



Town Planning Scheme No.3
Amendment No.179
(Standard)

Modifications to 'Additional Use No.1' (AU1) portion of Lots 704-706 Jandakot Road, Jandakot

MARCH 2025

Planning and Development Act 2005
RESOLUTION TO AMEND A TOWN PLANNING SCHEME

City of Cockburn
Town Planning Scheme No.3
Amendment No. 179

RESOLVED that the Council, in pursuance of Section 75 of the *Planning and Development Act 2005*, amend the City of Cockburn Town Planning Scheme No.3 by:

1. Modifying Additional Use 1 to:
 - A. Update the description of land (column 2) to Lots 807, 808, 809, 810 and 811 Jandakot Road, Jandakot.
 - B. Insert (D) after all Additional Uses (column 3).
 - C. Include the following Additional Uses (column 3):
 - *Fast Food Outlet (D)*
 - *Hardware Store (D)*
 - *Health Studio (D)*
 - *Industry – Light (D)*
 - *Industry – Service (D)*
 - *Lunch Bar (D)*
 - *Motor Vehicle, Boat and Caravan Sales (D)*
 - *Place of Worship (D)*
 - *Recreation-Private (D)*
 - *Trade Display (D)*
 - *Veterinary Services (D)*
 - D. Modifying the conditions (column 4) of AU1 as follows:
 - i. Delete conditions 1(f) and 6.
 - ii. Modify condition 2 to replace reference to Lot 702 with Lot 808.
 - iii. Modify condition 3 to state:

“Any new development proposed must be connected to reticulated sewer.”
 - iv. Inclusion of a new condition (1) stating:

“All development shall comply with the following objective: To accommodate light industrial and a limited range of commercial activities which require good vehicular access and/or large sites; which do not negatively impact existing or planned Activity Centres; and which are compatible with the Jandakot Groundwater mound and environmental values of the area.”

v. Inclusion of a new condition (9) stating:

"Within AU1 all 'fast food outlet' land uses shall have a maximum aggregate Gross Floor Area (GFA) of 1200m²."

vi. *Renumber the conditions.*

vii. *Correct spelling/typological errors.*

E. Modify all references to 'Storage' with 'Storage yard'.

The Amendment is 'standard' under the provisions of the *Planning and Development (Local Planning Schemes) Regulations 2015* for the following reason(s):

It is an amendment to the local planning scheme that:

- It is an amendment that does not result in any significant environmental, social, economic or governance impacts on land in the scheme area; and
- would not constitute a complex or basic amendment as defined in Part 5 Division 1 Regulation 34.

Dated this 11th day of March 2025



CHIEF EXECUTIVE OFFICER

FOREWORD: Inclusion of Minister's Modifications

Subsequent to Council initiation, on 20 June 2025 the Western Australian Planning Commission (WAPC) wrote to the City requiring in accordance with section.83A(2)(b) of the Planning and Development Act 2005, the proposal to be modified in the following tracked changes manner, prior to advertising:

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AMENDMENT REPORT

Table of Contents

Executive Summary	5	Appendices	
1.0 Introduction	6	Appendix A	Scheme Text Amendment Proposal
1.1 Purpose of Report	6	Appendix B	Estate Masterplan and Subdivision Approval
1.2 Site Overview	6	Appendix C	Approved Local Development Plan for South Connect Estate
1.3 Legal Description and Ownership	7	Appendix D	Environmental Assessment
1.4 Preliminary Engagement	7	Appendix E	Bushfire Management Plan
2.0 Planning Framework	8	Appendix F	Transport Impact Assessment
2.1 State Planning Framework	8	Appendix G	Approved Urban Water Management Plan
2.2 City of Cockburn Planning Framework	14		
3.0 Site Context	18		
3.1 Existing Approvals	18		
3.2 Environmental Considerations	20		
3.3 Bushfire Management	20		
3.4 Movement and Access	20		
3.5 Drainage and Utility Infrastructure	21		
4.0 Scheme Amendment	22		
4.1 Amendment Proposal	22		
4.2 Estate Masterplan	22		
4.3 Additional Use Considerations	24		
5.0 Conclusion	28		



Image 1: Progression of site works within the estate at 2024

Scheme Amendment Proposal | South Connect Estate

Executive Summary

This report has been prepared on behalf of Schaffer Corporation Ltd, as the owners of the South Connect Estate, to outline a proposed amendment to the City of Cockburn's *Local Planning Scheme No. 3* to expand upon the additional uses available under the existing Additional Use No. 1.

The subject site, which consists of Lots 704 - 706 Jandakot Road, Jandakot, forms part of the Jandakot Airport Specialised Activity Centre and is in the process of being subdivided and developed for commercial and freight and logistics purposes consistent with the shared vision for the site and the existing additional uses available.

As a component of progressing the Estate the project team has noted the evolving strategic planning for the surrounding region, and in particular:

- The growth in employment and logistics operations within the broader Jandakot Airport Specialised Activity Centre; and
- The existing and proposed residential development immediately surrounding the site to the south, west and east.

The expansion of development within the surrounding precinct has resulted in demand for a range of commercial services, and given its strategic location and site characteristics, the South Connect Estate is well placed to meet these needs.

In seeking to meet this demand Schaffer Corporation has further progressed masterplanning for the South Connect Estate and integrated the opportunities for diversification of land uses. This analysis has particularly focused on the Jandakot Road frontage of the site given the volume of commuter traffic passing this frontage and its positioning in terms of the future urban development to occur.

The development of the subject site is an outstanding opportunity to deliver an integrated commercial hub to provide goods and services to the significant workforce which visits the specialised activity centre on a daily basis, in addition the broader surrounding community.

Under *Local Planning Scheme No. 3* the Estate is able to accommodate the uses of Showroom, Warehouse, Storage, Nursery and Masonry Production, subject to development approval and compliance with the conditions contained within Additional Use No. 1.

In progressing the Estate masterplan the proponent is seeking the support of the City of Cockburn in the initiation of an amendment which seeks to expand upon the uses available within the precinct to include:

- **Convenience uses:** including the defined uses of Fast Food Outlet and Lunch Bar.
- **Commercial and Light Industrial Uses:** which extend to the defined uses of Industry-Light, Industry-Service, Hardware Showroom, Health Studio, Motor Vehicle, Boat and Caravan Sales, Recreation-Private, Storage Yard, Trade Display and Veterinary Services.

Each of these uses is well suited to the estate, complementary to the existing uses available, and unlikely to result in any land use conflict or impact on surrounding landowners.

No modifications are proposed to the City's Scheme Maps, as the depiction of Additional Use No. 1 correctly identifies the extent of the subject area, which includes all of Lots 704 and 705, but excludes the identified Bush Forever area within Lot 706.

As a result it is requested that the City of Cockburn support the initiation of an amendment to include these uses as permitted within the Scheme subject to the conditions applicable, and subject to further consideration of each use at the development application stage.

1.0 Introduction

1.1 Purpose of Report

This report has been prepared on behalf of Schaffer Corporation Ltd to support a proposal to amend the City of Cockburn *Local Planning Scheme No. 3* (LPS3) to modify and expand upon the additional uses available in the Scheme for the South Connect Estate (the subject site) to include a selection of other uses complementary to those already available.

1.2 Site Overview

The subject site is located within the southern metropolitan area in the suburb of Jandakot. The estate is strategically located adjacent to the Jandakot Airport Specialised Activity Centre, an area which is undergoing rapid development to accommodate a range of industrial and distribution operations, reinforcing the area as a major freight and logistics hub (**Figure 1**).

The subject site spans approximately 53 hectares of land comprising of Lots 704 - 706 Jandakot Road, and is bound by Jandakot Road to the southwest, Berrigan Drive / Pilatus Street to the northwest, rural-residential lots to the southeast and Jandakot Airport to the northeast (**Figure 2**).

The subject site has been historically used for sand extraction and has also accommodated a manufacturing, showroom and storage facility for paving stone manufacturer 'Urban Stone' since the mid 1990's.

Over the past five years the site has been redeveloped in preparation for future commercial and warehousing development consistent with the existing 'Additional Use' provisions of LPS3 and the broader Jandakot Airport Estate.

This has included the clearing and grading of the remaining developable portions of the site, earthworking consistent with subdivision approval, and demarcation of the land to be ceded as a 'Bush Forever' reserve in the north-east portion of Lot 706.

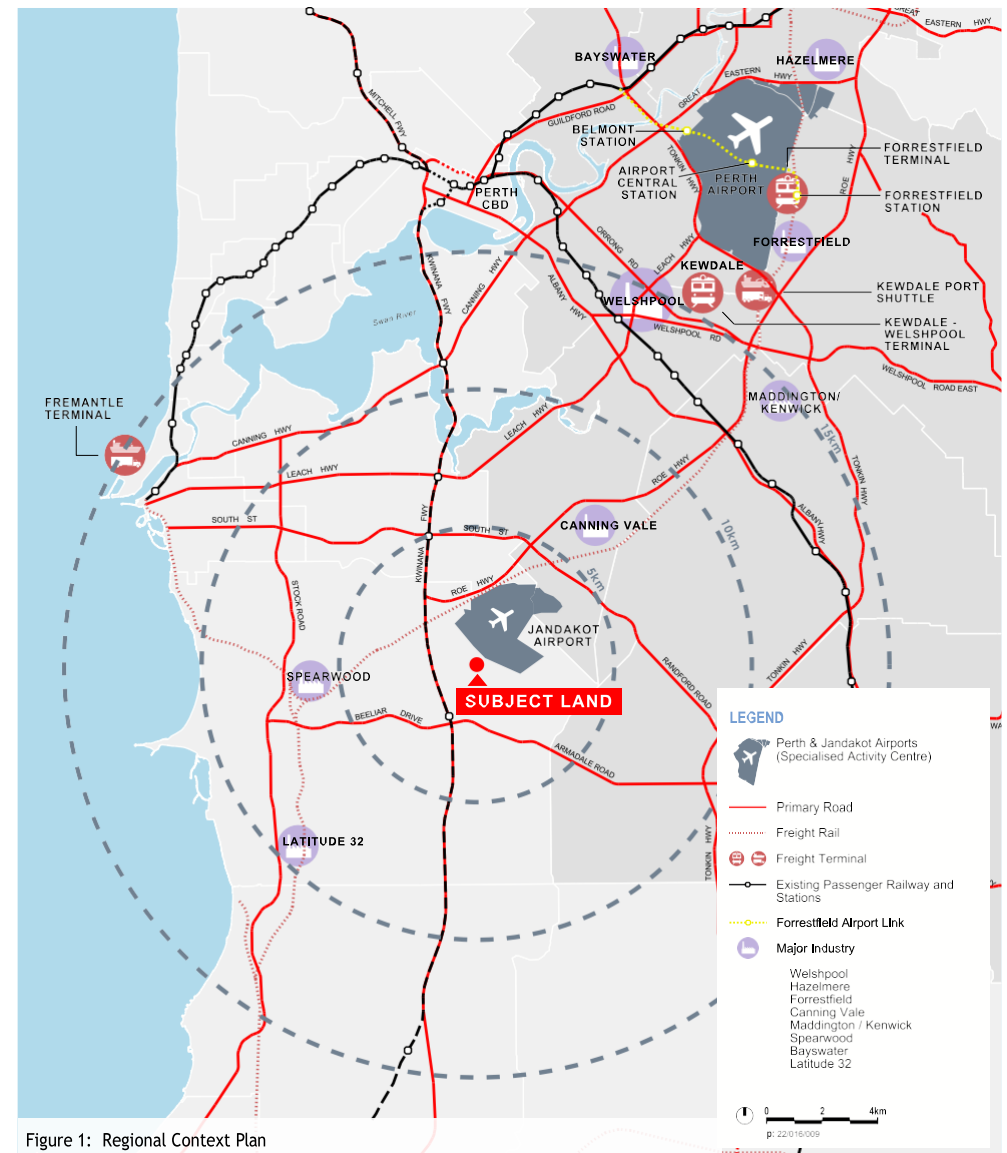


Figure 1: Regional Context Plan

Progressive development of the precinct is set to occur over the next five years following completion of the approved internal road network and delivery of all required civil infrastructure to facilitate commercial and freight and logistics development.

1.3 Legal Description and Ownership

The subject site is entirely within the control and ownership of the proponent, Schaffer Corporation Ltd. The details of the three land parcels included are outlined in **Table 1**.

Table 1: Lot summary details

Lot Address	Land Area (ha)	Volume / Folio	Plan No	Owner
Lot 704 Jandakot Road, Jandakot	3.2215	2999/304	417614	Schaffer Corporation Ltd
Lot 705 Jandakot Road, Jandakot	6.1878	2999/305	417614	Schaffer Corporation Ltd
Lot 706 Jandakot Road, Jandakot	43.6438	2999/306	417614	Schaffer Corporation Ltd

1.4 Preliminary Engagement

Schaffer Corporation has been regularly engaging with the City of Cockburn on the progression of the South Connect Estate over the past 10 years, and commenced discussion on a proposed Scheme amendment in early 2022.

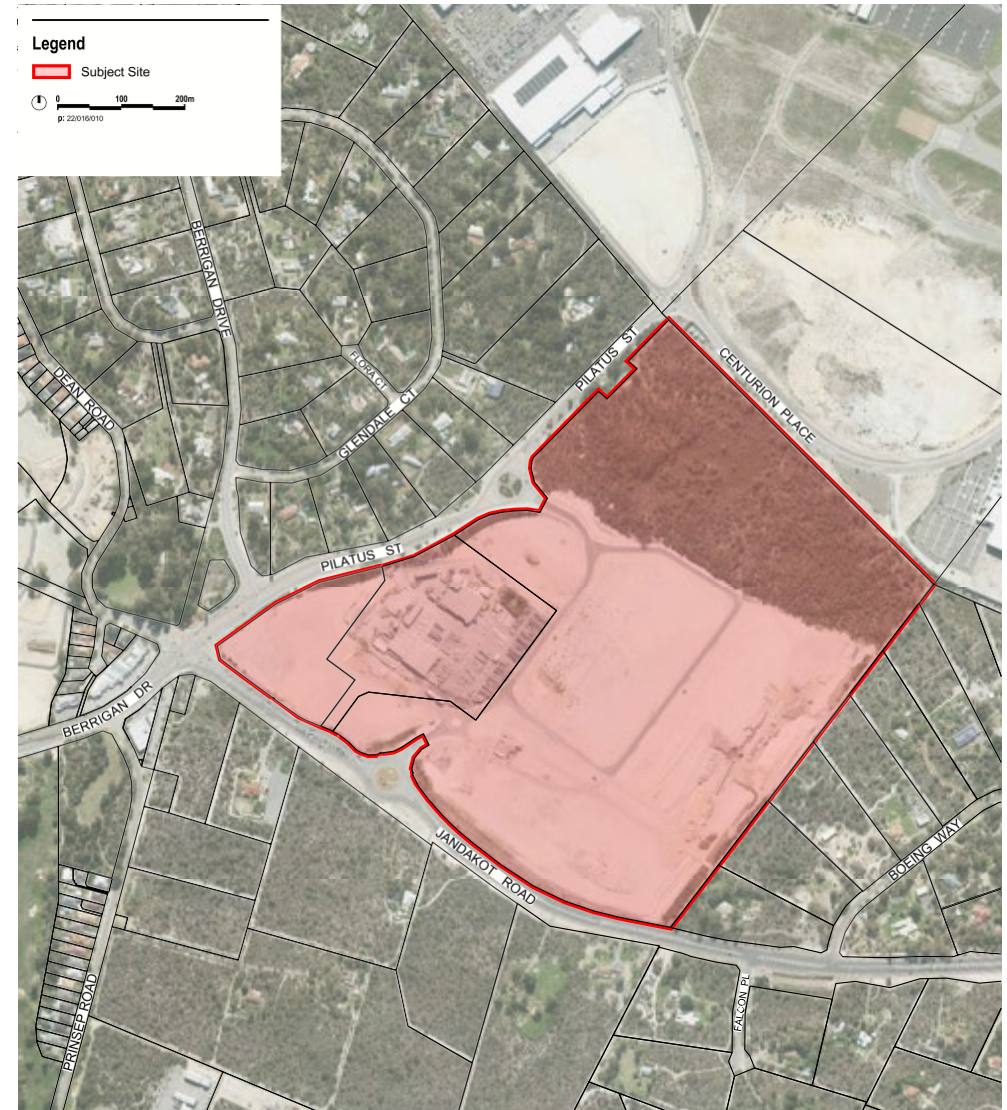


Figure 2: Subject Site Location

2.0 Planning Framework

2.1 State Planning Framework

2.1.1 South Metropolitan Sub-Regional Planning Framework

The Perth and Peel @ 3.5 million land use planning and infrastructure framework sets an over arching strategic plan for the City with a population of 3.5 million people by 2050. The framework provides guidance on where sustainable development should occur over the next 35 to 40 years to ensure the impact of urban growth on areas of environmental significance is minimised; to protect heritage; and to maximise the benefits of available land and existing infrastructure.

The subject site falls within the South Metropolitan Sub-Regional Framework, and is identified as an 'Industrial Investigation' area. These areas are noted as those which 'require further detailed planning to be undertaken prior to consideration for rezoning under the MRS or PRS. The classification of these areas is not to be construed as a commitment by the WAPC to support any rezoning as this will depend upon the outcome of further detailed planning investigations' (**Figure 3**).

The key considerations for the subject site are outlined in the framework as:

- Impacts, risks and management of Jandakot groundwater resources (existing Priority 2 Source Protection Area).
- Land to form part of the Jandakot Airport Specialised Centre.
- Determine specific land uses (e.g. light industrial in nature) and zoning to form part of the Jandakot Airport Specialised Centre and that are compatible with the P3 Drinking Water Source Area and the lands proximity to Jandakot Airport.

It is also noted that land surrounding the subject site is identified as 'Urban Expansion'. This allocation is the result of an amendment to the framework in August 2023 to modify these sites from 'Urban Investigation' to 'Urban Expansion' in recognition of the progression of groundwater monitoring and analysis to demonstrate the suitability of the land to accommodate urban development.

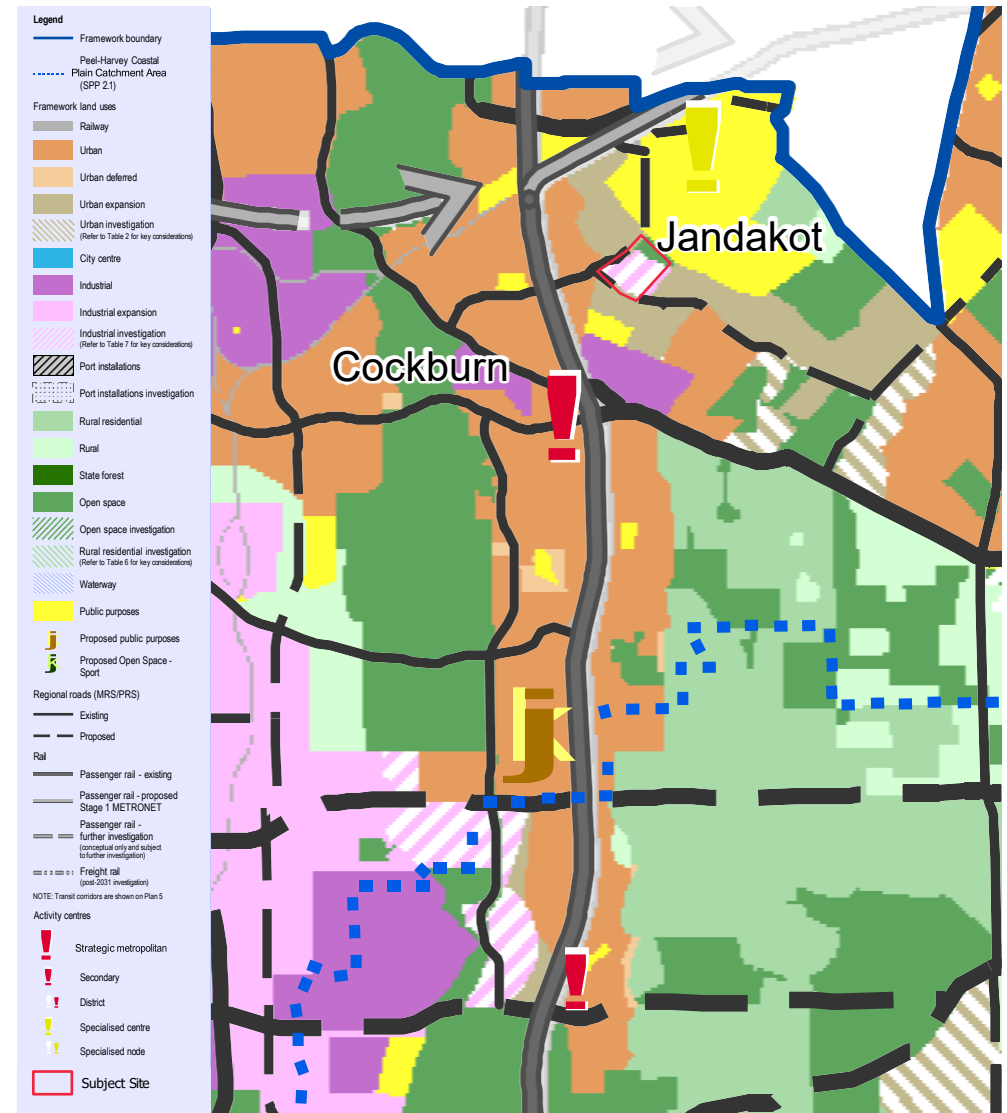


Figure 3: Perth and Peel @ 3.5 million - South Metropolitan Sub-Regional Framework

The proponent is keen to see the progression of the Metropolitan Region Scheme (MRS) rezoning for both the industrial investigation area and the urban expansion area in Jandakot.

It is anticipated, however, that given the groundwater sensitivity of the broader area, an 'Industry' rezoning under the MRS for the subject site is unlikely, as this would facilitate more general industrial uses which likely pose a greater risk to groundwater contamination. On this basis it is considered likely that both the industrial investigation area and the urban expansion area will be zoned 'Urban' at some point in the future.

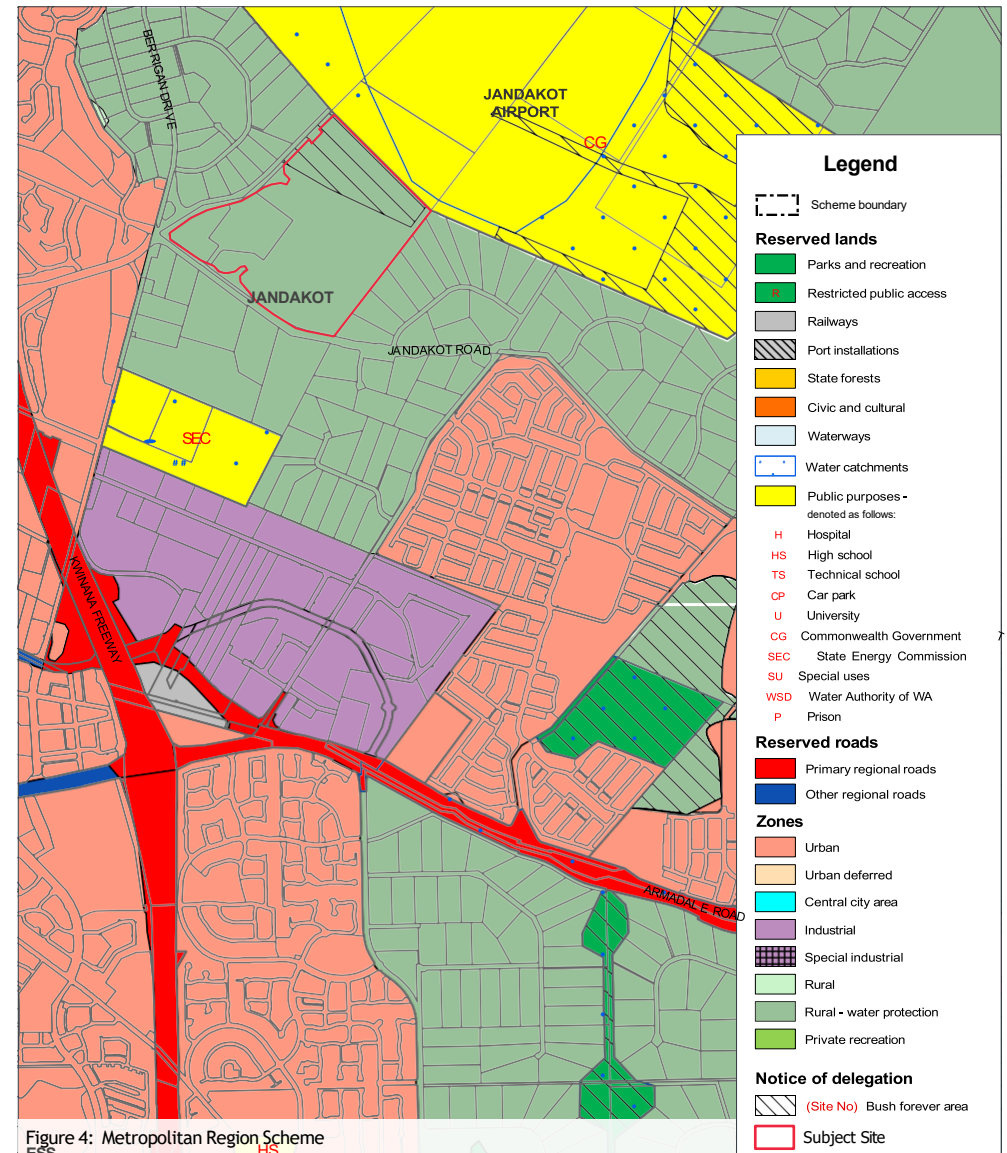
The likely MRS rezoning is important context to the proposed additional uses outlined within this request, as the future urban development of the broader region will provide additional demand for local employment opportunities and commercial services to provide for the growing population of the area.

The South Connect Estate will already provide this in the form of showroom and warehouse opportunities, and it will be highly beneficial for the functionality of the precinct and the surrounding area to expand on these to include other commercial and service opportunities.

2.1.2 Metropolitan Region Scheme

The subject site is currently zoned 'Rural - Water Protection' under the MRS as shown in Figure 4. This zoning also currently applies to the surrounding land to the south, east and west, and is defined as 'Rural land over public groundwater areas, where land use is controlled to avoid contamination'.

As outlined in section 2.1.2, given the broader area is identified as 'Urban Expansion' and 'Industrial Investigation' under the South Metropolitan Sub-Regional Framework, the area is likely to be the subject of a future MRS Amendment to rezone the land for urban purposes.



