0 metres high and are modelled in R30 and R40 areas of the subdivision (bordering Roe Highway and on the east and west boundaries). Two storey buildings will be constructed in the R50 areas and are assumed to be 7 metres high for modelling purposes (refer *Figure 3-2*).



Figure 3-2 Distribution of Single and Double Storey Dwellings

Indicative finished lot levels were provided by Tadros Dixon and the subdivision layout by SPH Architects.

3.2.2 Traffic Data

Traffic data includes:

• Road Surface – The noise relationship between different road surface types is shown below in *Table 3-1*.

Chip Seal			Asphalt			
14mm	10mm	5mm	Dense Graded	Novachip	Stone Mastic	Open Graded
+3.5 dB	+2.5 dB	+1.5 dB	0.0 dB	-0.2 dB	-1.0 dB	-2.5 dB

Table 3-1 Noise Relationship Between Different Road Surfaces

The existing and future road surface on Roe Highway is Open Graded Asphalt. The Willeri Drive Off ramp is also Open Graded Asphalt but considered to be Dense Graded Asphalt within 150m of the signals.

- Vehicle Speed The existing and future posted speeds are 100km/hr on Roe Highway and 70 km/hr on the Willeri Drive Off ramp.
- Traffic Volumes Information, obtained from Main Roads Western Australia (MRWA) used in the modelling is provided in *Table 3-2*.

	Commite					
	Scenario					
Parameter	Existing - 2014		Future - 2031			
	24 Hour Volume	% Heavy	24 Hour Volume	% Heavy		
Roe Highway Eastbound	32,310	14.8	60,900	14.8		
Roe Highway Westbound	31,355	15.0	55,575	15.0		
Roe Highway Willeri Dr Off Eastbound	5,887	14.8	10,984	14.8		

Table 3-2 Traffic Information Used in the Modelling

3.2.3 Ground Attenuation

The ground attenuation has been assumed to be 0.2 (20%) within the road reserve, 0.5 (50%) through developed areas, and 0.9 (90%) elsewhere. Note 0.0 represents hard reflective surfaces such as water and 1.00 represents absorptive surfaces such as grass.

3.2.4 Parameter Conversion

The CoRTN algorithms used in the *SoundPlan* modelling package were originally developed to calculate the $L_{A10,18hour}$ noise level. The WAPC Policy however uses $L_{Aeq(Day)}$ and $L_{Aeq(Night)}$. The relationship between the parameters varies depending on the composition of traffic on the road (volumes in each period and percentage heavy vehicles).

As noise monitoring was undertaken, the relationship between the parameters is based on the results of the monitoring – refer *Section 4.1*.

4 **RESULTS**

4.1 Noise Monitoring

The results of the noise monitoring are summarised below in *Table 4-1* for Roe Highway and shown graphically in *Figure 4-1*.

Dete	Average Weekday Noise Level, dB			
Date	L _{A10,18hour}	L _{Aeq,24hour}	L _{Aeq (Day)}	L _{Aeq (Night)}
Wednesday 4/06/2014	63.7	60.9	61.9	57.9
Thursday 5/06/2014	63.5	60.9	61.8	58.1
Friday 6/06/2014	62.9	60.5	61.5	57.5
Weekday Average	63.4	60.8	61.7	57.8

Table 4-1 Measured Average Noise Levels – Roe Highway

The average difference between the weekday $L_{A10,18hour}$ and $L_{Aeq(Day)}$ at this location is 1.7 dB and this conversion has been used in the modelling. The average differences between the weekday $L_{Aeq(Day)}$ and $L_{Aeq(Night)}$ is 3.9 dB. This same difference has been assumed to exist in future years. The night time levels will dictate compliance, as the difference between the night and day noise levels is less than 5 dB.

4.2 Noise Modelling

The noise modelling is provided in *Figures 4-2 to 4-3* as $L_{Aeq(Night)}$ noise level contour plots being for the existing and future traffic conditions respectively, including both ground and upper floors for the future scenario. The predictions include the barrier effects resulting from other parts of the subdivision including standard 1.8m boundary fencing.

The noise model was set-up to predict the $L_{Aeq(Night)}$ for existing conditions to enable a calibration factor to be determined, with the calibration factor also being used for the future noise model scenario. *Figure 4-3* provides a noise contour plot for the $L_{Aeq(Night)}$ scenario being the most critical (includes facade correction of +2.5 dB).







5 ASSESSMENT & CONCLUSION

The objectives of the criteria are for the noise at all noise sensitive premises to be no more than the *limit* and preferably no more than the *target*. Where the *target* is achieved, no further controls are required. Where the *target* is exceeded, further controls are necessary.

From *Figure 4-3*, it can be seen that the *target* will be exceeded at a majority of noise sensitive premises and therefore noise mitigation measures must be considered.

The Policy provides "deemed to comply" facade packages (Package A and B) where traffic noise is above the *target* but not more than 3 dB above the *limit*. For those lots predicted to receive a noise greater than 3 dB above the *limit*, Package C is suitable but only up to 6 dB above the *limit*. For noise levels above this, specialist acoustic advice would be required. The "deemed to comply" facade packages are provided at *Appendix A*.

It is the objective of the Policy to reduce noise levels as much as practicable. As such, two noise mitigation strategies have been investigated, using a noise wall of suitable height in conjunction with facade treatments:

- A solid noise barrier of 2.8 metres height combined with facade treatment packages as shown in *Figures 5-1 and 5-2* for ground and upper floors respectively; or
- A solid noise barrier of 3.6 metres height combined with facade treatment packages as shown in *Figure 5-3 and 5-4* for ground and upper floors respectively.

Note that the outer houses of the subdivision, including those adjoining Roe Highway are to be single storey and therefore facade treatments are not shown in *Figures 5-2 and 5-4*.

In addition to the facade packages, the Policy requires consideration of outdoor living areas. For high noise areas such as this, the Policy requirement is to implement customised noise mitigation measures with a view to achieving the *target* in at least one outdoor living area on each residential lot, or if this is not practicable, within the *margin*. This becomes a further consideration for the noise wall constructed in that:

- A 2.8 metre high wall will be less expensive, however the architectural treatments of Package B will be more expensive than those of Package A. More importantly, for those lots adjoining Roe Highway and exposed to noise levels above the *limit*, a further requirement will be to provide an alfresco type area within an alcove of the house so that noise levels in one outdoor area will be within the *margin*. This may cause some issues with house layout and the like.
- Where a 3.6 metre high wall is constructed, the wall will be more expensive and the Package A treatments less expensive than those of Package B. However, noise levels in the side of the lot facing Roe Highway will be within the *margin* and therefore restrictions on locating the outdoor living area would not apply.

All lots predicted to exceed the *target* criteria and therefore receive facade treatment packages are to have notifications on lot titles as per the Policy requirements – refer *Appendix A*.









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Appendix A

DEEMED TO SATISFY CONSTRUCTION STANDARDS

Package A: Noise levels within the margin

The following noise insulation package is designed to meet the indoor noise standards for residential developments in areas where noise levels exceed the noise target but are within the limit.

Area type	Orientation	Package A measures	
Indoors			
	Facing road/rail corridor	Package A measures • 6mm (minimum) laminated glazing • Fixed, casement or awning windows with seals • No external doors • Closed eaves • No vents to outside walls/eaves • Mechanical ventilation/airconditioning ¹ • 6mm (minimum) laminated glazing • Closed eaves • Mechanical ventilation/airconditioning No requirements 6mm (minimum) laminated glazing • Fixed, casement or awning windows with seals • 35mm (minimum) solid core external doors with acoustic seals ³ • Sliding doors must be fitted with acoustic seals • Closed eaves • No vents to outside walls/eaves • No vents to outside walls/eaves • Mechanical ventilation/airconditioning • Gmm (minimum) laminated glazing • Closed eaves • No vents to outside walls/eaves • Mechanical ventilation/airconditioning • Gmm (minimum) laminated glazing • Closed eaves • Mechanical ve	
Bedrooms		 Mechanical ventilation/airconditioning¹ 	
	Side-on to corridor	 6mm (minimum) laminated glazing Closed eaves Mechanical ventilation/airconditioning 	
	Away from corridor	No requirements	
Facing corridor		 6mm (minimum) laminated glazing Fixed, casement or awning windows with seals 35mm (minimum) solid core external doors with acoustic seals³ Sliding doors must be fitted with acoustic seals Closed eaves No vents to outside walls/eaves Mechanical ventilation/airconditioning 	
	Side-on to corridor	 6mm (minimum) laminated glazing Closed eaves Mechanical ventilation/airconditioning 	
	Away from corridor	No requirements	
Other indoor areas	Any	No requirements	

¹ See section on Mechanical ventilation/airconditioning for further details and requirements.

 $^{^{2}}$ These deemed-to-comply guidelines adopt the definitions of indoor spaces used in AS 2107-2000. A comparable description for bedrooms, living and work areas is that defined by the Building Code of Australia as a "habitable room". The Building Code of Australia may be referenced if greater clarity is needed. A living or work area can be taken to mean any "habitable room" other than a bedroom. Note that there are no noise insulation requirements for utility areas such as bathrooms. The Building Code of Australia describes these utility spaces as "non-habitable rooms". ³ Glazing panels are acceptable in external doors facing the transport corridor. However these must meet the

minimum glazing requirements.

Package B: Noise levels above the *limit* but within 3 dB

The following noise insulation package is designed to meet the indoor noise standards for residential developments in areas where noise levels exceed the *limit* by no more than 3 dB.

Area type	Orientation	Package B measures			
Indoors					
		 10mm (minimum) laminated glazing Eixed casement or awping windows with soals 			
		No external doors			
	Facing road/rail corridor	Closed eaves			
		No vents to outside walls/eaves			
Bedrooms		 No vents to outside walls/eaves Mechanical ventilation/airconditioning⁴ 10mm (minimum) laminated glazing Closed eaves Mechanical ventilation/airconditioning No requirements 10mm (minimum) laminated glazing Fixed, casement or awning windows with seals 40mm (minimum) solid core external doors with 			
		• 10mm (minimum) laminated glazing			
	Side-on to corridor	Closed eaves Mechanical ventilation (airconditioning			
		Mechanical ventilation/airconditioning			
	Away from corridor	No requirements			
		• 10mm (minimum) laminated glazing			
		• Fixed, casement or awning windows with seals			
		• 40mm (minimum) solid core external doors with acoustic seals ⁶			
	Facing corridor	• Sliding doors must be fitted with acoustic seals			
		Closed eaves			
Living and work areas ⁵		No vents to outside walls/eaves			
		Mechanical ventilation/airconditioning			
		6mm (minimum) laminated glazing			
	Side-on to corridor	Closed eaves			
		Mechanical ventilation/airconditioning			
	Away from corridor	No requirements			
Other indoor areas	Any	No requirements			

⁴ See section on Mechanical ventilation/airconditioning for further details and requirements.

⁵ These deemed-to-comply guidelines adopt the definitions of indoor spaces used in AS 2107-2000. A comparable description for bedrooms, living and work areas is that defined by the Building Code of Australia as a "habitable room". The Building Code of Australia may be referenced if greater clarity is needed. A living or work area can be taken to mean any "habitable room" other than a bedroom. Note that there are no noise insulation requirements for utility areas such as bathrooms. The Building Code of Australia describes these utility spaces as "non-habitable rooms".

as "non-habitable rooms". ⁶ Glazing panels are acceptable in external doors facing the transport corridor. However these must meet the minimum glazing requirements.

Package C: Noise levels more than 3 dB above the limit

The following noise insulation package is designed to meet the indoor noise standards for residential developments in areas where noise levels exceed the *limit* by more than 3 dB.

Area type	Orientation Package C measures		
Indoors			
Bedrooms	Facing road/rail corridor	 10.5mm (minimum) VLam Hush laminated glazing Fixed, casement or awning windows with seals No external doors Closed eaves No vents to outside walls/eaves Mechanical ventilation/airconditioning⁷ 	
	Side-on to corridor	 10.5mm (minimum) VLam Hush laminated glazing Closed eaves Mechanical ventilation/airconditioning 	
	Away from corridor	No requirements	
Living and work areas ⁸	Facing corridor	 10.5mm (minimum) VLam Hush laminated glazing Fixed, casement or awning windows with seals 40mm (minimum) solid core external doors with acoustic seals⁹ Sliding doors must be fitted with acoustic seals Closed eaves No vents to outside walls/eaves Mechanical ventilation/airconditioning 	
	Side-on to corridor	 10mm (minimum) laminated glazing Closed eaves Mechanical ventilation/airconditioning 	
	Away from corridor	No requirements	
Other indoor areas	Any	No requirements	

⁷ See section on Mechanical ventilation/airconditioning for further details and requirements.

⁸ These deemed-to-comply guidelines adopt the definitions of indoor spaces used in AS 2107-2000. A comparable description for bedrooms, living and work areas is that defined by the Building Code of Australia as a "habitable room". The Building Code of Australia may be referenced if greater clarity is needed. A living or work area can be taken to mean any "habitable room" other than a bedroom. Note that there are no noise insulation requirements for utility areas such as bathrooms. The Building Code of Australia describes these utility spaces as "non-habitable rooms". ⁹ Glazing panels are acceptable in external doors facing the transport corridor. However these must meet the

minimum glazing requirements.

Mechanical ventilation/airconditioning

Where outdoor noise levels are above the "target", mechanical ventilation or airconditioning is required to ensure that windows can remain closed in order to achieve the indoor noise standards.

In implementing ventilation, the following need to be observed:

- Evaporative airconditioning systems may meet the requirements provided attenuated air vents are provided in the ceiling space and designed in such a way so that windows can remain closed;
- Refrigerative airconditioning systems need to be designed to achieve fresh air ventilation requirements;
- air inlets need to be positioned facing away from the transport corridor where practicable;
- ductwork needs to be provided with adequate silencing, particularly in higher noise areas, to prevent noise intrusion.

Notification

Notifications on certificates of title and/or advice to prospective purchasers advising of the potential for noise impacts from road and rail corridors can be effective in warning people of the potential impacts of transport noise. Such advice can also bring to the attention of prospective developers the need and opportunities to reduce the impact of noise through sensitive design and construction of buildings and the location and/or screening of outdoor living areas.

Notification should be provided to prospective purchasers, and required as a condition of subdivision (including strata subdivision) for the purposes of noise-sensitive development or planning approval involving noise-sensitive development, where external noise levels are forecast or estimated to exceed the "target" criteria as defined by the Policy. In the case of subdivision and development, conditions of approval should include a requirement for registration of a notice on title, which is provided for under section 12A of the Town Planning and Development Act and section 70A of the Transfer of Land Act. An example of a suitable notice is given below.

Notice: This property is situated in the vicinity of a transport corridor, and is currently affected, or may in the future be affected, by transport noise. Further information about transport noise, including development restrictions and noise insulation requirements for noise-affected property, are available on request from the relevant local government offices.

Lloyd George Acoustics

Appendix B

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)

The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

L₁

An L_1 level is the noise level which is exceeded for 1 per cent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L10

An L_{10} level is the noise level which is exceeded for 10 per cent of the measurement period and is considered to represent the *"intrusive"* noise level.

L90

An L_{90} level is the noise level which is exceeded for 90 per cent of the measurement period and is considered to represent the "*background*" noise level.

L_{eq}

The L_{eq} level represents the average noise energy during a measurement period.

LA10,18hour

The $L_{A10,18 \text{ hour}}$ level is the arithmetic average of the hourly L_{A10} levels between 6.00 am and midnight. The *CoRTN* algorithms were developed to calculate this parameter.

L_{Aeq,24hour}

The $L_{Aeq,24 hour}$ level is the logarithmic average of the hourly L_{Aeq} levels for a full day (from midnight to midnight).

LAeq, 8hour / LAeq (Night)

The $L_{Aeq (Night)}$ level is the logarithmic average of the hourly L_{Aeq} levels from 10.00 pm to 6.00 am on the same day.

LAeq,16hour / LAeq (Day)

The $L_{Aeq (Day)}$ level is the logarithmic average of the hourly L_{Aeq} levels from 6.00 am to 10.00 pm on the same day. This value is typically 1-3 dB less than the $L_{A10,18hour}$.

Satisfactory Design Sound Level

The level of noise that has been found to be acceptable by most people for the environment in question and also to be not intrusive.

Maximum Design Sound Level

The level of noise above which most people occupying the space start to become dissatisfied with the level of noise.

Chart of Noise Level Descriptors



Time Austroads Vehicle Class

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Typical Noise Levels



APPENDIX D ENVIRONMENTAL ASSESSMENT REPORT



Lots 99 & 130 Portcullis Drive, Willeton

Environmental Assessment Report

Prepared for: NicheLiving Construction

August 2014

• people • planet • professional

Document	Beuleien	Prepared by	Reviewed by	Submitted to Client	
Reference	Revision			Copies	Date
LD469AB	A INTERNAL DRAFT	СТ	LR		01/08/14
LD469AB	A CLIENT FINAL	СТ	LR	1 x electronic	13/08/14

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Executive Summary

360 Environmental Pty Ltd was commissioned by NicheLiving Construction (NicheLiving) to prepare an Environmental Assessment Report (EAR) for Lots 99 and 130 Portcullis Drive, Willeton (Figure 1). In total, the site occupies an area of approximately 7.9 hectares (ha). The purpose of the report is to outline the key environmental features, constraints, and proposed management measures to support an amendment request to the City of Canning's Town Planning Scheme No. 40.

The scope of work for the EAR consisted of a desktop assessment for key environmental features and a historical aerial photo review. This study also included a site visits by 360 Environmental scientists to verify the findings of the desktop assessment and the two flora and vegetation reports prepared by ENV in 2005. A summary of the findings of the EAR is given below:

- Contamination and Acid Sulphate Soils (ASS): Acid sulphate soil (ASS) risk mapping for the Swan Coastal Plain (DEC, 2010) identified that the entire site consists of areas with 'moderate to low' risk of ASS.
- Groundwater and Surface Water: The site has previously been utilised for sand extraction and as a result regional topographic contours may not accurately reflect the relief of the site and the depth to groundwater may be at variance to regional groundwater mapping.

The site was not identified to occur within any surface or groundwater protection areas (DoW, 2014).

Flora and Vegetation: The site is highly degraded with pockets of remnant vegetation in a Good condition. Remnant vegetation across the site consists of *Banksia* Woodland and *Melaleuca* Woodland.

The site has been subject to a Level 2 Flora and Vegetation Survey (ENV, 2005a) and a targeted Spring Flora Survey (ENV, 2005b). No conservation significant flora was identified during the July or September 2005 flora and vegetation surveys. The *Banksia* communities at the site may potentially represent the Priority 3 (P3) community '*Banksia* dominated woodlands of the Swan Coastal Plain IBRA Region' (DPaW, 2013).

Threatened and Priority Fauna: Given the highly degraded and isolated nature of the site it is considered to hold limited habitat value.

Conflicting Land uses: No land use conflicts are expected to occur with adjacent 'Mixed Business' and 'Industrial' areas. A noise assessment for emissions associated with Roe Highway has been undertaken by Lloyd George Acoustics. This report details noise mitigation measures which will be employed to ensure future residents of the site are not impacted by undesirable levels.