2.1.3 State Planning Policies

2.1.3.1 State Planning Policy 2.3 – Jandakot Groundwater Protection

State Planning Policy 2.3 (SPP2.3) aims to protect the Jandakot Groundwater Protection Area from development and land uses that may have detrimental impact on the water resource. The Jandakot Groundwater Protection area provides a significant volume of high quality drinking and as such, land use planning within the groundwater protection zone must follow the requirements outlined throughout SPP2.3.

The subject site is zoned Rural – Water Protection and is classified as a P2 area under SPP2.3. The permissibility of land uses located within a P2 area is based on sufficiently meeting the objectives of risk minimisation. The policy outlines that low risk and intensity development consistent with the Resource zoning is generally supported.

Noting that the use classes of showroom, warehouse, nursery and masonry production have already been deemed appropriate in the context of SPP2.3, the further additional uses proposed are not considered to pose any greater threat to groundwater contamination than those already available.

2.1.3.2 State Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region

State Planning Policy 2.8 (SPP2.8) aims to provide a framework that will ensure bushland protection and management issues within the Perth Metropolitan Region are appropriately addressed and integrated with the surrounding land use planning.

The northeast portion of Lot 706 is identified as Bush Forever Site 388 and therefore is subject to the environmental guidelines and criteria defined within SPP2.8. The proposed additional uses outlined throughout this report are not proposed within the Bush Forever area and as such are not considered to impact the key environmental and biodiversity traits contained within the Bush Forever site.

2.1.3.3 State Planning Policy 3.7 – Planning in Bushfire Prone Areas

State Planning Policy 3.7 (SPP3.7) assists in reducing the risk of bushfire to property and infrastructure by encouraging a conservative approach to strategic land use planning and practices. A comprehensive bushfire management plan was prepared as component of the subdivision application and approval for the entire subject site, and this is included in **Appendix C**. Each development application within the precinct, where likely to be impacted by bushfire risk, will be reviewed and a BAL Contour plan will be prepared to demonstrate that risks are minimised in accordance with SPP3.7.

2.1.3.4 State Planning Policy 5.3 – Land Use Planning in the Vicinity of Jandakot Airport

State Planning Policy 5.3 (SPP5.3) applies to land in the vicinity of Jandakot Airport, which is, or may be affected in the future by aircraft noise associated with air traffic movement. The objectives of SPP5.3 are to protect encroachment of noise sensitive land uses within proximity to Jandakot airport and minimise the impact of airport operations on existing and future communities.

The vast majority of the site sits within the 25 ANEF contour, and as a result sensitive land uses (such as place of worship) are conditionally acceptable under SPP5.3 subject to site design and built form considerations.

2.1.3.5 State Planning Policy 4.2 – Activity Centres

State Planning Policy 4.2 - Activity Centres (SPP4.2) is intended to guide the preparation and assessment of planning instruments and approvals that relate to activity centres within the Perth Metropolitan Area. The policy seeks to ensure that (inter alia):

- The activity centre network meets different levels of community need and enables employment, housing, goods and services to be accessed efficiently and equitably by the community.

- New activity centres or the intensification of activity centres do not unreasonably undermine existing centres.

The subject site falls immediately adjacent to the Jandakot Airport Estate which is identified in SPP4.2 as a 'Specialised Activity Centre'.

SPP4.2 provides limited guidance on the progression of planning for specialised activity centres other than identification that a precinct structure plan should be prepared to guide future subdivision and development within these precincts. It also recognises, however, that Perth and Jandakot Airports are not subject to the Western Australian planning framework, and as such the preparation of precinct structure plans for these precincts is highly unlikely.

Instead the airport precincts are guided by the preparation of an Airport Masterplan under Part 5 of the *Airports Act 1996 (Commonwealth)*. The current Jandakot Airport Masterplan (2020) land use precinct plan is shown in Figure 5, and outlines the vision for the Airport Estate to be developed for aviation services and mixed business uses, inclusive of warehousing, manufacturing and office uses.

The development of the subject site is an outstanding opportunity to deliver an integrated commercial hub to provide goods and services to the significant workforce which visits the specialised activity centre on a daily basis, in addition the broader surrounding community.

The shared planning of the two estates is further strengthened by the South Metropolitan Peel Sub-Regional Planning Framework which specifies that the subject site is to be considered part of the Jandakot Airport Specialised Activity Centre, and that land uses within the subject site should be compatible with those across the Airport Estate. The spatial relationship is shown as an overlay to the Jandakot Airport Precinct Plan in **Figure 5**.

SPP4.2 notes that whilst precinct structure plans are the preferred mechanism to guide

subdivision and development within centres, in limited circumstances the WAPC may agree that a precinct structure plan is not required for an activity centre where:

- The local planning scheme already provides sufficient land which is appropriately zoned;
- There are sufficient built form controls in place to guide development; and
- The local planning scheme or strategy shows the location and boundaries of the relevant activity centre.

These conditions are further explored in **Table 2**, and provide a clear outline for why a precinct structure plan should not be required for the subject sites as part of the progression of this scheme amendment proposal.

SPP4.2 also outlines that where the expansion of activity centre uses is proposed, a Net Benefit Test is to be prepared to outline considerations and analysis with respect to:

- the supportable retail/commercial floorspace for an appropriate service population
- the implications for and optimal use of public and private infrastructure and services provided or planned in the locality
- the overall costs and benefits of the proposal to the community, considering the objectives, outcomes and measures of SPP 4.2.

In considering these provisions it is noted that a Net Benefit Test is not necessary as a component of this Scheme Amendment proposal as:

- The Scheme Amendment is not an 'Out of Centre' Development, as the precinct falls within the Jandakot Airport Specialised Activity Centre.
- The Scheme Amendment does not propose or facilitate a 'Major Development', as the extent of 'Category A' uses proposed only relates to 'Fast Food Restaurant' and the floorspace for these uses will not exceed the **Table I** threshold of 3,000m² NLA for a Specialised Activity Centre.

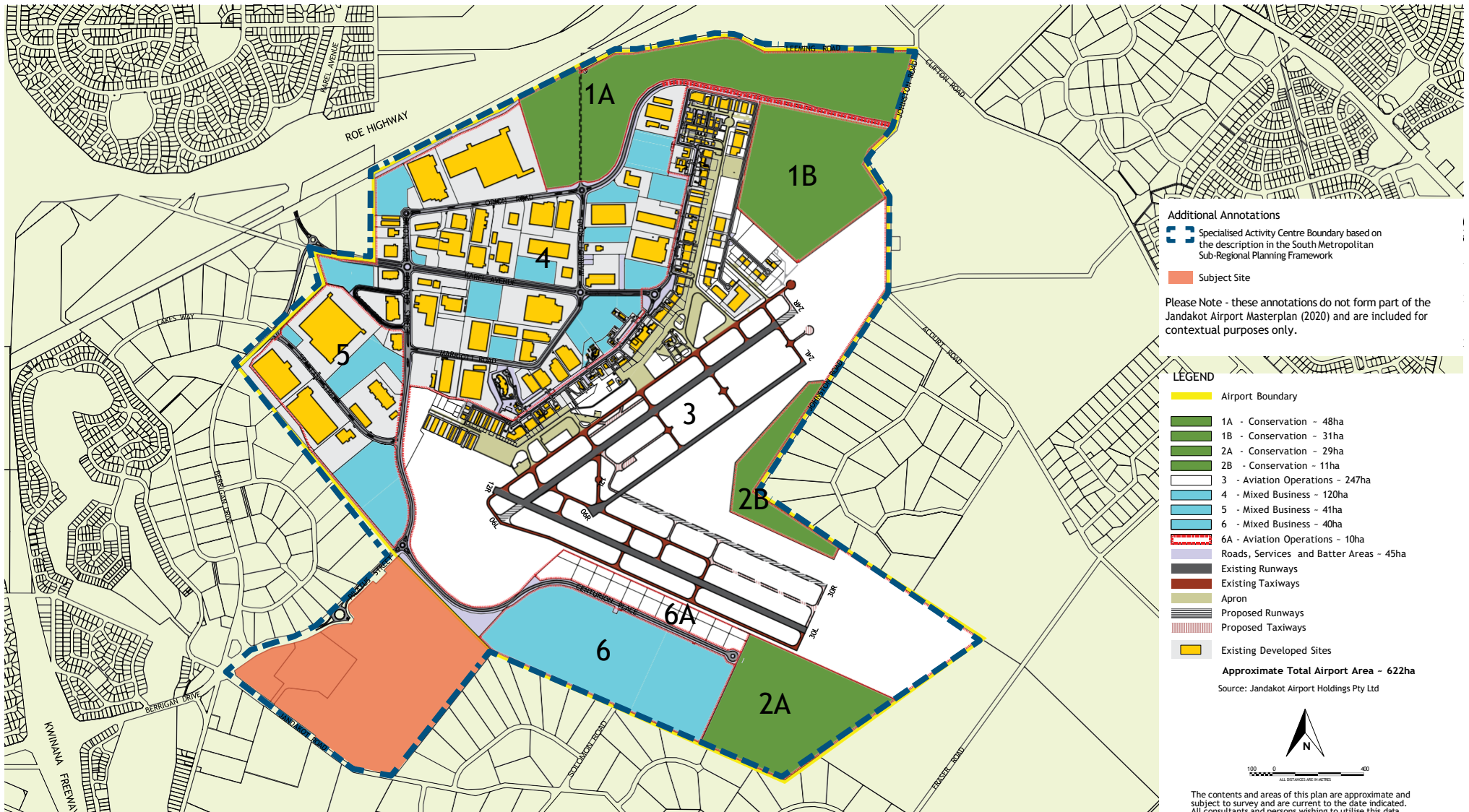


Figure 5: Jandakot Airport Masterplan (2020) - with additional annotations included as part of this proposal

Table 2: Precinct Structure Plan need assessment

SPP4.2 Precinct Structure Plan Consideration	Comment
The local planning scheme already provides sufficient land that is appropriately zoned.	<p>The City's Local Planning Scheme No. 3 already provides for the subject site to be subdivided and developed for commercial and logistics purposes through the additional uses available in Additional Use 1, including showrooms, warehouse, masonry production and nursery operations.</p> <p>The subject site is highly capable of accommodating other complementary land uses which are traditionally co-located with showroom and logistics operations, including convenience, commercial and light industrial uses.</p>
There are sufficient built form controls in place to guide development.	<p>Whilst the Scheme provisions do not specify built form controls for the subject site, they do require the preparation of a Local Development Plan to outline applicable built form and site design controls to ensure coordination of development outcomes across the site.</p> <p>A Local Development Plan has been prepared and endorsed for the subject site since the approval of the existing Additional Use provisions, but this will need to be revised should further additional uses become available. A Local Development Plan is considered to be the most appropriate planning instrument to guide development in the precinct given the estate is owned by a single landowner and will be progressively developed in accordance with an agreed Masterplan.</p>
The local planning scheme or strategy shows the location and boundaries of the relevant activity centre.	<p>The local planning scheme does not depict the boundary of the Jandakot Airport Specialised Activity Centre, but the City's draft Local Planning Strategy (2022) does identify the Jandakot Airport Estate as 'Activity Centre-Specialised'.</p> <p>It is further noted that the South Metropolitan Peel Sub-Regional Planning Framework specifically notes that the subject site, as part of its identification as an 'Industrial Investigation Area' should be considered as part of the Specialised Activity Centre.</p>

2.2 City of Cockburn Planning Framework

Local Planning Strategy (2024)

The City's Local Planning Strategy was adopted in October 2024.

The Strategy identifies the subject site as 'Planning Area C - Jandakot Industrial Investigation Area' as shown in **Figure 6**.

The considerations for this Planning Area are outlined in **Table 3**, with an assessment against each which demonstrates the consistency of this proposal with the planning direction identified.

Table 3: Assessment against Planning Area C Planning Direction as outlined in the draft City of Cockburn Local Planning Strategy

Planning Direction	Action	Rationale	Assessment Commentary
Investigate the appropriateness of providing a range of commercial and industrial uses on lots of a minimum of 2ha that do not have a negative impact on the groundwater mound, environmental values, and surrounding character and amenity.	Inclusion of a range of specifically tailored uses and conditions set in the local planning scheme through an 'Additional Use' or other appropriate mechanism, as shown in TPS3. To take advantage of the site's location near the Jandakot Specialised Activity Centre and respond to the historical land uses and planning framework. 0-5 years	To take advantage of the site's location near the Jandakot Specialised Activity Centre and respond to the historical land uses and planning framework.	The subject proposal actions the proposed investigation of a broader range of commercial and light industrial uses which are complementary to, and will have no impact upon the groundwater mound, environmental values, surrounding character or local amenity.
	Ensure the local planning scheme provides an appropriate framework to manage any potential negative impacts of commercial uses.	To ensure land uses do not negatively impact the groundwater mound, environmental values, and surrounding character and amenity.	
Protection of groundwater resource.	Local planning scheme and framework that appropriately controls the range of uses, including specific requirements and conditions for uses including (but not limited to) storage of materials.	To ensure land uses do not negatively impact the groundwater mound.	The further additional uses proposed will have no impact on the groundwater mound or sensitive environmental values of the local area.
	Advocate for a comprehensive study demonstrating protection of the groundwater resource; in addition to the groundwater impacts on the wetland systems and other environmental values.	Any land use changes have the potential to negatively impact environmental values.	
An interface that respects the character of the surrounding area.	Requirement for an appropriate vegetated buffer in the local planning scheme and framework.	To screen the land uses from the surrounding area to minimise their visual impact.	The requirement for vegetated buffers and land use controls already forms part of the Scheme provisions, and are being implemented through a Local Development Plan. This requirement is proposed to be maintained as part of this proposal.
	Land use planning controls that ensure built form and access does not detract from the character of the surrounding area.	To protect the intended character of the surrounding area.	
An appropriate interface with Bush Forever site 388.	Inclusion of appropriate interface requirements in the local planning scheme and framework.	To protect the environmental values of Bush Forever site 388.	The Bush Forever site is in the process of being ceded to the Crown, and nothing in this proposal will impact the interface with or environmental values of the Bush Forever site.
Appropriate protection of the operational needs and viability of the Jandakot Airport.	Ensure land use planning is cognisant of the operational needs of the airport to ensure its viability.	Protection of operational needs critical given the airport provides access for essential service organisations.	The proposed furthering of additional uses is complementary to the operations of Jandakot Airport, and will have no impact or limitation on these continued operations.

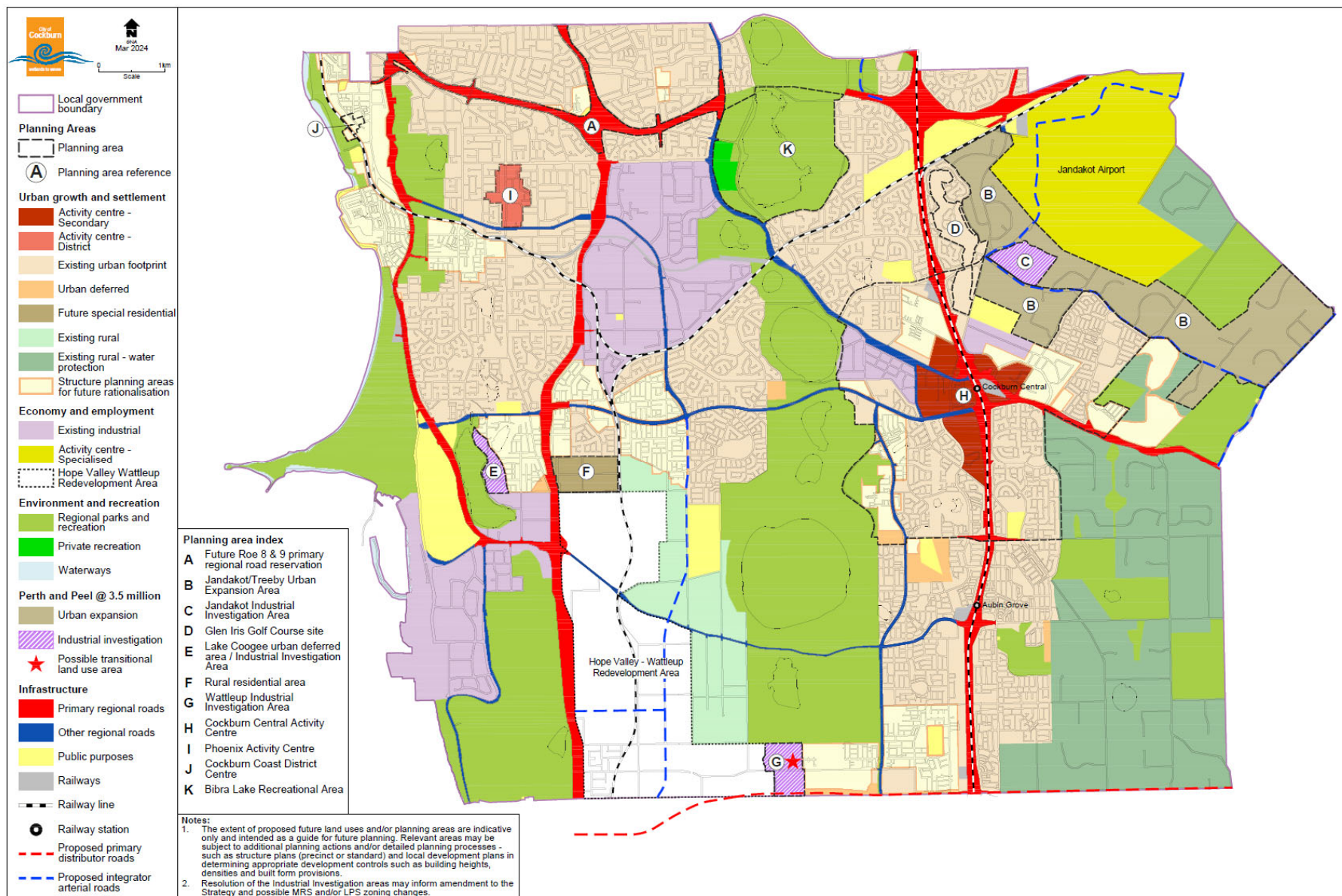


Figure 6 Local Planning Strategy Map

2.2.1 Local Planning Scheme No. 3

The subject site is zoned 'Resource' under the City of Cockburn's Local Planning Scheme No. 3 (LPS3) (**Figure 7**) which is intended to 'provide for the protection of the Perth Metropolitan underground water resource in accordance with the requirements of Statement of Planning Policy No. 6 published by the Western Australian Planning Commission on 12 June 1998.' The zone does not have a specified land use permissibility, with development to be considered against provisions outlined in clause 4.10.11.

It is anticipated that this zone, and the specific provisions associated, are likely to be rationalised as part of the new local planning scheme prepared by the City given the zone and provisions aren't likely to be consistent with the Model SchemeText.

In 2018 an amendment was approved and published in the Government Gazette which amended the Additional Use area to include the whole of Lots 701, 702 and 703 Jandakot Road (excluding road widening and Bush Forever Site 388C) and replaced the provisions outlining the permissibility of land uses and conditions applied thereto.






















The permitted uses outlined in LPS3 include:

- Nursery;
- Masonry Production;
- Warehouse, Showroom and Storage where the display, selling, hiring or storage of goods, equipment, plant or materials and the incidental site activities do not pose risk of pollution to the below ground public drinking water source.














The provisions of AU1 are outlined further in **Appendix A**, inclusive of the proposed amendments which are the subject of this proposal.

LEGEND
















REGION SCHEME RESERVES (MRS)

	Civic and Cultural		Public Purposes
	Other Regional Roads		Public Purposes - Car Park
	Parks and Recreation		Public Purposes - Commonwealth Government
	Parks and Recreation - restricted		Public Purposes - High School
	Port Installations		Public Purposes - Hospital
	Primary Regional Roads		Public Purposes - Prison
	Railways		Public Purposes - Special Uses
	State Forests		Public Purposes - State Energy Commission
	Waterways		Public Purposes - Technical School
	Water Catchments		Public Purposes - University
			Public Purposes - Water Authority of WA
















LOCAL SCHEME RESERVES

	Lakes and Drainage		Public Purposes : Oil Pipeline
	Local Road		Public Purposes : Pre-School
	Parks and Recreation		Public Purposes : Primary School
	Public Purposes : Civic		Public Purposes : Water Corporation
	Public Purposes : Dept of Agriculture		Public Purposes : Western Power
	Public Purposes : Fire Station		Public Purposes : Telstra
	Public Purposes : Gas Pipeline		

LOCAL SCHEME ZONES

	Development		Regional Centre
	District Centre		Residential
	Industry		Resource
	Lakes and Drainage		Rural
	Light and Service Industry		Rural Living
	Local Centre		Special Use
	Mixed Business		Strategic Industry
	Mixed Use		

OTHER CATEGORIES

(see scheme text for additional information)		Subject Site
	Scheme Area Boundary	
	Local Government Boundary	
	R20 R Codes	
	A1 Additional Uses	
	R1 Restricted Uses	
	SU1 Special Use Area	
	Peel-Harvey Coastal Plain Catchment Area	
	Building Envelope	
	DA1 Development Area	
	Development Contribution Area	
	JA Jandakot Airport	
	Heritage Place	
	No Zone	
	Waterbodies	

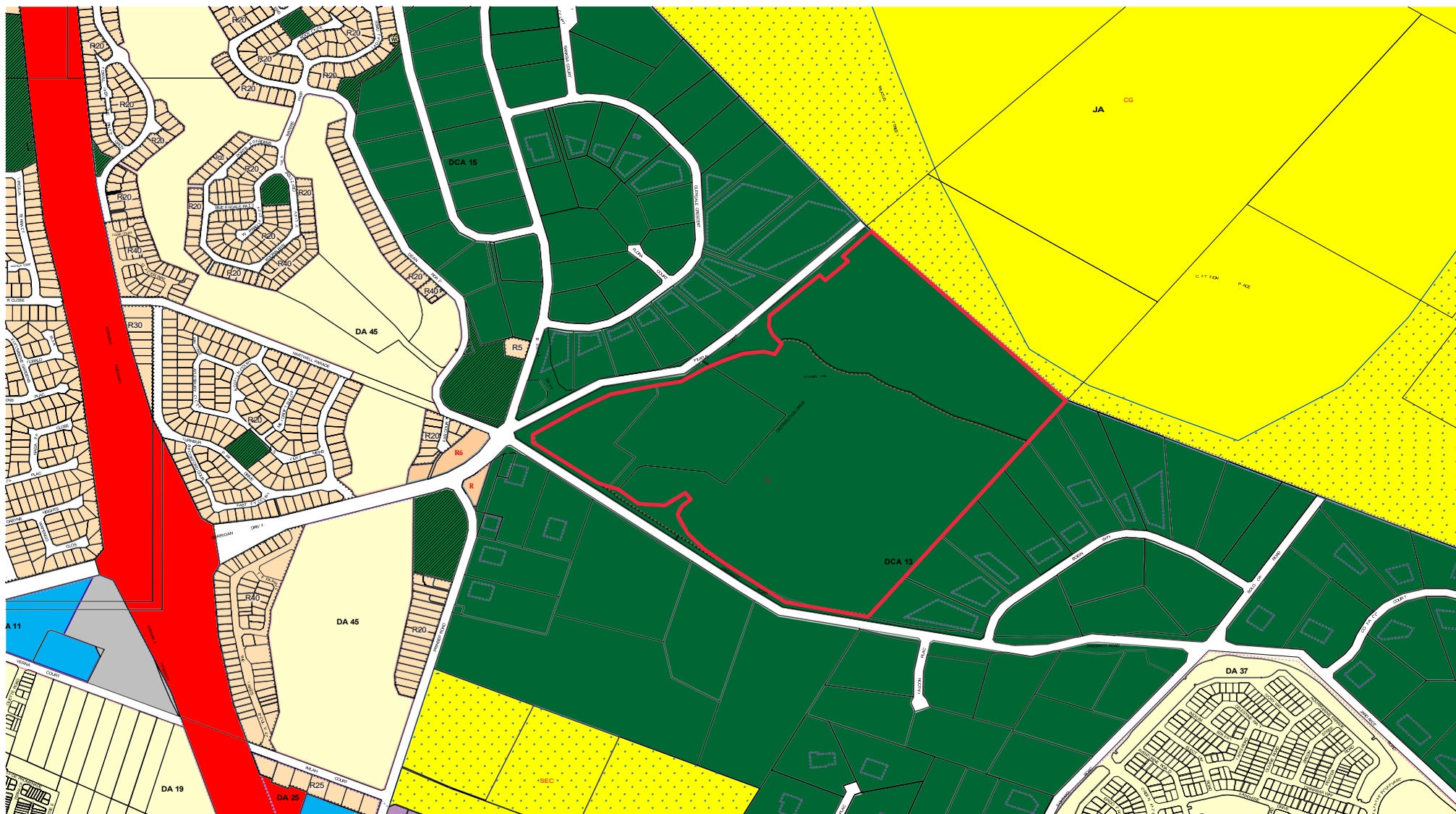


Figure 7: City of Cockburn Local Planning Scheme No. 3

3.0 Site Context

3.1 Existing Approvals

There are a number of existing approvals across the subject site which are relevant in considering the Scheme amendment proposal. These are summarised as follows:

3.1.1 Subdivision Approval (WAPC I60955)

The subject sites were approved for subdivision on 3 September 2021 to create 11 lots serviced by a new road network connecting the new lots to Jandakot Road and Pilatus Street. The subdivision also provided for the ceding of land for road widening, new road connections, drainage reservations and the declared 'Bush Forever' site, as outlined in **Appendix B**.

The approved Plan of Subdivision was modified in July 2022 to reduce the total number of developable lots from 11 lots to 5 larger lots, with no significant modification to the road network proposed to service these lots. This modification also removed the originally proposed battleaxe leg to the southernmost drainage basin, as access can be gained via Jandakot Road frontage, with secondary access via easement across adjacent lots. The approved revised Plan of Subdivision is shown as **Figure 9**.

The subdivision is currently being implemented, with works anticipated to be complete during the last quarter of 2024, and a deposited plan set to be lodged shortly thereafter. It should be noted that further minor variations are anticipated as part of the finalisation of the Deposited Plan prior to creation of titles.

3.1.2 Local Development Plan

As a condition of the existing AU1 provisions the landowner is required to prepare and seek approval for a Local Development Plan (LDP) which outlines key planning controls and considerations to guide assessment of development applications. The proponent prepared the required Local Development Plan and this was approved by the City of Cockburn in 2020. A further amendment to this LDP was sought to align the development provisions with the final approved subdivision design, and this Amended LDP was approved in 2023. A copy is provided as **Appendix C**.

The approved LDP provides comprehensive guidance on key development controls and considerations to ensure that the Estate is developed in accordance with best practice standards and impacts on the local environment and surrounding amenity are ameliorated insofar as possible.

3.1.3 Development Approval - Proposed Lot 811 Warehouse (DA22/0933)

Lot 706 was the subject of a development application for 'Warehouse and Incidental Office' in December 2022. The development, pictured in **Figure 8**, was approved by the City in February 2023 and is intended to be developed across the proposed Lot 811 as per **Figure 8**. The development will consist of two main buildings accommodating the five warehouse tenancies, with frontage to the new internal road being delivered as part of the subdivision.

The proponent is currently liaising with key tenants for the warehouse development, and it is anticipated that works will commence during the first quarter of 2025.



Figure 8: Development Perspective - Proposed Lot 811 Warehouse



LEGEND

TOTAL APPLICATION AREA (53.0531ha)

Modified Plan of Subdivision (WAPC Ref: 160955)
 (Revised Plan of Subdivision)
 LOTS 704, 705 and 706 (DP417614) JANDAKOT ROAD, JANDAKOT

plan: 22/016/003
 date: 15/07/2022
 scale: 1:4000@A3 | 1:2000@A1
 grid: PCG 94
 aerial: N/A

designed: JR
 checked: MB
 drawn: BR

Taylor Burrell Barnett Town Planning & Design
 Level 7, 160 St Georges Terrace, Perth WA 6000
 e: admin@tbbplanning.com.au
 p: (08) 9226 4276



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3.1.4 Masonry Production (Urban Stone)

Lot 705 (future Lot 808) Jandakot Road currently operates as a masonry production facility producing cement blocks and paving stones primarily for use in commercial and residential development throughout Western Australia. The site consists of the production facility and storage of finished products, in addition to incidental administrative offices and showroom facilities. The operation of Urban Stone is not proposed to be modified as a result of the proposed Scheme amendment, as the existing approved operation is intended to continue without further modification.

3.2 Environmental Considerations

3.2.1 Topography

The natural topographic contours for the subject site have been significantly altered as a result of the sand extraction occurring over the past 30 years.

The site falls to approximately 26m AHD upon the intersection of Jandakot Road and Berrigan Drive and has a notable rise to 42m AHD at the eastern boundary of the site.

3.2.2 Flora and Fauna

The subject site has been cleared and earthworked over several years of resource extraction, and more recently in accordance with the works to implement the approved Plan of Subdivision. The area subject of the Additional Use contains no native vegetation or features of environmental significance.

The remaining area of higher value remnant vegetation is identified as 'Bush Forever' and is required to be ceded to the Crown in accordance with the subdivision approval.

3.2.3 Groundwater

PGV Environmental undertook an Environmental Assessment which supported the approved TPS3 Amendment 112 over the subject site.

This assessment identified that there are very few impediments caused to groundwater as a result of expanding the permitted land uses of Masonry Production, Nursery, Warehouse, Showroom and Storage over additional landholdings, and is included as **Appendix D**.

It is considered that the intended land uses that form part of this amendment are appropriate in comparison to the existing permitted uses in AU1 and will not result in the intensification of hazardous land uses that may impact the Jandakot Groundwater Protection area.

3.3 Bushfire Management

The site is designated as a 'bushfire prone area' in the state Map of Bush Fire Prone Areas, and accordingly bushfire hazards are required to be considered in accordance with SPP 3.7.

A comprehensive Bushfire Management Plan was prepared as component of the subdivision application and approval for the entire subject site, and this is included in **Appendix E**.

Each development application within the precinct, where likely to be impacted by bushfire risk, will be reviewed and a BAL Contour plan will be prepared to demonstrate that risks are minimised in accordance with SPP3.7.

3.4 Movement and Access

Access to the site is currently available from the newly constructed Jandakot Road roundabout, with future access to be attained via the roundabout extension from Pilatus Street which transitions into Berrigan Drive further west.

The construction of the two roundabouts along key distributor transport routes provides essential access and egress to the site and is intended to support future commercial and logistics uses on site through the movement network of Restricted Access Vehicles (RAV) routes.

In support of progressing the Estate Masterplan a comprehensive Transport Impact Assessment has been prepared and included as **Appendix F** which:

- Assesses the internal transport network accessibility, circulation and safety for all modes of transportation; and
- Evaluates the level of transport integration between the Estate and surrounding land uses, and the impact of traffic generated on surrounding land uses and transport networks.

3.5 Drainage and Utility Infrastructure

Civil works are currently being undertaken throughout the estate consistent with the subdivision approval to provide the necessary drainage and utility infrastructure consistent with the requirements of the utility infrastructure providers and the City of Cockburn.

These works, inclusive of the delivery of drainage basins and the wastewater pump station, will be completed during 2024. The infrastructure being provided is to an urban standard, and there is more than sufficient capacity to accommodate the needs of these uses as development progresses. This has been demonstrated to the satisfaction of the City of Cockburn in accordance with the approved Urban Water Management Plan included as **Appendix G**.

4.0 Scheme Amendment

4.1 Amendment Proposal

This proposal seeks the City's support for the initiation of an amendment to *Local Planning Scheme No. 3* for the inclusion of further additional use classifications for the subject sites via modification to the 'Additional Use 1' (AU1) provisions of **Table 6** of the Scheme text. The full extent of modifications to the Scheme text are outlined in **Appendix A**, and there are no changes proposed to the Scheme maps resulting from the textual amendments.

The inclusion of these additional uses will provide tangible benefit to the local community and is justified for the following reasons:

1. The proposed uses are benign from an environmental perspective, and pose no greater risk to groundwater pollution than the existing additional uses of 'Showroom', 'Warehouse' or 'Masonry Production' available for the site. The existing conditions aligned to the additional uses provide for groundwater protection in any event, and will apply to the further uses outlined in this proposal.
2. Each of the proposed uses is complementary to the development of the estate as a service commercial precinct consisting primarily of warehouse and showroom developments. The proposed uses have been selected based on their potential to provide goods and services for visitors and employees of the estate, ensuring that they don't need to travel outside of the area for these needs, in addition to providing for the growing population of the surrounding local and regional area.

Minor modifications are also proposed to update the AU1 conditions, including:

- The inclusion of an objective statement to provide guidance on assessment of the additional uses in the context of the underlying 'Resource' zone.
- Updated lot description to reflect the new lots which will be created in accordance with WAPC 160955.
- Deletion of Condition 1(f) and Condition 6, as the land required for Jandakot Road upgrade has now been ceded and upgrades have been completed.
- Minor modifications to Condition 3 to reflect the potential for development beyond Warehouse, Showroom or Storage uses.

4.2 Estate Masterplan

In progressing the development of the subject site the proponent has engaged Meyer Shircore Architects to prepare a comprehensive Masterplan for the South Connect Estate which is outlined in **Figure 10**.

The masterplanning reflects the existing planning approvals attained for the estate, and outlines the vision moving forward for the remaining development sites, including:

- The ceding of the Bush Forever site and the embellishment of abutting recreational areas to provide additional amenity for employees and visitors to the estate.
- The creation of a well designed road network which accommodates safe and efficient access and egress to the estate for commercial and commuter vehicles.
- The ceding of land to accommodate areas required for stormwater drainage retention.
- The creation of a temporary wastewater pump station which will be located on proposed Lot 811 and subject to an easement in favour of the Water Corporation.
- The retention of the existing Urban Stone operation across proposed Lot 808.
- The facilitation of predominantly warehouse developments across proposed Lots 809 - 811, which may consist of multiple warehouse tenancies per development site.
- The development of commercial hub across proposed Lots 807 and 810, fronting Jandakot Road and sleeving the primary entry point to the estate.

The masterplan has been prepared as an initial draft to assist in project visioning only, and will be further iterated as development progresses and further engagement with the City and potential tenants evolves.



Figure 10: South Connect Estate Draft Masterplan

4.3 Additional Use Considerations

Each of the additional uses has been carefully considered in the context of the overall vision for the estate and the needs of the surrounding region. These considerations are further outlined in the following sections.

4.3.1 Convenience Uses

Given the accessibility of the estate, frontage to major roads and separation from existing and proposed residential areas, there are a range of convenience and service use classifications appropriate for inclusion within the Estate, and these are further outlined in **Table 4**.

Table 4: Convenience Uses proposed for inclusion Additional Use 1 (AU1)

Land Use	Scheme Definition	Proposed Permissibility	Commentary
Fast Food Outlet	means premises used for the preparation, sale and serving of food to customers in a form ready to be eaten without further preparation, primarily off the premises but does not include a lunch bar.	D	<p>Given the prime frontage to a major distributor road and the customer base both within the estate and within the surrounding catchment, the demand for fast food outlets is very strong and easily able to be accommodated within the precinct.</p> <p>This use is considered to be highly complementary to the other uses available in the estate, and subject to assessment of vehicle movements is not considered to pose any land use conflict potential.</p>
Lunch Bar	means premises or part of premises used for the sale of takeaway food (in a form ready to be consumed without further preparation) within industrial or commercial areas.	D	<p>The opportunity to accommodate a traditional 'lunch bar' within the estate is considered a logical extension of the existing commercial and industrial uses available within the precinct, and is not considered to have any potential for land use conflict given the use is specifically designed to be accommodated in industrial and commercial areas.</p>

4.3.2 Commercial and Light Industrial Uses

Based on existing and anticipated growth of the surrounding region there are substantial opportunities to provide further commercial and light industrial uses to provide goods and services to employees and residents within the regional area.

The proposed uses which are considered appropriate to include within Additional Use 1 are outlined further in **Table 5**.

Table 5: Commercial and Recreation uses proposed for inclusion Additional Use 1 (AU1)

Land Use	Scheme Definition	Proposed Permissibility	Commentary
Hardware Store	means land and buildings used for the storage, display and sale of building products, construction equipment and other similar items used primarily for domestic purposes.	D	The defined use of 'Hardware Store' is somewhat unique to LPS3, as a hardware store is more often classified as a showroom and warehouse development. Whilst it is considered that the existing permitted uses of 'Showroom' and 'Warehouse' could adequately accommodate a hardware store tenant within the estate if the opportunity arises, it is preferable that the defined use class be specified as permitted to avoid confusion or misinterpretation. This use is considered to be highly complementary to the other uses available in the estate, and is not considered to pose any land use conflict potential.
Health Studio	means land and buildings designed and equipped for physical exercise, recreation and sporting activities including outdoor recreation.	D	The opportunity to locate a private or public 'gym' facility within the estate will provide for employees and visitors looking to use these facilities as part of their visit to the estate, and provide this service for the broader catchment. A 24hr facility will also provide a level of nighttime activation of the estate which assists in safety and security, and will be complementary to the other land uses available throughout the precinct.

Land Use	Scheme Definition	Proposed Permissibility	Commentary
Industry - Light	means an industry - (a) in which the processes carried on, the machinery used, and the goods and commodities carried to and from the premises do not cause any injury to or adversely affect the amenity of the locality; (b) the establishment or conduct of which does not, or will not, impose an undue load on any existing or proposed service for the supply or provision of essential services	D	The accommodation of light industrial activities which are designed and demonstrated not to have an impact to the amenity of the locality, or risk to the local natural environment, should be capable of support within the precinct. These uses are considered complementary to the warehouse and showroom uses already available in the estate, and subject to demonstrating best practice stormwater and wastewater management, are not considered to pose any land use conflict potential.
Industry - Service	means - (a) an industry - light carried out from premises which may have a retail shop front and from which goods manufactured on the premises may be sold; or (b) premises having a retail shop front and used as a depot for receiving goods to be serviced.	D	

Land Use	Scheme Definition	Proposed Permissibility	Commentary
Motor Vehicle, Boat and Caravan Sales	means premises used to sell or hire motor vehicles, boats or caravans.	D	The location and scale of the subject site presents as a suitable opportunity to accommodate the motor vehicle, boat and caravan sales land use. The use is considered to be highly complementary to the warehouse, showroom and office uses and will provide a diversification to the employment market. Considering the nature of the land use, there will be no impact on the Jandakot Groundwater Protection (P2) area, and the land use is consistent with existing permitted uses.
Place of Worship	means premises used for religious activities such as a church, chapel, mosque, synagogue or temple.	D	<p>The opportunity for new places of worship to develop within the metropolitan area is challenging as they often need larger land areas to accommodate buildings and parking, and need to be close to residential catchments without necessarily being within a residential area.</p> <p>The South Connect estate forms an opportunity to accommodate a Place of Worship on a suitably sized site in close proximity to existing and future residential areas, which will not present a land use conflict with other uses available in the precinct.</p>
Recreation - Private	means premises used for indoor or outdoor leisure, recreation or sport which are not usually open to the public without charge.	D	The accommodation of indoor leisure and recreation facilities in commercial and industrial areas is increasingly common, as these facilities often require large format enclosed areas with good access to parking. These uses are considered complementary to the warehouse and showroom uses already available in the estate, and subject to consideration of provision of sufficient parking to accommodate patrons, are not considered to pose any land use conflict potential.

Land Use	Scheme Definition	Proposed Permissibility	Commentary
Storage Yard	means premises use for the storage of goods, equipment, plant or materials.	D	<p>It should be noted that the use of 'Storage' is already capable of approval under LPS3, but is not defined within the Scheme. It is proposed that this is replaced with the defined use of 'Storage Yard'.</p> <p>Storage yards are land uses that are typically acceptable within industrial areas due to its complementary nature. The accommodation of this use within the estate would be suitable within the broader estate and not along prime road frontage locations. The land use is not considered to pose any land use conflict potential and will have no impact on the below ground public drinking water source.</p>
Trade Display	means premises used for the display of trade goods and equipment for the purpose of advertisement.	D	The use of trade display is a logical extension of existing uses which are capable of approval within the Estate, and would most often be incidental to a predominant use of 'Showroom' or 'Warehouse'. Inclusion of this use will not result in any potential for land use conflict, and does not pose any risk to pollution of the public drinking water source.
Veterinary Services	means premises used to diagnose animal diseases or disorders, to surgically or medically treat animals, or for the prevention of animal diseases or disorders and includes the accommodation of sick animals.	D	<p>Veterinary services are often sought to be located within commercial and industrial precincts due largely to their need for separation from noise sensitive premises.</p> <p>Again, the estate is well positioned to accommodate these uses, as they are complementary to other commercial and industrial uses available within the estate, and will not pose any land use conflict or impact on surrounding properties.</p>

5.0 Conclusion

The successful progression of the South Connect estate over the past five years has been the result of visionary leadership of the City of Cockburn and the hard work and coordination of the landowner working in conjunction with government agencies and other stakeholders.

The further review and expansion of land use permissibility for the estate is a logical response to the progression of planning for the broader region, and a recognition of the strategic location of the site and the opportunities to deliver a more expansive array of commercial and service offering to employees, visitors and residents to the area.

The further support of the City of Cockburn for initiation of this amendment will ensure that these uses can be further interrogated, and ultimately facilitated in a well planned and coordinated manner.

Planning and Development Act 2005

City of Cockburn Town Planning Scheme No.3 Amendment No. 179

RESOLVED that the Council, in pursuance of Section 75 of the *Planning and Development Act 2005*, amend the City of Cockburn Town Planning Scheme No.3 by:

2. Modifying Additional Use 1 to:

F. Update the description of land (column 2) to Lots 807, 808, 809, 810 and 811 Jandakot Road, Jandakot.

G. Insert (D) after all Additional Uses (column 3).

H. Include the following Additional Uses (column 3):

- *Fast Food Outlet (D)*
- *Hardware Store (D)*
- *Health Studio (D)*
- *Industry – Light (D)*
- *Industry – Service (D)*
- *Lunch Bar (D)*
- *Motor Vehicle, Boat and Caravan Sales (D)*
- *Place of Worship (D)*
- *Recreation-Private (D)*
- *Trade Display (D)*
- *Veterinary Services (D)*

I. Modifying the conditions (column 4) of AU1 as follows:

- i. Delete conditions 1(f) and 6.
- ii. Modify condition 2 to replace reference to Lot 702 with Lot 808.
- iii. Modify condition 3 to state:

“Any new development proposed must be connected to reticulated sewer.”

iv. Inclusion of a new condition (1) stating:

“All development shall comply with the following objective: To accommodate light industrial and a limited range of commercial activities which require good vehicular access and/or large sites; which do not negatively impact existing or planned Activity Centres; and which are compatible with the Jandakot Groundwater mound and environmental values of the area.”

v. Inclusion of a new condition (9) stating:

"Within AU1 all 'fast food outlet' land uses shall have a maximum aggregate Gross Floor Area (GFA) of 1200m²."

vi. *Renumber the conditions.*

vii. *Correct spelling/typological errors.*

E. Modify all references to 'Storage' with 'Storage yard'.

The Amendment is 'standard' under the provisions of the *Planning and Development (Local Planning Schemes) Regulations 2015* for the following reason(s):

It is an amendment to the local planning scheme that:

- It is an amendment that does not result in any significant environmental, social, economic or governance impacts on land in the scheme area; and
- would not constitute a complex or basic amendment as defined in Part 5 Division 1 Regulation 34.

ADOPTION

Adopted by resolution of the Council of the City of Cockburn at the Meeting of the Council held on 11th day of March 2025



MAYOR



CHIEF EXECUTIVE OFFICER

FINAL APPROVAL

Adopted for final approval by resolution of the City of Cockburn at the Meeting of the Council held on the _____ day of _____, and the Common Seal of the City of Cockburn was hereunto affixed by the authority of a resolution of the Council in the presence of:

(Seal)

Recommended/Submitted for Final Approval

Final Approval Granted

MAYOR

CHIEF EXECUTIVE OFFICER

DELEGATED UNDER S.16 OF
THE P&D ACT 2005

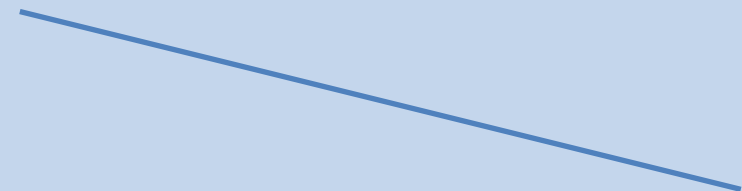
DATE _____

MINISTER FOR PLANNING

DATE _____

Appendix A

Scheme Text Amendment Proposal



Appendix 1 – Amendments to Additional Use 1

The existing Additional Use 1 (AU1) provisions are outlined in black in the table below, with the proposed amendments included as **red** text.

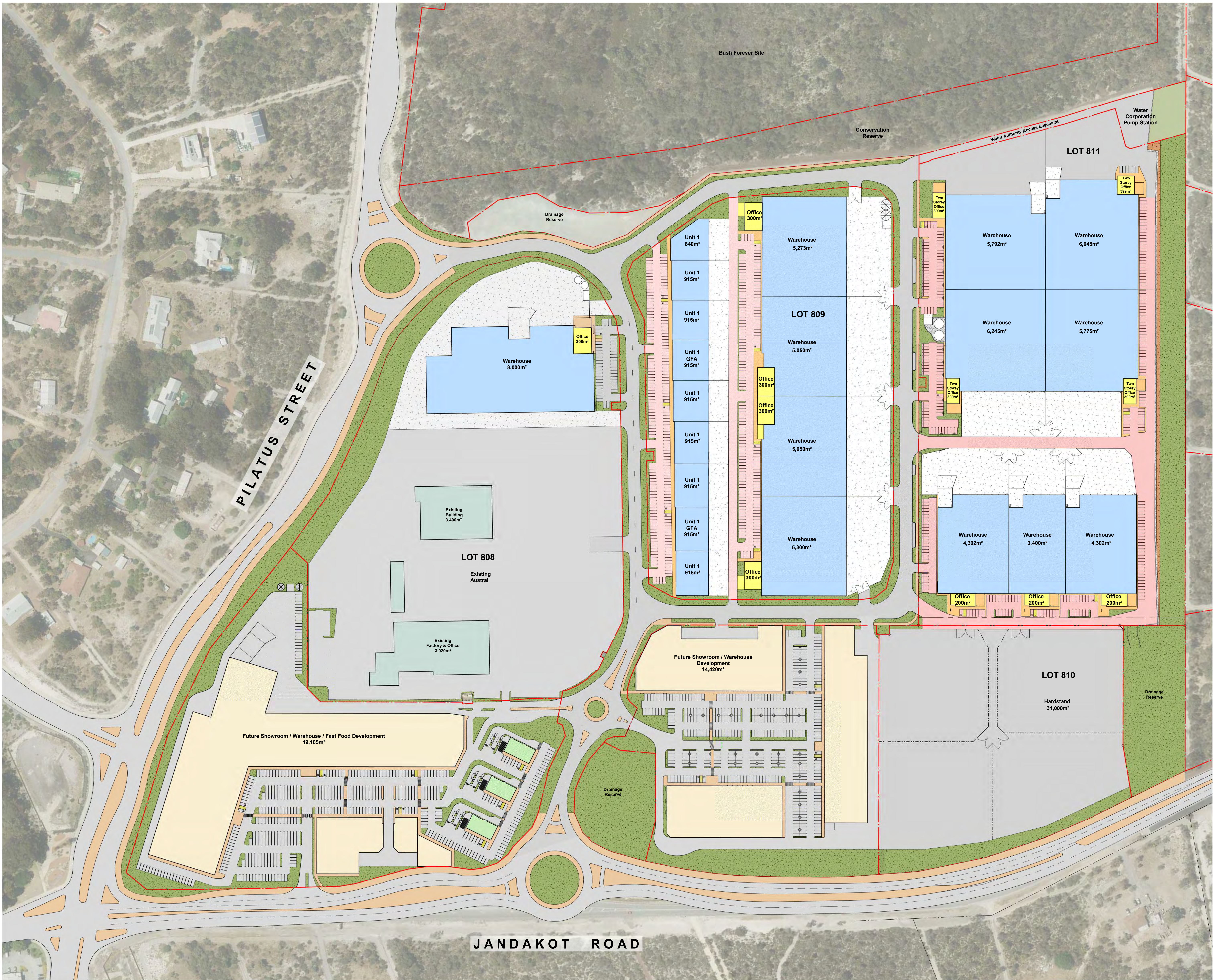
No.	Description of Land	Additional Use	Conditions
AU 1	<p>Lots 807, 808, 809, 810 and 811 Jandakot Road, Jandakot Lots 701, 702 and 703 (excluding Bush Forever Area 388C) Jandakot Road, Jandakot. (Formerly Lots 101, 103 and 104 Jandakot Road, Jandakot)</p> <p><i>Please note – we have suggested a change here to reflect the intended creation of Lots 807-811 in accordance with WAPC 160955, as the new lots will be created prior to the finalisation of the Scheme Amendment.</i></p>	<ul style="list-style-type: none"> Nursery (D) Masonry Production (D) Warehouse, Showroom and Storage Yard where the display, selling, hiring or storage of goods, equipment, plant or materials and the incidental site activities do not pose risk of pollution to the below ground public drinking water source (D) Fast Food Outlet (D) Hardware Store (D) Health Studio (D) Industry – Light (D) Industry – Service (D) Lunch Bar (D) Motor Vehicle, Boat and Caravan Sales (D) Place of Worship (D) Recreation-Private (D) Trade Display (D) Veterinary Services (D) 	<ol style="list-style-type: none"> All development shall comply with the following objective: <i>To accommodate light industrial and a limited range of commercial activities which require good vehicular access and/or large sites; which do not negatively impact existing or planned Activity Centres; and which are compatible with the Jandakot Groundwater mound and environmental values of the area</i> All development is to have due regard to a Local Development Plan prepared for the Additional Use No. 1 area. The Local Development Plan is to address the following: <ol style="list-style-type: none"> The standards to be applied for physical development in order to ensure the protection of the below ground public drinking water source; Building design, and vehicle access and egress arrangements to minimise the amenity impact to surrounding properties; Noise mitigation measures pursuant to the details of an acoustic report where required; Interface controls and/or measures with regard to Bush Forever Area 388, including, but not limited to; a hard road edge within the AU1 area abutting the Bush Forever area and/or bushland identified for protection; Bushfire mitigation measures being provided outside the Bush Forever area within the AU1 area; an appropriate wetland buffer, if considered relevant by the assessing authority, and; drainage to be contained within the AU1 area; Identify revegetation areas to be used as a buffer between adjoining environmental and rural living land uses; and Identify land on Lot 703 required for the upgrade of Jandakot Road, which may form part of Additional Use No. 1 area. No bulk storage of green-waste, compost or Toxic or Hazardous Substances (THS) are permitted above 25 litres in total volume, excluding fuel within vehicle fuel tanks. THS includes pesticides, herbicides, fuel (storage), explosives, flammable liquids, cleaners, alcohol, fertilisers (other than on Lot 702 808

			<p>under current development approvals), medical or veterinary chemicals, pool chemicals and corrosive substances; inclusive of the substances listed in the Poisons Act 1964 (Appendix B). These substances may only be stored in volumes above 25 Litres if contained within domestic sized packages ready for end use in domestic situations.</p> <p>4. Any new development proposed of any Warehouse, Showroom, or Storage land use must be connected to reticulated sewer.</p> <p>5. Any applications for the development of any Warehouse, Showroom or Storage Yard land use is subject to the preparation, implementation and update the following documents to the satisfaction of the local government:</p> <ul style="list-style-type: none"> a) Site Chemical Risk Assessment report; b) Dust Management Plan; and c) Acoustic report. <p>6. No below ground storage is permitted.</p> <p>7. As part of any future application for subdivision and/or development, land identified for the upgrade of Jandakot Road is to be ceded free of cost and constructed by the Applicant as follows:</p> <ul style="list-style-type: none"> a) The amount of land to be ceded from the Additional Use No. 1 area is to form a single carriage way as depicted on an approved Local Development Plan; and b) The Applicant is required to construct the ceded land as one additional carriage way to Jandakot Road. <p>7. As part of the first application for subdivision and/or development, the Applicant shall cede land within the Bush Forever Site free of cost to the Crown.</p> <p>8. Notwithstanding any subdivision provisions in the Scheme, the minimum lot size for subdivision is 2 hectares.</p>
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Appendix B