Aboriginal and European Heritage: No Aboriginal Heritage Sites were identified within or in the vicinity of the property (DoAA, 2014). The search showed one occurrence of one 'Other Heritage Place' (OHP) within the site which has been considered by the Aboriginal Cultural Materials Committee not to be a site under Section 5 of the Aboriginal Heritage Act thus appearing as 'Stored Data' on the Aboriginal Heritage Enquiry System (DoAA, 2014).

No European heritage sites were identified within or in close proximity to the property (State Heritage Office, 2014).



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1 Introduction

1.1 Background

360 Environmental Pty Ltd (360 Environmental) was commissioned by NicheLiving Construction to prepare an Environmental Assessment Report (EAR) for Lots 99 and 130 Portcullis Drive ('the site') (Figure 1). The EAR has been prepared to support an application for an amendment to the City of Canning's Town Planning Scheme (TPS) No. 40 from 'Mixed Business' to 'Residential'.

1.2 Scope

The following scope was undertaken for the preparation of this EAR:

- Literature review of relevant documents including:
 - o ENV Australia (2005a, 2005b) Flora and Vegetation Surveys;
 - City of Canning planning policies and environmental strategy documents; and,
 - o Relevant EPA and regulatory guidance statements.
- Desktop assessment of flora, vegetation and fauna values and significance;
- Desktop assessment of conservation areas, that may exist on or nearby to the site, including Bush Forever sites, Regional Parks and Environmentally Sensitive Areas (ESA's);
- Desktop assessment of mapped wetlands in the area and their conservation status and buffers;
- Desktop review of the geology, surface hydrology and groundwater information using available databases and digital mapping to identify:
 - o Groundwater protection areas;
 - o Surface water protection areas;
 - o Watercourses; and
 - Areas subject to flooding/inundation.
- Desktop site assessment of contamination and acid sulfate soils (ASS). Including a search of the Department of Environment and Regulation (DER) Contaminated Sites database and a review of historical and current land uses;
- Desktop heritage (Aboriginal and non-Aboriginal) assessment of the site;
- Review of nearby landuses and identification of any setbacks or land use conflicts;
- Site visit by a Senior Environmental Scientist and a Botanist to verify the findings of the desktop studies and previous surveys; and



Identification of environmental constraints and opportunities associated with the proposed development and the development of management actions in consultation with the client.



2 Site Description and Assessment

2.1 Property and Zoning Information

The site comprises of two Lots in the Suburb of Willeton (Figure 1) within the local government area of the City of Canning. In total the site comprises an area of 7.9 hectares (ha) and is located approximately 10km south of Perth CBD. The property is currently zoned as "Mixed Business" under the City's most recent *Town Planning Scheme* (TPS) No. 40 and is listed as "Urban" under the Western Australian Planning Commission's (WAPC) Metropolitan Region Scheme (MRS). Portcullis Drive and Woodthorpe Drive create the north-western boundary of the site while Roe Highway forms the south-eastern boundary.

2.2 Current Land Use and Features

The site currently comprises of 7.9 ha of vacant land in degraded condition. A Water Corporation high pressure water (Serpentine Trunk) main intercepts the eastern portion of the site. Consultation with the Water Corporation will be required to determine land use permissibility within this freehold lot.

2.3 Topography

The Perth Groundwater Atlas (DoW, 2014) indicates that the site is gently undulating from approximately 29 meters Australian Height Datum (AHD) on the site's western boundary to approximately 22 meters AHD in the north-eastern portion of the property (Figure 2). However, the site has been utilised for sand extraction and some topsoil has been removed resulting in an alteration of the natural topography of the site to a relatively flat land relief.

2.4 Regional Geology and Soils

The majority of the site falls within the soil sub-system '212Bs_S8'as indicated by The Department of Agriculture and Food Western Australia (DAFWA) dataset (DAFWA, 2005) (Figure 3). This soil sub-system is characterised by very light grey sands at the surface, yellow sands at depth, fine to medium grained, sub rounded quartz, moderately well sorted of Aeolian origin (DAFWA, 2005).

A very small area in the south of the site lies within the '213Pj_S10' soil sub-system which is characterised by a relatively thin sand veneer over sandy clay to clayey sand of Aeolian origin (DAFWA, 2005). The presence of clay may result in some perching of groundwater in a very small southern portion of the site. This will be confirmed through groundwater monitoring at future stages of the development.


2.5 Acid Sulfate Soils

Acid sulphate soil (ASS) risk mapping for the Swan Coastal Plain (DEC, 2010) identified that the entire site consists of areas with 'moderate to low' risk of ASS (Figure 4). Where necessary, prior to construction works further preliminary assessment of the site for ASS will be undertaken to determine the nature and extent of ASS (if any) at the site as well as identify any treatment and management required.

2.6 Contamination

2.6.1 Contaminated Sites Database Search

The site is not located within any registered contaminated sites however two contaminated sites were found to be located within 500 meters of the property (DER, 2014) (Figure 5). These sites and their classification are listed below:

- ID 9511- Remediated for restricted use; and,
- ID 16578- Remediated for restricted use.

Site 9511 and 16578 are located approximately 500 meters east of the property. The Source Sites have historically been used as a research laboratory and treatment facility for the cleaning of diamonds and diamond-bearing materials, an activity that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). A screening risk assessment has indicated that the contamination does not currently pose an unacceptable risk to the environment or environmental values (DER, 2014).

During an inspection by 360 Environmental Scientists in June it was noted that the site had been subjected to some minimal localised illegal dumping of waste material. Localised areas of the site contained demolition rubble (i.e. bricks, concrete and mortar) and household goods that had been dumped. No other evidence of potential contamination was observed. While it is noted that some of the above items may be sources of potential contamination (asbestos sheeting), the impact appears to be superficial and localised. This can be managed by the removal of any asbestos containing material by a licenced contractor. In addition discarded household items and dumped materials will be removed and disposed of appropriately prior to development.

2.6.2 Site History

Figures 6a to 6h represent a historical series of aerial photography spanning the years between 1953 and 2013. A summary of historic changes in and around the site is presented in Table 1.

Year	FIGURE	Notes
1953	Figure 6a	At this time the majority of the site was vegetated with the
		exception of a cleared area in the north-east of the site, a small

Table 1. Site Features and Surrounding Land Use Observations in Historical Photos



Year	FIGURE	Notes
		cleared area in the south of the site and some evidence of tracks
		through the centre of the property. The surrounding areas were
		mostly vegetated to the north' west and south of the site. Areas
		to the immediate south-east, east and north-east were largely
		cleared for agricultural purposes.
		During the period from 1953 and 1965 additional clearing has
1065	Figure 6b	occurred in the northern half of the site and also outside the
1303	i igule ob	north-western boundary of the property. The southern half of the
		site remains undisturbed.
		Between 1965 and 1974 extensive clearing occurred within the
1974	Figure 6c	site and to the north-west of the site. A small area of the south-
		west of the property remains undisturbed.
		From 1974 to 1981 clearing within the site and to the north-west
		continued for what appears to be sand extraction. Several tracks
1981	Figure 6d	surrounding the property were widened and residential
		development commenced to the north-west of the site. Land use
		to the east of the site remained rural at this time.
		During the period from 1981 to 1985 there was little disturbance
		within the site and some minor regeneration occurred. Residential
1985	Figure 6e	development continued to the north-west, west and south-west of
1000	r igure de	the property. Additional roads surrounding the site were
		constructed in this time and the rural property to the south-east
		was demolished and its surrounding vegetation cleared.
	Figure 6f	Between 1985 and 1995 extensive residential development
		occurred in the areas surrounding the site with the exception of
		industrial development to the south and mixed business to the
		immediate north and north-east. Additional clearing occurred at
1995		the site during this time, potentially for sand extraction for the
		surrounding development. There was little remnant vegetation at
		this time. Some remnant vegetation existed within the border of
		the southern portion of the site and some scattered trees also
		existed in the north of the site.
		From 1995 to 2005 little disturbance within the site and some
2005		minor regeneration of vegetation occurred. The mixed business
	Figure 6g	area to the immediate north continued to develop as did the
		industrial area to the south of the site. The major development
		during this period was the construction of Roe Highway adjacent
		to the north-eastern site boundary.
		Between 2005 and 2010 there was no further evident degradation
2010	Figure 6h	of the site however the majority of the site remained highly
		disturbed due to historical sand extraction. Some pockets of



Year	FIGURE	Notes
		remnant vegetation currently remain.

The review of historical aerial photographs for the site did not identify any causes for concern in relation to land uses which would potentially conflict with the proposed scheme amendment.

2.7 Surface Hydrology and Wetlands

A search of the Landgate 'Shared Land Information Platform (SLIP)' (Landgate, 2014) Geomorphic Wetland Dataset did not identify any surface water features within, or in the vicinity of the site, the closest mapped geomorphic wetland is a Conservation Category Wetland (CCW) which is located approximately 1.8 kilometres to the south of the site.

A search of the Environmental Protection Policy Lakes (EPP Lakes) dataset (EPA, 2010) did not identify any EPP Lakes within the site (Figure 7). The closest EPP lake is located approximately 900 meters north-west of the site.

A search of matters protected under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 using the *Protected Matters Search Tool (PMST)* (Department of the Environment (DotE), 2014) did not identify any Ramsar listed sites or Wetlands of National Importance within the site or immediate surrounds. The closest Ramsar sites are located over 10 kilometres south of the site and are associated with Forrestdale and Thompsons Lakes. The closest Nationally Important Wetland is the Swan Canning Estuary located over 2 km to the north of the site.

2.8 Hydrogeology

Regional groundwater levels at the site are estimated to be approximately between 19 m AHD and 21m AHD based on regional groundwater mapping and topography data (DoW, 2014) (Figure 2). This information would suggest that groundwater could range from approximately one meter to 10 m below ground level. As the site has been utilised for sand extraction and topographically altered, the depth to groundwater may be at variance to what is suggested by regional groundwater mapping.

2.9 Public Drinking Water Source Areas

The site was not identified to occur within any surface or groundwater protection areas (DoW, 2014). The closest Public Drinking Water Source Area is located approximately 2.6 kilometres south-west of the property and is associated with Jandakot Underground Water Pollution Control Area.



2.10 Vegetation

2.10.1 Broad Vegetation Mapping

Broad Heddle Vegetation mapping identifies the entire site as occurring within the Bassendean Complex- Central and South (Heddle *et al.*, 1980) (Figure 8a). As of 2013, this system had 27.7% of its pre-European vegetation remaining (PBP, 2013). The Environmental Protection Authority (EPA) recognises vegetation complexes that are not well represented in reserves as being significant. Vegetation complexes which have 10%-30% remaining may be considered regionally significant. Proposals in constrained areas that would affect a vegetation complex with 10% or less remaining are likely to be formally assessed by the EPA. Although the complex which falls within the site may be considered not well represented, they are above the 10% threshold to be considered critical assets in constrained areas (DEC, 2009a).

A constrained area is defined as 'An area where there is a reasonable expectation that development will be able to proceed' (EPA, 2008). As this area is currently zoned as 'Urban' under the MRS and 'Mixed Business' under the City's TPS, it is considered that the site is a constrained area.

2.10.2 Vegetation Characteristics of the Site

The vegetation on site is highly fragmented and weed infested as a result of past sand extraction activities. The vegetation consists of:

Low Open Woodland of Banksia menziesii, Banksia attenuata, Eucalyptus todtiana and Allocasuarina fraseriana over Adenanthos cygnorum, Jacksonia furcellata, Gompholobium tomentosum, Stirlingia latifolia, Scholtzia involucrata, Xanthorrhoea preissii, Hibbertia subvaginata and Patersonia occidentalis; and

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Low Open Woodland of Melaleuca preissiana and Banksia ilicifolia over Xanthorrhoea preissii, Phlebocarya ciliata, Hypocalymma angustifolium, Melaleuca thymoides, Dasypogon bromeliifolius and Lyginia imberbis.

The remainder of the vegetation consists of garden escape/planted species such as **Chamelaucium uncinatum* and Acacia saligna and weed species such as **Arundo donax* and **Leptospermum laevigatum*.

A recent site visit by a 360 Environmental Botanist assessed the condition of the vegetation at the site in accordance with the Vegetation Condition Scale developed by Keighery (1994) and as summarized in Bush Forever (Government of Western Australia, 2000) (Figure 8b). The site was found to consist of native vegetation in the following condition:



- Good: 1.06 ha (13%)
- Degraded: 0.44 ha (6%)
- Completely Degraded: 6.40 ha (81%)



2.10.3 Priority and Declared Rare Flora

On the 29th May 2005 a database search request was submitted to The Department of Conservation and Land Management (now DPaW) to obtain a list of rare and priority flora that have been recorded in the vicinity of the site (ENV, 2005a). The search results returned the following two species:

Species	FEDERAL CONSERVATION SIGNIFICANCE	STATE CONSERVATION SIGNIFICANCE
Caladenia huegeli	Endangered	Declared Rare Flora
Tripterococcus paniculatus	NL	Priority 4

A flora and vegetation survey was undertaken by ENV on 5th July 2005 (ENV, 2005a) (Appendix A) and a subsequent targeted Spring flora survey on the 14th September 2005 (ENV, 2005b) (Appendix B). No priority or rare species were identified during the July flora and vegetation survey or the Spring flora survey undertaken in September.

Given that these searches were undertaken over five years ago, a generalised search of a five kilometre area surrounding the site was conducted using the DPaW *NatureMap* search tool and also the Protected Matters Search Tool (*PMST*) (DPaW, 2014, DotE, 2014) (Appendix C and D respectively). The results of these desktop searches show the potential for threatened or priority species to occur within the vicinity of the site, these are provided below in Table 2:

Species	FEDERAL CONSERVATION SIGNIFICANCE	STATE CONSERVATION SIGNIFICANCE	SUITABLE HABITAT PRESENT ONSITE? Y/N
Andersonia gracilis	Endangered	Vulnerable	N
Caladenia huegeli	Endangered	Critically Endangered	Y
Calytrix breviseta subsp. breviseta	Endangered	Critically Endangered	Ν
Centrolepis caespitosa	Endangered	Priority 4	Ν
Darwinia foetida	Critically Endangered	Endangered	Ν
Diuris micrantha	Vulnerable	Vulnerable	Ν
Diuris purdiei	Endangered	Endangered	N
Drakea elastica	Endangered	Critically Endangered	Ν
Drakea micrantha	Vulnerable	Endangered	N

Table 2: Conservation	n Significant Flora	potentially occurring	g within 5km of the site.
-----------------------	---------------------	-----------------------	---------------------------



-	Declared Rare Flora	Ν
Endangered	Critically Endangered	Ν
Endangered	Endangered	N
Endangered	Endangered	Ν
Endangered	Endangered	Y
Endangered	Critically Endangered	Ν
Endangered	Critically Endangered	N
, in the second s		
-	Priority 1	Ν
-	Priority 2	Ν
-	Priority 3	Ν
-	Priority 3	Ν
-	Priority 3	Ν
-	Priority 4	Ν
-	Priority 4	N
-	Priority 4	Ν
	- Endangered Endangered Endangered Endangered Endangered Endangered - - -	-Declared Rare FloraEndangeredCritically EndangeredEndangeredEndangeredEndangeredEndangeredEndangeredEndangeredEndangeredCritically EndangeredEndangeredCritically EndangeredEndangeredPriority 1-Priority 2-Priority 3-Priority 3-Priority 4-Priority 4-Priority 4

Of the species listed above, the property contains potentially suitable habitat for both conservation significant species *Caladenia huegeli* and *Macarthuria keigheryi*. As previously mentioned a targeted Spring flora survey was undertaken on the 14th September 2005 (ENV, 2005b) specifically targeting *Caladenia huegeli*. This species was not identified during the survey and therefore it is considered that it is not present within the site.

Although no conservation significant flora were recorded at the time of the survey, *Macarthuria keigheryi* was not specifically targeted in the search. A review of the available information for this species indicates that *Macarthuria keigheryi* is currently known from six isolated populations, five of which are in the Perth metropolitan region (DEC, 2009b). The nearest recorded population of this species is approximately 4.5 kilometers north-east of the site near the banks of the Canning River (DPaW, 2014). The species is found in low-lying winter-wet damp, grey/white sands and grows in open patches with low tree canopy cover among heathland, jarrah (*Eucalyptus marginata*) and *Allocasuarina/ Banksia* woodland at Welshpool and Kewdale (DEC, 2009b).



Regional topographic and groundwater contour mapping suggest that he nearest population occupies low lying (<5m AHD) areas with minimal to no separation to groundwater (DoW, 2014). Given that no surface water features were identified within the site and that the separation to groundwater is expected to be greater than one meter, the site is not considered to be a 'low lying winter-wet area' which is suitable for this species.

In addition, the flora survey (ENV, 2005a) did not identify any jarrah within the site. Jarrah forms part of the preferred habitat for this species as described above. It is therefore concluded that although possible, *Macarthuria keigheryi* is unlikely to occur at the site despite the presence of some *Allocasuarina/ Banksia* woodland.

2.10.4 Threatened and Priority Ecological Communities

On the 29th May 2005 a database search request was submitted to The Department of Conservation and Land Management (now DPaW) to obtain a list of Threatened Ecological Communities recorded to occur within the vicinity of the site. The results did not identify any TEC's occuring within the site, however two TEC's were recorded within a 2km radius and are listed below:

- SCP 8- Herb rich shrublands in clay pans
- SCP 10a- Shrublands on dry clay flats

These two vegetation communities were not identified during the 2005 survey (ENV, 2005a).

The results of the *PMST* listed two TEC's with the potential to occur within the vicinity of the site. These are:

- Claypans of the Swan Coastal Plain
- Subtropical and Temperate Coastal Saltmarsh

Neither of these TECs are considered likely to occur on site.

Based on the vegetation description of the site and observations in the field, the vegetation association is likely to be analogous with a listed Priority 3 vegetation community.

In 2012 a nomination was put forward to list all *Banksia attenuata* and *Banksia menziesii* woodlands as conservation significant. The listing name for this vegetation community is "Banksia dominated woodlands of the Swan Coastal Plain IBRA region". The main feature of these *Banksia* woodlands is the presence of *Banksia attenuata* and/or B. *menziesii* occurring on deeps sands. This community is currently listed as Priority 3 which are poorly known communities including:

 communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation; or



- communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or
- communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

PECs are known as ecologically valuable communities that need further investigation and have no formal protection. *Banksia* woodland within the site that is in a 'Good' condition will be retained in POS areas where possible.

2.11 Threatened and Priority Fauna

A generalised search of a five kilometre area surrounding the site was conducted using the DPaW NatureMap search tool and also the federal Department of the Environment (DotE) PMST (DPaW, 2014, DotE, 2014). The results of these desktop searches are provided in Appendix A and B respectively. The likelihood of these species to occur within the site was assessed against their habitat requirements and distribution, the species which could potentially inhabit the site are provided in Table 3 below:

SPECIES	FEDERAL CONSERVATION SIGNIFICANCE	STATE CONSERVATION SIGNIFICANCE
Calyptorhynchus banksii	Vulnerable	Vulnerable
naso		
Calyptorhynchus baudinii	Vulnerable	Endangered
Calyptorhynchus latirostris	Endangered	Endangered
Merops ornatus	Protected under international	agreement
Lerista lineata	-	Priority 3
Neelaps calonotos	-	Priority 3
Macropus irma	-	Priority 4
lsoodon obesulus subsp. fusciventer	-	Priority 5

Toble 2	Significant	Found	Species	Detentially	Occurring	at the	Cito
I able 3	Significant	rauna	Species	Potentially	Occurring	at the	Site

Although the site is isolated and in a highly degraded condition, minimal areas of *Banksia* woodland in a Good condition have been identified and provide potential foraging habitat for Black Cockatoos. The proponent will consider the requirement for an EPBC referral for any potential impacts to Matters of National Environmental Significance (MNES) based on the likely extent of impacts, and will meet any federal referral and approval



obligations (if required) prior to clearing the site. If a referral is required, the proponent will undertake this prior to subdivision, and is not anticipated to impact on the rezoning of the site.