Subdivision Approval



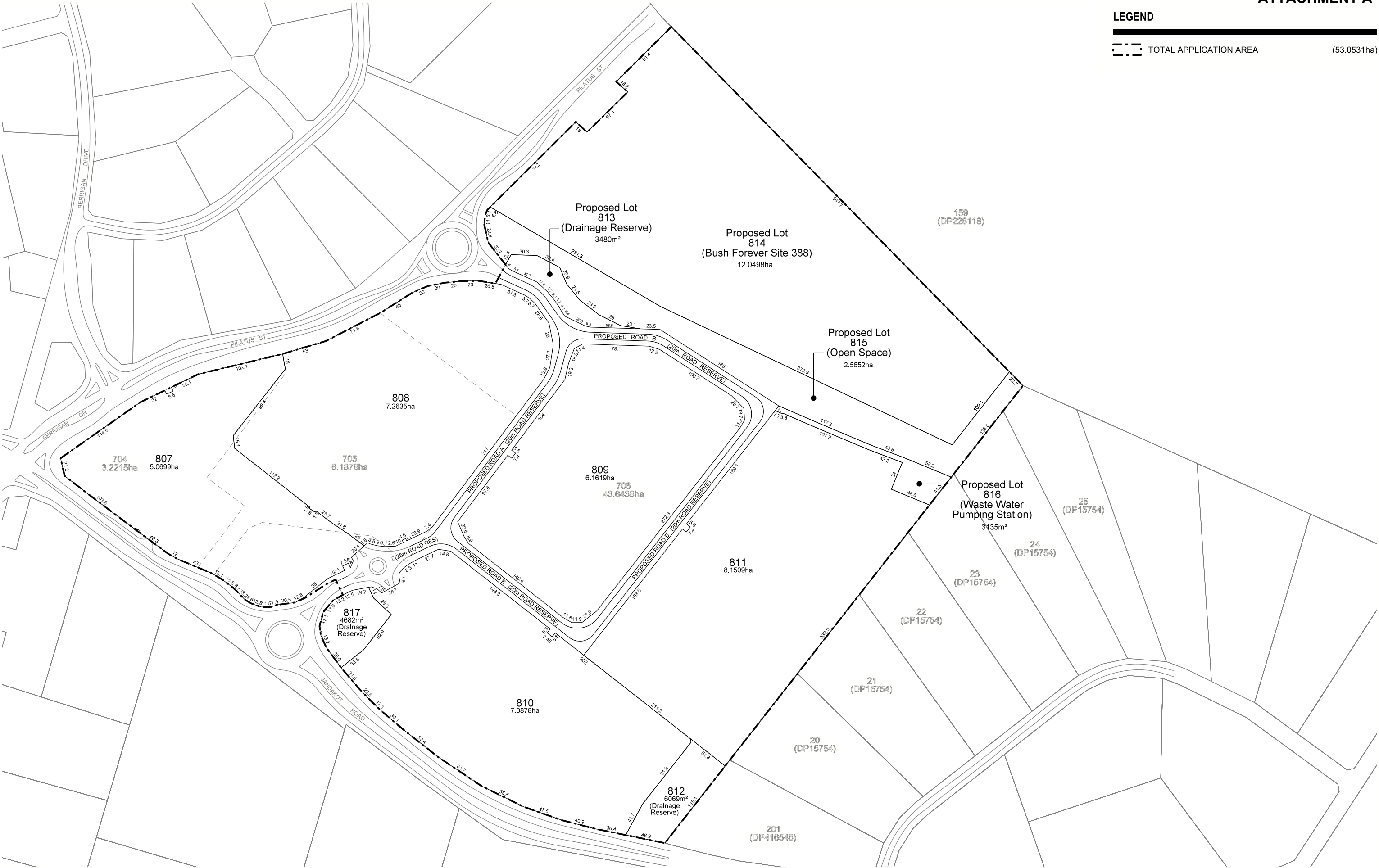
MASTER SITE PLAN
SCALE: 1 : 1200



LEGEND

TOTAL APPLICATION AREA

(53.0531ha)



Modified Plan of Subdivision (WAPC Ref: 160955)
(Revised Plan of Subdivision)
LOTS 704, 705 and 706 (DP417614) JANDAKOT ROAD, JANDAKOT

plan:
22/016/003

scale:
1:4000@A3 | 1:2000@A1

0 20 40 60 80m

date:
15/07/2022

grid:
PCG 94

aerial:
N/A

designed:
JR

checked:
MB

drawn:
BR

Taylor Burrell Barnett Town Planning & Design
Level 7, 160 St Georges Terrace, Perth WA 6000
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Taylor
Burrell
Barnett

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Appendix C

Approved Local Development Plan for South Connect Estate



Reference Number: LDP23/02 - 6035866

08 March 2023

Taylor Burrell Barnett
Level 7/160 St Georges Terrace
PERTH WA 6000

**Local Development Plan - Amended Local Development Plan (LDP 19/27)
South Connect Estate, Jandakot
7 Jandakot Road JANDAKOT WA 6164**

The Local Development Plan (LDP) received 07/02/2023 has been approved in accordance with Clause 52 of the Planning and Development (Local Planning Schemes) Regulations 2015.

Please ensure all prospective purchasers of the lots subject to the LDP are made aware of the approval.

You are reminded that in accordance with Clause 57 of the Regulations, the approval has effect for a period of 10 years from the date of this approval.

A signed copy of the document is attached for your records. In the event you have any questions, please contact the undersigned.

Should you require further information, please contact the City's Statutory Planning Department on 9411 3444.

Sincerely,

A handwritten signature in black ink, appearing to read 'Riley Brown', is positioned above the printed name and title.

Riley Brown
ACTING COORDINATOR - STATUTORY PLANNING

9 Coleville Crescent, Spearwood WA 6163, PO Box 1215, Bibra Lake DC WA 6965
T: 08 9411 3444 E: customer@cockburn.wa.gov.au
W: cockburn.wa.gov.au ABN 27 471 341 209

Local Development Plan Provisions

1. Implementation

- 1.1. The provisions of this adopted Local Development Plan (LDP) are applicable to the lots identified on the plan and are to provide guidance in the assessment and approval of development applications for these lots, in accordance with the provisions of the City of Cockburn *Local Planning Scheme No. 3* (LPS3), Table 6 – Additional Use AU1.
- 1.2. All other development standards and requirements of this LPS are otherwise applicable, and where discretion is applied, the provisions of this LDP are to be taken into consideration.
- 1.3. Variations to the provisions of this LDP can be considered and approved by the determining authority subject to justification outlined within a development application.
- 1.4. It is recommended that landowners undertake consultation with Jandakot Airport with regards to Jandakot Restricted Light Zone and Obstacle Limitation Surfaces, in the preparation of a development application, and have due regard to the endorsed Jandakot Airport Masterplan.

2. Development Design and Quality

- 2.1. Portions of a building which face all street frontages are to incorporate:
- Variation in colours and materials with a minimum of two different colours and/or two different materials to be used;
 - Where feasible and appropriate, horizontal and vertical articulation to assist in breaking up the building mass through the use of architectural features; and
 - Glazing to office and administration buildings to provide passive surveillance of the adjacent public realm.
- 2.2. Where relevant, building form shall use architectural features to establish visually distinct pedestrian access points. This includes the provision of legible pedestrian access points and distinctive entry doors and canopies to the street elevations.
- 2.3. All stormwater from roofs, clean paved areas and carpark areas is to be managed as recommended in the Stormwater Management Manual for Western Australia or relevant equivalent.
- 2.4. Any proposed outdoor lighting will be subject to the requirements of *Australian Standard AS 4282 – 2019 “Control of the Obtrusive Effects of Outdoor Lighting”* to ensure general compliance, and to control potential impact on civil aviation from Jandakot Airport.

3. Building Setbacks

- 3.1. The minimum building setback from the primary street frontage is 15.0m.
- 3.2. The minimum building setback from the secondary street frontage is 3.0m.
- 3.3. Reductions to the minimum primary and secondary street building setbacks may be considered where it can be demonstrated that the proposed setback is consistent with the existing streetscape or will not result in a detrimental impact to the streetscape.
- 3.4. The minimum building setback to any other lot boundary shall be in accordance with National Construction Code requirements.

4. Height Limitations

- 4.1. For all lots, any building / construction proposed shall not exceed the height limitation outlined within the ‘obstacle limitation surfaces’ for Jandakot Airport operations at the time of construction.
- 4.2. For lots 810 and 811, in addition to the Jandakot Airport OLS requirements, specific building height limitations are applicable to portions of these lots (as detailed in table below) to mitigate building impact on lots adjacent the south-eastern LDP boundary:

Lot	Maximum building height measured from finished floor level	Area applicable for maximum height limitation
810	16m	Within 50m of south-eastern LDP/lot boundary
	24m	Within 150m of south-eastern LDP/lot boundary
811	16m	Within 100m of south-eastern LDP/lot boundary
	24m	Within 200m of south-eastern LDP/lot boundary

5. Landscaping Standards

- 5.1. A minimum of 5% of the total lot area is to be landscaped in accordance with the Scheme standards, inclusive of any landscape buffers required to be provided and shall respond to the Bushfire Management Plan requirements for Asset Protection Zones.
- 5.2. All verges adjacent to a development site are to be landscaped and maintained in accordance with an approved landscape plan provided as a component of a development application.
- 5.3. Shade tree planting within the site and verge areas is to be in accordance with the Scheme or otherwise agreed with council as part of a development application.
- 5.4. A minimum of 1 shade tree per 10 car parking bays within dedicated car park areas shall apply to the primary street setback area only. Tree planting is not applicable to overflow car parking areas beyond the primary street setback area.

6. Parking and Access

- 6.1. Multiple crossovers to individual sites are permitted subject to demonstration that this is necessary for efficiency and safety of vehicle movements to and from the site, and that sufficient onsite and verge landscaping is provided as a component of the development.
- 6.2. The design of crossovers shall generally not be supported within areas annotated as ‘No Vehicle Access’ unless justified as a component of a development application.
- 6.3. Variations to parking standards under Local Planning Scheme No. 3 will be considered where justified via a development application and based on anticipated employee/visitor parking demand for the development.
- 6.4. On street car parking directly adjacent to the proposed development site may be included within the car parking provision as a component of a development application
- 6.5. Areas of dedicated car parking to accommodate staff and visitors are to consist of a sealed finish such as asphalt, paving material or concrete.
- 6.6. All vehicular access ways, service areas and parking areas shall be designed to enable vehicles to enter and leave in forward gear.

7. Boundary Fencing

- 7.1. Fencing located along the front lot boundary (Primary Street) is to be black powder coated Garrison or Palisade fencing to a maximum height of 1800mm.
- 7.2. Fencing to the front of the property shall be visually permeable to ensure passive surveillance opportunities.
- 7.3. Fencing located behind the building line is to:
- Be generally consistent with the front boundary fencing (black powder coated Garrison or Palisade fencing); or
 - Be designed to a minimum standard of 1800mm rail-less chain link or steel mesh incorporating black coloured PVC coating with black gates, posts and fittings; or
 - Be designed as a solid material fence where not visible from an adjoining street along internalised side and rear lot boundaries.
- 7.4. Barbed wire is generally permissible but must not be installed along a street boundary.

8. Interface with Rural Residential Development

- 8.1. Development of land parcels adjacent to the south-eastern LDP boundary have the potential to impact upon the amenity of the adjacent rural-residential land parcels, and at the discretion of the City in considering a proposed development, may require the following as a component of a development application:
- A noise management plan, prepared by a suitably qualified acoustic consultant, detailing the potential noise impact on adjacent noise sensitive uses and site design or management measures to minimise this impact;
 - A dust management plan, outlining the potential creation of dust as a component of construction or ongoing operation, and the management measures put in place to avoid nuisance to surrounding landowners; and/or
 - An odour management plan, outlining the potential creation of odour as a component of construction or ongoing operation, and the management measures put in place to avoid nuisance to surrounding landowners.
- 8.2. Where identified as necessary in a noise management plan under clause 8.1, a noise wall or earth/rock bund is to be installed between development and the south-eastern boundary at a minimum height of 1.8m, and:
- Where designed as an earth/rock bund, stabilised and landscaped as a component of the landscape buffer required at clause 8.4; or
 - Where designed as a noise wall, finished in a uniform colour or design complementary to the native flora and in-keeping with the eastern rural amenity.
- 8.3. All building facades towards the south-eastern LDP boundary are to be finished in similar colours and/or design complementary to the native flora and in keeping with the eastern rural amenity, to the satisfaction of the determining authority.
- 8.4. A minimum 20m wide landscape buffer is required to be planted and maintained for properties abutting the south-eastern LDP boundary in accordance with an approved landscape plan. The 20m buffer shall be inclusive of any required firebreak, and will traverse the drainage basin and wastewater pumping station reserves.
- 8.5. A minimum setback of 100m from the south-eastern LDP boundary applies for the use classes of ‘Masonry Production’ or ‘Nursery’, and these uses will not be approved within this setback area.
- 8.6. All proposed outdoor lighting located within 100m of the south-eastern LDP boundary shall be restricted to 0cd lighting.

9. Other Matters

- 9.1. A development application is to specify the intended operating hours and management measures associated with the operation, noting that as a commercial / industrial estate it is anticipated the majority of uses will operate 24 hours per day and 7 days per week.

Legend

- Extent of Local Development Plan
- Bush Forever Site 388
- Conservation Reserve
- Drainage Reserve
- Waste Water Pump Station
- No Vehicle Access
- Landscape Interface (minimum locations)
- Landscape Buffer (20m width)
- Restricted Use Buffer (100m width)
- Right of Carriageway easement in favour of the City of Cockburn for access to drainage basin (6m wide)
- Firebreak Access Locations



CITY OF COCKBURN

LOCAL DEVELOPMENT PLAN

Endorsement Table

This Local Development Plan has been approved.

Authorised Officer:

APPROVED

Date:

08 Mar 2023

File Ref: LDP23/02

Plan 1 of 1

Amended Local Development Plan
LOT 807 - 811 JANDAKOT ROAD, JANDAKOT

scale:
1:5000@A3 | 1:2500@A1

0 50 100m

plan:
22/016/001D

date:
24/01/2023

Taylor Burrell Barnett Town Planning & Design
Level 7, 160 St Georges Terrace, Perth WA 6000
e: admin@tbbplanning.com.au
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Appendix D

Environmental Assessment

LOTS 101,103 AND 104 JANDAKOT ROAD, JANDAKOT

ENVIRONMENTAL ASSESSMENT

Prepared for: Schaffer Corporation

Report Date: 26 August 2016

Version: 4

Report No. 2016-267



CONTENTS

Contents	i
List of Attachments	iii
1 INTRODUCTION	1
1.1 Background.....	1
1.2 Site Location	1
1.3 Scope of Works.....	1
2 EXISTING ENVIRONMENT	3
2.1 Land Use	3
2.1.1 Previous Land Use	3
2.1.2 Surrounding Land Use	4
2.2 Topography	4
2.3 Geomorphology and Soils	4
2.4 Hydrology	5
2.4.1 Groundwater	5
2.4.2 Surface Water and Wetlands	5
2.5 Flora.....	6
2.5.1 Flora Desktop Studies.....	6
2.5.2 Preliminary Flora List.....	9
2.5.3 Threatened or Priority Ecological Communities Database Searches	9
2.6 Vegetation	10
2.6.1 Vegetation Types.....	10
2.6.2 Vegetation Condition	13
2.6.3 Conservation Significant Vegetation	14
2.7 Fauna	14
2.7.1 Fauna Habitats.....	14
2.7.2 Habitat Condition	15
2.7.3 Fauna Database Searches.....	16
2.7.4 Likely Occurrence of Significant Species	17
3 ENVIRONMENTAL IMPACT ASSESSMENT	22
3.1 Previous Land Use	22
3.2 Topography	22
3.3 Geomorphology and Soils	22

3.4	Hydrology	22
3.5	Flora.....	22
3.6	Vegetation	23
3.7	Fauna	23
4	CONCLUSIONS AND SUMMARY.....	25
5	REFERENCES	26

LIST OF ATTACHMENTS

Tables

Table 1:	List of Flora Species Identified from Database Searches
Table 2:	Likelihood of Identified Significant Flora Species occurring on the Site
Table 3:	Vegetation Condition Rating Scale
Table 4:	Conservation Significant Fauna Species Possibly Occurring in the Region
Table 5:	Likelihood of Conservation Significant species being present on the site

Plates

Plate 1:	1981 – The site is fully vegetated
Plate 2:	1985 – The site has been cleared in the northern half
Plate 3:	2011 – The previously cleared eastern area has been replanted.
Plate 4:	Wetland Mapping on the site
Plate 5:	<i>Eucalyptus camaldulensis</i> planted east of the Urban Stone lay down area.
Plate 6:	Replanted vegetation
Plate 7:	Remnant <i>Banksia</i> Woodland in the Triangular Stand
Plate 8:	<i>Banksia</i> Woodland with <i>Eucalyptus tottiana</i>
Plate 9:	Buffer vegetation
Plate 10:	Replanted woodland/shrubland Habitat
Plate 11:	<i>Banksia</i> Woodland Habitat in Very Good Condition
Plate 12:	<i>Banksia</i> Woodland Habitat in Degraded Condition

Appendices

Appendix 1:	Proposed Rezoning Footprint
Appendix 2:	DPaW Flora Database Searches
Appendix 3:	Protected Matters Search Tool Report
Appendix 4:	Naturemap Report
Appendix 5:	Conservation Codes
Appendix 6:	Native species recorded on the site

Appendix 7: DPaW Fauna Database Search

1 INTRODUCTION

1.1 Background

PGV Environmental has been commissioned by the Schaffer Corporation to undertake an Environmental Assessment of Lots 101, 103 and 104 Jandakot Road, Jandakot that is under investigation for future development and requires rezoning (Appendix 1). Currently the site is zoned as 'Rural – Water Protection' under the Perth Metropolitan Region Scheme (MRS) and 'Resource' under the City of Cockburn Local Planning Scheme No. 3 (WAPC, 2002).

The site contains approximately 0.5ha of native vegetation located to the west of the existing Urban Stone facilities and adjacent to the unmade Lauanders Street road reserve. A triangular area, about 0.3ha in size, to the west and 25ha of revegetated sand quarry (Appendix 1).

Some of the adjoining native vegetation to the west of the lot has been approved for clearing to construct Lauanders Street. These works are anticipated to occur in 2016 and construction of firebreaks will be required in the Balance Lot.

1.2 Site Location

The site is located in Jandakot in the City of Cockburn approximately 14km south of the Perth Central Business District. The site is bounded by Jandakot Road and Special Rural lots the south, the Urban Stone factory site to the west, Bush Forever Site 388 'Jandakot Airport, Jandakot' to the north and Special Rural lots to the east.

The portion of Bush Forever Site 388 that occurs on Lots 101, 103 and 104 remains in the ownership of Schaffer Corporation but is not part of this Environmental Assessment.

1.3 Scope of Works

PGV Environmental was commissioned to undertake an Environmental Assessment of Lots 101, 103 and 104 Jandakot Road, Jandakot. The assessment includes information on the following environmental factors.

- Physical characteristics including a description of:
 - Landform of the site;
 - Drainage and water bodies;
 - Geological, hydrogeological and hydrological characteristics; and
 - Acid Sulphate Soil Risk Mapping.
- Recent and present land use including:
 - Surrounding land uses; and
 - Assessment of current and historical activities on the subject site and surrounding areas which have the potential to result in contamination issues at the site
- Flora and Vegetation including:

- A Level 1 Flora and Vegetation Survey undertaken in accordance with Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* and includes:
 - Desktop search and review of the Department of Parks and Wildlife’s (DPaW’s) Declared Rare and Priority Flora database and Threatened Ecological Communities database;
 - Examination of recent aerial photography and contour maps to provisionally identify vegetation types and condition;
 - A thorough site walkover, recording of any significant plant species using a hand-held GPS;
 - Description of vegetation types and vegetation condition; and
 - Compilation of a preliminary flora list.
- Fauna including:
 - A Level 1 fauna survey undertaken in accordance with Guidance Statement 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b) including:
 - The results from Declared Rare and Priority Fauna searches of the DPaW Databases;
 - Results from the Commonwealth Protected Matters Search Tool which will identify possible matters of Environmental Significance listed under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) that may occur on the sites;
 - A thorough site walkover to describe fauna habitats and condition on the site; and
 - An assessment of the likelihood of conservation significant fauna being present on the sites.

The impact of the proposed rezoning has been assessed in the context of impacts on the above factors.

2 EXISTING ENVIRONMENT

2.1 Land Use

2.1.1 Previous Land Use

According to historic aerial photography available on-line (Landgate, 2012a) the site remained fully vegetated until sometime after 1981 (Plate 1) (Landgate, 2012a). The 1985 aerial photograph (Plate 2) shows that the south-western part of the site was cleared as part of sand quarrying operations on the larger landholding. A buffer strip of native vegetation adjacent to Jandakot Road remained uncleared as is normal practice for sand quarries in the Perth Metropolitan Region. Plate 3 shows the revegetation in the previously cleared area establishing in 2011. The photo also shows small pockets of remnant native vegetation that are described later in the report.

Plate 1: 1981 – The site is fully vegetated



Plate 2: 1985 – The site has been cleared in the northern half

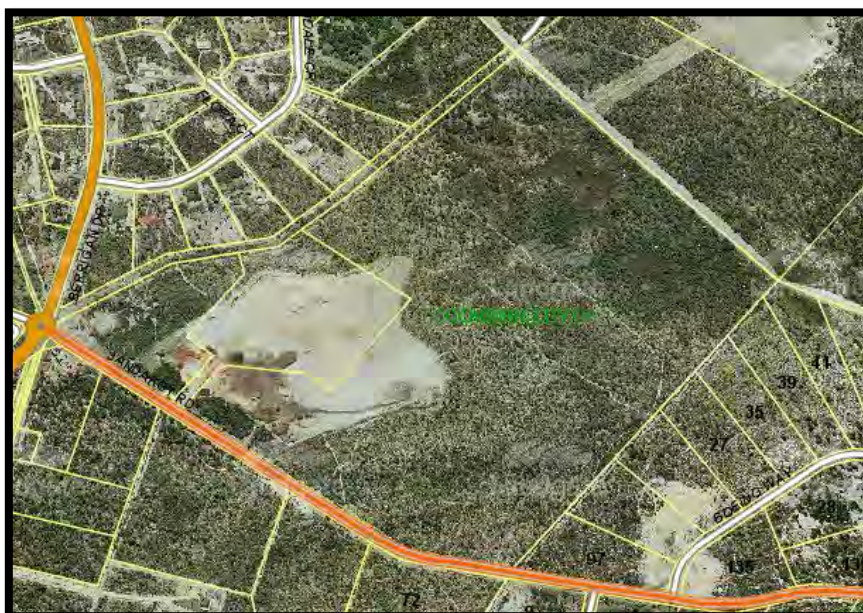


Plate 3: 2011 – The previously cleared eastern area has been replanted.



2.1.2 Surrounding Land Use

To the north of the site is Bush Forever Site 388 which abuts Jandakot Airport and to the east are existing 'Rural' lots. The current Urban Stone operations are located within the western part of the proposed rezoning area. On the western boundary is the unconstructed Launderers Street which has a Clearing Permit approval (CPS 4399/1) for the road reserve. To the south is Jandakot Road.

2.2 Topography

The site is flat to gently sloping with a few steeper areas of batter slopes between the area previously mined and the unmined areas. The western side of the site is approximately 8m higher than the low point in the centre of the site (Appendix 1). The elevation of the site varies between approximately 40-28m Australian Height Datum (AHD). Most of the site has been disturbed and there are some small piles of sand present.

2.3 Geomorphology and Soils

The geology of the area is described as basement rocks of the Leeuwin Complex which are granitic with an overlying weathering profile overlain by coastal limestone (DoW, 2012a). The soils on the site are part of the Bassendean Dune System and are very sandy, leached, infertile and mildly acidic.

The soils on the site has been described by the Department of Agriculture and Food Western Australia (DAFWA) as:

- Bassendean B1 Phase (212Bs_B1) which are described as deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2m. These soils occur on extremely low to very low relief dunes, undulating sandplain and discrete sand rises; and
- Bassendean B2 Phase (212Bs_B2) which are located on flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2m (DAFWA, 2016).

2.4 Hydrology

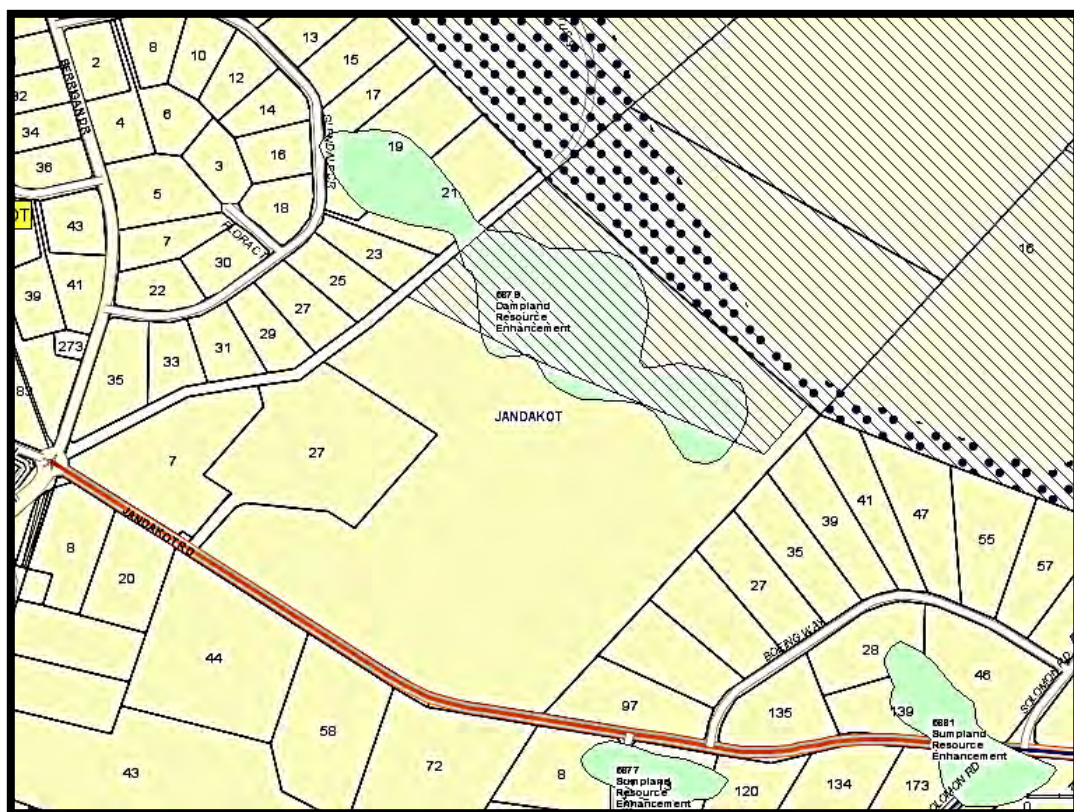
2.4.1 Groundwater

The Perth Groundwater Atlas shows the top of the groundwater table at 23 to 24m AHD which is approximately 3m to 11m below the ground surface. Groundwater is generally flowing to the west (DoW, 2012b).

2.4.2 Surface Water and Wetlands

There is a small portion of Resource Enhancement Wetland mapped on the site with the remainder in Bush Forever Site 388 on the northern boundary. There are no other wetlands on the site as mapped in the Geomorphic Wetlands of the Swan Coastal Plain Database (Landgate, 2016) (Plate 4).