Other fauna species of conservation significance are unlikely to inhabit the site due to its isolated and degraded nature.

2.12 Conservation Areas

A search of WA Atlas (Landgate, 2014) identified that the site does not fall within or in close proximity to any Environmentally Sensitive Areas (ESAs), Bush Forever (BF) Sites or DPaW Managed Lands, The closest conservation area is associated with the EPP Lake located approximately 900 meters to the north-west of the site.

2.13 Conflicting Land Uses

Issues surrounding potentially conflicting adjacent land uses are detailed in the separate Scheme Amendment Request Report prepared by Taylor Burrell Barnett Town Planning and Design ((TBB), 2013) and are outlined in this section.

The southern portion of the site is located adjacent to Roe Highway, a primary regional road. A Road Traffic Noise Assessment has been undertaken by Lloyd George Acoustics to determine potential noise implications to residential development associated with the major road. The report identifies necessary mitigation measures, such as minimum glazing thickness, to be incorporated into the future built form to ensure that a suitable noise level is achieved in future dwellings.

To the south of Roe Highway lies Canning Vale Strategic Industrial Area. No off-site buffer is currently in existence that would impact on the proposed change of use, or density of development proposed within the site (TBB, 2013).

The areas adjacent to the north-east and north-west boundaries of the site are zoned under the TPS as 'Mixed Business'. As specified by SPP4.1 all light and service industry (such as approvable uses within the existing Mixed Business zone), are required to retain all emissions and hazards on-site (TBB, 2013). Therefore no buffer implications are considered to be imposed on residential development of the site in consideration of the adjacent 'Mixed Business' land uses.

Dissecting the eastern corner of Lot 130 is a narrow Water Corporation freehold lot (Lot 64) representing the alignment of a high pressure water main (Serpentine Trunk). As mentioned previously, consultation with the Water Corporation will be required to determine land use permissibility within thislot.

2.14 Heritage

2.14.1 Aboriginal Heritage

A search of the Department of Aboriginal Affairs (DAA) *Aboriginal Heritage Inquiry System* did not return any registered Aboriginal Heritage Sites within or in the vicinity of



the property (DAA (now Department of Indigenous Affairs), 2014). The search showed one occurrence of one 'Other Heritage Place' (OHP) within the site (Figure 9) which is associated with site '4313- Beasley Road'.

OHP's are locations whereby they have been either considered by the Aboriginal Cultural Materials Committee not to be a site under Section 5 of the Aboriginal Heritage Act (AHA) (where they appear as 'stored data'), or whereby some information has been received however is insufficient to constitute a location as a 'site' under Section 5 of the AHA. Site 4313 is listed as 'stored data-not a site' and therefore is not considered to be an Aboriginal Heritage Site under the Act.

2.14.2 European Heritage

A search of the State Heritage Office dataset using WA Atlas did not identify any European heritage sites within or in close proximity to the property (State Heritage Office, 2014).



3 Impacts and Management

Any potential environmental impacts that may result from development of the site are discussed below, along with the management measures intended to mitigate any possible impacts.

3.1 Separation to Groundwater

In accordance with the Department of Water (DoW) *Better Urban Water Management* Guidelines (DoW, 2008), where the level is at or less than 1.2 m of the surface, the importation of clean fill and/or the provision of sub-surface drainage will be required to ensure that adequate separation of building floor slabs from groundwater is achieved.

3.1.1 Management measures

Management of surface and groundwater will be reported in an Urban Water Management Plan, which will be required prior to subdivision..

3.2 Acid Sulfate Soils

Projects and developments in ASS risk areas which involve excavation, lowering of the water table (temporarily or permanently), compaction of saturated soils or sediments and/or lateral displacement of previously saturated sediments, may adversely disturb ASS.

In accordance with DER ASS Investigation guidelines, any dewatering or soil disturbance, compaction or lateral displacement in the ASS risk areas will require a Preliminary Site Investigation (PSI),

3.2.1 Management measures

Prior to the commencement of construction works, a preliminary desktop based ASS investigation will be undertaken into consideration of any plans of excavation and servicing requirements to determine if any further investigations or management plans are required.

3.3 Potential Localised Contamination

During an inspection by 360 Environmental Scientists in November 2013 it was noted that the site had been subjected to minimal localised dumping of waste material some of which potentially contains asbestos.

3.3.1 Management measures

In the event that the rubbish on site contains asbestos, the only management requirement expected is the proper removal of asbestos by an accredited contractor. The removal of any identified asbestos should be undertaken in accordance with the National Occupational Health and Safety Commission (NOHSC) *Code of Practice for the safe*



removal of asbestos 2nd edition (NOHSC: 2002 (2005)). This is not considered to result in any contamination concerns given the minimal localised nature of the dumping on-site.

3.4 Vegetation and Fauna

Areas of the site were assessed as being in a Good condition and potentially represent a Priority 3 Ecological Community. Fauna habitat is limited across the site, and is mostly associated with the remnant pockets of trees and bushland on the eastern, northern and western boundaries. Generally the site is heavily degraded and disturbed due historical land uses.

3.4.1 Management Measures

The proponent acknowledges the referral requirements under the EPBC Act, and will meet the expectations of the Commonwealth DotE for any potential impacts to nationally protected matters. It should be noted that this process is separate to the scheme amendment assessment process and should not prevent the consideration of the amendment and accompanying technical information.

Areas of vegetation within the site that were assessed as being in a Good condition have been considered in the design of the concept plan. The proposed Public Open Space area contains small pockets of remnant vegetation in Good condition. This vegetation will be incorporated into the landscaping design and retained where possible.



4 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data and analyses ("client's information") provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

Subject to the terms of the contract between the Client and 360 Environmental Pty Ltd, copying, reproducing, disclosing or disseminating parts of this report is prohibited (except to the extent required by law) unless the report is produced in its entirety including this page, without the prior written consent of 360 Environmental Pty Ltd.



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FIGURES











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APPENDIX A

ENV Flora and Vegetation Survey Report

FLORA AND VEGETATION SURVEY OF LOT 130 AND PART OF LOT 99 WOODTHORPE DRIVE, WILLETTON



On behalf of : ESTATES DEVELOPMENT COMPANY

Prepared by: ENV Australia ACN 091 839 520 Level 7 182 St Georges Terrace Perth WA 6000 Telephone (08) 9289 8360 Facsimile (08) 9322 4251



Australia

05.093/RP001 July 2005

FINAL Approved for Issue :

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FIGURE 1	SITE LOCATION
FIGURE 2	VEGETATION MAP
FIGURE 3	PHOTO LOCATIONS AND DIRECTIONS

APPENDICES

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APPENDIX A	DEFINITION OF RARE AND PRIORITY FLORA SPECIES
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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and ENV.Australia Pty Ltd (ENV) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, ENV has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, ENV has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. ENV will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to ENV.

Environmental Conclusions

In accordance with the scope of services, ENV has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. ENV assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of ENV or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.



Other Limitations

4

ENV will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.



1 INTRODUCTION

ENV.Australia Pty Ltd (ENV) was commissioned by Estates Development Company to undertake a flora and vegetation survey of a parcel of land between Woodthorpe Drive and Roe Highway, which consists of a part of Lot 99 and the whole of Lot 130, Willetton (Figure 1). It is understood that the field survey is required to provide information about the site that will aid in future subdivision, rezoning and development proposals involving the property.

The purpose of this flora and vegetation survey is to provide information about the site with particular emphasis in identifying any significant environmental factors that will have to be considered when planning the subdivision and development of the property.

1.1 LOCATION

The survey site is approximately 15 kilometres south of Perth (see Figure 1).

The survey area is located in the south west province of Western Australia in the Darling Botanical District. This region typically consists of forest country with related woodlands and is divided into four subregions or botanic subdistricts.

The parcel of land between Woodthorpe Drive and Roe Highway, Willetton is located within the Drummond Botanical Subdistrict, which consists of mainly Banksia Low Woodland on leached sands and Melaleuca Swamps in poorly drained areas. Woodland of Tuart (*Eucalyptus gomphocephala*), Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) are on less leached soils (Beard, 1990).

The climate of this region is Warm Mediterranean, with winter precipitation of 600-1000 mm and 5-6 dry months per year.

1.2 DECLARED RARE AND PRIORITY FLORA

Flora species acquire Declared Rare or Priority conservation status where populations are geographically restricted or threatened by local processes. The Department of Conservation and Land Management (CALM) enforce regulations under the Wildlife Conservation Act (1950) to conserve Declared Rare Flora and protect significant populations.

Rare Flora species are gazetted under Subsection 2 of Section 23F of the Wildlife Conservation Act (1950) and therefore it is an offence to "take" or damage rare flora without Ministerial approval. Section 23F of the Wildlife Conservation Act (1950-1980) defines "to take" as to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.

Priority Flora are under consideration for declaration as 'rare flora', but are in urgent need of further survey (Priority One to Three) or require monitoring every 5-10 years (Priority Four) (see Appendix A for definitions).



Flora is also classified according to their conservation status at a federal level, under the Environmental Protection and Biodiversity Conservation Act, 1999. These categories of classification are summarised in Appendix A

1.3 THREATENED ECOLOGICAL COMMUNITIES

A vegetation community is considered a Threatened Ecological Community (TEC) if it is found to fit into one of the following categories:

- Presumed Totally Destroyed;
- Critically Endangered;
- Endangered; or
- Vulnerable

The definitions of these categories are described in Appendix B. Coordination of threatened species and ecological community conservation is carried out by CALM's Nature Conservation Division, primarily through the Western Australian Threatened Species and Communities Unit (WATSCU).

1.4 LISTING OF THREATENED FLORA AND VEGETATION

The Wildlife Conservation Act provides for taxa of plants and animals to be listed as 'threatened'. CALM Policy Statements Nos 9 *Conservation of threatened flora in the wild* and 33 *Conservation of endangered and specially protected fauna in the wild* cover this area.

Listings are reviewed and changes recommended by CALM's Threatened Species Scientific Committee. Ministerial approval is necessary before changes are given legal status in a notice in the Government Gazette.

There is currently no equivalent legislation or formal policy for the protection of threatened ecological communities. However, an informal, non-statutory process, including advice from a scientific advisory committee, the establishment of the threatened ecological communities database, and steps for assigning ecological communities to categories of threat, is now in place.

The Department has been identifying and informally listing threatened ecological communities (TECs) for ten years. At May 2003, 106 ecological communities had been entered into the Department's TEC Database. Of these, 21 have been endorsed by the Minister for the Environment as Critically Endangered, 17 as Endangered, 28 as Vulnerable and three as presumed totally destroyed. The remainder are either awaiting endorsement as threatened or are allocated to one of five priority lists. Sixteen TECs are now listed under the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Any person may nominate an ecological community for listing under the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999. Nominations are forwarded to the Threatened Species Scientific Committee.



Once the Committee has conducted an assessment of the conservation status of the ecological community, its advice and subsequent recommendations are forwarded to the Minister for the Environment and Heritage who makes the final decision. The recommendations endorsed by the Minister in making a listing decision are provided via the EPBC Act lists.



2 SCOPE OF WORKS

The scope of services for the project consisted of the following:

- Undertake a data base search for Rare and Endangered species and Threatened Ecological Communities (TECs) that may occur in the area, by reference to Department of Conservation and Land Management (CALM) and Department of Environment and Heritage (DEH) databases;
- Comprehensive flora and vegetation field survey;
- Search for rare and endangered flora contained within the property;
- Identify any Threatened Ecological Communities (TECs);
- Review data collected against criteria established in state and federal processes for species conservation;
- Review the requirements in obtaining a clearing permit for the site; and
- Summarise findings in a final report.



3 METHODS

The methodology for works involved the following key steps:

Phase 1

On the 29 May 2005 a database search request was submitted to the Department of Conservation and Land Management to obtain a list of rare and priority flora species and Threatened Ecological Communities (TECs) that occur within the surrounding area of the subject lots. The search co-ordinates used were - 32.055140E 115.884160N and -32.067650E 115.917070N (GDA94) (CALM, 2005 Department's *Threatened (Declared Rare) Flora* database).

Phase 2

On 5 July 2005 a field survey of the lots was undertaken by traversing by foot. When a flora species could not be identified in the field, a GPS reading was taken and a specimen was collected. Details of the plant were recorded (i.e. flower colour, height, number of individuals). The vegetation and characteristics of the site were then mapped onto an aerial photograph.

Phase 3

Specimens of flora species collected during the field survey were taken to the State Herbarium where the samples were identified and compared to herbarium specimens for confirmation.



4 RESULTS

The following results are accurate at the time of report preparation. Flora composition changes over time with flora species having specific growing periods, especially annuals and ephemerals (some plants lasting for a markedly brief time, some only a day or two). For this reason the outcome of future botanical surveys undertaken on the property have the potential to change.

4.1 DATABASE SEARCH

The database search resulted in one rare and one priority species being identified as potentially occurring in the area. The two species are:

Family	Таха	Conservation Code: FEDERAL	Conservation Code: STATE
ORCHIDACEAE	Caladenia huegelii	Endangered	R
STACKHOUSIACEAE	Tripterococcus	NL	P1
	paniculatus (ms)		

The database search showed that there are no known occurrences of Threatened Ecological Communities (TECs) within the survey site. There are however two TECs that occur within a 2 kilometre radius, these are:

- SCP 8 Herb rich shrublands in clay pans
- SCP 10a Shrublands on dry clay flats

Community SCP 8 is listed as Vulnerable and SCP 10a is listed as Endangered under the Western Australia criteria. Neither are listed under the Commonwealth Environmental Protection and Biodiversity Act, 1999

See Appendix B for the definitions of Threatened Ecological Community conservation categories.

4.2 FLORA

A total of 30 families, 72 genera and 90 dominant taxa were recorded in the survey area. Of these 17 species were introduced (see Appendix C).

4.2.1 Introduced species

Of the 90 species recorded at the site 17 were introduced. The dominant weed families were POACEAE (5) and ASTERACEAE (3).

None of these species are listed as Declared Plants by the Department of Agriculture. Pursuant to section 37 of the Agriculture and Related Resources Protection Act, 1976, the Agriculture Protection Board lists the classes of plants that are for the time being subject of declaration made under section 35 of the Act, together with the matters specified pursuant to Subsection (2) of that section in relation to each class (Department of Agriculture, 2004)



4.2.2 Significant flora

No plant taxa gazetted as Declared Rare pursuant to subsection (2) of section 23F of the Wildlife Conservation Act (1950) or Priority Flora species (Department of Conservation and Land Management 2000) were located within the survey area.

No Endangered or Vulnerable species, pursuant to s178 of the Environmental Protection and Biodiversity Conservation Act, 1999 were located during the survey.

4.3 VEGETATION

4.3.1 Vegetation map

The majority of the land has been cleared for the purpose of sand extraction for residential development in the surrounding area. This has left the majority of the native vegetation fragmented and weed infested.

Below are descriptions of the vegetation on site. The numbers correlate to site locations in Figure 2. The species that occur at each site can be seen in Appendix C and site photo can be seen in Appendix D.

(*: denotes introduced taxa)

- 1: A Low Open Woodland of Eucalyptus todtiana, Allocasaurina fraseriana, Banksia menziesii, Banksia ilicifolia and Nuytsia floribunda over Adenanthos cygnorum, Jacksonia furcellata, Gompholobium tomentosum, Lechenaultia floribunda and Acacia pulchella.
- 2: Low Woodland of Banksia menziesii, Banksia attenuata, Eucalyptus todtiana, Allocasaurina fraseriana and Nuytsia floribunda over Adenanthos cygnorum, Gastrolobium capitatum, Stirlingia latifolia, Beaufortia elegans, Scholtzia involucrata, Lyginia imberbis and Hibbertia subvaginata.
- 3: Low Open Woodland of *Allocasaurina fraseriana* and *Nuytsia floribunda* over low dense shrubland/sedgeland of *Phlebocarya ciliata*, *Eremaea pauciflora* var. *pauciflora*, *Xanthorrhoea preissii*, *Acacia pulchella*, *Calytrix flavescens*, *Patersonia occidentalis*, *Hibbertia subvaginata* and *Gonocarpus pithyoides*.
- 4: Shrubland of Xanthorrhoea preissii, Phlebocarya ciliata, Hypocalymma angustifolium, Melaleuca thymoides, Beaufortia elegans, Lyginia imberbis, Dasypogon bromeliifolius, and Pericalymma aff. ellipticum with scattered Melaleuca preissiana and Banksia ilicifolia.
- 5: Low Open Woodland of Allocasaurina fraseriana and Nuytsia floribunda over low dense shrubland/sedgeland of Phlebocarya ciliata, Eremaea pauciflora var. pauciflora, Xanthorrhoea preissii, Acacia pulchella, Calytrix flavescens, Patersonia occidentalis, Hibbertia subvaginata and Gonocarpus pithyoides with *Gladiolus caryophyllaceus and *Oxalis compressa.



- 6: An area of *Chamelaucium uncinatum, Adenanthos cygnorum, Acacia saligna, *Cynodon dactylon and *Oxalis compressa
- 7: An area of *Chamelaucium uncinatum, Adenanthos cygnorum, Acacia saligna, *Cynodon dactylon and *Oxalis compressa
- 8: An area of *Chamelaucium uncinatum, Adenanthos cygnorum, Acacia saligna, *Cynodon dactylon and *Oxalis compressa
- 9: An area of *Chamelaucium uncinatum, Adenanthos cygnorum, Acacia saligna, *Cynodon dactylon and *Oxalis compressa
- 10: An Adenanthos cygnorum
- 11: An Adenanthos cygnorum
- 12: An area of *Chamelaucium uncinatum, Adenanthos cygnorum, Acacia saligna, *Cynodon dactylon and *Oxalis compressa
- 13: An area of *Arundo donax
- 14: An area of *Arundo donax
- 15: An area of **Chamelaucium uncinatum*
- 16: An Acacia saligna
- 17: An Acacia saligna
- 18: An area Acacia saligna
- 19: A row of Acacia saligna
- 20: A row of Acacia saligna
- 21: An area of Kunzea ?ericifolia
- 22: An area of *Arundo donax
- 23: An area of Adenanthos cygnorum
- 24: An area of *Arundo donax
- 25: An Adenanthos cygnorum
- 26: An area of Adenanthos cygnorum and *Carpobrotus edulis
- 27: A disturbed area of shrubland with Adenanthos cygnorum, Leucopogon conostephioides, Lyginia imberbis, Jacksonia furcellata, Hibbertia hypericoides, Persoonia saccata with scattered Banksia attenuata and numerous introduced species.
- 28: A patch of *Leptospermum laevigatum
- 29: An area of Banksia menziesii, *Leptospermum laevigatum and *Chamelaucium uncinatum
- 30: A *Leptospermum laevigatum
- 31: An area of Adenanthos cygnorum and *Leptospermum laevigatum



- 32: An area of Adenanthos cygnorum
- 33: An area of Adenanthos cygnorum
- 34: Low Woodland of Banksia menziesii, Banksia attenuata, Banksia ilicifolia over Adenanthos cygnorum, Acacia pulchella, Lyginia imberbis, Scholtzia involucrata, Petrophile linearis, Hibbertia subvaginata, Phlebocarya ciliata, Bossiaea eriocarpa, Conostephium pendulum and Xanthorrhoea preissii.
- 35: Low Woodland of Banksia menziesii, Banksia attenuata, Banksia ilicifolia over Adenanthos cygnorum, Acacia pulchella, Lyginia imberbis, Scholtzia involucrata, Petrophile linearis, Hibbertia subvaginata, Phlebocarya ciliata, Bossiaea eriocarpa, Conostephium pendulum and Xanthorrhoea preissii.
- 36: Low Woodland of Banksia attenuata, Allocasaurina fraseriana, Banksia menziesii over Adenanthos cygnorum, Acacia pulchella, Hibbertia hypericoides, Melaleuca thymoides Lechenaultia floribunda, Lyginia inberbis, Gompholobium tomentosum, Bossiaea eriocarpa, Patersonia occidentalis and Stirlingia latifolia.
- 37: Patches of Adenanthos cygnorum and *Leptospermum laevigatum
- 38: Low Woodland of Banksia attenuata, Allocasaurina fraseriana, Banksia menziesii over Adenanthos cygnorum, Acacia pulchella, Hibbertia hypericoides, Melaleuca thymoides Lechenaultia floribunda, Lyginia inberbis, Gompholobium tomentosum, Bossiaea eriocarpa, Patersonia occidentalis and Stirlingia latifolia.
- 39: Low Woodland of Banksia attenuata, Allocasaurina fraseriana, Banksia menziesii over Adenanthos cygnorum, Acacia pulchella, Hibbertia hypericoides, Melaleuca thymoides Lechenaultia floribunda, Lyginia inberbis, Gompholobium tomentosum, Bossiaea eriocarpa, Patersonia occidentalis and Stirlingia latifolia.
- 40: Low Woodland of Banksia attenuata, Allocasaurina fraseriana, Banksia menziesii over Adenanthos cygnorum, Acacia pulchella, Hibbertia hypericoides, Melaleuca thymoides Lechenaultia floribunda, Lyginia inberbis, Gompholobium tomentosum, Bossiaea eriocarpa, Patersonia occidentalis and Stirlingia latifolia.

4.3.2 Vegetation Condition

Due to the high variability of the vegetation over the survey site the condition classification ranges from Completely Degraded to Very Good. This classification is applied using the condition scale most commonly used in the Perth metropolitan area, Bush Forever, Keighery B J (1994) (see Appendix E for descriptions).

There are 8 sites that are considered to be in Very Good condition, these are 1-5, 34, 36 and 38 (Figure 2). Sites 1-5 form the largest portion of native vegetation within the survey site and has differing levels of topography creating different vegetation community units.



These are:

Site 1: Midslope;

Site 2: Upperslope;

Site 3 and 5: Lowerslope; and

Site 5: Depression

All of the eight sites that are in very good condition also have high native species diversity.

The rest of the native vegetation is highly fragmented and weed infested. The remaining vegetation on site consists of introduced species.

4.3.3 Threatened Ecological Communities

The database search identified Threatened Ecological Communities SCP8 and SCP10b within a 2km radius of the lots. These two vegetation communities were not found during the field survey.

4.3.4 Vegetation Complex

The patterning of plant and animal distributions on the Swan Coastal Plain is closely related to the geology, geomorphology and soils of the plain. Lots 99 and 130, Woodthorpe Drive, Willetton, are located on the Bassendean Dunes (Bush Forever, 2000). This major landform element is identified as the following:

The Bassendean Dunes lie in the centre of the Swan Coastal Plain and is the oldest of the three aeolian dune systems.

The dune system is generally of low relief and often consists of broad swales or relatively flat sand sheets between low dunes. The Bassendean Dunes at a regional level have six vegetation complexes, of which Lots 130 and 99 falls within the Bassendean Complex – Central and South (Bush Forever, 2000).

The Bassendean Complex – Central and South has 24% of the preclearing extent remaining (Bush Forever, 2000) with 13% proposed for protection. This complex consists of vegetation ranging from Woodlands of Eucalyptus marginata – Allocasuarina fraseriana and Banksia spp. to Low Woodland of Melaleuca species, and Sedgelands on the moister sites. This area includes the transition of Eucalyptus marginata to Eucalyptus todtiana in the vicinity of Perth.

Like many sites in the Perth metropolitan area, this site is a very small proportion of the Bassendean Complex – Central and South dunes system.

4.4 BUSH FOREVER

Lots 130 and 99 are not included in any Bush Forever sites.



5 **DISCUSSION**

Lot 99 and 130 Woodthorpe Drive Willetton has been used for sand extraction to supply the housing developments in the area and the properties are currently being used for four wheel driving and rubbish dumping.

70% of the survey site is void of native vegetation and is dominated by introduced species. The remaining native vegetation occurs in fragmented patches with the largest portion occurring in the western corner (approximately 0.7ha) (map sites 1-6). The vegetation in this corner has four distinct vegetation community units on differing levels of topography. The descriptions of these are in sections 4.3 and 4.4.

The vegetation communities that make up the bushland in the western corner (excluding site 6) are in very good condition and have high native species diversity. The area does have a high percentage of weeds (approximately 20%), which will continue to degrade the native vegetation. It is therefore required to undertake weed management if sites 1-5 are selected to be retained.

The other large area of native vegetation is site 34 (Figure 2). Even though the edges are degraded and weed infested, the centre of the vegetation community is in very good condition and also has high native species diversity. During the field survey *Banksia* deaths were observed at this site. The cause of the deaths is not known (they don't have fire scars like those at sites 1-6).

There are also two smaller sites that are in very good condition and have high native species diversity, these are 36 and 38. They are thin strips on the upperslope/ridge. The thinness of the two fragments raise the issue of whether the two sites would be sustainable, as weeds are going to quickly encroach into the rest of the vegetation remnant from the infestation of weeds on the edges.

Lot 99 and 130 are not considered to be significant from a conservation perspective on a regional scale. This is due to the absence of the environmental factors that determine that an area of vegetation is regarded as regionally significant. Lot 99 and 130 are not considered to be regionally significant due to the following reasons:

- No plant taxa gazetted as Declared Rare or Priority Flora species were located within the survey area;
- No Endangered or Vulnerable species were located during the survey;
- No threatened Ecological Communities were located during the survey;
- Is not considered to be large on a regional scale;
- It supplies limited faunal habitat;
- It does not form part of a regional link or corridor; and
- Is not of scientific or evolutionary importance



Due to the survey site being surrounded by residential development on two sides, light industrial on one side and a major highway on the remaining side, maintenance of the native vegetation will do little to maintain connectivity with nearby bushland. Except for the highly mobile avifauna, the site is effectively a closed system. Any severe perturbations in the area, such as fire or disease, will decrease the ability of the biota currently present to be conserved.

Regardless of the fact that the survey site is not considered to be regionally or locally significant, the vegetation within sites 1-5, 34, 36 and 38 are in very good condition and therefore any of them would be worthy of retention. It is important to note however, that weeds are a major issue of the survey site and therefore if any of the native vegetation is chosen to be retained, management of the weeds will need to be undertaken so they do not further displace native species.

If site 4 is not going to be retained, consideration should be given to the fact that there are numerous *Xanthorrhoea preissii* (Grass trees) within the site that could be transplanted and used to landscape the area. They are large and healthy and would make suitable feature plants along roadsides, roundabouts and public open space.

5.1 CLEARING PERMITS

New laws have been introduced under the Environmental Protection Act 1986 which specify that clearing native vegetation now requires a permit, unless the clearing is for an exempt purpose. Lots 99 and 130 could be exempt from obtaining a clearing permit if the subdivision/development plan for the site is submitted to the Western Australian Planning Commission (WAPC) and they determine that the environmental impact of the proposal does not warrant a clearing permit.

This situation evolves when the WAPC refers a subdivision/development proposal plan to the local authority, Department of Conservation and Land Management (CALM), Department of Environment (DoE), Western Power and Water Corporation. The departments respond with comments and recommendations on the proposal to the WAPC. The WAPC then evaluates the responses to decide whether there should be any conditions placed on the proposal. One of the conditions can be the need to obtain a clearing permit.



6 CONCLUSION AND RECOMMENDATIONS

Based on the findings of the survey undertaken on Lot 99 and 130 Woodthorpe Drive, Willetton the following conclusions and recommendations can be made.

- No plant taxa gazetted as Declared Rare or Priority Flora species were located within the survey area;
- No Endangered or Vulnerable species were located during the survey;
- No Threatened Ecological Communities were located during the survey;
- The survey site is not within a Bush Forever site;
- The native vegetation within the survey area is not considered to be regionally or locally significant;
- Several sites (1-5, 34, 36 and 38) (Figure 2) are in very good condition and have high native species diversity and therefore would be suitable for retention;
- Weeds are a major issue of the survey area and if any of the native vegetation is going to be retained, weed management will need to be undertaken;
- Within site 4 (Figure 2) there are numerous Grass trees that could be used for landscaping (if this site is going to be cleared);
- A clearing permit may be required. This however will be determined by the WAPC when the subdivision/development proposal is submitted for approval. ENV therefore recommends that the clearing permit application be deferred until the proposal has been assessed by the WAPC.

In conclusion ENV considers that the conservation attributes of Lots 130 and 99 are not of any high standard or significance due to the vegetation being highly fragmented. The site is not considered so unique as to inhibit obtaining approvals for the subdivision and development of the lots. With this in mind consideration should be given to retaining portions of the vegetation that have been identified as being in very good condition.



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APPENDIX A DEFINITION OF RARE AND PRIORITY FLORA SPECIES



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APPENDIX A Definition of Rare and Priority Flora Species (Department of Conservation and Land Management, 2003)

Conservation Code	Category
R	Declared Rare Flora- Extant Taxa
K	"Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such"
X	Declared Rare Flora – Presumed Extinct Taxa
	Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.
P1	Priority One- Poorly Known Taxa
	"Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey."
P2	Priority Two- Poorly Known Taxa
	"Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey."
P3	Priority three- Poorly Known Taxa
	"Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but need further survey."
P4	Priority Four- Rare Taxa
	"Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years."

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APPENDIX A

Categories of Threatened Flora Species (Environmental Protection and Biodiversity Conservation Act, 1999)

Category Code	Category
Ex	Extinct
	Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the wild
	Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered
	Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
i i i i i i i i i i i i i i i i i i i	Endangered
	Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
V	Vulnerable
	Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent
	Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.



ESTATES DEVELOPMENT COMPANY -- Flora and Vegetation Survey - Woodthorpe Drive, Willetton

APPENDIX B DEFINITIONS OF THREATENED ECOLOGICAL COMMUNITIES



Definitions of Threatened Ecological Communities

Presumed Totally Destroyed (PD)

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B);

- A) Records within the last 50 years have not been confirmed despite thorough searches or known or likely habitats **or**
- B) All occurrences recorded within the last 50 years have since been destroyed.

Critically Endangered (CR)

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria (A, B or C):

- A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii)
 - geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 5 years)
 - ii) modification throughout its range is continuing such that in the immediate future (within approximately 5 years) the community is unlikely to be capable of being substantially rehabilitated.
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
 - geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 5 years)
 - ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes



- iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes
- C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the immediate future (within approximately 5 years)

Endangered (EN)

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria (A, B or C):

- A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% and **either or both** of the following apply (i or ii)
 - i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term (within . approximately 10 years)
 - ii) modification throughout its range is continuing such that in the short term future (within approximately 10 years) the community is unlikely to be capable of being substantially restored or rehabilitated.
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
 - i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 10 years)
 - ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes
 - there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes
- C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the short term future (within approximately 10 years).



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Vulnerable (VU)

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction in the medium to long term future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria (A, B or C):

- A) The ecological community exists largely as modified occurrences which are likely to be capable of being substantially restored or rehabilitated.
- B) The ecological community can be modified or destroyed and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.
- C) The ecological community may still be widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.



APPENDIX C SPECIES LIST



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APPENDIX D SITE PHOTOS



APPENDIX E BUSH FOREVER CONDITION SCALES



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Table 12: Vegetation Condition Scales commonly used in Perth Metropolitan Region (Source: Bush Forever)

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



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APPENDIX B

ENV Targeted Spring Survey Report

DECLARED RARE AND PRIORTY FLORA SEARCH

LOT 130 AND PART OF LOT 99 WOODTHORPE DRIVE, WILLETTON



On behalf of : ESTATES DEVELOPMENT COMPANY

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STATEMENT OF LIMITATIONS

Scope of Services

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This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and ENV.Australia Pty Ltd (ENV) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, ENV has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, ENV has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data. ENV will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to ENV.

Environmental Conclusions

In accordance with the scope of services, ENV has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. ENV assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of ENV or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report. Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.



Other Limitations

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ENV will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.



1 INTRODUCTION

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ENV. Australia Pty Ltd (ENV) was commissioned in September 2005 by Estates Development Company to undertake a Declared Rare and Priority search of a parcel of land between Woodthorpe Drive and Roe Highway, which consists of a part of Lot 99 and the whole of Lot 130, Willetton (Figure 1).

It is understood that the field survey is required to provide information about the site that will aid in future subdivision, re-zoning and development proposals involving the property.

The purpose of this spring survey is to provide additional information concerning the site in regards to annual species and significant species that may not have been identified by ENV's survey undertaken in July 2005.

1.1 BACKGROUND

ENV.Australia Pty Ltd (ENV) was commissioned by Estates Development Company to undertake a flora and vegetation survey of the same parcel of land in July 2005. The purpose of the flora and vegetation survey was to provide information about the site, with particular emphasis on identifying any significant environmental factors that will have to be considered when planning the subdivision and development of the property.

Due to the timing of the previous survey (winter) ENV recommended that a spring survey also be undertaken to collect information regarding annual and ephemeral species that may not have been present during the July survey.

1.2 LOCATION

The survey site is approximately 15 kilometres south of Perth (see Figure 1).

The survey area is located in the south west province of Western Australia in the Darling Botanical District. This region typically consists of forest country with related woodlands and is divided into four subregions or botanic subdistricts.

The parcel of land between Woodthorpe Drive and Roe Highway, Willetton is located within the Drummond Botanical Subdistrict, which consists mainly of the following vegetation communities:

- Banksia Low Woodland on leached sands and Melaleuca Swamps in poorly drained areas.
- Woodland of Tuart (Eucalyptus gomphocephala); and
- Jarrah (Eucalyptus marginata) and Marri (Corymbia calophylla) on the less leached soils (Beard, 1990).


The climate of this region is Warm Mediterranean, with winter precipitation of 600-1000 mm and 5-6 dry months per year.

1.3 DECLARED RARE AND PRIORITY FLORA

Flora species acquire Declared Rare or Priority conservation status where populations are geographically restricted or threatened by local processes. The Department of Conservation and Land Management (CALM) enforces regulations under the Wildlife Conservation Act (1950) to conserve Declared Rare Flora and protect significant populations.

Rare Flora species are gazetted under Subsection 2 of Section 23F of the Wildlife Conservation Act (1950) and therefore it is an offence to "take" or damage rare flora without Ministerial approval. Section 23F of the Wildlife Conservation Act (1950-1980) defines "to take" as to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.

Priority Flora are under consideration for declaration as 'rare flora', but are in urgent need of further survey (Priority One to Three) or require monitoring every 5-10 years (Priority Four) (see Appendix A for definitions).

Flora is also classified according to their conservation status at a federal level, under the Environmental Protection and Biodiversity Conservation Act, 1999. These categories of classification are summarised in Appendix A

1.4 LISTING OF THREATENED FLORA AND VEGETATION

The Wildlife Conservation Act provides for taxa of plants and animals to be listed as 'threatened'. CALM Policy Statements Numbers 9, *Conservation of Threatened Flora in the Wild*, and Number 33, *Conservation of Endangered and Specially Protected Fauna in the Wild*, cover this area.

Listings are reviewed and changes recommended by CALM's Threatened Species Scientific Committee. Ministerial approval is necessary before changes are given legal status in a notice in the Government Gazette.

There is currently no equivalent legislation or formal policy for the protection of threatened ecological communities. However, an informal, non-statutory process is now in place. It includes advice from a scientific advisory committee, the establishment of the threatened ecological communities database, and steps for assigning ecological communities to categories of threat, is now in place.

The Department has been identifying and informally listing threatened ecological communities (TECs) for ten years. In May 2003, 106 ecological communities had been entered into the Department's TEC Database.



Of these, 21 have been endorsed by the Minister for the Environment as Critically Endangered, 17 as Endangered, 28 as Vulnerable and three as presumed totally destroyed.

The remainder are either awaiting endorsement as threatened or are allocated to one of five priority lists. Sixteen TECs are now listed under the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Any person may nominate an ecological community for listing under the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999. Nominations are forwarded to the Threatened Species Scientific Committee. Once the Committee has conducted an assessment of the conservation status of the ecological community, its advice and subsequent recommendations are forwarded to the Minister for the Environment and Heritage who makes the final decision. The recommendations endorsed by the Minister in making a listing decision are provided via the EPBC Act lists.



2 SCOPE OF WORK

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The scope of services for the project consisted of the following:

- Undertake a database search for Rare and Endangered species that may occur in the area by reference to Department of Conservation and Land Management (CALM) and Department of Environment and Heritage (DEH) databases;
- Search for rare and endangered flora contained within the property;
- Review data collected against criteria established in state and federal processes for species conservation; and
- Summarise findings in a final report.



3 METHODS

The methodology for the work included the following:

Phase 1

On the 29 May 2005 a database search request was submitted to the Department of Conservation and Land Management to obtain a list of rare and priority flora species and Threatened Ecological Communities (TECs) that occur within the surrounding area of the subject lots. The search co-ordinates used were -32.055140E 115.884160N and -32.067650E 115.917070N (GDA94) (CALM, 2005 Department's *Threatened (Declared Rare) Flora* database).

Phase 2

On 14 September 2005 a field survey of the lots was undertaken by traversing by foot. When a flora species could not be identified in the field, a GPS reading was taken and a specimen was collected. Details of the plant were recorded (i.e. flower colour, height, number of individuals).

Phase 3

Specimens of flora species collected during the field survey were taken to the State Herbarium where the samples were identified and compared to herbarium specimens for confirmation.



4 **RESULTS**

The following results are accurate at the time of report preparation. Flora composition changes over time with flora species having specific growing periods, especially annuals and ephemerals (plants lasting for a markedly brief time, some only a day or two). For this reason the outcome of future botanical surveys undertaken on the property have the potential to change.

4.1 DATABASE SEARCH

The database search resulted in one rare and one priority species being identified as <u>potentially</u> occurring in the area. The two species are:

Family	Таха	Conservation Code: FEDERAL	Conservation Code:STATE	
ORCHIDACEAE	Caladenia huegelii	Endangered	R	
STACKHOUSIACEAE	Tripterococcus paniculatus (ms)	NL	P1	

4.2 FIELD SURVEY

The field search found that none of the above species or any other additional significant species occurred within the subject land.