Plate 4: Wetland Mapping on the site



A site inspection by PGV Environmental on 1 June 2016 showed the areas of wetland mapped within the site are part of the area mined as a sand quarry and do not have the wetland species or soil typical of wetlands. Therefore, it is PGV Environmental's assessment that the wetland boundary has not been accurately mapped on the site. The wetland does not appear to extend beyond the boundary of Bush Forever site 388. Accurate determination of the wetland boundary will be required as part of the rezoning process.

2.5 Flora

2.5.1 Flora Desktop Studies

A search of the DPaW Threatened Flora Database, the WA Herbarium database and the Declared Rare and Priority Flora Species List identified 3 Threatened and 18 Priority plant species that have been located in the vicinity of the site (Table 1 and Appendix 2). The three Threatened species under the *Wildlife Conservation Act 1950* are also listed as Endangered under the EPBC Act. Three additional Endangered species were identified by the EPBC Act Protected Matters Search Tool (Appendix 3) and the Naturemap database search (Appendix 4).

Table 1: List of Flora Species Identified from Database Searches.

Species	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Andersonia gracilis</i>	Slender Andersonia	Threatened	Endangered
<i>Caladenia huegelii</i>	Grand Spider Orchid	Threatened	Endangered
<i>Diuris purdiei</i>	Purdie's Donkey Orchid	Threatened	Endangered
<i>Drakaea elastica</i>	Glossy-leaved Hammer Orchid	Threatened	Endangered
<i>Drakaea micrantha</i>	Dwarf Hammer Orchid	Threatened	Endangered
<i>Lepidosperma rostratum</i>		Threatened	Endangered
<i>Thelymitra dedmaniarum</i>	Cinnamon Sun Orchid	Threatened	Endangered
<i>Dampiera triloba</i>		Priority 1	
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (GJ Keighery 5026)	Panjang	Priority 1	
<i>Amanita carneiphylla</i>	Pink-gilled Amanita (fungus)	Priority 2	
<i>Amanita griseibrunnea</i>	(fungus)	Priority 2	
<i>Thelymitra variegata</i>	Queen of Sheba	Priority 3	
<i>Amanita drummondii</i>	Drummond's Grisette	Priority 3	
<i>Amanita fibrilloses</i>		Priority 3	
<i>Amanita wadjukiorum</i>		Priority 3	
<i>Byblis gigantea</i>	Rainbow Plant	Priority 3	
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i>	Blue Devils	Priority 3	
<i>Jacksonia gracillima</i>		Priority 3	
<i>Stylidium paludicola</i>		Priority 3	
<i>Cyathochaeta teretifolia</i>		Priority 3	
<i>Phlebocarya pilosissima</i> subsp. <i>pilosissima</i>		Priority 3	
<i>Dodonaea hackettiana</i>	Hackett's Hopbush	Priority 4	
<i>Thysanotus glaucus</i>		Priority 4	
<i>Microtis quadrata</i>		Priority 4	
<i>Ornduffia submersa</i>		Priority 4	
<i>Grevillea thelemanniana</i> subsp. <i>thelemanniana</i>	Spider Net Grevillea	Priority 4	

Species	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Microtis quadrata</i>	South Coast Mignonette Orchid	Priority 4	
<i>Stylidium longitubum</i>	Jumping Jacks	Priority 4	
<i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234) (also listed as <i>Tripterococcus paniculatus</i> in Database Searches)		Priority 4	
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		Priority 4	

A list of the Conservation codes is in Appendix 5.

The species identified in the database searches have been examined to rate the likelihood of their presence on the site (Table 2).

Table 2: Likelihood of Identified Significant Flora Species occurring on the Site

Species	Preferred Habitat*	Likelihood to occur on the site
<i>Andersonia gracilis</i>	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Highly Unlikely – no wetland habitat on the site
<i>Caladenia huegelii</i>	Sand or clay loam. Does not survive in disturbed areas.	Possible
<i>Diuris purdiei</i>	Grey-black sand, moist. Winter-wet swamps	Highly Unlikely – no wetland habitat on the site
<i>Drakaea elastica</i>	Low-lying situations adjoining winter-wet swamps. Does not survive in disturbed areas	Highly Unlikely – no wetland habitat on the site
<i>Drakaea micrantha</i>	Grey sands over dark, grey to blackish, sandy clay-loam substrates in winter wet depressions or swamps	Highly Unlikely – no suitable soils on the site
<i>Lepidosperma rostratum</i>	Peaty and clay soils	Highly Unlikely – no wetland habitat on the site
<i>Thelymitra dedmaniarum</i> (<i>Thelymitra manginii</i>)	Cinnamon sun orchid is known from only two locations in the Gidgegannup area. It is confined to open wandoo woodland on red-brown sandy loam associated with dolerite and granite outcropping (DEC, 2012).	No
<i>Dampiera triloba</i>	Damp peaty sand	Highly Unlikely – no Dampland habitat on the site
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (<i>GJ Keighery 5026</i>)	Grey or black sand over clay. Swampy areas, winter-wet lowlands.	Highly Unlikely – no wetland habitat on the site
<i>Amanita carneiphylla</i>	Deep rooting in sandy soils with Eucalyptus Banksia and Sheoak	Possible
<i>Amanita griseibrunnea</i>	Sandy soil with Jarrah and pine trees	Unlikely – No pines present

Species	Preferred Habitat*	Likelihood to occur on the site
<i>Thelymitra variegata</i>	Sandy clay, sand, laterite. Does not survive in disturbed areas	No – no lateritic sand present
<i>Amanita drummondii</i>	Solitary to gregarious in leaf litter in association with <i>Agonis flexuosa</i> , <i>A. theiformis</i> , <i>Allocasuarina fraseriana</i> , <i>Corymbia calophylla</i> , <i>Eucalyptus marginata</i> , <i>E. patens</i> , <i>E. staeri</i> , <i>Jacksonia furcellata</i> , <i>Kunzea glabrescens</i> , <i>Melaleuca</i> sp., <i>Podocarpus drouynianus</i> , <i>Taxandria parviceps</i> . (Davidson et al., 2015) growing in sandy soil (Amanitaceae Org, 2015)	Unlikely – Dominant Banksia is not preferred by this species
<i>Amanita fibrilloses</i>	Grey sand on track	Possible
<i>Amanita wadjukiorum</i>	Solitary to gregarious, in sandy soil in degraded native vegetation of <i>Allocasuarina fraseriana</i> , <i>Corymbia calophylla</i> , <i>C. citriodora</i> and <i>Brachychiton</i> sp. (Davidson et al., 2013)	Unlikely due to vegetation types
<i>Byblis gigantea</i>	Sandy-peat swamps in seasonally wet areas	Highly Unlikely – no wetland habitat on the site
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i>	Clay, sandy clay. Claypans, seasonally wet flats	Highly Unlikely – no wetland habitat on the site
<i>Jacksonia gracillima</i>	Grey and brown well-drained sand	Unlikely – not recorded during the thorough site walkover
<i>Stylidium paludicola</i>	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Highly Unlikely – no wetland habitat on the site
<i>Cyathochaeta teretifolia</i>	Grey sand, sandy clay. Swamps, creek edges	Highly Unlikely – no wetland habitat on the site
<i>Phlebocarya pilosissima</i> subsp. <i>pilosissima</i>	White or grey sand and lateritic gravel	Unlikely – no laterite on the site
<i>Dodonaea hackettiana</i>	Sandy soils with outcrops of limestone.	Unlikely – no outcropping limestone
<i>Thysanotus glaucus</i>	White, grey or yellow sand, sandy gravel	Unlikely -
<i>Microtis quadrata</i>	Black, peaty soil	Highly Unlikely – no wetland habitat on the site
<i>Ornduffia submersa</i>	Pools, lakes, swamps, winter-wet depressions, claypans	No – no suitable habitat on the site
<i>Grevillea thelemanniana</i> subsp. <i>thelemanniana</i>	Sand or clay, occupying swamps, heathland	Highly Unlikely – no wetland habitat on the site
<i>Stylidium longitubum</i>	Sandy clay, clay. Seasonal wetlands	Highly Unlikely – no wetland habitat on the site

Species	Preferred Habitat*	Likelihood to occur on the site
<i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234) (also listed as <i>Tripterococcus paniculatus</i> in Database Searches)	Grey, black or peaty sand. Winter-wet flats	Highly Unlikely – no wetland habitat on the site
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	Grey, black or peaty sand. Winter-wet depressions	Highly Unlikely – no wetland habitat on the site

* sourced from Florabase as well as the DPaW database searches unless otherwise denoted

The Grand Spider Orchid (*Caladenia huegelii*) is the only Threatened or Endangered species considered to potentially occur on the site in the areas of native vegetation remaining on the site outside of the Bush Forever area. There is also a small possibility that the orchid could occur in the vegetated buffer along Jandakot Road. The remainder of the Threatened or Endangered species are not likely to occur due either to the inappropriate soil types, the previous clearing of a large portion of the site or the high density of weeds in the native vegetation buffer.

Two priority species of fungi were considered to possibly be present on the site *Amanita carneiphylla* and *Amanita fibrilloses*.

2.5.2 Preliminary Flora List

A Level 1 Flora and Vegetation survey does not require a full spring flora survey to be conducted, however a site walkover was undertaken by Dr Paul van der Moezel of PGV Environmental on 6 May 2016. Opportunistic recordings were made of the native species observable during the site inspection. The list of species recorded in the native bushland on the site is contained in Appendix 6.

The preliminary flora list recorded in areas of remnant vegetation included 42 native and 3 introduced species. Given the high quality of the vegetation, many additional annual and ephemeral species would be expected to be recorded in spring and early summer.

None of the species recorded in May 2016 is a Threatened (Declared Rare) or Priority listed species. Of the conservation significant species that have been recorded in the vicinity of the site the Threatened orchid species *Caladenia huegelii* could potentially occur due to the presence of Banksia woodland on dry sandy soils in very good condition. The likelihood of the species occurring, however, is considered very low due to the very small size of the remnant vegetation, around 1ha. *Caladenia huegelii* can only be positively identified in the field when it is in flower from mid-September to mid-October.

A spring (mid-September to mid-October) survey will be undertaken in 2016 to identify whether the Grand Spider Orchid, or any other conservation significant plant species occurs on the site.

2.5.3 Threatened or Priority Ecological Communities Database Searches

A search of DPaW's Threatened (TEC) and Priority Ecological Communities (PEC) database was conducted for the site (11-0212EC). There are no known occurrences of any TECs or PECs on the site.

There are occurrences of the following Priority Ecological Communities within 1km of the site. These are:

- The 'Priority 3' ecological community – 'Low lying *Banksia attenuata* woodlands or shrublands (SCP21c)'
- The 'Priority 2' ecological community – 'Wooded wetlands which support colonial waterbird nesting areas'.

Neither of these two ecological communities is expected to occur on the site due to the absence of suitable site conditions.

2.6 Vegetation

2.6.1 Vegetation Types

Revegetated Sand Mine

The types of vegetation in the revegetated sand mine varies across the site, presumably indicating different rehabilitation methods at each stage following sand mining operations.

A central portion of the site, adjacent to the eastern boundary of the Urban Stone laydown area, contains a denser stand of trees than elsewhere on the site. The trees mostly consist of species not local to the Jandakot area such as *Eucalyptus camaldulensis* (River Red Gum) and WA Peppermint (*Agonis flexuosa*) (Plate 5). Other taller species in this area include *Acacia rostellifera*, *Banksia menziesii* and a few *Eucalyptus gomphocephala* (Tuart).

The native understorey in this area is almost completely lacking and consists of Annual Veldtgrass (*Ehrharta calycina*) and Couch Grass (*Cynodon dactylon*).

Plate 5: *Eucalyptus camaldulensis* planted east of the Urban Stone lay down area.



The remainder of the rehabilitation area contains a broader mix of native shrub and tree species, planted in a random fashion. Common species include *Agonis flexuosa*, *Eucalyptus camaldulensis*, *Corymbia calophylla* (Marri) in an area close to the Bush Forever site, *Eucalyptus rudis* (Flooded Gum), *Acacia rostellifera*, *Eucalyptus decipiens*, *Callistemon* sp. (Bottlebrush) and *Jacksonia furcellata* (Plate 6).

Plate 6: Replanted vegetation



A number of native understorey species are present throughout this part of the rehabilitated area, presumably self-seeded rather than planted or seeded by hand, including *Leucopogon conostephioides*, *Leschenaultia floribunda* and *Scholtzia involucrata*. Weed species in these areas are uncommon. The woody weed species Victorian Tea Tree (*Leptospermum laevigatum*) is common on some batter slopes.

Remnant Native Vegetation

Several small areas of remnant native vegetation occur on the site. One area is a triangular-shaped stand and is located to the north west of the existing Urban Stone facilities and adjacent to the unmade Launderers Street road reserve. Another area is also adjacent to the unmade Launderers Street road reserve to the north east of the Urban Stone facilities.

Another area of native vegetation is located on the southeastern end of the Bush Forever site and forms a narrow strip of vegetation about 0.4ha in size between the Bush Forever site and the property boundary.

Some native vegetation is also likely to occur between the southwestern boundary of the Bush Forever site and the rehabilitated sand quarry. The extent of this is subject to further on-ground verification.

The remnant vegetation is predominantly a *Banksia attenuata*/*B. menziesii* Low Open Woodland to 5m over an *Allocasuarina humilis*/*Acacia pulchella* Open Low Heath (Plate 7) on dry sand soils.

Eucalyptus tottiana is common in parts of the vegetation (Plate 8) and Marri (*Corymbia calophylla*) may also occur as a natural stand adjacent to the Bush Forever site.

Other common native understorey species include *Lyginia barbata*, *Beaufortia elegans*, *Amphipogon turbinatus* and *Leucopogon conostephioides*.

Plate 7: Remnant Banksia Woodland in the Triangular Stand



Plate 8: Banksia Woodland with *Eucalyptus tottiana*



The vegetated buffer is described as *Banksia attenuata*/ *B. menziesii* Woodland over *Eremaea pauciflora*/ *Hibbertia hypericoides*/ *Lyginia barbata* and *Allocasuarina humilis* shrubland (Plate 9).

Plate 9: Buffer vegetation



Based on the species recorded during the site inspection, the areas of native vegetation are most likely representative of FCT 23a “Central *Banksia attenuata* – *B. menziesii* Woodlands”.

2.6.2 Vegetation Condition

The vegetation condition over the site ranged from Completely Degraded in the eastern part of the site that had been previously cleared and planted with exotic species to Good to Degraded for the strip of native buffer vegetation adjacent to Jandakot Road. The other areas of remnant native vegetation are mostly in Very Good to Excellent condition. The definitions of the ratings are outlined in Table 3.

Table 3: Vegetation Condition Rating Scale

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	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	Vegetation structure significantly altered by very obvious signs of multiple disturbances. 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.

Condition	Description
Degraded	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.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Source: Government of Western Australia, 2000.

2.6.3 Conservation Significant Vegetation

The areas of native vegetation are likely to be representative of Floristic Community Type 23a which is not a Threatened or Priority Ecological Community. The vegetation does not resemble 'Low lying *Banksia attenuata* woodlands or shrublands (SCP21c)' or 'Wooded wetlands which support colonial waterbird nesting areas' that have been identified within 1km of the site by the DPaW database search.

2.7 Fauna

2.7.1 Fauna Habitats

The site inspection conducted by PGV Environmental on 6 February 2012 identified two fauna habitats on the site, as follows:

- Replanted woodland/shrubland; and
- Banksia woodland.

The replanted woodland/shrubland occurs on the site of the old sand mine. The understorey is sparse (Plate 10).

Plate 10: Replanted woodland/shrubland Habitat



The small areas of remnant native vegetation are described as Banksia woodland and are in Very Good to Excellent condition (Plate 11). The vegetation in the Jandakot Road buffer is Degraded (Plate 12). None of the native trees or tall replanted trees on the site contain hollows.

Plate 11: Banksia Woodland Habitat in Very Good Condition



Plate 12: Banksia Woodland Habitat in Degraded Condition



2.7.2 Habitat Condition

Fauna habitat can be assessed using a number of factors including, the size of the habitat, the level of habitat connectivity, availability of specific resources (e.g. tree hollows) and overall vegetation quality. The habitat was assessed according to the following categories:

High quality fauna habitat – These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.

Very good fauna habitat - These areas show minimal signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally affected by disturbance.

Good fauna habitat – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.

Disturbed fauna habitat – These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, contain weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.

Highly degraded fauna habitat – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Faunal assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance (Coffey Environments, 2009).

The revegetated sand mine is considered to be Disturbed Fauna habitat while the areas of Banksia woodland in Very good to Excellent condition are considered to be Good Fauna habitat.

2.7.3 Fauna Database Searches

A search of the DPaW Threatened and Priority fauna database (Appendix 7), the EPBC Act Protected Matters Search Tool (Appendix 2) and search results Naturemap (Appendix 3) identified 20 species that have been recorded in the general vicinity of the site (Table 4). Marine fauna that were identified in the desktop searches have been discarded from further consideration.

Table 4: Conservation Significant Fauna Species Possibly Occurring in the Region

Scientific Name	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Botaurus poiciloptilus</i>	Australasian bittern	Schedule 2 - EN	Endangered
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	Schedule 2 - EN	Endangered
<i>Myrmecobius fasciatus</i>	Numbat, Walpurti	Schedule 2 - EN	Vulnerable
<i>Rostratula benghalensis australis</i>	Australian Painted Snipe	Schedule 2 - EN	Endangered / Marine/ Migratory
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	Schedule 3 - VU	Vulnerable
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	Schedule 3 - VU	Vulnerable

Scientific Name	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Leipoa ocellata</i>	Mallee Fowl	Schedule 3 - VU	Vulnerable
<i>Setonix brachyurus</i>	Quokka	Schedule 3 - VU	Vulnerable
<i>Merops ornatus</i>	Rainbow Bee-eater	Schedule 5 - IA	Marine/ Migratory
<i>Phascogale calura</i>	Red-tailed Phascogale, Kenngoor	Schedule 6 - CD	Endangered
<i>Falco peregrinus</i>	Peregrine Falcon	Schedule 7 - OS	Marine/ Migratory
<i>Throscodectes xiphos</i>	Cricket	Priority 1	
<i>Lerista lineata</i>	Perth Slider, Lined Skink	Priority 3	
<i>Neelaps calonotos</i>	Black-striped Snake	Priority 3	
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	Priority 4	
<i>Isoodon obesulus fusciventer</i>	Southern Brown Bandicoot, Quenda	Priority 4	
<i>Macropus eugenii derbianus</i>	Tammar Wallaby	Priority 4	
<i>Macropus irma</i>	Western Brush Wallaby	Priority 4	
<i>Synemon gratiosa</i>	Graceful Sun-moth	Priority 4	
<i>Thinornis rubricollis</i> (also listed as <i>Charadrius rubricollis</i>)	Hooded Plover	Priority 4	Marine

2.7.4 Likely Occurrence of Significant Species

Outlined below is a short description of each of the species that were identified in the DPaW database searches and Protected Matters Search Tool search in Table 4. The preferred habitat has been compared to the habitats on the site described above and the likelihood of each species to be present on the site (Table 5).

Table 5: Likelihood of Conservation Significant species being present on the site

Scientific Name	Common Name	Habitat	Likelihood to occur on the site
<i>Botaurus poiciloptilus</i>	Australasian bittern	The Australasian Bittern occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.	Highly Unlikely – No wetland habitat

Scientific Name	Common Name	Habitat	Likelihood to occur on the site
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	Carnaby's Cockatoo is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of Banksia, Dryandra, Hakea, Eucalyptus, Grevillea, Pinus and Allocasuarina spp. It is nomadic often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 - 12m above the ground and have an entrance 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell) (SEWPaC, 2012)	Likely
<i>Myrmecobius fasciatus</i>	Numbat, Walpurti	Numbats occur in eucalypt forests and woodlands dominated by <i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> and <i>Eucalyptus wandoo</i> .	Highly Unlikely – Habitat not a Eucalypt Woodland
<i>Rostratula benghalensis australis</i>	Australian Painted Snipe	The Australian Painted Snipe has been recorded at wetlands in all states of Australia but is most common in eastern Australia. It generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. It also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include a cover of vegetation, including grasses.	Highly Unlikely – No wetland habitat
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	Forest Red-tailed Black Cockatoos frequent the humid to sub-humid south-west of Western Australia from Gingin in the north, to Albany in the south and west to Cape Leeuwin and Bunbury (SEWPaC, 2012). It nests in tree hollows with a depth of 1-5m, that are predominately Marri (<i>Corymbia calophylla</i>), Jarrah (<i>Eucalyptus marginata</i>) and Karri (<i>E. diversicolor</i>) and it feeds primarily on the seeds of Marri.	Possible – limited foraging on the site

Scientific Name	Common Name	Habitat	Likelihood to occur on the site
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	The Chuditch have been known to occupy a wide range of habitats including woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts. They are opportunistic feeders, and forage on the ground at night, feeding on invertebrates, small mammals, birds and reptiles.	Highly Unlikely due to surrounding disturbance
<i>Leipoa ocellata</i>	Mallee Fowl	Mallee fowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards in mallee bushland.	No – No suitable habitat is present on the site
<i>Setonix brachyurus</i>	Quokka	Quokkas were originally very common on the Swan Coastal Plain, however, their distribution is now limited to Rottnest Island and a few isolated areas in the south-west of WA. On the mainland, they prefer densely vegetated areas around wetlands and streams, whereas on Rottnest Island they inhabit low scrubby coastal vegetation where water is not readily available year-round.	No - this species is locally extinct
<i>Merops ornatus</i>	Rainbow Bee-eater	Populations that breed in northern Australia are considered to be resident, and in many northern localities the Rainbow Bee-eater is present throughout the year. The Rainbow Bee-eater nests in a burrow dug in the ground. It is found across the better-watered parts of WA including islands preferring lightly wooded, sandy country near water.	Likely – Intermittent visitor but highly unlikely to rely on the site for survival
<i>Phascogale calura</i>	Red-tailed Phascogale, Kenngoor	The Red-tailed Phascogale is a small, arboreal, carnivorous marsupial. The preferred habitats for this species are Allocasuarina woodlands with hollow-containing eucalypts (e.g. Eucalyptus wandoo) and Gastrolobium spp..	Highly Unlikely due to surrounding disturbance
<i>Falco peregrinus</i>	Peregrine Falcon	The Peregrine Falcon is found in a variety of habitats but nests on high cliff ledges or artificial structures. It feeds primarily on small-medium sized birds, but occasionally taking insects, such as moths, cicadas and locusts (Birdlife Australia, 2012).	Unlikely – This species is flighty and the site too disturbed for the species to occur on the site

Scientific Name	Common Name	Habitat	Likelihood to occur on the site
<i>Throscodectes xiphos</i>	Cricket	This species of cricket was described in the Jandakot region in Melaleuca dominated vegetation (ENV, 2009).	No – no suitable habitat on the site
<i>Lerista lineata</i>	Perth Slider, Lined Skink	The Lined Skink is a burrowing species that occurs in pale sandy soils with coastal heath and shrubland areas in isolated populations in the south-west and mid-west coast of Western Australia. It feeds on termites and other small insects (AROD, 2014).	Unlikely – the habitat on the site is not preferred by this species
<i>Neelaps calonotos</i>	Black-striped Snake	The Black-striped snake has a limited distribution, inhabiting areas with sandy soils that support heathlands and Banksia/Eucalypt Woodlands (Nevill, 2005) on the Swan Coastal Plain generally in the lower west coast from Lancelin to Mandurah (Storr et al, 1999).	Unlikely due to the surrounding disturbance
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	This species occurs in high rainfall Jarrah, Karri and Tuart forests and coastal woodlands. They roost in hollows of trees, branches and stumps, and are insectivorous, feeding at night between the canopy and understorey of tall forest trees (Environment Australia, 1999).	No – No suitable habitat on the site
<i>Isoodon obesulus fusciventer</i>	Southern Brown Bandicoot, Quenda	Southern Brown Bandicoots are small grey marsupials that prefer dense scrub (up to one metre high). Their diet includes invertebrates (including earthworms, adult beetles and their larvae), underground fungi, subterranean plant material, and very occasionally, small vertebrates (DEC, 2012).	Likely – evidence has been recorded recently in the vicinity of the site
<i>Macropus eugenii derbianus</i>	Tammar Wallaby	The Tammar Wallaby prefers dense, low vegetation for daytime shelter and open grassy areas for feeding. This species inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland (DEC, 2012).	Unlikely – may occur in the adjacent Bush Forever site
<i>Macropus irma</i>	Western Brush Wallaby	The Western Brush Wallaby is a medium sized marsupial and its optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets (DEC, 2012).	Unlikely – may occur in the adjacent Bush Forever site

Scientific Name	Common Name	Habitat	Likelihood to occur on the site
<i>Synemon gratiosa</i>	Graceful Sun-moth	The Graceful Sun-moth is a diurnal moth with dull coloured brown to black forewings and brightly coloured orange hind wings. The larvae burrow into the rhizomes of <i>Lomandra maritima</i> and <i>Lomandra hermaphrodita</i> exclusively and therefore require the presence of one or both of these species to be present in an area (Bishop et al., 2011).	Unlikely – habitat not present on the site
<i>Thinornis rubricollis</i> (also listed as <i>Charadrius rubricollis</i>)	Hooded Plover	The Hooded Plover primarily inhabits sandy, ocean beaches, with the highest densities on beaches with large amounts of beach-washed seaweed that are backed by extensive open dunes. In Western Australia the species also inhabits inland and coastal salt lakes (Birdlife International 2014)	No – not coastal habitat

It is possible that Carnaby's Black-Cockatoo forages on the areas containing *Banksia* trees on the site and possibly the Marri trees. There are no trees with hollows suitable for Carnaby's Black-Cockatoo breeding currently. No native trees occur on the site with a diameter of greater than 500mm that might produce suitable hollows in the near future. There are extensive areas of foraging habitat in the Jandakot area particularly in the nearby Jandakot Airport. Clearing of the remnant vegetation is highly unlikely to cause a significant impact on Carnaby's Black-Cockatoo and is unlikely to trigger the need to refer the action under the EPBC Act.

There are a few Marri trees on the site used by Forest Red-tailed Black Cockatoos for foraging. The number of trees is so small that the species is highly unlikely to be impacted by the proposed change in land use on the site.

The Rainbow Bee-eater can utilise relatively degraded areas as well as natural areas and therefore the species may use the site as habitat. Development of the site would be highly unlikely to cause a significant impact on the species due to the abundance of similar disturbed sandy areas immediately adjacent to the site and extensive areas of natural vegetation on sandy soils in the Jandakot area.