No plant taxa gazetted as Declared Rare or Priority pursuant to subsection (2) of Section 23F of the Wildlife Conservation Act (1950) (Department of Conservation and Land Management, 2000) were located within the survey area.

No Endangered or Vulnerable species, pursuant to s178 of the Environmental Protection and Biodiversity Conservation Act, 2000 were located during the survey.

4.3 ADDITIONAL SPECIES

Taxa that were identified during the spring survey and not found in the July 2005 survey were as follows:

Family	Таха
COLCHICACEAE	Burchardia umbellata
HAEMODORACEAE	Anigozanthos manglesii
ORCHIDACEAE	Caladenia flava
	Caladenia latifolia
	Diuris corymbosa
DROSERACEAE	Drosera menziesii
CRASSULACEAE	Crassula colorata var. colorata
APIACEAE	Trachymene pilosa



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Family	Таха
PRIMULACEAE	*Anagallis arvensis
GOODENIACEAE	Dampiera lineris
ASTERACEAE	Millotia tenuifolia var. tenuifolia
	Quinetia urvillei

*: denotes introduced species

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The results of the survey performed support the conclusion that no plant taxa gazetted as Declared Rare or Priority pursuant to subsection (2) of Section 23F of the Wildlife Conservation Act (1950) (Department of Conservation and Land Management 2000) were located within the survey area. Also no Endangered or Vulnerable species, pursuant to s178 of the Environmental Protection and Biodiversity Conservation Act, 2000 were located during the survey.

As stated in ENV's July report, regardless of the fact that the survey site does not contain any Declared Rare or Priority species, Threatened Ecological communities or is regarded as regionally significant, several patches of vegetation within the site are in very good condition and therefore any of them would be worthy of retention. These are areas 1-5, 34, 36 and 38 as shown on figure 2. It is important to note however, that weeds are a major issue of the survey site and therefore if any of the native vegetation is chosen to be retained, management of the weeds will need to be undertaken so that they do not further displace native species.

If clearing is going to be undertaken, consideration should be given to the possibility of transplanting pre-existing vegetation to new locations throughout the site for use in either public open space areas or landscaping.



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6 **REFERENCES**

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ENV Australia (2005). Flora and Vegetation Survey of Lot 130 and Part of Lot 99 Woodthorpe Drive, Willetton. Unpublished report for Estates Development Company.

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APPENDIX A DEFINITIONS OF DECLARED RARE, PRIORITY AND THREATENED FLORA CATEGORIES



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APPENDIX A Definition of Rare and Priority Flora Species (Department of Conservation and Land Management, 2003)

Conservation Code	Category
R	Declared Rare Flora- Extant Taxa
	"Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such"
X	Declared Rare Flora – Presumed Extinct Taxa
	Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.
P1	Priority One- Poorly Known Taxa
	"Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey."
P2	Priority Two- Poorly Known Taxa
	"Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey."
P3	Priority three- Poorly Known Taxa
	"Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but need further survey."
P4	Priority Four- Rare Taxa
	"Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years."



APPENDIX A

Categories of Threatened Flora Species (Environmental Protection and Biodiversity Conservation Act, 1999)

Category Code	Category
EX	Extinct
	Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the wild
	Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered
	Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered
	Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
V	Vulnerable
	Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent
	Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.



APPENDIX C

DPaW NatureMap Search Report



NatureMap Species Report

Created By Guest user on 04/06/2014

Kingdom	Plantae
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115°54' 01" E,32°03' 30" S
Buffer	5km
Group By	Conservation Status

Conservation Status	Species	Records
Rare or likely to become extinct	6	45
Priority 1	1	1
Priority 2	1	1
Priority 3	3	7
Priority 4	3	15
Non-conservation taxon	370	712
TOTAL	384	781

	Name ID	Species Name N	laturalised	Conservation Code	¹ Endemic To Query Area
Rare or likely to become extinct					
1.	1596	Caladenia huegelii (Grand Spider Orchid)		т	
2.	1637	Diuris purdiei (Purdie's Donkey Orchid)		т	
3.	1639	Drakaea elastica (Glossy-leaved Hammer Orchid)		Т	
4.	13635	Drakaea micrantha		т	
5.	17150	Eremophila glabra subsp. chlorella		т	
6.	18590	Synaphea sp. Fairbridge Farm (D. Papenfus 696)		т	
Dui a uiter d					
Priority 1	44074				
7.	11074	Hydrocotyle striata		P1	
Priority 2					
8.	3237	Acacia benthamii		P2	
Dui a uitur 2					
Priority 3	7004	Annienthus missenadicides		Do	
9.	7631	Anglanthus micropodoldes		P3	
10.	3178	Byblis gigantea (Rainbow Plant)		P3	
11.	25800	Stylialum palualcola		P3	
Priority 4					
12.	13191	Drosera occidentalis subsp. occidentalis		P4	
13.	16998	Tripterococcus paniculatus		P4	
14.	14714	Verticordia lindleyi subsp. lindleyi		P4	
Non conco	nuction to				
Non-consei					
15.	10400	Acacia appianata			
10.	3374	Acacia Integeni	N.		
17.	2502	Acacia iongitolia subsp. iongitolia	Ŷ		
10.	45402	Acadia pulchella (Frickly Moses)			
19.	10483				
20.	30032	Acadia saligita subsp. saligita			
21.	17774		V		
22.	1701	Aderopha abayatia (Basket Elawar)	ř		
23.	191	Aira canvophylloa (Silvon Hairgrass)	V		
24.	104	Allacaquarina francriana (Shacak Kandil)	Ŷ		
25.	1720	Allocasuarina humilia (Duarf Shacak)			
20.	2649	Altornanthora donticulata (Losson Jouwood)			
27.	2040	Americanthus could tue (Level Lice Blooding)	V		
20.	2000	Amehinaran turbinatus	Ţ		
29.	200	Ampinpugun ununaus Ampena linonhulla			
30.	23/5	Anigoraphas humilis (Catenaw)			
31.	1409	Aniyozanunos (Ultillis (Udispaw)			
J∠.	1064	Anorinum proissii			
33.	1204	Anoonium prossi			
ureMap is a colla	aborative pro	pject of the Department of Environment and Conservation, Western Australia, and the Western	Australian Museur	n. Environment	and Conservation muse

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
34	20752	Asparagus aethiopicus	Y		
35.	1364	Asphodelus fistulosus (Onion Weed)	Y		
36.	20350	Astartea affinis			
37.	20283	Astartea scoparia			
38.	7851	Asteridea pulverulenta (Common Bristle Daisy)			
39.	6339	Astroloma xerophyllum			
40.	2462	Atriplex hypoleuca			
41.	2471	Atriplex prostrata (Hastate Orache)	Y		
42.	233	Avena barbata (Bearded Oat)	Y		
43.	42902	Azolla rubra			
44.	1800	Banksia attenuata (Slender Banksia, Piara)			
45.	1822	Banksia ilicifolia (Holly-leaved Banksia)			
46.	1830	Banksia littoralis (Swamp Banksia, Pungura)			
47.	1834	Banksia menziesii (Firewood Banksia)			
48.	740	Baumea arthrophylla			
49.	743	Baumea juncea (Bare Twigrush)			
50.	745	Baumea preissii			
51.	1417	Blancoa canescens (Winter Bell)			
52.	16636	Boronia crenulata subsp. viminea			
53.	11503	Boronia crenulata var. crenulata			
54.	4438	Boronia ramosa			
55.	11381	Boronia ramosa subsp. anethifolia			
56.	3710	Bossiaea eriocarpa (Common Brown Pea)			
57.	30136	Brachyloma preissii subsp. preissii			
58.	7878	Brachyscome iberidifolia			
59.	244	Briza maxima (Blowfly Grass)	Y		
60.	245	Briza minor (Shivery Grass)	Y		
61.	249	Bromus diandrus (Great Brome)	Y		
62.	15330	Caladenia arenicola			
63.	1592	Caladenia flava (Cowslip Orchid)			
64.	15348	Caladenia flava subsp. flava			
65.	15361	Caladenia longicauda subsp. calcigena			
66.	1605	Caladenia marginata (White Fairy Orchid)			
67.	15503	Caladenia paludosa			
68.	18019	Caladenia vulgata			
69.	15398	Caladenia xantha			
70.	2848	Calandrinia corrigioloides (Strap Purslane)			
71.	19309	Calectasia narragara			
72.	5458	Calytrix flavescens (Summer Starflower)			
73.	5460	Calytrix fraseri (Pink Summer Calytrix)			
74.	17318	Cardiospermum grandiflorum	Y		
75.	754	Carex divisa (Divided Sedge)	Y		
76.	755	Carex fascicularis (Tassel Sedge)			
77.	2795	Carpobrotus edulis (Hottentot Fig)	Y		
78.	1162	Cartonema philydroides			
79.	11799	Cassytha racemosa forma racemosa			
80.	18321	Casuarina glauca	Y		
81.	1742	Casuarina obesa (Swamp Sheoak, Kuli)			
82.	7916	Centaurea melitensis (Maltese Cockspur)	Y		
83.	6542	Centaurium tenuitiorum	Y		
84.	6214	Centella asiatica			
85.	1121	Centrolepis aristata (Pointed Centrolepis)			
86.	1125				
87.	17685	Chaetanthus aristatus			
88.	18156	Chamaecytisus palmensis (Tagasaste)	Ŷ		
89.	1280	Chamaescilla corymposa (Blue Squill)			
90.	7925	Chondrilla juncea (Skeleton weed)	Ŷ		
91.	4000	Conesperma calymega (Blue-spike Milkwort)			
92.	6249	Conostenhium nendulum (Dearl Flower)			
93.	6240	Conostonhium proissii			
94.	1/10	Conostylis aculaata (Prickly Conostylis)			
95.	1418	Connetulis aculeata (FICRI) CUTUSIVIIS)			
90.	11020	Concetulis candicans subsp. candicans			
97.	1/26	Conostylis candicans subsp. candicans			
90.	7030	Convar honariensis (Flaxleaf Fleahane)	\checkmark		
100	17104	Conrribia calophylla (Marri)	T		
101	7945	Cotula coronopifolia (Waterbuttons)	V		
102	3136	Crassula alata	Y		
103.	3137	Crassula colorata (Dense Stonecrop)			

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

Department of Environment and Conservation museum

	Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query
104.	29054	Crepis foetida subsp. foetida	Y		
105.	13527	Croninia kingiana			
106.	15404	Cyanicula sericea			
107.	40660	Cycnogeton huegelii			
108.	783	Cyperus congestus (Dense Flat-sedge)	Y		
109.	18198	Cyperus papyrus	Y		
110.	806	Cyperus polystachyos (Bunchy Sedge)	Y		
111.	815	Cyperus tenellus (Tiny Flatsedge)	Y		
112.	10942	Cyrtostylis tenuissima			
113.	7454	Dampiera linearis (Common Dampiera)			
114.	7484	Dampiera trigona (Angled-stem Dampiera)			
115.	1218	Dasypogon bromeliifolius (Pineapple Bush)			
116.	3805	Daviesia decurrens (Prickly Bitter-pea)			
117.	18560	Daviesia divaricata subsp. divaricata			
118.	3816	, Daviesia incrassata			
119.	3832	Daviesia physodes			
120.	3845	Daviesia triflora			
121	6616	Dichondra repens (Kidney Weed)			
121.	18307		V		
122.	1640	Dinoiphoineea echonis Drakaea givntodon (King-in-his-carriage)	I		
123.	3005	Drakača glypiodoli (Ning-In-his-calinage)			
124.	12047	Drosora organomiza (Neu nin outlidew)			
120.	13217	Diosera erytinonniza subsp. erytinonniza			
120.	3106				
127.	14298	Drosera macrantna subsp. macrantha			
128.	3109	Drosera menziesii (Pink Rainbow)			
129.	13216	Drosera menziesii subsp. penicillaris			
130.	3115	Drosera occidentalis (Western Sundew)			
131.	13188	Drosera paleacea subsp. paleacea			
132.	3131	Drosera stolonifera (Leafy Sundew)			
133.	3135	Drosera zonaria (Painted Sundew)			
134.	347	Ehrharta calycina (Perennial Veldt Grass)	Y		
135.	349	Ehrharta longiflora (Annual Veldt Grass)	Y		
136.	5187	Elatine gratioloides (Waterwort)			
137.	6133	Epilobium hirtigerum (Hairy Willow Herb)			
138.	13950	Eremaea asterocarpa subsp. asterocarpa			
139.	15414	Eriochilus helonomos			
140.	13511	Eucalyptus rudis subsp. rudis			
141.	5790	Eucalyptus todtiana (Coastal Blackbutt)			
142.	3872	Euchilopsis linearis (Swamp Pea)			
143.	29940	Euphorbia maculata	Y		
144.	3880	Eutaxia virgata			
145.	430	Festuca arundinacea (Tall Fescue)	Y		
146.	2969	Fumaria capreolata (Whiteflower Fumitory)	Y		
147	907	Gabria trifida (Coast Saw-sedge)			
148	11571	Galenia nubescens var. nubescens	v		
1/0	20475	Gastrolohium canitatum	I		
150	20473	Castrolobium obractoolatum			
150.	20473	Castrolobium linearifelium			
151.	20483		V		
152.	4339		Y		
153.	1520		Y		
154.	3957	Gompnoiobium tomentosum (Hairy Yellow Pea)			
155.	6161	Gonocarpus pithyoides			
156.	7538	Goodenia pulchella			
157.	2216	Hakea varia (Variable-leaved Hakea)			
158.	3961	Hardenbergia comptoniana (Native Wisteria)			
159.	8007	Hedypnois rhagadioloides (Cretan Weed)	Y		
160.	28253	Hedypnois rhagadioloides subsp. cretica	Y		
161.	8008	Helianthus annuus (Sunflower)	Y		
162.	16934	Hemiandra glabra subsp. glabra			
163.	6839	Hemiandra pungens (Snakebush)			
164.	38320	Hemiandra sp. Jurien (B.J. Conn & M.E. Tozer BJC 3885)			
165.	1293	Hensmania turbinata			
166.	1526	Hesperantha falcata	Y		
167.	5134	Hibbertia huegelii			
168.	5135	Hibbertia hypericoides (Yellow Buttercups)			
169.	5162	Hibbertia racemosa (Stalked Guinea Flower)			
170	5172	Hibbertia stellaris (Orange Stars)			
171	5172	Hibbertia subvaginata			
172	6222	Homalosciadium homalocaroum			
	0222	rionaloosaalain nomalooarpan			
172.	140	Hardoum alououm (Northorn Porto: Cross)	N/		

Na	ame ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
174.	449	Hordeum leporinum (Barley Grass)	Υ		
175.	3966	Hovea pungens (Devil's Pins, Puyenak)			
176.	3968	Hovea trisperma (Common Hovea)			
177.	12859	Hovea trisperma var. trisperma			
178.	12741	Hyalosperma cotula			
179.	6238	Hydrocotyle ranunculoides	Y		
180.	5817	Hypocalymma angustitolium (white Myrtle, Kudjid)			
101.	35070	Hypocalymina angustiolium subsp. Swan Coastal Plain (G.J. Keignery 10777)	V		
183	0000	Hypochaeris giabra (Shiobin Calsear)	ř		
184.	20200	Isolenis cernua var. setiformis	I		
185.	917	Isolepis marginata (Coarse Club-rush)	Y		
186.	10831	Isolepis prolifera (Budding Club-rush)	Y		
187.	1533	Ixia paniculata	Y		
188.	3998	Jacksonia angulata			
189.	4012	Jacksonia furcellata (Grey Stinkwood)			
190.	4029	Jacksonia sternbergiana (Stinkwood, Kapur)			
191.	19632	Johnsonia pubescens subsp. pubescens			
192.	1178	Juncus bufonius (Toad Rush)	Y		
193.	1185	Juncus kraussii (Sea Rush)			
194.	11922	Juncus kraussii subsp. australiensis	X		
195.	1180	Juncus microcepnaius	Y		
197	1196	Juncus usitatus (Common Rush)	Y		
198	4044	Kennedia prostrata (Scarlet Runner)	I		
199.	15498	Kunzea glabrescens (Spearwood)			
200.	13562	Lachenalia aloides	Y		
201.	29046	Lactuca serriola forma serriola	Y		
202.	14646	Lagunaria patersonia	Y		
203.	4052	Latrobea tenella			
204.	1307	Laxmannia ramosa (Branching Lily)			
205.	1309	Laxmannia squarrosa			
206.	7574	Lechenaultia floribunda (Free-flowering Leschenaultia)			
207.	8099	Leontodon saxatilis (Hairy Hawkbit)	Y		
208.	925	Lepidosperma angustatum			
209.	15418	Leptoceras menziesii			
210.	5850	Leptomena paucinora (Sparse-nowered Currant Dush)	V		
212.	6374	Leucopogon conostephioides	I		
213.	6425	Leucopogon oxycedrus			
214.	6434	Leucopogon polymorphus			
215.	6440	Leucopogon racemulosus			
216.	19579	Leucopogon sp. Murdoch (M. Hislop 1037)			
217.	40803	Leucopogon squarrosus subsp. squarrosus			
218.	6451	Leucopogon tenuis			
219.	7677	Levenhookia stipitata (Common Stylewort)			
220.	7075	Linaria maroccana	Y		
221.	9289	Lobella anceps (Angled Lobella)			
223	475	Lojum multiflorum (Italian Rvegrass)	V		
224.	478	Lolium rigidum (Wimmera Ryegrass)	Y		
225.	1223	Lomandra caespitosa (Tufted Mat Rush)	·		
226.	1228	Lomandra hermaphrodita			
227.	1234	Lomandra nigricans			
228.	1236	Lomandra odora (Tiered Matrush)			
229.	1239	Lomandra preissii			
230.	8564	Lotus subbiflorus	Y		
231.	1097	Lyginia barbata			
232.	18049	Lyginia imberbis			
233.	2396	Lysiana casuarinae	N/		
∠34. 235	303/5 61F0	Lysiniauna arvensis (minperner)	Ŷ		
235.	34736	Lysinema eleyatis Lysinema pentapetalum			
237.	2839	Macarthuria australis			
238.	85	Macrozamia riedlei (Zamia, Djiridii)			
239.	4077	Medicago minima (Small Burr Medic)	Y		
240.	4079	Medicago polymorpha (Burr Medic)	Y		
241.	17679	Meeboldina coangustata			
242.	17747	Meeboldina decipiens			
243.	5900	Melaleuca cuticularis (Saltwater Paperbark)			