There was potential evidence of bandicoots being present on the site recorded in 2012 with cone like diggings. Development of the site is highly unlikely to cause a significant impact on the Bandicoot due to the large amount of suitable native vegetation remaining in the Jandakot area.

The areas of *Banksia* woodland are suitable habitat for the Black-striped Snake and may be present on the site. Development of the site is highly unlikely to cause a significant impact on the Black-striped Snake due to the large amount of suitable native vegetation remaining in the Jandakot area.

3 ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Previous Land Use

The site has largely been cleared in the past and the activity on the site is not likely to have contaminated the site. The site is not used for public purposes and therefore is not an impediment to the proposed change in land use.

3.2 Topography

The site is undulating and the final contours will be in accordance with the detailed design of the proposed hardstand area and will comply with the Development Application requirements. There are no topographical features on the site that would provide an impediment to the proposed development.

3.3 Geomorphology and Soils

The site has appropriate sand for the uses proposed and the soils on the site are not an impediment to the proposed development.

3.4 Hydrology

Groundwater is not at the surface of the site. Appropriate drainage methods in accordance with Better Urban Water Management (WAPC, 2008) will be required to be incorporated into the design of the hardstand. Details required will be the management of stormwater in swales up to the 1 in 100 Annual Recurrence Interval (ARI) for contaminants and gross pollutants. The design will also have to address the protection of groundwater quality and levels in the surrounding areas.

Although management of the hydrology of the site will be required the risks to the environment can be mitigated through appropriate planning and design therefore, the hydrology of the site is not an impediment to development. The wetland in the nearby Bush Forever site 388 will also need to be considered in the final design of the proposed development. A buffer of 30-50m as measured from the edge of the wetland is likely to be required. PGV Environmental considers that the boundary of the wetland is not accurately mapped on the DPaW geomorphic wetland database and the imposition of any buffer on the currently mapped wetland could adversely impact on the development potential. A wetland assessment has been scheduled to be undertaken to accurately determine the boundary.

3.5 Flora

There were no Declared Rare species recorded on the site however the areas of remnant native Banksia woodland vegetation could possibly contain *Caladenia huegelii*. A Level 2 Flora and Vegetation survey has been scheduled for Spring 2016 and will include a targeted search for this species. No priority species were recorded on the site and are not likely to occur on the site.

3.6 Vegetation

The vegetation in the revegetated area that is the majority of the site is not considered to be environmentally significant. The revegetation is a mixture of endemic and non-endemic species that is considered to be Completely Degraded.

The areas of remnant native vegetation are not considered to be representative of a TEC or PEC. Two of the areas have connectivity with Bush Forever site 388. The areas of vegetation are small compared to the amount of similar vegetation in the adjoining Bush Forever site. Therefore, the vegetation is not considered to be environmentally significant.

The vegetation in the buffer area is Degraded and is not considered to be representative of a TEC or PEC. The vegetation is isolated to approximately 12m to the east and 20m to the south in width and has a high proportion of weeds and therefore is not considered to be environmentally significant. The remainder of the vegetation is fragmented into small areas and likely to be impacted by edge effects upon the construction of Launderers Street and the associated required firebreaks.

3.7 Fauna

There are two Schedule 1 species identified on the database searches that are likely to, or have been recorded utilising the site. These are:

- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii* subsp. *naso*)
- Carnaby's Black Cockatoo (short-billed black-cockatoo) (*Calyptorhynchus latirostris*)

These species are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as well as the *Wildlife Protection Act 1950*. The site has limited foraging for Forest Red-tailed Black Cockatoos. The site is in the range of Carnaby's Black Cockatoos however there are no recorded roosting sites within approximately 3km of the site and no recorded breeding sites within 10km (DoP, 2011).

The Rainbow Bee-eater (Schedule 3) were considered to possibly be intermittently present on the site. Quenda, or Southern Brown Bandicoot, a Priority 4 species, were identified in the database search as being possibly intermittently present on the site. These species are quite mobile and are highly unlikely to rely on the site for survival, given the large areas of habitat to the north.

A Level 2 Fauna survey as outlined by *Guidance for Assessment of Environmental Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia, No. 56*. (EPA, 2004b) is not recommended for the site for general fauna assemblages. Two Schedule 1 listed species (Carnaby's Black Cockatoo and Forest Red-tailed Black-Cockatoo) have been determined to be present on the site. The habitat requirements for Carnaby's Black Cockatoo include foraging (*Banksia* species, Parrot Bush and other Proteaceous shrubs), roosting (tall eucalypts and pines) or breeding habitat (Eucalypt trees). There are some *Banksia* trees in the areas of remnant native vegetation and along the Jandakot Road buffer strip. There are no significant trees on the site which are suitable habitat for Carnaby's Black Cockatoo. If clearing of the vegetation were proposed, the clearing of native vegetation containing foraging habitat under 1ha is not likely to be significant and therefore will not require referral under the EPBC Act.

The Forest Red-tailed Black Cockatoo may feed on Marri seeds on the site. However, the removal of these trees is unlikely to have a significant impact on this species

4 CONCLUSIONS AND SUMMARY

This Environmental Assessment concludes the following with respect to the future development of Lots 101, 103 and 104 Jandakot Road:

- The previous land use is not an impediment to the proposed change in land use;
- The topography of the site is not an impediment to the proposed zoning;
- The soils on the site are not an impediment to the proposed land use;
- Stormwater will need to be managed in accordance with DoW policy and Better Urban Water Management (WAPC, 2008).
- The wetlands in the Bush Forever site 388 that are mapped as extending into the proposed redevelopment area are not mapped accurately and are highly likely to not occur on the redevelopment site. A wetland boundary and buffer study is scheduled to be undertaken in Spring 2016 to determine whether any buffer could impact on the development site;
- The majority of the site has been previously cleared of native vegetation and now consists of replanted Australian native species, generally not locally native to the site;
- The areas of remnant *Banksia* woodland are rated as being in Very Good to Excellent condition. All areas of remnant native vegetation on the site will be assessed during a spring 2016 flora and vegetation survey. Any areas assessed as having conservation significance will be considered in future planning of the site;
- The small amount of remnant *Banksia* woodland (approximately 1.5ha) adjacent to Jandakot Road is rated as being in Degraded condition due to the abundance of weeds;
- One Threatened or Endangered flora species, the Grand Spider Orchid, may occur on the site in the areas of *Banksia* woodland, although it is highly unlikely given the small area of vegetation. A Level 2 flora and vegetation survey will be undertaken in September/October in all areas of remnant vegetation outside of the Bush Forever site and particularly targeting any potential conservation significant species;
- Three Priority flora species and two Priority fungi species may possibly occur on the site due to the right habitat type. However, given the small area of native vegetation the potential for the species to occur on the site is considered very low;
- The remnant *Banksia* woodland areas are considered to be representative of Floristic Community Type 23a which is not listed as a Threatened or Priority Ecological Community. This will be further assessed during the Level 2 flora and vegetation survey to be conducted in 2016;
- The site mostly contains Disturbed fauna habitat in the replanted area small areas of Good fauna habitat in the *Banksia* woodland;
- The site has potential habitat for one Endangered fauna species (Carnaby's Black Cockatoo), one Vulnerable species (Forest Red-tailed Black Cockatoo) one Migratory species (Rainbow Bee-eater) and one Priority species (Southern Brown Bandicoot), however due to the small area of habitat and abundance of better quality habitat in the Jandakot region, it is considered that development would not have a significant impact on any of these species. Referral under the Commonwealth EPBC Act should not be required.

5 REFERENCES

- Amanitaceae Org (2015) Species Profile *Amanita carneiphylla* Accessed August 2015 <http://www.amanitaceae.org/?Amanita+carneiphylla> Australia
- Australian Rattles Online Database (AROD) (2014) Perth Slider (*Lerista lineata*). Accessed July 2014 <http://www.arod.com.au/arod/reptilia/Squamata/Scincidae/Lerista/lineata> Australia.
- Birdlife Australia (2012) Peregrine Falcon (*Falco peregrinus*) Factsheet. Accessed November 2012 <http://www.birdlife.org.au/images/uploads/branches/documents/ARA-Peregrine-Factsht.pdf> Australia.
- Birdlife International (2014) Hooded Plover (*Thinornis cucullatus*) Species Profile. Accessed November 2014 <http://www.birdlife.org/datazone/speciesfactsheet.php?id=3144>
- Birds Australia (2012). <http://www.birdsaustralia.com.au/> Accessed February, 2012, Australia
- Bishop C., M. Williams, D. Mitchell, A. Williams, J. Fissioli & T. Gamblin (2011) *Conservation of the Graceful Sun-moth: Findings from the 2010 Graceful Sun-moth surveys and habitat assessments across the Swan, South West and southern Midwest Regions*. Interim report. Kensington, Western Australia: Department of Environment and Conservation.
- Davidson, E.M., Giustiniano, D., McGurk, L.E., Syme, K. and Robinson, R.M. (2015) *Amanita drummondii* and *A. quenda* (Basidiomycota), two new species from Western Australia, and an expanded description of *A. walpolei* *Nuytsia* 25:1-13 Perth, Western Australia
- Department of Agriculture and Food Western Australia (DAFWA) (2012). Natural Resource Management – http://spatial.agric.wa.gov.au/slip/products_view.asp Shared Land Information Platform. Accessed February 2012 Western Australia.
- Department of Environment and Conservation (DEC) (2012) Cinnamon Sun Orchid Endangered Flora of Western Australia Fact Sheet. <https://www.dpaw.wa.gov.au/images/documents/> Perth, Western Australia
- Department of Environment and Conservation (DEC) (2012) Fauna Species Profiles: Quenda *Isodon obesulus* (Shaw, 1797). Perth, Western Australia.
- Department of Environment and Conservation (DEC) (2012) Fauna Species Profiles: Tammar Wallaby *Macropus eugenii* (Desmarest, 1817). Perth, Western Australia.
- Department of Environment and Conservation (DEC) (2012) Fauna Species Profiles: Western Brush Wallaby *Macropus irma* (Jourdan, 1837). Perth, Western Australia.
- Department of Environment and Conservation (DEC) (2002). Fauna Species Profiles Accessed February 2012 <http://www.dec.wa.gov.au/content/view/3432/1999/>
- Department of Environment and Conservation (DEC) (2007). Definitions, Categories and Criteria for Threatened and Priority Ecological Communities. Perth Western Australia

- Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2012). *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso*. Canberra, Commonwealth of Australia
- Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2012). *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso*. Canberra, Commonwealth of Australia
- Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2012a). Protected Matter Search Tool <http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst.jsf> accessed February 2012.
- Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2012b). Listed Species and Communities. <http://www.environment.gov.au/epbc/protect/species-communities.html> . Accessed February
- Department of Water (DoW) (2012a). Hydrogeological Atlas Accessed February 2012 <http://www.water.wa.gov.au/Tools/Maps+and+atlases/Perth+groundwater+atlas/default.aspx> Perth Western Australia
- Department of Water (DoW) (2012b). Perth Groundwater Atlas accessed February, 2012 <http://www.water.wa.gov.au/idelve/gwa/> Perth Western Australia
- ENV Australia (ENV) (2009) *Jandakot Airport Fauna Survey*. Report prepared for Jandakot Airport Holdings Pty Ltd. Perth, Western Australia.
- Environment Australia (1999) *The Action Plan for Australian Bats*. Government of Australia, Canberra.
- Environmental Protection Authority, (EPA) (2004b). *Guidance for the Assessment of Terrestrial Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia, Guidance Statement No. 51, June* Perth Western Australia
- Environmental Protection Authority, (EPA) (2004a). *Guidance for the Assessment of Terrestrial Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, Guidance Statement No. 51, June* Perth Western Australia
- Florabase (2012). Website <http://florabase.dec.wa.gov.au/> accessed February 2012 Perth Western Australia
- Landgate (2012a). Historical Aerial Photography Accessed February 2012 <https://www.landgate.wa.gov.au/bmvf/app/mapviewer/> Perth, Western Australia

- Landgate (2012b). WA Atlas Shared Land Information Platform Accessed February 2012
<https://www2.landgate.wa.gov.au/bmvf/app/waatlas/> Perth, Western Australia
- Nevill, S. (ed) (2005) *Guide to the Wildlife of the Perth Region*. Simon Nevill Publications. Perth, Western Australia
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1999) *Lizards of Western Australia I: Skinks*. Revised Edition, WA Museum. Perth, Western Australia.

APPENDIX 1

Proposed Rezoning Footprint



EXISTING ZONING MAP

Region Scheme Reserves

- CG** Commonwealth Government
- SEC** Commonwealth Government
- Water Catchments

Local Scheme Reserves

- Parks and Recreation
- Local Road

Local Scheme Zones

- Development
- Residential
- Resource
- Special Use

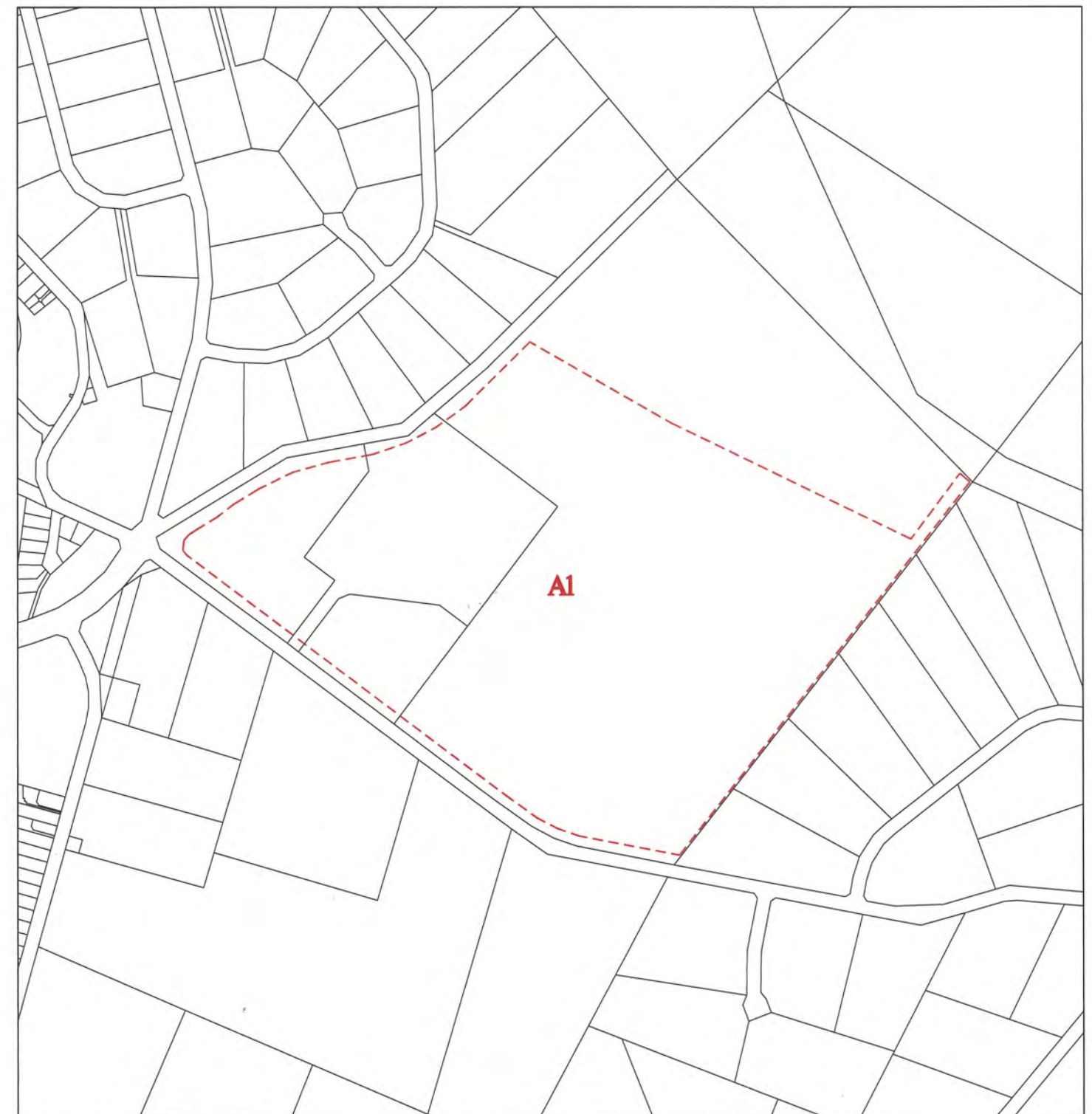
Other Categories

- R20 R Codes
- A1 Additional Uses
- R1 Restricted Uses
- SU1 Special Use Area
- Building Envelopes
- BVA Bushfire Vulnerability Area
- JA Jandakot Airport
- DCA Development Contribution Area
- No Zone

MGA
TOWN PLANNERS

Ph: (08) 9321 3011
Fax: (08) 9324 1961
email: mga@global.net.au

CITY OF COCKBURN
AMENDMENT No. __
DISTRICT PLANNING SCHEME No. 3



PROPOSED ZONING MAP

0 Metres 250
Scale 1:8000

A3
2507-Jandakot(2016)Zoning.dwg
19 May 2016

APPENDIX 2

DPaW Flora Database Searches

DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DECLARED RARE AND PRIORITY FLORA LIST
16 September 2010

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (GJ Keighery 5026)	1	SW	North Dandalup, Mundijong, Gosnells, Jandakot, Serpentine, Mundijong	My, Aug
<i>Amanita carneiphylla</i>	2	SW, WB	Murdoch, Dryandra	
<i>Amanita griseibrunnea</i>	2	SW	Murdoch, Kings Park	May
<i>Byblis gigantea</i>	3	SW, MW	Yule Brook, Cannington, Jandakot, Brookton Highway, Cervantes	Sep-Jan
<i>Dodonaea hackettiana</i>	4	SW	Wattleup, Thompson Lake, Kings Park, Jandakot, Bibra Lake-The Spectacles, Gingin, Peron, Baldivis, Beeliar, Baldivis, Harry Waring Marsupial Reserve	Jul-Oct
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i> ms	3	SW	Serpentine, Kenwick, Upper Swan, Gingin, Forrestdale, Bullsbrook, Mandurah, Arrowsmith, Capel	-
<i>Grevillea thelemanniana</i> subsp. <i>thelemanniana</i>	4	SW	Cannington, Kenwick, Wattle Grove, Forrestdale, Jervoise Bay, Joondalup	Jun-Sep
<i>Jacksonia gracillima</i>	3	SW, SR	Mundijong, Forrestdale, Capel, Elgin, Modong N.R., Forrestfield, Ambergate	Oct-Nov
<i>Lepidosperma rostratum</i>	T	SW	Cannington, Kenwick, Forrestdale Lake NR	Aug
<i>Microtis quadrata</i>	4	SC, WA, SW, WB	Pinjarra, Jandakot, Albany, Lake Barker, Denamrk, Baufort Inlet	Dec-Jan
<i>Ornduffia submersa</i>	4	SR, WA, SC, SW	Gunapin, Boyanup, Lake Muir, Denmark, Forrestdale, Kenwick, Frankland River, Lane Poole	Sep-Oct
<i>Stylidium longitubum</i>	3	SW, WB, SR	Upper Swan, Bullsbrook, Bunbury, Midland, Busselton, Arthur River, Jandakot, Mundijong, Karnup	Nov
<i>Thysanotus glaucus</i>	4	MW, SR, SW, SC, WB	Regans Ford, Forrestdale, Busselton, Lake King, West Mt Barren, Lesueur NPK	Nov-Feb
<i>Tripterococcus paniculatus</i> ms	4	SW, SR	Cannington, Armadale, Leeming, Forrestfield, Upper Swan, Willetton, Forrestdale, Busselton	Nov
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	4	SW, MW	Gillingarra-Forrestdale, Cannington, Guildford, Muchea, Gingin, Murray River, Moore River, Serpentine	Nov-Jan

OID_	SHEET	SPNAME	CONSVCODE	POPID1	POPID2	GDA94LAT	GDA94LONG	VESTING	PURPOSE1	PURPOSE2	STATUS	OWNERDATE
	23556	Amanita carneiphylla		2	1	-32.075	115.83889	PRI	EDE			3/06/1995 0:00
	23557	Amanita griseibrunnea		2	1	-32.075	115.83889	PRI	EDE			3/06/1995 0:00
	21652	Caladenia huegelii	T		3	-32.07628	115.85676	PRI			X	1/01/2004 0:00
	21627	Caladenia huegelii	T		4	-32.07889	115.85833	SHI	OTH		X	22/09/2004 0:00
	25096	Caladenia huegelii	T		6	-32.08261	115.87642	SHI	CON			18/10/2005 0:00
	41414	Caladenia huegelii	T		18	-32.07667	115.90075	SHI				1/09/2009 0:00
	21616	Caladenia huegelii	T		21 A	-32.08184	115.89121	SHI	CON			11/10/2004 0:00
	15598	Caladenia huegelii	T		21 B	-32.07989	115.89093	SHI	RUB			2/10/1998 0:00
	21650	Caladenia huegelii	T		28 A	-32.06611	115.85236	MTR	CPK		X	19/03/2005 0:00
	21651	Caladenia huegelii	T		28 B	-32.06631	115.85108	MTR				28/01/2005 0:00
	23848	Caladenia huegelii	T		41	-32.12758	115.8575	MRD	VER		X	23/10/2006 0:00
	25097	Caladenia huegelii	T		42 A	-32.12703	115.8775	HOW	GVT			14/10/2005 0:00
	21637	Caladenia huegelii	T		42 B	-32.12608	115.87778	PRI				9/10/2004 0:00
	21638	Caladenia huegelii	T		42 C	-32.12458	115.88528	PRI				9/10/2004 0:00
	21639	Caladenia huegelii	T		42 D	-32.12675	115.87694	SHI	VER			9/10/2004 0:00
	21624	Caladenia huegelii	T		56 A	-32.09778	115.88569	COM	AIR			24/09/2004 0:00
	21230	Caladenia huegelii	T		56 B	-32.08636	115.88925	COM	AIR			24/09/2004 0:00
	21847	Caladenia huegelii	T		56 C	-32.08653	115.87594	COM	AIR			29/09/2005 0:00
	21848	Caladenia huegelii	T		56 D	-32.09511	115.87478	COM	AIR			29/09/2005 0:00
	21849	Caladenia huegelii	T		56 E	-32.09047	115.86894	COM	AIR			29/09/2005 0:00
	21850	Caladenia huegelii	T		56 F	-32.08711	115.86797	COM	AIR			29/09/2005 0:00
	21851	Caladenia huegelii	T		56 G	-32.0875	115.87539	COM	AIR			28/09/2005 0:00
	21852	Caladenia huegelii	T		56 H	-32.08264	115.88142	COM	AIR			28/09/2005 0:00
	31753	Caladenia huegelii	T		57	-32.07564	115.87303	SHI	GOL			25/09/2008 0:00
	21112	Caladenia huegelii	T		58	-32.07628	115.85492	SHI	REC			7/10/2004 0:00
	25092	Caladenia huegelii	T		61	-32.14725	115.88689	PRI				5/10/2005 0:00
	6246	Dodonaea hackettiana		4	4 A	-32.13212	115.83065	PRI				15/10/1980 0:00
	6247	Dodonaea hackettiana		4	4 B	-32.13767	115.83065	SHI	VER			15/10/1980 0:00
	6245	Dodonaea hackettiana		4	4 C	-32.14045	115.82926	NON	OTH			15/10/1980 0:00
	6255	Dodonaea hackettiana		4	6	-32.10573	115.82926	PRI				11/11/1981 0:00
	21846	Drakaea elastica	T		29	-32.08628	115.87856	COM	AIR			27/09/2005 0:00
	5218	Tripterococcus paniculatus		4	2	-32.10989	115.91482	UNK				24/11/1980 0:00
	18826	Tripterococcus paniculatus		4	8	-32.08017	115.90037	UNK	UNK			21/03/1999 0:00

OID_ SHEET_NO	SPECIES	CONSCODE	SITE	VEGETATION	LOCALITY	LAT	LONG_	DATE_
PERTH 00190705	Acacia lasiocarpa var. bracteolata	1	Black sandy swampy area.	Jarrah.	1 mile past bridge, Nicholson	-32.09333	115.82333	26 08 1957
PERTH 255955	Caladenia huegelii	T	Sand.	Open low woodland, heath;	Leeming, 400 metres S of South	-32.06666	115.85	21 09 1983
PERTH 256021	Caladenia huegelii	T	In sandy soil.	Jarrah - Banksia woodland.	Bartram Road, Jandakot	-32.11666	115.83333	07 09 1958
PERTH 256013	Caladenia huegelii	T	In sand.	Open low woodland, heath;	Leeming, Finlay Road, 1.5 km S of	-32.06666	115.85	21 09 1983
PERTH 04421213	Caladenia huegelii	T	Coastal plain. Grey sand.	Closed Banksia woodland.	300 m E (right) on sand track, 300	-32.12544	115.87926	20 09 1996
PERTH 04421205	Caladenia huegelii	T	Coastal plain. Grey sand.	Closed Banksia woodland.	300 m E (right) on sand track, 300	-32.12544	115.87926	20 09 1996
PERTH 06752624	Caladenia huegelii	T	Grey sand.	Low open woodland of	Bush Forever Site 390, Fraser	-32.12619	115.88513	30 10 2003
PERTH 06534163	Cyathochaeta teretifolia	3			In or adjacent to Emma Treeby	-32.13333	115.86667	10 12 1995
PERTH 08298815	Dampiera triloba	1	Coastal plain. Damp peaty sand.		North Lake, Pylon track	-32.08274	115.83335	26 10 2010
PERTH 01157663	Dodonaea hackettiana	4	Grey sand.		Intersection Mason and Forrest	-32.11666	115.83333	20 12 1980
PERTH 01157566	Dodonaea hackettiana	4			Bibra Lakes	-32.1	115.81667	11 11 1981
PERTH 01157655	Dodonaea hackettiana	4			Thomson's Lake Reserve,	-32.13333	115.83333	09 1962
PERTH 01157132	Dodonaea hackettiana	4	Disturbed area, in sandy	Eucalyptus marginata open	20 km S of Perth, 1 km S of Bibra	-32.11666	115.81667	05 12 1978
PERTH 01157124	Dodonaea hackettiana	4	Disturbed area, in sandy	Eucalyptus marginata open	20 km S of Perth, 1 km S of Bibra	-32.11666	115.81667	05 12 1978
PERTH 06533345	Jacksonia gracillima	3	Flat ground, grey and brown	Low Forest A, Associated species:	East of Roe Swamp to north of	-32.0848	115.83499	25 10 1994
PERTH 00282235	Microtis quadrata	4	In black peaty soil.	Under paperbarks.	NW side of Lake Jandakot	-32.11666	115.83306	11 11 1960
PERTH 1084135	Phlebocarya pilosissima subsp.	3	Sand ridge.	In Banksia woodland.	Prinsep Road, Jandakot	-32.10833	115.85	23 05 1978
PERTH 03172805	Stylidium longitubum	3			Bartram Road, Jandakot	-32.11666	115.83306	22 11 1973
PERTH 00279188	Thelymitra variegata	3	In yellow sand.	With Banksia attenuata,	Russel Road, Jandakot	-32.11666	115.83306	16 08 1959
PERTH 02521296	Tripterococcus paniculatus	4	Winter wet flats, peaty sand over	Hypocalymma angustifolium low	Gazetted Reserve 418 [Reserve	-32.15	115.88333	21 02 1992
PERTH 05678749	Tripterococcus paniculatus	4	Coastal plain (winter damp). Bare	Low Heath C (Muir, 77).	Remnant bushland between	-32.08017	115.90037	21 03 1999

APPENDIX 3

Protected Matters Search Tool Report



EPBC Act Protected Matters Report

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

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

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

Report created: 08/06/16 13:04:17

[Summary](#)

[Details](#)

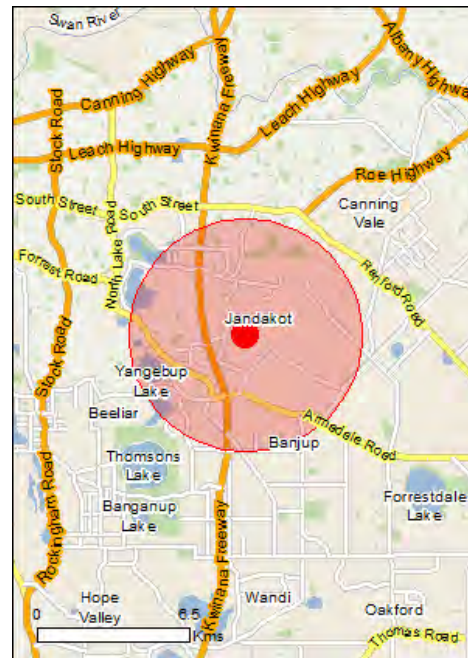
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

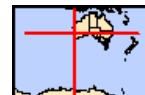
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	18
Listed Migratory Species:	18

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

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

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

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	40
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 and thomsons lakes	Within Ramsar site	

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroi Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty	Endangered	Species or species

Name	Status	Type of Presence
Spider-orchid [7309]		habitat known to occur within area
Diuris micrantha		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei		
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area
Drakaea elastica		
Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area
Lepidosperma rostratum		
Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Thelymitra dedmaniarum		
Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

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

Name
Commonwealth Land -

Listed Marine Species [\[Resource Information \]](#)

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

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		within area Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Black-winged Stilt [870]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Name		State
Thomsons Lake		WA
Unnamed WA49561		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 Resources Audit, 2001.		