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1	lame ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
244.	5926	Melaleuca lateritia (Robin Redbreast Bush)			7.100
245.	5946	Melaleuca pauciflora			
246.	5952	Melaleuca preissiana (Moonah)			
247.	5959	Melaleuca rhaphiophylla (Swamp Paperbark)			
248.	5964	Melaleuca seriata			
249.	5978	Melaleuca teretifolia (Banbar)			
250.	5980	Melaleuca thymoides			
251.	5983	Melaleuca trichophylla			
252.	13280	Melaleuca viminea subsp. viminea			
253.	20/18	Miniotra terruniona (Solt Miniotra)	×		
255	19179	Moraea flaccida (One-leaf Cane Tulin)	T V		
256.	2401	Nuytsia floribunda (Christmas Tree, Mudja)			
257.	20052	Oenothera jamesii	Y		
258.	6141	Oenothera speciosa (White Evening Primrose)	Y		
259.	18255	Opercularia vaginata (Dog Weed)			
260.	4113	Ornithopus compressus (Yellow Serradella)	Y		
261.	507	Panicum miliaceum (Millet Panic)	Y		
262.	17114	Paraserianthes lophantha subsp. lophantha			
263.	527	Paspalum dilatatum	Y		
264.	532	Paspalum urviller (Vasey Grass)	Ŷ		
205.	1550	Patersonia occidentalis (Purple Plag, Noma)	V		
267	6006	Pericalymma ellinticum (Swamp Teatree)	T		
268.	16477	Pericalymma ellipticum var. ellipticum			
269.	16478	Pericalymma ellipticum var. floridum			
270.	11020	Persicaria hydropiper			
271.	2273	Persoonia saccata (Snottygobble)			
272.	2299	Petrophile linearis (Pixie Mops)			
273.	18529	Philotheca spicata (Pepper and Salt)			
274.	1478	Phlebocarya ciliata			
275.	1479	Phlebocarya filifolia			
276.	2793	Phytolacca octandra (Red Ink Plant)	Y		
2778	8165	Pithocarna pulchella (Beautiful Pithocarna)			
279	18353	Pithocarpa pulchella var. pulchella			
280.	6249	Platvsace compressa (Tapeworm Plant)			
281.	6253	Platysace filiformis			
282.	4524	Platytheca galioides			
283.	571	Poa annua (Winter Grass)	Y		
284.	8182	Podotheca angustifolia (Sticky Longheads)			
285.	8184	Podotheca gnaphalioides (Golden Long-heads)			
286.	2905	Polycarpon tetraphyllum (Fourleaf Allseed)	Y		
287.	2419	Polygonum aviculare (Wireweed)	Y		
200.	/601	Polypogon monspellensis (Annual Dearograss)	Ť		
290.	109	Potamogeton crispus (Curly Pondweed)			
291.	1673	Prasophyllum gibbosum (Humped Leek Orchid)			
292.	1674	Prasophyllum giganteum (Bronze Leek Orchid)			
293.	1676	Prasophyllum hians (Yawning Leek Orchid)			
294.	1677	Prasophyllum macrostachyum (Laughing Leek Orchid)			
295.	1680	Prasophyllum parvifolium (Autumn Leek Orchid)			
296.	10853	Prasophyllum plumiforme			
297.	1681	Prasophyllum regium (King Leek Orchid)			
298.	12217	Pterostylis sanguinea			
299.	4181	Pultenaea reticulata			
301	16367	Pyrorchis nigricans (Red beaks, Elephants ears)			
302.	8195	Quinetia urvillei			
303.	2933	Ranunculus muricatus (Sharp Buttercup)	Y		
304.	11927	Ranunculus sessiliflorus var. sessiliflorus			
305.	6012	Regelia ciliata			
306.	6014	Regelia inops			
307.	4822	Rhamnus alaternus (Buckthorn)	Y		
308.	4705	Ricinus communis (Castor Oil Plant)	Y		
309.	11544	Rumuea rosea var. australis (Guildford Grass)	Y		
310.	20406	Rubus laudatus	T Y		
312.	2433	Rumex crispus (Curled Dock)	Y		
313.	2906	Sagina apetala (Annual Pearlwort)	Y		

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Nam	ne ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
314. 17	7591	Sagittaria platyphylla	Y		
315.	79	Salvinia molesta (Salvinia)	Y		
316.	6484	Samolus repens (Creeping Brookweed)			
317. 2	2593	Sarcocornia quinqueflora (Beaded Samphire)			
318. 13	3182	Scaevola repens var. repens			
319. 1 ⁻	1027	Schinus terebinthifolius	Y		
320.	973	Schoenus asperocarpus (Poison Sedge)			
321.	978	Schoenus previsetis			
323 1	904 7614	Schoenus plumosus			
324	6033	Scholtzia involucrata (Spiked Scholtzia)			
325. 25	5878	Senecio condylus			
326. 19	9453	Setaria parviflora	Y		
327.	8225	Siloxerus humifusus (Procumbent Siloxerus)			
328.	6988	Solanum americanum (Glossy Nightshade)	Y		
329.	7022	Solanum nigrum (Black Berry Nightshade)	Υ		
330.	8228	Solidago canadensis (Goldenrod)	Y		
331. 8	8231	Sonchus oleraceus (Common Sowthistle)	Y		
332.	616	Sorghum bicolor (Grain Sorghum)	Y		
333.	1558	Sparaxis bulbifera	Y		
334.	1560	Sparaxis pillansii (Harlequin Flower)	Y		
335.	2912	Spergula arvensis (Corn Spurry)	Y		
330	2915	Spergularia rubra (Sand Spurry)	Ŷ		
338	4211	Sphaerolobium hygrophilum Sphaerolobium vimineum (Leafless Globe Pea)			
339	635	Sporobolus virginicus (Marine Couch)			
340.	9069	Stackhousia huegelii			
341.	2316	Stirlingia latifolia (Blueboy)			
342.	7693	Stylidium brunonianum (Pink Fountain Triggerplant)			
343.	7774	Stylidium piliferum (Common Butterfly Triggerplant)			
344.	7785	Stylidium repens (Matted Triggerplant)			
345. 20	0521	Stylidium rigidulum			
346.	7798	Stylidium schoenoides (Cow Kicks)			
347.	2639	Suaeda australis (Seablite)			
348. 2	5902	Symphyotrichum squamatum (Bushy Starwort)	Y		
349.	8245	Taraxacum officinale (Dandelion)	Y		
350. 20	1702	Taxandria linearitolia			
352	1702	Thelymitra campanulata (Shin Orchid)			
353	1716	Thelymitra finaina (Tiger Orchid)			
354. 20	0731	Thelymitta uganis			
355.	1319	Thysanotus arenarius			
356.	1338	Thysanotus manglesianus (Fringed Lily)			
357.	1339	Thysanotus multiflorus (Many-flowered Fringe Lily)			
358.	1357	Thysanotus thyrsoideus			
359.	1358	Thysanotus triandrus			
360.	6280	Trachymene pilosa (Native Parsnip)			
361.	1482	Tribonanthes brachypetala			
362.	4383	I ribulus terrestris (Caltrop)	Y		
303.	1301	Trifolium angustifolium (Narrowloof Clover)	V		
365	+∠09 1 / 17	Tridlochin mucronata	r		
366.	4737	Tripterococcus brunonis (Winged Stackhousia)			
367.	98	Typha domingensis (Bulrush, Djandiid)			
368.	99	Typha orientalis (Bulrush, Cumbungi)	Y		
369.	8255	Ursinia anthemoides (Ursinia)	Y		
370.	7157	Utricularia violacea (Violet Bladderwort)			
371. 33	3537	Vallisneria australis	Y		
372.	7108	Veronica arvensis (Wall Speedwell)	Y		
373.	6077	Verticordia drummondii (Drummond's Featherflower)			
374.	4322	Vicia sativa (Common Vetch)	Y		
375. 1	7285	Vicia sativa subsp. cordata	Y		
3/6.	4325	viminaria juncea (Swishbush, Koweda)	X		
377	724	vuipia promotos (Squiner Fail Fescue)	Y		
379 1'	2052	Vulpia myuros (mais rain resourc) Vulpia myuros forma megalura	Y		
380.	7389	Wahlenbergia preissii			
381.	8282	Waitzia suaveolens (Fragrant Waitzia)			
382. 18	8118	Watsonia meriana var. meriana	Y		
383.	1256	Xanthorrhoea preissii (Grass tree, Palga)			

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Name ID Species Name

384. 6289 Xanthosia huegelii

Conservation Code ¹Endemic To Query Area Naturalised

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

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholely 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.

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NatureMap Species Report

Created By Guest user on 04/06/2014

Kingdom	A - to - to -
Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115°54' 01" E,32°03' 30" S
Buffer	5km
Group By	Conservation Status

Conservation Status	Species	Records
Rare or likely to become extinct	4	62
Other specially protected fauna	2	248
Priority 3 Priority 4	2	14 17
Priority 5	1	31
Non-conservation taxon	193	10419
TOTAL	210	10793

	Name ID Species Name	Naturalised Co	onservation Code	¹ Endemic To Query Area
Rare or like	Iv to become extinct			
1.	24731 Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)		т	
2.	24733 Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)		т	
3.	24734 Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		Т	
4.	24146 Myrmecobius fasciatus (Numbat, Walpurti)		т	
Protected u	nder international agreement			
5	41323 Actitis hypoleucos (Common Sandhiner)		10	
6	41324 Ardea modesta (Fastern Great Faret)		IA	
7	24293 Haliaeetus leuconaster (White-hellied Sea-Fanle)		14	
8	24598 Merons ornatus (Rainbow Bee-eater)		IA	
9	24843 Plenadis falcinellus (Glossy Ibis)			
10	24908 Tringa nebularia (Common Greenshank)		14	
10.				
Other spec	ally protected fauna			
11.	25624 Falco peregrinus (Peregrine Falcon)		S	
12.	24475 Falco peregrinus subsp. macropus (Australian Peregrine Falcon)		S	
Priority 3				
13.	25147 Lerista lineata (Perth Slider, Lined Skink)		P3	
14.	25249 Neelaps calonotos (Black-striped Snake)		P3	
Priority 4				
15	24215 Hudramus chrusogastor (Water rat)		D4	
16	24213 Macronus irma (Western Brush Wallahu)		P4	
10.	24155 Wallopus IIIIa (Western Brush Wallaby)		F 4	
Priority 5				
17.	24153 Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)		P5	
Non-conse	vation taxon			
18.	24260 Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)			
19.	24261 Acanthiza chrysorrhoa (Yellow-rumped Thornbill)			
20.	24262 Acanthiza inornata (Western Thornbill)			
21.	24560 Acanthorhynchus superciliosus (Western Spinebill)			
22.	25535 Accipiter cirrocephalus (Collared Sparrowhawk)			
23.	25536 Accipiter fasciatus (Brown Goshawk)			
24.	42368 Acritoscincus trilineatus (Western Three-lined Skink)			
25.	25755 Acrocephalus australis (Australian Reed Warbler)			
26.	-13418 Akamptogonus novarae			
27.	-12228 Aname mainae			
28.	-13162 Aname tepperi			
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Nar	me ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
29. 2	24312	Anas gracilis (Grey Teal)			
30. 2	24313	Anas platyrhynchos (Mallard)			
31. 2	24315	Anas rhynchotis (Australasian Shoveler)			
32. 2	24316	Anas superciliosa (Pacific Black Duck)			
33. 2	24332	Anhinga melanogaster subsp. novaehollandiae (Darter)			
34. 2	24561	Anthochaera carunculata (Red Wattlebird)			
35. 2	24562	Anthochaera lunulata (Western Little Wattlebird)			
361	16302	Apogon rueppellii			
37. 2	24991	Aprasia repens (Sand-plain Worm-lizard)			
38. 2	24285	Aquila audax (Wedge-tailed Eagle)			
39. 2	25559	Ardea intermedia (Intermediate Egret)			
40. 2	24341	Ardea pacifica (White-necked Heron)			
411	16050	Arenigobius bifrenatus			
421	11771	Artoria flavimana			
431	12709	Artoria linnaei			
441	11855	Artoria taeniifera			
451	17621	Atherinosoma wallacei			
46. 2	24318	Aythya australis (Hardhead)			
471	12928	Ballarra longipalpus			
48. 2	24319	Biziura lobata (Musk Duck)			
49. 4	42381	Brachyurophis semifasciatus (Southern Shovel-nosed Snake)			
50. 2	25714	Cacatua pastinator (Western Long-billed Corella)			
51. 2	25716	Cacatua sanguinea (Little Corella)			
52. 2	24729	Cacatua tenuirostris (Eastern Long-billed Corelia)	Ŷ		
53. 2	25598	Cacomantis fiabelliformis (Fan-tailed Cuckoo)			
54. 2	+2307	Calorianus paindus (Painu Cuckoo)			
55. 2	23/17	Caryptomyrichus banksii (Red-tailed Black-Cockatoo)			
57 2	24377	Charadhus fullcapilius (Reu-capped Flover)			
59 2	24321	Christians marmaratus (Marhlad Gacka)			
59 2	24288	Circus approximans (Swamp Harrier)			
60 2	24396	Climacteris rufa (Rufous Treecreeper)			
611	14605	Cnidoglanis macrocephalus			
62. 2	25675	Colluricincla harmonica (Grev Shrike-thrush)			
63. 2	24399	Columba livia (Domestic Pigeon)	Y		
64. 2	25568	Coracina novaehollandiae (Black-faced Cuckoo-shrike)			
651	13396	Cormocephalus rubriceps			
66. 2	25592	Corvus coronoides (Australian Raven)			
67. 2	24417	Corvus coronoides subsp. perplexus (Australian Raven)			
68. 2	24420	Cracticus nigrogularis (Pied Butcherbird)			
69. 2	25595	Cracticus tibicen (Australian Magpie)			
70. 2	25596	Cracticus torquatus (Grey Butcherbird)			
71. 2	25398	Crinia georgiana (Quacking Frog)			
72. 2	25399	Crinia glauerti (Clicking Frog)			
73. 2	25400	Crinia insignifera (Squelching Froglet)			
74. 3	30893	Cryptoblepharus buchananii			
75. 2	25020	Cryptoblepharus plagiocephalus			
761	13155	Cryptoerithus quobba			
77. 3	30899	Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)			
78. 2	25027	Ctenotus australis			
79. 2	20040	cienolus geninula (Jewelleu South-west Clenolus (Swan Coastal Plain pop P3),			
80	25047	Ctopotus impor			
Q1 2	23047	Cignuls atratus (Ribek Swan)			
82 3	30001	Dacelo novaequineae (Laurhing Kookahurra)	V		
83 2	25673	Danhoenositta chrysontera (Varied Sittella)	1		
84 2	25766	Delma fraseri (Fraser's Legless Lizard)			
85. 2	24999	Delma gravii			
86. 2	25607	Dicaeum hirundinaceum (Mistletoebird)			
871	13407	Dingosa serrata			
88. 2	25100	Egernia napoleonis			
89. 2	25250	Elapognathus coronatus (Crowned Snake)			
901	12173	Eodelena lapidicola			
911	12119	Erythracarus decoris			
92. 2	24471	Falco berigora subsp. berigora (Brown Falcon)			
93. 2	25622	Falco cenchroides (Australian Kestrel)			
94. 2	25623	Falco longipennis (Australian Hobby)			
95. 2	25727	Fulica atra (Eurasian Coot)			
96. 3	30916	Funambulus pennanti (Indian Palm Squirrel)	Y		
97. 2	25729	Gallinula tenebrosa (Dusky Moorhen)			

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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
98.	25730	Gallirallus philippensis (Buff-banded Rail)			
99.	42314	Gavicalis virescens (Singing Honeyeater)			
100.	-13510	Gea theridioides			
101.	25530	Gerygone fusca (Western Gerygone)			
102.	24735	Glossopsitta porphyrocephala (Purple-crowned Lorikeet)			
103.	24443	Grallina cyanoleuca (Magpie-lark)			
104.	24487	Haematopus longirostris (Pied Oystercatcher)			
105.	24295	Haliastur sphenurus (Whistling Kite)			
105.	25410	Henierais auadrilineata			
107.	25734	Himantonus himantonus (Black-winged Stilt)			
109.	24491	Hirundo neoxena (Welcome Swallow)			
110.	-17590	Hyporhamphus regularis			
111.	-13397	Idiommata blackwalli			
112.	-11759	Idiosoma hirsutum			
113.	-12179	Idiosoma sigillatum			
114.	-12223	Isopeda leishmanni			
115.	-13011	Ixodes australiensis			
116.	-11934	Lampona brevipes			
117.	-1903	Lampona cylindrata			
118.	24511	Larus novaehollandiae subsp. novaehollandiae (Silver Gull)			
119.	25133	Lerista elegans			
120.	25005	Lians JuniUIIIs Lichmera indistincta (Brown Honeycotor)			
121.	2/582	Lichmera indistincta (Drown Honeyealer)			
122.	25415	Limnodynastes dorsalis (Western Banio Frod)			
124.	25388	Litoria moorei (Motorbike Frog)			
125.	24326	Malacorhynchus membranaceus (Pink-eared Duck)			
126.	25651	Malurus lamberti (Variegated Fairy-wren)			
127.	25654	Malurus splendens (Splendid Fairy-wren)			
128.	25758	Megalurus gramineus (Little Grassbird)			
129.	25663	Melithreptus brevirostris (Brown-headed Honeyeater)			
130.	25184	Menetia greyii			
131.	-12664	Mituliodon tarantulinus			
132.	-11922	Mitzoruga insularis			
133.	25191	Morethia lineoocellata			
134.	24223	Muis musculus (nouse mouse)	Ŷ		
135.	25420	Myobatrachus gouldii (Turtle Ergg)			
137.	25248	Neelaps bimaculatus (Black-naped Snake)			
138.	24738	Neophema elegans (Elegant Parrot)			
139.	25748	Ninox novaeseelandiae (Boobook Owl)			
140.	24820	Ninox novaeseelandiae subsp. boobook (Boobook Owl)			
141.	25252	Notechis scutatus (Tiger Snake)			
142.	-12319	Notiasemus glauerti			
143.	25564	Nycticorax caledonicus (Rufous Night Heron)			
144.	24194	Nyctophilus geoffroyi (Lesser Long-eared Bat)			
145.	24742	Nymphicus hollandicus (Cockatiel)			
146.	24407	Ocyphaps lophotes (Crested Pigeon)			
147.	24328	vyyura ausurans (Diue-billeu Duck) Pachycephala nectoralis subsp. fulininosa (Golden Whistler)			
149	25680	Pachycephala rufiventris (Rufous Whistler)			
150.	24624	Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)			
151.	25253	Parasuta gouldii			
152.	25681	Pardalotus punctatus (Spotted Pardalote)			
153.	25682	Pardalotus striatus (Striated Pardalote)			
154.	24648	Pelecanus conspicillatus (Australian Pelican)			
155.	24659	Petroica goodenovii (Red-capped Robin)			
156.	24660	Petroica multicolor subsp. campbelli (Scarlet Robin)			
157.	25697	Phalacrocorax carbo (Great Cormorant)			
158.	24667	Prialacrocorax sulcirostris (Little Black Cormorant)			
160	-16355	Frialacioculax Vallus (Pleu Cultificialit) Phalloceros harnados			V
161	24409	Phaps chalcoptera (Common Bronzewing)			ī
162.	-12701	Phryganoporus candidus			
163.	24596	Phylidonyris novaehollandiae (New Holland Honeyeater)			
164.	-12656	Pinkfloydia harveii			
165.	24841	Platalea flavipes (Yellow-billed Spoonbill)			
166.	25007	Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)			
167.	25703	Podargus strigoides (Tawny Frogmouth)			

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

Department of Environment and Conservation museum

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
168.	25704	Podiceps cristatus (Great Crested Grebe)			
169.	24907	Pogona minor subsp. minor (Dwarf Bearded Dragon)			
170.	24681	Poliocephalus poliocephalus (Hoary-headed Grebe)			
171.	-11886	Poltys laciniosus			
172.	25731	Porphyrio porphyrio (Purple Swamphen)			
173.	24769	Porzana fluminea (Australian Spotted Crake)			
174.	24771	Porzana tabuensis (Spotless Crake)			
175.	25259	Pseudonaja affinis subsp. affinis (Dugite)			
176.	24711	Puffinus assimilis subsp. assimilis (Little Shearwater)			
177.	25008	Pygopus lepidopodus (Common Scaly Foot)			
178.	25271	Ramphotyphlops australis			
179.	25288	Ramphotyphlops waitii			
180.	24245	Rattus rattus (Black Rat)	Y		
181.	-12242	Raveniella cirrata			
182.	-13643	Raveniella peckorum			
183.	24776	Recurvirostra novaehollandiae (Red-necked Avocet)			
184.	25614	Rhipidura leucophrys (Willie Wagtail)			
185.	24454	Rhipidura leucophrys subsp. leucophrys (Willie Wagtail)			
186.	25534	Sericornis frontalis (White-browed Scrubwren)			
187.	30948	Smicrornis brevirostris (Weebill)			
188.	25589	Streptopelia chinensis (Spotted Turtle-Dove)	Y		
189.	25590	Streptopelia senegalensis (Laughing Turtle-Dove)	Y		
190.	30950	Streptopelia senegalensis subsp. senegalensis (Laughing Turtle-Dove)	Y		
191.	-12419	Supunna funerea			
192.	-13429	Synothele rastelloides			
193.	25705	Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)			
194.	24331	Tadorna tadornoides (Australian Shelduck, Mountain Duck)			
195.	-11766	Tamopsis perthensis			
196.	-13204	Tetragnatha demissa			
197.	24844	Threskiornis molucca (Australian White Ibis)			
198.	24845	Threskiornis spinicollis (Straw-necked Ibis)			
199.	25203	Tiliqua occipitalis (Western Bluetongue)			
200.	25519	Tiliqua rugosa			
201.	25207	Tiliqua rugosa subsp. rugosa			
202.	25549	Todiramphus sanctus (Sacred Kingfisher)			
203.	-14628	Torquigener pleurogramma			
204.	25723	Trichoglossus haematodus (Rainbow Lorikeet)			
205.	24849	Turnix varia subsp. varia (Painted Button-quail)			
206.	-12897	Urodacus novaehollandiae			
207.	24386	Vanellus tricolor (Banded Lapwing)			
208.	-11839	Venator immansueta			
209.	25765	Zosterops lateralis (Grey-breasted White-eye, Silvereye)			
210.	24856	Zosterops lateralis subsp. gouldi (Grey-breasted White-eye)			

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

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholely 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.