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species

Name	Status	Type of Presence habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large- leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Nationally Important Wetlands		[Resource Information]
Name		State
Gibbs Road Swamp System		WA

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 and National Heritage properties, Wetlands of International and National 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.

Coordinates

-32.10783 115.86699

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:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Parks and Wildlife Commission NT, Northern Territory Government](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian 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](#)
- [Forestry Corporation, 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 4

Naturemap Report

NatureMap Species Report

Created By Jackalyn Hams on 08/06/2016

Current Names Only Yes

Core Datasets Only Yes

Method 'By Circle'

Centre 115° 51' 51" E, 32° 06' 30" S

Buffer 5km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	15466	<i>Acacia applanata</i>			
2.	3307	<i>Acacia divergens</i>			
3.	3374	<i>Acacia huegelii</i>			
4.	14932	<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (G.J. Keighery 5026)		P1	
5.	17861	<i>Acacia longifolia</i>	Y		
6.	3502	<i>Acacia pulchella</i> (Prickly Moses)			
7.	15481	<i>Acacia pulchella</i> var. <i>glaberrima</i>			
8.	30032	<i>Acacia saligna</i> subsp. <i>saligna</i>			
9.	3557	<i>Acacia stenoptera</i> (Narrow Winged Wattle)			
10.	3602	<i>Acacia willdenowiana</i> (Grass Wattle)			
11.	24260	<i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
12.	24261	<i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
13.	24262	<i>Acanthiza inornata</i> (Western Thornbill)			
14.		<i>Acantholophus hypoleucus</i>			
15.	24560	<i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
16.	25535	<i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
17.	25536	<i>Accipiter fasciatus</i> (Brown Goshawk)			
18.	24282	<i>Accipiter fasciatus</i> subsp. <i>fasciatus</i> (Brown Goshawk)			
19.	17774	<i>Acetosella vulgaris</i>	Y		
20.	42368	<i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			
21.	25755	<i>Acrocephalus australis</i> (Australian Reed Warbler)			
22.	24831	<i>Acrocephalus australis</i> subsp. <i>gouldi</i> (Australian Reed Warbler)			
23.	41323	<i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
24.	11837	<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> (Common Woollybush)			
25.	1791	<i>Adenanthos obovatus</i> (Basket Flower)			
26.	25544	<i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
27.		<i>Agaricus</i> sp.			
28.	184	<i>Aira caryophyllea</i> (Silvery Hairgrass)	Y		
29.		<i>Akamptogonus novarae</i>			
30.		<i>Albugo</i> sp.			
31.	1728	<i>Allocasuarina fraseriana</i> (Sheoak, Kondil)			
32.	1732	<i>Allocasuarina humilis</i> (Dwarf Sheoak)			
33.		<i>Allothereua maculata</i>			
34.	2652	<i>Alternanthera nodiflora</i> (Common Joyweed)			
35.	18195	<i>Amanita carneiphylla</i>		P2	
36.	38754	<i>Amanita conicobulbosa</i>			
37.	45013	<i>Amanita drummondii</i>		P3	
38.	43543	<i>Amanita fibrilloses</i>		P3	
39.	18196	<i>Amanita griseibrunnea</i>		P2	
40.	38755	<i>Amanita ochroterrea</i>			
41.		<i>Amanita</i> sp.			
42.	43542	<i>Amanita wadjukiorum</i>		P3	
43.		<i>Amaranthus</i> sp.			
44.	200	<i>Amphipogon turbinatus</i>			
45.		<i>Aname mainae</i>			
46.		<i>Aname tepperi</i>			
47.	24310	<i>Anas castanea</i> (Chestnut Teal)			
48.	24312	<i>Anas gracilis</i> (Grey Teal)			
49.	24313	<i>Anas platyrhynchos</i> (Mallard)			
50.	24315	<i>Anas rhynchotis</i> (Australasian Shoveler)			
51.		<i>Anas</i> sp.			
52.	24316	<i>Anas superciliosa</i> (Pacific Black Duck)			
53.	25553	<i>Anhinga melanogaster</i> (Darter)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
54.	<i>Anhinga novaehollandiae</i>			
55.	1409 <i>Anigozanthos humilis</i> (Catspaw)			
56.	11434 <i>Anigozanthos humilis</i> subsp. <i>humilis</i>			
57.	1411 <i>Anigozanthos manglesii</i> (Mangles Kangaroo Paw, Kurulbrang)			
58.	44629 <i>Anilios australis</i>			
59.	<i>Anser anser</i>			
60.	<i>Anser</i> sp.			
61.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
62.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
63.	12724 <i>Anthotium junciforme</i>			
64.	<i>Antichiropus variabilis</i>			
65.	3686 <i>Aotus cordifolia</i>			
66.	3692 <i>Aotus procumbens</i>			
67.	24991 <i>Aprasia repens</i> (Sand-plain Worm-lizard)			
68.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
69.	<i>Araneus cyphoxis</i>			
70.	<i>Araneus eburneiventris</i>			
71.	<i>Araneus senicaudatus</i>			
72.	<i>Archiargiolestes parvulus</i>			
73.	<i>Archiargiolestes pusillus</i>			
74.	38963 <i>Arcyria affinis</i>			Y
75.	38964 <i>Arcyria cinerea</i>			
76.	38965 <i>Arcyria denudata</i>			
77.	38966 <i>Arcyria ferruginea</i>			
78.	38967 <i>Arcyria incarnata</i>			
79.	38970 <i>Arcyria obvelata</i>			
80.	38973 <i>Arcyria pomiformis</i>			
81.	38974 <i>Arcyria stipata</i>			Y
82.	25556 <i>Ardea alba</i> (Great Egret)			
83.	24337 <i>Ardea garzetta</i> subsp. <i>nigripes</i> (Little Egret)			
84.	41324 <i>Ardea modesta</i> (Eastern Great Egret)		IA	
85.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
86.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
87.	1264 <i>Arnocrinum preissii</i>			
88.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
89.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
90.	<i>Artoria flavimana</i>			
91.	<i>Artoria linnaei</i>			
92.	<i>Artoria taeniifera</i>			
93.	20752 <i>Asparagus aethiopicus</i>	Y		
94.	1364 <i>Asphodelus fistulosus</i> (Onion Weed)	Y		
95.	20283 <i>Astartea scoparia</i>			
96.	7851 <i>Asteridea pulverulenta</i> (Common Bristle Daisy)			
97.	6334 <i>Astroloma pallidum</i> (Kick Bush)			
98.	6339 <i>Astroloma xerophyllum</i>			
99.	<i>Austracantha minax</i>			
100.	<i>Austroagrimon cyane</i>			
101.	<i>Austrolestes annulosus</i>			
102.	<i>Austropeplea lessoni</i>			
103.	<i>Austropsocus occidentalis</i>			
104.	17234 <i>Austrostipa compressa</i>			
105.	17240 <i>Austrostipa flavescens</i>			
106.	233 <i>Avena barbata</i> (Bearded Oat)	Y		
107.	<i>Aythya</i> (Nyroca) <i>australis</i>			
108.	24318 <i>Aythya australis</i> (Hardhead)			
109.	17737 <i>Azolla pinnata</i>			
110.	42902 <i>Azolla rubra</i>			
111.	<i>Backobourkia heroine</i>			
112.	<i>Badhamia affinis</i>			
113.	38975 <i>Badhamia capsulifera</i>			Y
114.	38976 <i>Badhamia foliicola</i>			
115.	38977 <i>Badhamia goniospora</i>			Y
116.	<i>Badhamia</i> sp.			
117.	<i>Ballarra longipalpus</i>			
118.	1800 <i>Banksia attenuata</i> (Slender Banksia, Piara)			
119.	1822 <i>Banksia ilicifolia</i> (Holly-leaved Banksia)			
120.	1830 <i>Banksia littoralis</i> (Swamp Banksia, Pungura)			
121.	1834 <i>Banksia menziesii</i> (Firewood Banksia)			
122.	<i>Banksiamyces</i> sp.			
123.	<i>Barnardius zonarius</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
124.	15037	<i>Bartsia trixago</i>	Y		
125.	741	<i>Baumea articulata</i> (Jointed Rush)			
126.	743	<i>Baumea juncea</i> (Bare Twigrush)			
127.	744	<i>Baumea laxa</i>			
128.	745	<i>Baumea preissii</i>			
129.	748	<i>Baumea vaginalis</i> (Sheath Twigrush)			
130.	5382	<i>Beaufortia elegans</i>			
131.	25788	<i>Billardiera fraseri</i> (Elegant Pronaya)			
132.		<i>Biphyllocera kirbyana</i>			
133.	24319	<i>Biziura lobata</i> (Musk Duck)			
134.	749	<i>Bolboschoenus caldwellii</i> (Marsh Club-rush)			
135.	4413	<i>Boronia crenulata</i> (Aniseed Boronia)			
136.	16636	<i>Boronia crenulata</i> subsp. <i>viminea</i>			
137.	4417	<i>Boronia dichotoma</i>			
138.	4420	<i>Boronia fastigiata</i> (Bushy Boronia)			
139.	4438	<i>Boronia ramosa</i>			
140.	3710	<i>Bossiaea eriocarpa</i> (Common Brown Pea)			
141.		<i>Botelloides ludbrookae</i>			Y
142.	30131	<i>Brachyloma preissii</i> subsp. <i>lanceolatum</i>			
143.	30142	<i>Brachyloma preissii</i> subsp. <i>obtusifolium</i>			
144.	30136	<i>Brachyloma preissii</i> subsp. <i>preissii</i>			
145.	7867	<i>Brachyscome bellidoides</i>			
146.	7878	<i>Brachyscome iberidifolia</i>			
147.	42381	<i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
148.	244	<i>Briza maxima</i> (Blowfly Grass)	Y		
149.	245	<i>Briza minor</i> (Shivery Grass)	Y		
150.	249	<i>Bromus diandrus</i> (Great Brome)	Y		
151.	12770	<i>Burchardia congesta</i>			
152.	25714	<i>Cacatua pastinator</i> (Western Long-billed Corella)			
153.	25715	<i>Cacatua roseicapilla</i> (Galah)			
154.	25716	<i>Cacatua sanguinea</i> (Little Corella)			
155.		<i>Cacatua</i> sp.			
156.	24729	<i>Cacatua tenuirostris</i> (Eastern Long-billed Corella)	Y		
157.	25598	<i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
158.	42307	<i>Cacomantis pallidus</i> (Pallid Cuckoo)			
159.	1276	<i>Caesia micrantha</i> (Pale Grass Lily)			
160.		<i>Cairina moschata</i>			
161.	15330	<i>Caladenia arenicola</i>			
162.	1586	<i>Caladenia discoidea</i> (Dancing Orchid)			
163.	1592	<i>Caladenia flava</i> (Cowslip Orchid)			
164.	15348	<i>Caladenia flava</i> subsp. <i>flava</i>			
165.	15502	<i>Caladenia footeana</i>			
166.	1596	<i>Caladenia huegelii</i> (Grand Spider Orchid)		T	
167.	1599	<i>Caladenia latifolia</i> (Pink Fairy Orchid)			
168.	15361	<i>Caladenia longicauda</i> subsp. <i>calcigena</i>			
169.	1604	<i>Caladenia macrostylis</i> (Leaping Spider Orchid)			
170.	1605	<i>Caladenia marginata</i> (White Fairy Orchid)			
171.	17589	<i>Caladenia occidentalis</i>			
172.	15503	<i>Caladenia paludosa</i>			
173.		<i>Caladenia</i> sp.			
174.	2848	<i>Calandrinia corrigioloides</i> (Strap Purslane)			
175.	2856	<i>Calandrinia liniflora</i> (Parakeelya)			
176.	19309	<i>Calectasia narragara</i>			
177.	24779	<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		IA	
178.	24784	<i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
179.	24786	<i>Calidris melanotos</i> (Pectoral Sandpiper)		IA	
180.	24788	<i>Calidris ruficollis</i> (Red-necked Stint)		IA	
181.	24789	<i>Calidris subminuta</i> (Long-toed Stint)		IA	
182.		<i>Calocera guepinioides</i>			
183.	38981	<i>Calomyxa metallica</i>			Y
184.	5415	<i>Calothamnus lateralis</i>			
185.	5429	<i>Calothamnus sanguineus</i> (Silky-leaved Blood flower, Pindak)			
186.		<i>Calvatia</i> sp.			
187.	25717	<i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
188.	24731	<i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black-Cockatoo)		T	
189.	24734	<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
190.		<i>Calyptorhynchus</i> sp.			
191.	5439	<i>Calytrix angulata</i> (Yellow Starflower)			
192.	5458	<i>Calytrix flavescens</i> (Summer Starflower)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
193.	5460 <i>Calytrix fraseri</i> (Pink Summer Calytrix)			
194.	<i>Calytrix</i> sp.			
195.	38767 <i>Campanella gregaria</i>			
196.	<i>Campanella</i> sp.			
197.	32338 <i>Campylopus introflexus</i>	Y		
198.	<i>Carassius auratus</i>			
199.	18555 <i>Cardamine</i> sp. Jandakot (P. Luff s.n. 4/7/1969)	Y		
200.	2794 <i>Carpobrotus aequilaterus</i> (Angular Pigface)	Y		
201.	2795 <i>Carpobrotus edulis</i> (Hottentot Fig)	Y		
202.	1162 <i>Cartonema phylloides</i>			
203.	<i>Castiarina crenata</i>			
204.	<i>Castiarina darkinensis</i>			Y
205.	<i>Castiarina rufipennis</i>			
206.	1742 <i>Casuarina obesa</i> (Swamp Sheoak, Kuli)			
207.	<i>Catasarcus bilineatus</i>			
208.	<i>Catasarcus intermedius</i>			
209.	<i>Catasarcus spinipennis</i>			
210.	6214 <i>Centella asiatica</i>			
211.	1121 <i>Centrolepis aristata</i> (Pointed Centrolepis)			
212.	1125 <i>Centrolepis drummondiana</i>			
213.	2889 <i>Cerastium glomeratum</i> (Mouse Ear Chickweed)	Y		
214.	38982 <i>Ceratomyxa fruticulosa</i>			
215.	17685 <i>Chaetanthes aristatus</i>			
216.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
217.	18156 <i>Chamaecytisus palmensis</i> (Tagasaste)	Y		
218.	1280 <i>Chamaescilla corymbosa</i> (Blue Squill)			
219.	25574 <i>Charadrius dubius</i> (Little Ringed Plover)		IA	
220.	24373 <i>Charadrius melanops</i> (Black-fronted Dotterel)			
221.	24376 <i>Charadrius rubricollis</i> (Hooded Plover)		P4	
222.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
223.	43380 <i>Chelodina colliei</i> (Oblong Turtle)			
224.	24321 <i>Chenonetia jubata</i> (Australian Wood Duck, Wood Duck)			
225.	2483 <i>Chenopodium album</i> (Fat Hen)	Y		
226.	2491 <i>Chenopodium macrospermum</i>	Y		
227.	<i>Cheramoeca leucosterna</i>			
228.	<i>Chiloscyphus semiteres</i> var. <i>semiteres</i>			
229.	7925 <i>Chondrilla juncea</i> (Skeleton Weed)	Y		
230.	17706 <i>Chordifex sinuosus</i>			
231.	8971 <i>Chorizema cordatum</i>			
232.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
233.	<i>Chroicocephalus novaehollandiae</i>			
234.	25601 <i>Chrysococcyx lucidus</i> (Shining Bronze Cuckoo)			
235.	24288 <i>Circus approximans</i> (Swamp Harrier)			
236.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
237.	7937 <i>Cirsium vulgare</i> (Spear Thistle, Scotch Thistle)	Y		
238.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
239.	38983 <i>Clastoderma debaryanum</i>			
240.	<i>Clitocybe</i> sp.			
241.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
242.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
243.	38986 <i>Comatricha elegans</i>			
244.	38988 <i>Comatricha laxa</i>			
245.	38990 <i>Comatricha nigra</i>			
246.	38991 <i>Comatricha pulchella</i>			
247.	4550 <i>Comesperma calymega</i> (Blue-spike Milkwort)			
248.	1858 <i>Conospermum amoenum</i> (Blue Smokebush)			
249.	6348 <i>Conostephium pendulum</i> (Pearl Flower)			
250.	6349 <i>Conostephium preissii</i>			
251.	1418 <i>Conostylis aculeata</i> (Prickly Conostylis)			
252.	11826 <i>Conostylis aculeata</i> subsp. <i>aculeata</i>			
253.	1427 <i>Conostylis candicans</i> (Grey Cottonhead)			
254.	11438 <i>Conostylis candicans</i> subsp. <i>candicans</i>			
255.	1436 <i>Conostylis juncea</i>			
256.	1453 <i>Conostylis serrulata</i>			
257.	1455 <i>Conostylis setosa</i> (White Cottonhead)			
258.	7939 <i>Conyza bonariensis</i> (Flaxleaf Fleabane)	Y		
259.	20074 <i>Conyza sumatrensis</i>	Y		
260.	<i>Coptotermes michaelsoni</i>			
261.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
262.	24363 <i>Coracina novaehollandiae</i> subsp. <i>subpallida</i> (Black-faced Cuckoo-shrike)			

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263.	<i>Cormocephalus aurantipes</i>			
264.	<i>Cormocephalus novaehollandiae</i>			
265.	<i>Cormocephalus rubriceps</i>			
266.	<i>Cortinarius</i> sp.			
267.	24416 <i>Corvus bennetti</i> (Little Crow)			
268.	25592 <i>Corvus coronoides</i> (Australian Raven)			
269.	24417 <i>Corvus coronoides</i> subsp. <i>perplexus</i> (Australian Raven)			
270.	<i>Corvus</i> sp.			
271.	17104 <i>Corymbia calophylla</i> (Marri)			
272.	7945 <i>Cotula coronopifolia</i> (Waterbuttons)	Y		
273.	<i>Coxiella</i> (<i>Coxiella</i>) <i>striatula</i>			
274.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
275.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
276.	24422 <i>Cracticus tibicen</i> subsp. <i>dorsalis</i> (White-backed Magpie)			
277.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
278.	3137 <i>Crassula colorata</i> (Dense Stonecrop)			
279.	3139 <i>Crassula exserta</i>			
280.	3140 <i>Crassula glomerata</i>	Y		
281.	38997 <i>Craterium leucocephalum</i>			
282.	38998 <i>Craterium minutum</i>			
283.	38780 <i>Crepidotus eucalyptorum</i>			
284.	39001 <i>Cribraria cancellata</i>			
285.	39002 <i>Cribraria microcarpa</i>			
286.	39003 <i>Cribraria minutissima</i>			
287.	39006 <i>Cribraria tenella</i>			
288.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
289.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
290.	25400 <i>Crinia insignifera</i> (Squelching Froglet)			
291.	13527 <i>Croninia kingiana</i>			
292.	30893 <i>Cryptoblepharus buechananii</i>			
293.	25020 <i>Cryptoblepharus plagioccephalus</i>			
294.	<i>Cryptoerithus quobba</i>			
295.	1627 <i>Cryptostylis ovata</i> (Slipper Orchid)			
296.	30899 <i>Ctenophorus adelaidensis</i> (Southern Heath Dragon, Western Heath Dragon)			
297.	25027 <i>Ctenotus australis</i>			
298.	25039 <i>Ctenotus fallens</i>			
299.	25040 <i>Ctenotus gemmula</i> (Jewelled South-west Ctenotus (Swan Coastal Plain pop P3), skink)			
300.	25047 <i>Ctenotus impar</i>			
301.	<i>Cubicorhynchus crenicollis</i>			
302.	6663 <i>Cuscuta epithymum</i> (Lesser Dodder, Greater Dodder)	Y		
303.	16245 <i>Cyathochaeta teretifolia</i>		P3	
304.	40660 <i>Cynogeton huegelii</i>			
305.	<i>Cygnus</i> (<i>Chenopsis</i>) <i>atratus</i>			
306.	24322 <i>Cygnus atratus</i> (Black Swan)			
307.	283 <i>Cynodon dactylon</i> (Couch)	Y		
308.	783 <i>Cyperus congestus</i> (Dense Flat-sedge)	Y		
309.	816 <i>Cyperus tenuiflorus</i> (Scaly Sedge)	Y		
310.	<i>Cyrtophora parnasia</i>			
311.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
312.	7454 <i>Dampiera linearis</i> (Common Dampiera)			
313.	7462 <i>Dampiera pedunculata</i>			
314.	7485 <i>Dampiera triloba</i>		P3	
315.	<i>Daphnella</i> (<i>Hemidaphne</i>) <i>souverbiei</i>			
316.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
317.	5508 <i>Darwinia citriodora</i> (Lemon-scented Darwinia)			
318.	1218 <i>Dasypogon bromeliifolius</i> (Pineapple Bush)			
319.	18560 <i>Daviesia divaricata</i> subsp. <i>divaricata</i>			
320.	3832 <i>Daviesia physodes</i>			
321.	3845 <i>Daviesia triflora</i>			
322.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
323.	25468 <i>Demansia psammophis</i> (Yellow-faced Whipsnake)			
324.	25296 <i>Demansia psammophis</i> subsp. <i>reticulata</i> (Yellow-faced Whipsnake)			
325.	<i>Dermocybe clelandii</i>			
326.	<i>Dermocybe</i> sp.			
327.	<i>Descolea maculata</i>			
328.	16595 <i>Desmocladius flexuosus</i>			
329.	<i>Dexerra angularis</i>			
330.	299 <i>Deyeuxia quadriseta</i> (Reed Bentgrass)			
331.	1259 <i>Dianella revoluta</i> (Blueberry Lily)			

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332.	11636 <i>Dianella revoluta</i> var. <i>divaricata</i>			
333.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
334.	1287 <i>Dichopogon capillipes</i>			
335.	32344 <i>Dicranoloma diaphanoneuron</i>			
336.	44064 <i>Dictydiaethalium plumbeum</i>			Y
337.	39011 <i>Diderma asteroides</i>			
338.	39015 <i>Diderma hemisphaericum</i>			Y
339.	<i>Diderma</i> sp.			Y
340.	39017 <i>Didymium anellus</i>			Y
341.	39023 <i>Didymium perforatum</i>			Y
342.	39024 <i>Didymium serpula</i>			
343.	39025 <i>Didymium squamulosum</i>			
344.	32345 <i>Didymodon australasiae</i>			
345.	17838 <i>Dielsia stenostachya</i>			
346.	<i>Dingosa serrata</i>			
347.	19649 <i>Disa bracteata</i>	Y		
348.	11049 <i>Diuris corymbosa</i>			
349.	1636 <i>Diuris pauciflora</i>			
350.	1637 <i>Diuris purdiei</i> (Purdie's Donkey Orchid)		T	
351.	4763 <i>Dodonaea hackettiana</i> (Hackett's Hopbush)		P4	
352.	1639 <i>Drakaea elastica</i> (Glossy-leaved Hammer Orchid)		T	
353.	11156 <i>Drakaea livida</i>			
354.	13635 <i>Drakaea micrantha</i>		T	
355.	3095 <i>Drosera erythrorhiza</i> (Red Ink Sundew)			
356.	13217 <i>Drosera erythrorhiza</i> subsp. <i>erythrorhiza</i>			
357.	15453 <i>Drosera gigantea</i> subsp. <i>gigantea</i>			
358.	3106 <i>Drosera macrantha</i> (Bridal Rainbow)			
359.	3109 <i>Drosera menziesii</i> (Pink Rainbow)			
360.	13216 <i>Drosera menziesii</i> subsp. <i>penicillaris</i>			
361.	13188 <i>Drosera paleacea</i> subsp. <i>paleacea</i>			
362.	3118 <i>Drosera pallida</i> (Pale Rainbow)			
363.	29178 <i>Drosera porrecta</i>			
364.	3133 <i>Drosera subhirtella</i> (Sunny Rainbow)			
365.	3135 <i>Drosera zonaria</i> (Painted Sundew)			
366.	<i>Dysmicoccus macrozamia</i>			
367.	33500 <i>Dysphania ambrosioides</i> (Mexican Tea)	Y		
368.	11105 <i>Echinochloa crus-galli</i>	Y		
369.	39029 <i>Echinostelium minutum</i>			
370.	<i>Ecnomus pansus</i>			
371.	25100 <i>Egernia napoleonis</i>			
372.	<i>Egretta garzetta</i>			
373.	<i>Egretta novaehollandiae</i>			
374.	347 <i>Ehrharta calycina</i> (Perennial Veldt Grass)	Y		
375.	349 <i>Ehrharta longiflora</i> (Annual Veldt Grass)	Y		
376.	42241 <i>Elaeomyxa reticulospora</i>			Y
377.	<i>Elanus axillaris</i>			
378.	25540 <i>Elanus caeruleus</i> (Black-shouldered Kite)			
379.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
380.	5187 <i>Elatine gratioloides</i> (Waterwort)			
381.	<i>Elseymoris melanops</i>			
382.	1643 <i>Elythranthera brunonis</i> (Purple Enamel Orchid)			
383.	1644 <i>Elythranthera emarginata</i> (Pink Enamel Orchid)			
384.	39030 <i>Enerthenema papillatum</i>			
385.	<i>Entoloma</i> sp.			
386.	<i>Eodelena convexa</i>			
387.	<i>Eolophus roseicapillus</i>			
388.	1645 <i>Epiblema grandiflorum</i> (Babe-in-a-cradle)			
389.	6133 <i>Epilobium hirtigerum</i> (Hairy Willow Herb)			
390.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
391.	376 <i>Eragrostis curvula</i> (African Lovegrass)	Y		
392.	13950 <i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>			
393.	13962 <i>Eremaea atala</i>			
394.	13951 <i>Eremaea hadra</i>			
395.	5541 <i>Eremaea pauciflora</i>			
396.	14104 <i>Eremaea pauciflora</i> var. <i>pauciflora</i>			
397.	5543 <i>Eremaea violacea</i> (Violet Eremaea)			
398.	15412 <i>Eriochilus dilatatus</i> subsp. <i>multiflorus</i>			
399.	15414 <i>Eriochilus helonomos</i>			
400.	15415 <i>Eriochilus scaber</i> subsp. <i>scaber</i>			
401.	<i>Eriophora biapicata</i>			