APPENDIX D

DotE Protected Matters Search Report



Australian Government

Department of the Environment

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 <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 04/06/14 15:03:56

Summary Details Matters of NES Other Matters Protected by the EPBC Act Extra Information Caveat Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

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 <u>Administrative Guidelines on Significance</u>.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	41
Listed Migratory Species:	23

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 <u>heritage values</u> 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 <u>permit</u> 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:	1
Listed Marine Species:	23
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:	5
State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	41
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	[Resource Information]
Name	Proximity
Forrestdale & thomsons lakes	Within 10km of Ramsar

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distri recovery plans, State vegetation maps, remote sensing ecological community distributions are less well known, data are used to produce indicative distribution maps.	bution is well known, maps i imagery and other source , existing vegetation maps :	are derived from s. Where threatened and point location
Name	Status	Type of Presence
Claypans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species

Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo [67034]	Vulnerable
<u>Calyptorhynchus baudinii</u> Baudin's Black-Cockatoo, Long-billed Black- Cockatoo [769]	Vulnerable
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black- Cockatoo [59523]	Endangered
Diomedea epomophora epomophora Southern Royal Albatross [25996]	Vulnerable
Diomedea epomophora sanfordi Northern Royal Albatross [82331]	Endangered

habitat known to occur within area

Species or species habitat may occur within area

Roosting known to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Diomedea exulans amsterdamensis		
Amsterdam Albatross [82330]	Endangered	Species or species habitat may occur within
		area
Diomedea exulans exulans		
Tristan Albatross [82337]	Endangered	Species or species habitat may occur within
		area
<u>Diomedea exulans (sensu lato)</u>		
Wandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Macronectes giganteus	E o de o o o o d	On a size on an a size
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<u>Sternula nereis nereis</u> Australian Eairy Torn [82050]	Vulnorabla	Spacios or spacios
	vumerable	habitat known to occur within area
<u>Inalassarche cauta cauta</u> Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnorable	Spacios or spacios
The lessenship source stead	vuinerable	habitat likely to occur within area
White-canned Albatross [82344]	Vulnerable	Species or species
	Vuniciabic	habitat likely to occur within area
Thalassarche melanophris		o · ·
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris impavida	N/ 1 11	
Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within
Mammals		alea
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis	V/la enekle	On a size on an a size
western Ringtall Possum, Ngwayir [25911]	vuinerable	habitat likely to occur within area
Setonix brachyurus	Vulnarabla	Species or species
Quokka [229]	Vulnerable	Species or species habitat may occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat known to occur within area
Caladenia huegelii		
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Calytrix breviseta subsp. breviseta		
Swamp Starflower [23879]	Endangered	Species or species

Name	Status	Type of Presence
		habitat likely to occur
Controlonio econitada		within area
	Endongorod	Spacios or opacios
[0393]	Endangered	babitat likely to occur
		within area
Darwinia foetida		
Muchea Bell [83190]	Critically Endangered	Species or species
		habitat likely to occur
Diuria microatha		within area
Diuris micranina Dwarf Bee-orchid [55082]	Vulnerable	Species or species
Dwall Dee-Orchiu [55062]	vuillelable	habitat likely to occur
		within area
Diuris purdiei		
Purdie's Donkey-orchid [12950]	Endangered	Species or species
		habitat known to occur
Drekees election		within area
<u>Drakaea elastica</u>	Fodoogorod	Charles or encodes
Glossy-leated Hammer-orchid, Praying Virgin	Endangered	Species or species
[10755]		within area
Drakaea micrantha		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species
		habitat known to occur
		within area
Eucalyptus balanites		
Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species
		nabitat may occur within
Grevillea curviloba subsp. incurva		alea
Narrow curved-leaf Grevillea [64909]	Endangered	Species or species
	Endangered	habitat may occur within
		area
Lepidosperma rostratum		
Beaked Lepidosperma [14152]	Endangered	Species or species
		habitat likely to occur
Macarthuria kojaborvi		within area
Keighery's Macarthuria [64930]	Endangered	Spacias or spacias
Reighery S Macarthuna [0+300]	Lindangered	habitat likely to occur
		within area
Synaphea stenoloba		
Dwellingup Synaphea [66311]	Endangered	Species or species
		habitat may occur within
Thelymitre menginii K Diven & Detty me		area
	Endongorod	Spacios or spacios
[07443]	Endangered	babitat may occur within
		area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species
		habitat known to occur
Chalania mudaa		within area
Croop Turtlo [1765]	Vulnarabla	Spacios or spacios
Green Turne [1765]	vuillelable	babitat known to occur
		within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species
	-	habitat known to occur
N la fa fa a la a		within area
Natator depressus		o · · ·
FIAIDACK TUITIE [59257]	vuinerable	Species or species
		within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on th	ne EPBC Act - Threatened	Species list.
Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea amsterdamensis		
Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
Diomedea dabbenena		O
Tristan Albatross [66471]	Endangered [*]	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto)		
Southern Royal Albatross [1072]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea exulans (sensu lato)		O
Vvandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area
<u>Diomedea saniordi</u> Northorn Poyol Albotroco [64456]	Endongorod*	Spacios or spacios
Maaranaataa gigantawa	Endangered	habitat likely to occur within area
Southern Giant-Potrol [1060]	Endangered	Spacios ar spacios
	Endangered	habitat may occur within area
Macronectes halli		
Northern Glant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<u>I halassarche cauta (sensu stricto)</u>	\/laarabla*	
Shy Albatross, Tasmanian Shy Albatross [64697]	vuinerable*	Species or species habitat likely to occur within area
<u>Inalassarche Impavida</u> Comphell Albetross [6//50]	\/ulparabla*	Spacios ar spacios
	vullerable	habitat may occur within area
Thalassarche melanophris	N/ 1 11	O
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
White-canned Albatross [6//62]	\/ulperable*	Species or species
	vullerable	habitat likely to occur within area
Migratory Marine Species		
Loggerhead Turtle [1763]	Endangered	Species or species
Cholonia mydac	Lindangered	habitat known to occur within area
Green Turtle [1765]	Vulnerahle	Species or species
		habitat known to occur within area
<u>Dermochelys coriacea</u>	Endon erare d	Chapter of an article
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Lamna nasus Derbearde, Maekerel Shark [82288]		Chapies er chapies
Monto birostric		habitat may occur within area
Giant Manta Ray, Chevron Manta Ray, Pacific		Species or species
Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		habitat may occur within area
<u>Inalator depressus</u> Elathack Turtle [50257]	Vulnerable	Spacies or spacies
$[1000 \times 1010 \times 1000 \times 10000 \times 1000 \times 1000 \times 1000 \times 1000 \times 10000 \times 100000000$	VUILLIANE	habitat known to occur

within area

Name	Threatened	Type of Presence
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]		Breeding known to occur within area
<u>Ardea ibis</u>		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat likely 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 -		
Commonwealth Heritage Places		[Resource Information]
Name	State	Status
Natural		
Jandakot Airport Area	WA	Indicative Place
Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the	ne EPBC Act - Threatened	Species list.
Name	Threatened	Type of Presence
Birds		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species

Apus pacificus Fork-tailed Swift [678]

Ardea alba Great Egret, White Egret [59541]

Ardea ibis Cattle Egret [59542]

Diomedea amsterdamensis Amsterdam Albatross [64405]

Diomedea dabbenena Tristan Albatross [66471]

Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]

Diomedea exulans (sensu lato) Wandering Albatross [1073] habitat may occur within area

Species or species habitat likely to occur within area

Breeding known to occur within area

Species or species habitat likely to occur within area

Species or species habitat may occur within area

Species or species habitat may occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur

Vulnerable*

Endangered*

Endangered*

Vulnerable

Name	Threatened	Type of Presence
		within area
<u>Diomedea sanfordi</u> Northern Royal Albatross [64456]	Endangered*	Species or species habitat likely to occur within area
Haliaeetus leucogaster		within area
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		0
Northern Glant-Petrel [1061]	Vuinerable	Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Breeding known to occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
<u>Inalassarche cauta (sensu stricto)</u> Shy Albetrees, Teemenien Shy Albetrees [64607]	\/ulaarabla*	Species or opecies
Shy Albatross, Tasmanian Shy Albatross [64697]	vunerable	habitat likely to occur within area
Thalassarche impavida		
Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
White-canned Albatross [6//62]	\/ulnerahle*	Species or species
		habitat likely to occur within area
Reptiles		

Caretta caretta Loggerhead Turtle [1763]

<u>Chelonia mydas</u> Green Turtle [1765] Endangered

Vulnerable

Endangered

Species or species habitat known to occur within area

Species or species habitat known to occur within area

Species or species habitat known to occur within area

Species or species habitat known to occur within area

Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]

Natator depressus Flatback Turtle [59257]

Vulnerable

Extra Information

Extra information		
Places on the RNE		[Resource Information]
Note that not all Indigenous sites may be listed.		
Name	State	Status
Natural		
Ken Hurst Park and Adjacent Areas	WA	Indicative Place
Canning River Regional Park	WA	Registered
Canning River Wetlands (Mount Henry to Clontarf)	WA	Registered
Jandakot Airport Area	WA	Registered
Historic		
Grasmere	WA	Registered
State and Territory Reserves		[Resource Information]
Name		State
Unnamed WA49362		WA
Unnamed WA49363		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]

Passer montanus Eurasian Tree Sparrow [406]

Streptopelia chinensis Spotted Turtle-Dove [780]

Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]

Sturnus vulgaris Common Starling [389]

Turdus merula Common Blackbird, Eurasian Blackbird [596] Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Mammals
Name

Bos taurus Domestic Cattle [16]

Canis lupus familiaris Domestic Dog [82654]

<u>Felis catus</u> Cat, House Cat, Domestic Cat [19]

<u>Funambulus pennantii</u> Northern Palm Squirrel, Five-striped Palm Squirrel [129]

Mus musculus House Mouse [120]

Oryctolagus cuniculus Rabbit, European Rabbit [128]

Rattus norvegicus Brown Rat, Norway Rat [83]

Rattus rattus Black Rat, Ship Rat [84]

Vulpes vulpes

Red Fox, Fox [18]

Plants

Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643] Asparagus aethiopicus

Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]

Status

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Asparagus asparagoides

Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]

<u>Asparagus plumosus</u> Climbing Asparagus-fern [48993]

Brachiaria mutica Para Grass [5879]

<u>Cenchrus ciliaris</u> Buffel-grass, Black Buffel-grass [20213]

<u>Chrysanthemoides monilifera</u> Bitou Bush, Boneseed [18983]

<u>Chrysanthemoides monilifera subsp. monilifera</u> Boneseed [16905]

<u>Genista linifolia</u> Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800] Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat may occur within area

Species or species habitat may occur within area

Species or species habitat may occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Name	Status	Type of Presence
Genista monspessulana		
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126] Genista sp. X Genista monspessulana		Species or species habitat likely to occur within area
Broom [67538]		Species or species habitat may occur within area
Lantana camara		o · · · ·
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum		Species or species habitat likely to occur within area
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
<u>Olea europaea</u>		
Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata		
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus plumosus		
Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus truticosus aggregate		0
Blackberry, European Blackberry [68406]		habitat likely to occur within area
Sagittaria platypnylla Dalta Armanuk and Armanuk and Clauder Armanuk and		
[68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x	<u>reichardtii</u>	
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]

Tomoriv onbullo

Species or species habitat likely to occur within area

<u>Tamanx apnylla</u>	
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering	Species or species habitat likely to occur
Cypress, Salt Cedar [16018]	within area
Reptiles	
Hemidactylus frenatus	
Asian House Gecko [1708]	Species or species habitat likely to occur within area
Nationally Important Wetlands	[Resource Information]
Name	State
Swan-Canning Estuary	WA

Coordinates

-32.05895 115.8997

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.

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APPENDIX E ABORIGINAL HERITAGE INVESTIGATIONS



Real value in a changing world



From: Ian Marker [mailto:Ian.Marker@estates.com.au]
Sent: Wednesday, 15 January 2014 3:07 PM
To: Fogliani, Phillip (Australia)
Cc: Adam Collins
Subject: FW: Assessment of DAA 4313 (Beasley Road)

Phil, Please refer email from DAA below.

Regards Ian Marker Chief Executive Officer

Estates Development Company 49 Hampden Road PO Box 329 Nedlands WA 6009

T 08 9389 4300 M 0418 859 718 W <u>www.estatesdevelopment.com.au</u>

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From: Andrea Barton [Office of the Director General] [mailto:Andrea.Barton@daa.wa.gov.au]
Sent: Tuesday, 14 January 2014 12:03 PM
To: Ian Marker
Subject: Assessment of DAA 4313 (Beasley Road)

Dear Mr Marker

I refer to your discussion with Ms Christine Lewis in relation to the Aboriginal Cultural Material Committee's assessment of DAA 4313 (Beasley Road).

I can confirm that the Committee assessed DAA 4313 at its 18 December 2013 meeting, and determined that it is not a site to which section 5 of the *Aboriginal Heritage Act 1972* applies. The Aboriginal Heritage Inquiry System will be updated to reflect that determination following the ratification of the December meeting minutes by the Committee at its 12 February 2014 meeting.

Kind regards Andrea

Andrea Barton Executive Officer | Aboriginal Cultural Material Committee



Government of Western Australia Department of Aboriginal Affairs

Ground Floor, 151 Royal Street, East Perth WA 6004 Ph: (08) 6551 8115 Fax: (08) 6551 8088 Andrea.Barton@dia.wa.gov.au www.daa.wa.gov.au

DAA Strategic Framework 2012 – 2014

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Government of Western Australia Department of Aboriginal Affairs

ENQUIRIES : Rebecca Bairnsfather-Scott - Ph 65518050

OUR REF: 13/0062

YOUR REF:

Dr Edward McDonald Ethnosciences PO Box 121 MELVILLE WA 6956

Dear Dr McDonald

SITE ID 4313 BEASLEY ROAD.

Thank you for your information regarding Department of Aboriginal Affairs (DAA) heritage place 4313 Beasley Road received by DAA 13 August 2013.DAA has reviewed all the relevant information including information submitted by Ethnosciences and I provide the following comment:

The Registrar, Tanya Butler has reviewed the information relating to DAA 4313 – Beasley Road and has prepared a recommendation to Aboriginal Cultural Material Committee (ACMC) for this place to be reassessed.

At this time there is no date for when DAA 4313 – Beasley Road will be formerly assessed by the ACMC.

The Registrar is of the view that as the proposed works are within an area that has been previously disturbed there will be no impact to heritage values.

If you have any questions regarding the above please contact me on 6551 8061.

Kind Regards

Manager Advice and Approvals Industry 27 August/2013

ABN: 47 065 099 228 Aboriginal Heritage

Ms Tanya Butler Acting Registrar of Aboriginal Sites Department of Aboriginal Affairs PO Box 3153, East Perth, WA 6004

Dear Ms Butler

Re: Site ID 4313 Beasley Road

Estates Development Company (EDC) is considering a proposal to develop Lots 99 Portcullis Drive and 130 Woodthorpe Drive (formerly Beasley Road), Willetton. As part of their due diligence process, EDC, conducted a search of the AHIS and discovered that Site ID 4313 Beasley Road is listed on the land. The site, an artefact scatter, is listed as an 'Other Heritage Place', having 'Insufficient Information' to determine its status in respect of Section 5 of the Aboriginal Heritage Act (1972).

EDC commissioned Ethnosciences to provide advice as to how Site ID 4313 ought to be managed if the Lots were to be developed. Consequently, Ethnosciences commissioned Snappy Gum Heritage Services to undertake an archaeological assessment of the current state of Site ID 4313 and to report on future management options. A copy of Snappy Gum's report is attached (Hovingh, R. (May 2013) Report on an inspection of DAA Site ID 4313 in Willeton, Perth, Western Australia).

According to the site file, Site ID 4313 Beasley Road (S00778) was recorded in February 1974. The available information indicates that, 37 artefacts were located within a 20m x 10m area on a "high sand hill adjacent to low land." The site is reportedly located south-east of Beasley Road, approximately 300-400m south-west of Collins Road "between the road and the sand pit rim", that is, on the edge of an active sand quarry.

Snappy Gum's investigations have shown that site is no longer extant. An inspection of the area resulted in the identification of only a single quartz distal flake fragment (GPS coordinates (50 H 396178m E 6452652m N) in the vicinity of where Site ID 4313 was recorded. No other Indigenous cultural material was identified on the Lots or immediate vicinity.

Ethnosciences ABN: 47 065 099 228 Aboriginal Heritage

The documentary evidence, aerial photography and other sources indicate that extraction of sand from the quarry occurred over number of years in the 1970s. An estimated 356,460m³ of sand has been removed from the Lots over time and originally the 'sandy hill', on which the artefact scatter was located, stood approximately 7m above the current ground surface. This disturbance, together with other factors such as recreational off-road vehicle use and domestic and other rubbish disposal has resulted in the obliteration of the site. Two small discrete areas of remnant dune still exist in the area and Snappy Gum has recommended that these are archaeological monitored in the course of any future earthworks. EDC has agreed to engage a suitably qualified archaeologist to undertake this work.

In our view, the Snappy Gum report now provides sufficient information on which to assess Site ID 4313 Beasley Road's status with regard to Section 5 of the Act. On the basis of the archival and field investigations we submit that Site ID 4313 Beasley Road is not a place of importance and significance as specified by Section 5(a) of the Act as the artefactual material has been removed together with the original landscape and the place no longer has any archaeological values. Therefore, we would submit, the place is not an Aboriginal site within the meaning of the Act Consequently; we suggest that development of the land by EDC would not result in a breach of Section 17 of the Aboriginal Heritage Act (1972) as no Aboriginal heritage values will be impacted upon. We recommend that and information about the place should be archived in 'Stored Data'.

Your speedy advice on this matter would be appreciated as EDC has deadlines to meet with respect to other aspects of the planning approvals process.

Yours faithfully

Dr Edward M McDonald Ethnosciences July 17, 2013

PO Box 121, MELVILLE WA 6956 Phone (08) 9339 8431; Fax: (08) 9438 1717; Mobile: 0419 957 140 Email: dredward@iinet.net.au



Report on an inspection of DAA Site ID 4313 in Willeton, Perth, Western Australia

For Ethnosciences & Estates Development Company Pty Ltd

Ryan Hovingh BSc Hons (Archaeology)

May 2013





Snappy Gum Heritage Services Pty Ltd Unit 29, 2232B Albany Hwy, Gosnells WA 6110 phone: 08 9425 5220 fax: 08 6424 8786

www.snappygumheritage.com.au





INTRODUCTION

Snappy Gum Heritage Services Pty Ltd (SGH) was requested by Ethnosciences on behalf of Estates Development Company Pty Ltd (EDC) to assess the current condition of Site ID 4313 and determine how it should be managed during future developments on Lots 99 and 130 Beasley Road, Willeton (see Figure 1). Ryan Hovingh and Jane Ogilvie of SGH met with Grant de Longville of EDC to inspect the area on 17 April 2013.

This document discusses the findings of the desktop review and the field inspection.

SITE ID 4313 BEASLEY ROAD

On the 13 March 2013, Ethnosciences obtained the Site ID 4313 archive information from the Department of Aboriginal Affairs (DAA). A copy of the record is listed in Appendix 1. The DAA currently have Site Id 4313 listed as being of 'Insufficient Information'.

Site ID 4313 Beasley Road (S00778) is an artefact scatter recorded by R. Stranger in February 1974. According to the available information, 37 artefacts were located within a 20 m x 10 m area on a "high sand hill adjacent to low land." The site is reportedly located south-east of Beasley Road, approximately 300-400 m south-west of Collins Road "between the road and the sand pit rim" (see Figure 2). The topsoil had reportedly been disturbed and eroded away at the time of recording.

The assemblage is described as a moderate stone artefact scatter on bare sand, comprising "nodules, lumps, chips, flakes, frags, flaked pieces, micro cores, ultilised flaked piece, utilised micro core, utilised fragments, stone scrapers, adzes and fabricators manufactured from quartz and fossiliferrous chert.

The current DAA AHIS records have demarcated Site Id 4313 within a circle with an approximate diameter of 240 m and centred on 50 H 396179 mE 6452618 mN. Using the approximate dimensions from the Collins and Beasley road intersections and the fact that the site is on the south side of the road, SGH narrowed the location to within that detailed in Figure 1.



13 BEASLEY ROAD

300 m from old Collins Road/

Beasley Rd Intersection

Most likely location of site based on archive information

400 m from old Collins Road/ Beasley Rd Intersection

Possible remnant hill

Possible remnant hill

Partie Barris





Figure 1: Approximate Plan showing Lots 99, 130 and Site Id 4313.

LEGEND



Possible Remnant hill

Most likely site location based on archival data

Denotes 1973 contours

Denotes 2010 contours



Aerial image sourced from Nearmap. Contour information supplied by Cardno Survey Services. Aboriginal Site Data © Dept. of Aboriginal Affairs, WA Figure 2: Site map of Site ID 4313 (sourced from the Department of Aboriginal Affairs)

é SCALE 1: 1;000 N1 40 metres 0 . 10 30 2.0 6.300 trom peosley Rd. SAND QUARRY FLOOR 6FOUND GROUND HIVEREST 5 6 SAND QUARRY FLOOR 2 HIGH 0 V S #164

LOTS 99 & 130 BEASLEY ROAD, WILLETON

Lots 99 and 130 Beasley Road, Willeton have been subjected to many changes since the areas were inspected by R. Stranger in February 1974. The roads surrounding the area have undergone significant changes: Beasley Road is now called Woodthorpe Drive, and the intersection between the old Beasley and Collins roads have now been incorporated into commercial industries. The southern side of the allotments are now bounded by Roe Highway. Figure 2 clearly shows sand mining activities on both sides of Beasley Road but today the northern side of the road is populated by commercial businesses and a Buddhist monastery. Large powerlines and powerpoles run along the northern side of Woodthorpe Drive.

The allotments have also undergone changes through large scale sand mining and low scale recreation and other uses. Gordon Jones of Cardno Spectrum Surveys (CSS) sourced a contour plan of the area dated to 20 December 1973, which is approximately two months before R. Stranger's field investigation. The contours clearly show that a hill occupied the area where the site once stood, approximately 7 m above the current ground levels (see Figure 1 and Appendix 2). CSS calculated that approximately 356,460 m³ of sand has been removed from the allotments between the 1973 topographic survey and one later undertaken in 2010 (Appendix 3).

There are three areas that may be partial remnants of the hill: a powerline sits on a moderate mound to the north of Woodthorpe Drive (outside the allotments – see Photo 1); a low sandy rise in Lot 130 to the south (Figure 1) and in the north-west of Lot 99 (Figure 1). While the latter two hills are vegetated, the survey maps show that both hills have decreased in size by approximately 1 m (Figure 1).

Aside from the mining activities, the area has been disturbed by recreational off-road vehicle tracks and household and rubble disposal leaving broad expanses in the centre and to the north-east particularly free of vegetation (see Photo 2 and Figure 1). There are wetlands currently in the centre of Lot 130 but contour assessment suggests that they are between about 3 and 6 m below the original hill surface.



Photo 1: The power pole hill from the current surface of Lot 130. Notice retaining wall.



Photo 2: A panoramic view of the survey area looking south from the power pole to the north of the allotments.

THE FIELD INSPECTION

SGH visited Lots 99 and 130 Beasley Road, Willeton on the 17 April 2013. Google Earth was used to identify the original intersection of Collins Road and Beasley Road. Given the small area covered by the allotments, the team inspected most exposed ground surfaces to allow for inaccuracies in either the DAA data set or the GIS translation. Numerous household rubbish and bulk landscape discard piles were identified, including some sands containing amorphous lumps of quartz within Lot 99. None contained Indigenous cultural material.

A single quartz distal flake fragment was identified at 50 H 396178 mE 6452652 mN within the area where SGH determined Site ID 4313 was likely located. No other Indigenous cultural material was identified.

DISCUSSION

Comparisons between December 1973 and the 2010 contour data sets suggest that a sandy hill, approximately 7 m about the current ground surface, has been removed in the last 37 years. Small rises to the south, north-west and across Woodthorpe Drive may be remnant portions of the original hill, but similar topographic data suggests that they have been either naturally or culturally deflated about 1 m (see Figure 1).

As the presence of the hill is consistent with the February 1974 field recording and the approximate distance from the original Collins Road/Beasley Road intersection, it can be reasonably assumed that the surface expression of the cultural assemblage of Site Id 4313 no longer exists. As the hill has been removed, the potential for stratified subsurface cultural material near Site Id 4313 is also unlikely, although the remnant portions may still encompass subsurface materials.

It is therefore recommended that the DAA be informed that Site Id 4313 no longer has any archaeological values and that its status of 'Insufficient Information' is not likely to be upgraded in the future. Consequently, Site Id 4313 is not currently protected under the *Aboriginal Heritage Act 1972* and is not likely to be given the significant changes in local topography.

Similarly, the changes in topography also suggest that the single quartz distal flake fragment near Site Id 4313 is also out of context and cannot contribute archaeological research. It is therefore considered an isolated artefact and therefore the place where it is located is not likely to be determined to be a "place of importance and significance" as defined by section 5(a) of the *Aboriginal Heritage Act 1972* and therefore can not reasonably be considered to be an 'Aboriginal site'.

The prior presence of archaeological materials on the allotments suggests that others may be found nearby. Sandy hills, particularly near water sources such as wetlands, streams and drainage channels, are favoured locations for Indigenous occupation. Anderson's (1984) *Between Plateau and Plain: Flexible Responses to* *Varied Environments in Southwestern Australia*, which is still one of the seminal studies on Western Australian archaeology in the south-west, discusses the findings of numerous archaeological studies across the southwest. Her survey of a 6 km² area of the Perth Airport identified 39 sites, with all but one of them being located on sandy ridges overlooking swamps and streams (Anderson 1984:19). This has been replicated in a study by Hallam (1986). Furthermore, Aboriginal burials may also be interred in relic sand dune systems.

As a result, it is recommended that an archaeologist and the appropriate members of the Noongar community be present during the initial excavations of the two remnant sand dune systems located on Lot 99 and 130 (see Figure 1) to ensure no subsurface cultural materials are uncovered during the excavation process. EDC is reminded of their obligations under section 15 of the *Aboriginal Heritage Act 1972* to report the discovery of any cultural material to the DAA. Similarly, the police and the DAA need to be informed under Section 17 of the *Coroners Act 1996* should any skeletal material be uncovered during the course of the excavation. In both cases, the EDC should stop work immediately.

CONCLUSION

Snappy Gum Heritage Services Pty Ltd (SGH) was requested by Ethnosciences on behalf of Estates Development Company Pty Ltd (EDC) to assess the current condition of Site ID 4313 and determine site management strategies during future developments on Lots 99 and 130 Beasley Road, Willeton. SGH inspected the area on 17 April 2013.

Both allotments have been subjected to significant disturbances in the last 37 years, mainly through sand mining. Comparisons between 2010 and 1973 contours surveys show that the hill, on which Site Id 4313 is thought to be located, has largely disappeared except for two remnant dunes on each of the allotments. Its status of 'Insufficient Information' is not likely to be upgraded in the future so consequently, Site Id 4313 is not currently considered a place of importance or significance under section 5 (a) or (c) of the *Aboriginal Heritage Act 1972* and is not likely to be given the significant changes in local topography. DAA should be informed about this change in site status.

While the hill where Site Id 4313 once stood is no longer present, there is the potential for cultural materials being uncovered during excavation works within the two remnant portions of the hill as shown in Figure 1. Excavations within these areas should be monitored by an archaeologist and members from the Noongar community.

RECOMMENDATIONS

Based on the archaeological inspection of Site Id 4313:

It is **recommended** that the DAA be informed about the altered landscape within the vicinity of Site Id 4313 and that it can be concluded that the site no longer exists and therefore the place does not constitute an Aboriginal site as defined by section 5(a) of the *Aboriginal Heritage Act 1972*. The Aboriginal Cultural Materials Committee (ACMC) should likewise be informed.

The two remnant portions of the hill where Site Id 4313 once stood, on the southern side of Lot 130 and the north-western corner of Lot 130, may still have subsurface Indigenous cultural materials. It is therefore **recommended** that monitors from SGH and/or representatives of the relevant Nyoongar community by present to avoid inadvertent site disturbance.

It is **recommended** that Estates Development Company Pty Ltd or their subcontractors stop work should any cultural material be identified and inform the Department of Aboriginal Affairs.

In addition, it is **recommended** that the Estates Development Company Pty Ltd or their subcontractors halt work immediately and contact the police (in accordance with the *Coroners Act* 1996) and the Department of Aboriginal Affairs if any skeletal material is uncovered by ground disturbance works.

It is **recommended** to the ACMC that the quartz distal flake fragment be considered an isolated artefact and not be considered an Aboriginal site under section 5(a) of the *Aboriginal Heritage Act 1972*.

REFERENCE LIST

- Anderson, J. (1984) <u>Between Plateau and Plain: Flexible Responses to Varied Environments in Southwestern</u> <u>Australia</u>, Department of Prehistory, Research School of Pacific Studies, Australian National University.
- Hallam, S. J. (1986) <u>Prehistoric Aboriginal Populations on the Swan Coastal Plain, Western Australia: Australian</u> <u>Research Grants Scheme : Final Report on the Project</u>.

APPENDIX 1: SITE ID 4313 SITE INFORMATION

Site Identifier: 4313 Site Number: S007	78	Aboriginal Sites Site Verification Report		t C	C#>		
Site Name: B	EASLEY R	ROAD				DEPARTMENT OF INI	DIGENOUS AFFA
Site Recorder(s):							-
Consultation			- 2-		_		
Person(s) Consulted:							
Site Details							
Site Considered Dang	gerous:	Yes	No				
Site Has Been Restrie	cted	Yes	No 🔽	Other R	estrictions:	No Gender Restrictions	
Site Type	1						
Ceremonial		Myth	nological			Repository / Cache	-
Skeletal material/Buri	al 🔲	Man-Made Structure		ructure	П	Fish Tran	
Modified Tree		Pain	ting		П	Engraving	
Quarry		Artel	facts			Midden / Scattor	
Historical		Grinding Patches / Grooves		Midden / Scatter			
Additional Informati	on						
Archeological Deposit		Mass	sacre			Ochre	
Birthplace		Meeting Place				Plant Resource	
Camp		Mission				Shell	
Hunting Place		Named Place				Rockshelter	
Natural Feature		Wate	r Source			Recenter	Ц.
Other:			Befo	ore Prese	nt Dating:		
					and provide some		

ARCHAEOLOGICAL SITE INFORMATION SHEET

W.A. MUSEUM SITE NO. 50778 SITE NAME BEASLEY ROAD MAP SHEET - 1:250,000 _____ 1:100,000 _____ GRID REF. AMG ______ 396.6452 OTHER REFERENCE imp: 389.3 . 10355 RECORDER R. STRANGER DATE FEB, 1974 REPORT CLIENT - -AUTHOR SITE TYPE ARTEFACTS ARC. DIMENSIONS _ 20 x low LANDFORM/ENVIRONMENT high sand hill adjacent to lowland. Typical sand plain flora. Bare sand NO. OF ARTEFACTS 37 ARTEFACT ASSEMBLAGE notules, lump, chips, flatters, frags, fl. pieces, micro corres, ut. P. piece, ut. micro core, ut. frag. st. scraper, adzes, fabrs. LITHIC TYPES quartz, foss. these COMPONENTS moderate stone anteract scatter on love sand OTHER COMMENTS -SKETCH MAP SE of Beasley Ed., C. 3-400m SW of Collin Rd., between road and rim of sand-pit. CBOCON CAlins Pet SAND QUARTY THOR the Cold High Succes With MIL SAN'S QUARCY FLO.R HINGTON DATE 25-2-98 RESEARCHER CH

SITE NAME BEASLE SUBURE, etc. CAN	Y ROAD	MAPS 1/4" S	I 50/2	GRID ROF.	1 3893, ¹ 035	6 5
·	TING VALL	l" FRE	MANTLE 404	LETRO MAP	42, E6	
DETAILS OF LOCATION Owner. etc.	I - Berran	hv. R. Strang	per <u>Date Rep</u> Date(s) vis	91201: 5/2/7	74	OFFICE SE
Access SE of Beas	ley Road. c.	3-400m S⊎ of Co	lins Road.	between pord		
Present condition	Bare sand,		F.	im of sand-pit		
Disturbance Top	soil disturbe	d and/or eroded	i away.			D
Threat	1				0	2·2)B
<u>Ecology</u> A high sa <u>Water supply</u> bee	nd hill adjac n Banksia, Ca	ent to low-land suarine and typ	. Original f Mical sandpla	flora would ha ain flora.	IDE	
LRTEFACT SCITTER(S)	Oversl		- 772.7. 7.		14 km	B.5.
<u>Dimensions</u>	20 × 10	<u>—</u> т	(<u>Individ</u> :	lai Sontters)	Calc.	Asses
Quantity estimate	moderati	VVV				
Donaiti	mobszer				e3:2	C'
Densities	moderati	· XXX				
COLLEVETCULC				2222	e ³	c ??
Sample (line Fig. 2)	2	-		0202		in an all proceeds as an inter
<u>merec</u> , ring, [ron]:	·, [5n]4)	lotal	275.1		2FF	37
SPECIAL FEAGURES					Perman	9 lence .
POTENTIAL/ DVICE						1
	4	×		D	Overal	I grade
ARTEFACT ASSEMBLAGE						C*! (C
2 fl. pcs, 1 mic frag, 1 st. scr,	QUARTZ: 3 ro core, 1 ut 2 adzes, 2 f	nods, l lump, 2 il. fl. pce, 1 abrs.	frags, 6 f. util. micro	lekes, 6 chips core, 1 util.	. 9465es Q 78 C 22	SS 12. BB -
	DTHER 1.	: 5 Tlakes, 2	chips, 1 mi	cro core,	· 0 -	W 22
CEDE OFT DE LES (-)					EHLL	FII
SKETCH PLAN(S)	1	incom			1? - X	-121
ľ		LUCATION	V. PLAN.			
		Rile	Rd / Nicei Rd	1		
	WILLETO	N K	- C 233 '056C	N		
	ł		& LYINW	OOD :		
4	Corties 1	d-				
And the same set of the			SCALE	1: 25,000		
			Constant	Shart manage m	4	
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		Ally.	Johnston Ed			
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	3372'0345 K	1/33991034	8 Alinaia	The factor		
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	1	11/29				
		51	atter			

SITE NAME : BEASLEY RD. GRID REF. 3893'0355 CANNINGVALE SUBURB . METRO MAP 42, E6 SKETCH PLAN OF SITE. SCALE 1: 1,000 NT 0 10 20 30 40 metres C.3com from Beasley SAND QUARRY GROUND FLOOR GROUND HILLAEST K SAND HIGH QUARRY 0 5 FLOOR H16H

SITES VERIFICATION PROJECT

CAPTU	RE OPERATOF	R NOTES	
SITE # 4313	REPO	ORT REF:	
CATAGORY	Sketch		
RECORDED DATE 5	/2/1974		
NOMINAL BOUNDARY	N		
SOURCE RELIABLE	N		
EXTENT	N PARTIAL		
SECOND POINT	N)		
SITE LOCATION	GRID DATUM		
GRID CO-ORDINATES	66 84 94		
3 96040 E 64	52470 N	50 Z Map Sheet	#
GEOGRAPHIC CO-ORD (Decin	nal)		
- S	Е	Probability Radius/ Boundary/L	ine Extent
		1 Lun	-
Probability Radius Rearley	road from	of measurement collins	along
20 m to	r site exten.	4.	
COMMENT POINT 2			
MGA/GDA REF: 396179h.E	64 .52 618	im hi	
AData	V 2010	21.2	
OPERATOR 2018 1200,	OUALIT	Y ASSURANCE /0/ 9/	2001