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402.	6219 <i>Eryngium pinnatifidum</i> (Blue Devils)			
403.	<i>Erythrarcus decoris</i>			
404.	24379 <i>Erythronys cinctus</i> (Red-kneed Dotterel)			
405.	5659 <i>Eucalyptus gomphocephala</i> (Tuart, Duart)			
406.	5708 <i>Eucalyptus marginata</i> (Jarrah, Djara)			
407.	13547 <i>Eucalyptus marginata</i> subsp. <i>marginata</i> (Jarrah)			
408.	5739 <i>Eucalyptus patens</i> (Swan River Blackbutt, Dwuda)			
409.	5763 <i>Eucalyptus rudis</i> (Flooded Gum, Kulurda)			
410.	13511 <i>Eucalyptus rudis</i> subsp. <i>rudis</i>			
411.	5790 <i>Eucalyptus todtiana</i> (Coastal Blackbutt)			
412.	3872 <i>Euchilopsis linearis</i> (Swamp Pea)			
413.	4627 <i>Euphorbia helioscopia</i> (Sun Spurge)	Y		
414.	4648 <i>Euphorbia terracina</i> (Geraldton Carnation Weed)	Y		
415.	3880 <i>Eutaxia virgata</i>			
416.	25621 <i>Falco berigora</i> (Brown Falcon)			
417.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
418.	25623 <i>Falco longipennis</i> (Australian Hobby)			
419.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
420.	24041 <i>Felis catus</i> (Cat)	Y		
421.	27748 <i>Flavoparmelia rutidota</i>			
422.	<i>Frankliniella schultzei</i>			
423.	18392 <i>Freesia alba</i> x <i>leichtlinii</i>	Y		
424.	25727 <i>Fulica atra</i> (Eurasian Coot)			
425.	24761 <i>Fulica atra</i> subsp. <i>australis</i> (Eurasian Coot)			
426.	39033 <i>Fuligo septica</i>			
427.	2969 <i>Fumaria capreolata</i> (Whiteflower Fumitory)	Y		
428.	11571 <i>Galenia pubescens</i> var. <i>pubescens</i>	Y		
429.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
430.	24763 <i>Gallinula tenebrosa</i> subsp. <i>tenebrosa</i> (Dusky Moorhen)			
431.	24764 <i>Gallinula ventralis</i> (Black-tailed Native-hen)			
432.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
433.	20475 <i>Gastrolobium capitatum</i>			
434.	20483 <i>Gastrolobium linearifolium</i>			
435.	20482 <i>Gastrolobium nervosum</i>			
436.	3921 <i>Gastrolobium reticulatum</i>			
437.	3924 <i>Gastrolobium spinosum</i> (Prickly Poison)			
438.	42314 <i>Gavialis virescens</i> (Singing Honeyeater)			
439.	24959 <i>Gehyra variegata</i>			
440.	<i>Gelochelidon nilotica</i>			
441.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
442.	24271 <i>Gerygone fusca</i> subsp. <i>fusca</i> (Western Gerygone)			
443.	1520 <i>Gladiolus caryophyllaceus</i> (Wild Gladiolus)	Y		
444.	24735 <i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)			
445.	<i>Glyptophysa</i> (<i>Glyptophysa</i>) <i>georgiana</i>			
446.	10909 <i>Gompholobium confertum</i>			
447.	3957 <i>Gompholobium tomentosum</i> (Hairy Yellow Pea)			
448.	6161 <i>Gonocarpus pithyoides</i>			
449.	<i>Goodenia</i> sp.			
450.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
451.	37500 <i>Grammatotheca bergiana</i> var. <i>bergiana</i>	Y		
452.	<i>Gymnopilus allantopus</i>			
453.	38789 <i>Gymnopilus junonius</i>			
454.	<i>Gymnopilus purpuratus</i>			
455.	<i>Gymnopilus</i> sp.			
456.	1470 <i>Haemodorum paniculatum</i> (Mardja)			
457.	1475 <i>Haemodorum spicatum</i> (Mardja)			
458.	2128 <i>Hakea amplexicaulis</i> (Prickly Hakea)			
459.	2197 <i>Hakea prostrata</i> (Harsh Hakea)			
460.	2216 <i>Hakea varia</i> (Variable-leaved Hakea)			
461.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)		IA	
462.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
463.	3961 <i>Hardenbergia comptoniana</i> (Native Wisteria)			
464.	<i>Hebeloma</i> sp.			
465.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
466.	29594 <i>Helichrysum luteoalbum</i> (Jersey Cudweed)			
467.	<i>Helicoverpa punctigera</i>			
468.	6710 <i>Heliotropium europaeum</i> (Common Heliotrope)	Y		
469.	<i>Hellyethira litua</i>			
470.	16933 <i>Hemiandra glabra</i>			
471.	6838 <i>Hemiandra linearis</i> (Speckled Snakebush)			

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472.	6839	<i>Hemiantra pungens</i> (Snakebush)			
473.		<i>Hemicordulia tau</i>			
474.	25119	<i>Hemiergis quadrilineata</i>			
475.		<i>Hemisaga denticulata</i>			
476.	1293	<i>Hensmania turbinata</i>			
477.		<i>Heterorotula multiformis</i>			
478.	5112	<i>Hibbertia aurea</i>			
479.	5134	<i>Hibbertia huegelii</i>			
480.	5135	<i>Hibbertia hypericoides</i> (Yellow Buttercups)			
481.	45534	<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>			
482.	5162	<i>Hibbertia racemosa</i> (Stalked Guinea Flower)			
483.	43280	<i>Hibbertia sericosepala</i>			
484.		<i>Hibbertia</i> sp. Bankstown (R.T.Miller & C.P.Gibson s.n. 18/10/06)			
485.	5173	<i>Hibbertia subvaginata</i>			
486.	25734	<i>Himantopus himantopus</i> (Black-winged Stilt)			
487.	24775	<i>Himantopus himantopus</i> subsp. <i>leucocephalus</i> (Black-winged Stilt)			
488.	24491	<i>Hirundo neoxena</i> (Welcome Swallow)			
489.	25629	<i>Hirundo nigricans</i> (Tree Martin)			
490.		<i>Hogna crispipes</i>			
491.	444	<i>Holcus lanatus</i> (Yorkshire Fog)	Y		
492.	6222	<i>Homalosciadium homalocarpum</i>			
493.	449	<i>Hordeum leporinum</i> (Barley Grass)	Y		
494.	3966	<i>Hovea pungens</i> (Devil's Pins, Puyenak)			
495.	3968	<i>Hovea trisperma</i> (Common Hovea)			
496.	12859	<i>Hovea trisperma</i> var. <i>trisperma</i>			
497.	12741	<i>Hyalosperma cotula</i>			
498.	5216	<i>Hybanthus calycinus</i> (Wild Violet)			
499.	6240	<i>Hydrocotyle scutellifera</i>			
500.	38795	<i>Hygrocybe conica</i>			
501.	5817	<i>Hypocalymma angustifolium</i> (White Myrtle, Kudjid)			
502.	35070	<i>Hypocalymma angustifolium</i> subsp. Swan Coastal Plain (G.J. Keighery 16777)			
503.	5825	<i>Hypocalymma robustum</i> (Swan River Myrtle)			
504.	8086	<i>Hypochaeris glabra</i> (Smooth Catsear)	Y		
505.		<i>Hypocrea</i> sp.			
506.	1070	<i>Hypolaena exsulca</i>			
507.		<i>Idiomma blackwalli</i>			
508.		<i>Inocybe</i> sp.			
509.	20200	<i>Isolepis cernua</i> var. <i>setiformis</i>			
510.	913	<i>Isolepis fluitans</i> (Floating Club Rush)			
511.	917	<i>Isolepis marginata</i> (Coarse Club-rush)			
512.	921	<i>Isolepis producta</i>			
513.	10831	<i>Isolepis prolifera</i> (Budding Club-rush)	Y		
514.	25478	<i>Isoodon obesulus</i> (Southern Brown Bandicoot)		P5	
515.	24153	<i>Isoodon obesulus</i> subsp. <i>fusciventer</i> (Quenda, Southern Brown Bandicoot)		P5	
516.		<i>Isopeda leishmanni</i>			
517.	8092	<i>Ixiolaena viscosa</i> (Sticky Ixiolaena)			
518.		<i>Ixobrychus dubius</i>			
519.	4012	<i>Jacksonia furcellata</i> (Grey Stinkwood)			
520.	20462	<i>Jacksonia gracillima</i>		P3	
521.	4029	<i>Jacksonia sternbergiana</i> (Stinkwood, Kapur)			
522.	1178	<i>Juncus bufonius</i> (Toad Rush)	Y		
523.	1188	<i>Juncus pallidus</i> (Pale Rush)			
524.		<i>Kangarosa properipes</i>			
525.	17506	<i>Kunzea ericifolia</i> subsp. <i>ericifolia</i>			
526.	15498	<i>Kunzea glabrescens</i> (Spearwood)			
527.		<i>Laccocephalum mylittae</i>			
528.	13562	<i>Lachenalia aloides</i>	Y		
529.	1370	<i>Lachenalia reflexa</i>	Y		
530.	20019	<i>Lachnagrostis filiformis</i>			
531.	6777	<i>Lachnostachys albicans</i>			
532.	38803	<i>Lachnum virgineum</i>			
533.	467	<i>Lagurus ovatus</i> (Hare's Tail Grass)	Y		
534.		<i>Lampona cylindrata</i>			
535.	25637	<i>Larus novaehollandiae</i> (Silver Gull)			
536.	4052	<i>Latrobea tenella</i>			
537.		<i>Latrobiella guttatus</i>			
538.		<i>Latrodectus hasseltii</i>			
539.	1307	<i>Laxmannia ramosa</i> (Branching Lily)			
540.	11911	<i>Laxmannia ramosa</i> subsp. <i>ramosa</i>			
541.	1309	<i>Laxmannia squarrosa</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
542.	7572	<i>Lechenaultia expansa</i>			
543.	7574	<i>Lechenaultia floribunda</i> (Free-flowering Leschenaultia)			
544.	33982	<i>Leioproctus contrarius</i> (bee)		P3	
545.	1051	<i>Lemna disperma</i> (Duckweed)			
546.	39038	<i>Leocarpus fragilis</i>			
547.	44490	<i>Leontodon rhagadioloides</i>	Y		
548.	8099	<i>Leontodon saxatilis</i> (Hairy Hawkbit)	Y		
549.	925	<i>Lepidosperma angustatum</i>			
550.	45753	<i>Lepidosperma oldhamii</i> (Oldham's Sword Sedge)			
551.	940	<i>Lepidosperma pubisquameum</i>			
552.	41649	<i>Lepidosperma rigidulum</i>			
553.	944	<i>Lepidosperma scabrum</i>			
554.		<i>Lepidosperma</i> sp.			
555.	945	<i>Lepidosperma squamatum</i>			
556.	1653	<i>Leporella fimbriata</i> (Hare Orchid)			
557.	15418	<i>Leptoceras menziesii</i>			
558.	2344	<i>Leptomeria empetriiformis</i>			
559.	2350	<i>Leptomeria pauciflora</i> (Sparse-flowered Currant Bush)			
560.	5847	<i>Leptospermum erubescens</i> (Roadside Teatree)			
561.	25133	<i>Lerista elegans</i>			
562.	25147	<i>Lerista lineata</i> (Perth Slider, Lined Skink)		P3	
563.	6374	<i>Leucopogon conostephioides</i>			
564.	6425	<i>Leucopogon oxycedrus</i>			
565.	6427	<i>Leucopogon parviflorus</i> (Coast Beard-heath)			
566.	6434	<i>Leucopogon polymorphus</i>			
567.	6436	<i>Leucopogon propinquus</i>			
568.	6439	<i>Leucopogon pulchellus</i> (Beard-heath)			
569.	6440	<i>Leucopogon racemulosus</i>			
570.		<i>Leucopogon</i> sp.			
571.	19579	<i>Leucopogon</i> sp. Murdoch (M. Hislop 1037)			
572.	40803	<i>Leucopogon squarrosus</i> subsp. <i>squarrosus</i>			
573.	6451	<i>Leucopogon tenuis</i>			
574.	7677	<i>Levenhookia stipitata</i> (Common Stylewort)			
575.	25005	<i>Lialis burtonis</i>			
576.	39042	<i>Licea minima</i>			
577.	39046	<i>Licea rufocuprea</i>			Y
578.		<i>Licea</i> sp.			
579.	25661	<i>Lichmera indistincta</i> (Brown Honeyeater)			
580.	24582	<i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
581.	38808	<i>Limacella pitereka</i>			
582.	25415	<i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
583.	25741	<i>Limosa limosa</i> (Black-tailed Godwit)		IA	
584.	36179	<i>Liparophyllum violifolium</i>			
585.	25378	<i>Litoria adelaidensis</i> (Slender Tree Frog)			
586.	25388	<i>Litoria moorei</i> (Motorbike Frog)			
587.	7408	<i>Lobelia tenuior</i> (Slender Lobelia)			
588.	10957	<i>Lolium perenne</i> x <i>rigidum</i>	Y		
589.	478	<i>Lolium rigidum</i> (Wimmera Ryegrass)	Y		
590.	1223	<i>Lomandra caespitosa</i> (Tufted Mat Rush)			
591.	1228	<i>Lomandra hermaphrodita</i>			
592.	1234	<i>Lomandra nigricans</i>			
593.	1236	<i>Lomandra odora</i> (Tiered Matrush)			
594.	1239	<i>Lomandra preissii</i>			
595.	25683	<i>Lonchura castaneothorax</i> (Chestnut-breasted Mannikin)			
596.		<i>Longepi woodman</i>			
597.		<i>Lophoictinia isura</i>			
598.	8564	<i>Lotus subbiflorus</i>	Y		
599.	4063	<i>Lotus uliginosus</i> (Greater Lotus)	Y		
600.	4066	<i>Lupinus cosentinii</i>	Y		
601.	39048	<i>Lycogala epidendrum</i>			
602.		<i>Lycosa gilberta</i>			
603.	1097	<i>Lyginia barbata</i>			
604.	18049	<i>Lyginia imberbis</i>			
605.	36375	<i>Lysimachia arvensis</i> (Pimpernel)	Y		
606.	6456	<i>Lysinema ciliatum</i> (Curry Flower)			
607.	6458	<i>Lysinema elegans</i>			
608.	34736	<i>Lysinema pentapetalum</i>			
609.	2838	<i>Macarthuria apetala</i>			
610.	2839	<i>Macarthuria australis</i>			
611.	24132	<i>Macropus fuliginosus</i> (Western Grey Kangaroo)			

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612.	24133	<i>Macropus irma</i> (Western Brush Wallaby)		P4	
613.	18119	<i>Macrozamia fraseri</i>			
614.	85	<i>Macrozamia riedlei</i> (Zamia, Djiridji)			
615.	24326	<i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
616.		<i>Malurus</i> (<i>Malurus</i>) <i>splendens</i>			
617.	25651	<i>Malurus lamberti</i> (Variegated Fairy-wren)			
618.	25654	<i>Malurus splendens</i> (Splendid Fairy-wren)			
619.	24583	<i>Manorina flavigula</i> (Yellow-throated Miner)			
620.		<i>Maratus pavonis</i>			
621.		<i>Marchantia berteroana</i>			
622.	4079	<i>Medicago polymorpha</i> (Burr Medic)	Y		
623.	17747	<i>Meeboldina decipiens</i>			
624.	17843	<i>Meeboldina tephрина</i>			
625.	25758	<i>Megalurus gramineus</i> (Little Grassbird)			
626.		<i>Megalurus</i> sp.			
627.	34676	<i>Meionectes brownii</i> (Swamp Raspwort)			
628.	5917	<i>Melaleuca hamulosa</i>			
629.	13273	<i>Melaleuca incana</i> subsp. <i>incana</i>			
630.	18394	<i>Melaleuca parviceps</i>			
631.	5952	<i>Melaleuca preissiana</i> (Moonah)			
632.	5959	<i>Melaleuca raphiophylla</i> (Swamp Paperbark)			
633.	5964	<i>Melaleuca serjata</i>			
634.	5978	<i>Melaleuca teretifolia</i> (Banbar)			
635.	5980	<i>Melaleuca thymoides</i>			
636.	5983	<i>Melaleuca trichophylla</i>			
637.	5987	<i>Melaleuca viminea</i> (Mohan)			
638.	25663	<i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
639.	24587	<i>Melithreptus chloropsis</i> (Western White-naped Honeyeater)			
640.	24736	<i>Melopsittacus undulatus</i> (Budgerigar)			
641.	25184	<i>Menetia greyii</i>			
642.	6884	<i>Mentha spicata</i> (Spearment)	Y		
643.	24598	<i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
644.	955	<i>Mesomelaena pseudostygia</i>			
645.		<i>Metaballus frontalis</i>			
646.		<i>Metaballus litus</i>			
647.		<i>Microcarbo melanoleucos</i>			
648.	25693	<i>Microeca fascians</i> (Jacky Winter)			
649.	1658	<i>Microtis atrata</i> (Swamp Mignonette Orchid)			
650.	8814	<i>Microtis brownii</i>			
651.	31713	<i>Microtis cupularis</i>			
652.	10954	<i>Microtis media</i> (Tall Mignonette Orchid)			
653.	12761	<i>Microtis media</i> subsp. <i>densiflora</i>			
654.	15419	<i>Microtis media</i> subsp. <i>media</i>			
655.	33742	<i>Microtis quadrata</i>		P4	
656.		<i>Microtis</i> sp.			
657.	8106	<i>Millotia tenuifolia</i> (Soft Millotia)			
658.	25542	<i>Milvus migrans</i> (Black Kite)			
659.		<i>Missulena granulosa</i>			
660.		<i>Missulena occatoria</i>			
661.		<i>Mituliodon tarantulinus</i>			
662.		<i>Mitzoruga insularis</i>			
663.	37440	<i>Monopsis debilis</i> var. <i>depressa</i>	Y		
664.	4666	<i>Monotaxis occidentalis</i>			
665.	25191	<i>Morethia lineocellata</i>			
666.	25192	<i>Morethia obscura</i>			
667.	2412	<i>Muehlenbeckia adpressa</i> (Climbing Lignum)			
668.	24223	<i>Mus musculus</i> (House Mouse)	Y		
669.		<i>Mycena carmeliana</i>			
670.		<i>Mycena nargan</i>			
671.		<i>Mycena</i> sp.			
672.	38813	<i>Mycena subgalericulata</i>			
673.		<i>Mycenastrum corium</i>			
674.	25420	<i>Myobatrachus gouldii</i> (Turtle Frog)			
675.	7291	<i>Myoporum insulare</i> (Blueberry Tree, boobialla)			
676.	14187	<i>Myriocephalus occidentalis</i>			
677.	6199	<i>Myriophyllum tillaeoides</i>			
678.		<i>Myrmecia chasei</i>			
679.		<i>Myrmecia infima</i>			
680.	24146	<i>Myrmecobius fasciatus</i> (Numbat, Walpurti)		T	
681.		<i>Nebothriomyrmex majeri</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
682.	25249 <i>Neelaps calonotos</i> (Black-striped Snake)		P3	
683.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
684.	25747 <i>Ninox connivens</i> (Barking Owl)			
685.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
686.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
687.	<i>Notoncus hickmani</i>			
688.	<i>Notoperata syncope</i>			
689.	2401 <i>Nuytsia floribunda</i> (Christmas Tree, Mudja)			
690.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
691.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
692.	<i>Occasitermes occasus</i>			
693.	<i>Occiperipatoides</i> sp.			
694.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
695.	<i>Oecetis pechana</i>			
696.	14293 <i>Oenothera indecora</i> subsp. <i>bonariensis</i>	Y		
697.	20052 <i>Oenothera jamesii</i>	Y		
698.	16347 <i>Oenothera laciniata</i>	Y		
699.	6140 <i>Oenothera mollissima</i>	Y		
700.	39054 <i>Oligonema schweinitzii</i>			
701.	<i>Onthophagus vermiculatus</i>			
702.	36177 <i>Ornduffia albiflora</i>			
703.	<i>Orthetrum caledonicum</i>			
704.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
705.	6005 <i>Osbornia octodonta</i> (Myrtle Mangrove)			
706.	17756 <i>Osteospermum ecklonis</i>	Y		
707.	168 <i>Ottelia ovalifolia</i> (Swamp Lily)			
708.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
709.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
710.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
711.	<i>Pachysaga australis</i>			
712.	<i>Pandion cristatus</i>			
713.	24299 <i>Pandion haliaetus</i> subsp. <i>cristatus</i> (Osprey)			
714.	<i>Paralamyctes cammoensis</i>			Y
715.	<i>Paramphisopus</i> sp.			
716.	25253 <i>Parasuta gouldii</i>			
717.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
718.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
719.	24628 <i>Pardalotus striatus</i> subsp. <i>murchisoni</i> (Striated Pardalote)			
720.	7090 <i>Parentucellia viscosa</i> (Sticky Bartsia)	Y		
721.	30458 <i>Parmotrema reticulatum</i>			
722.	532 <i>Paspalum urvillei</i> (Vasey Grass)	Y		
723.	1550 <i>Patersonia occidentalis</i> (Purple Flag, Koma)			
724.	30471 <i>Patersonia occidentalis</i> var. <i>angustifolia</i>			
725.	4343 <i>Pelargonium capitatum</i> (Rose Pelargonium)	Y		
726.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
727.	16477 <i>Pericalymma ellipticum</i> var. <i>ellipticum</i>			
728.	16478 <i>Pericalymma ellipticum</i> var. <i>floridum</i>			
729.	39057 <i>Perichaena corticalis</i>			
730.	39058 <i>Perichaena depressa</i>			
731.	<i>Peripsocus maoricus</i>			
732.	<i>Peronospora</i> sp.			
733.	13911 <i>Persicaria decipiens</i>			
734.	2273 <i>Persoonia saccata</i> (Snottygobble)			
735.	<i>Petrochelidon (Hylochelidon) nigricans</i>			
736.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
737.	2299 <i>Petrophile linearis</i> (Pixie Mops)			
738.	19825 <i>Petrorhagia dubia</i>	Y		
739.	<i>Peziza</i> sp.			
740.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
741.	24665 <i>Phalacrocorax fuscescens</i> (Black-faced Cormorant)			
742.	25698 <i>Phalacrocorax melanoleucos</i> (Little Pied Cormorant)			
743.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
744.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
745.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
746.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
747.	<i>Phenasteron longiconductor</i>			
748.	18529 <i>Philotheca spicata</i> (Pepper and Salt)			
749.	1478 <i>Phlebocarya ciliata</i>			
750.	1479 <i>Phlebocarya filifolia</i>			
751.	11557 <i>Phlebocarya pilosissima</i> subsp. <i>pilosissima</i>		P3	

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752.	25669	<i>Phylidonyris nigra</i> (White-cheeked Honeyeater)			
753.	24596	<i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
754.	4675	<i>Phyllanthus calycinus</i> (False Boronia)			
755.	4	<i>Phylloglossum drummondii</i> (Pigmy Clubmoss)			
756.	4141	<i>Phyllota gracilis</i>			
757.	39061	<i>Physarum bitectum</i>			
758.	39062	<i>Physarum bivalve</i>			
759.	39063	<i>Physarum cinereum</i>			
760.	39064	<i>Physarum citrinum</i>			Y
761.	39065	<i>Physarum compressum</i>			
762.	39069	<i>Physarum famintzinii</i>			Y
763.	39072	<i>Physarum melleum</i>			
764.	39074	<i>Physarum pusillum</i>			
765.	39076	<i>Physarum sessile</i>			
766.		<i>Physarum</i> sp.			
767.	39079	<i>Physarum viride</i>			
768.		<i>Phytophthora cinnamomi</i>			
769.	5243	<i>Pimelea ferruginea</i>			
770.	11402	<i>Pimelea imbricata</i> var. <i>piligera</i>			
771.	5254	<i>Pimelea leucantha</i>			
772.	5261	<i>Pimelea rosea</i> (Rose Banjine)			
773.	18117	<i>Pimelea rosea</i> subsp. <i>rosea</i>			
774.	12041	<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>			
775.		<i>Pinkfloydia harveii</i>			
776.	42281	<i>Pithocarpa cordata</i>			
777.	8165	<i>Pithocarpa pulchella</i> (Beautiful Pithocarpa)			
778.	18353	<i>Pithocarpa pulchella</i> var. <i>pulchella</i>			
779.	24841	<i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
780.	24747	<i>Platycercus spurius</i> (Red-capped Parrot)			
781.	25721	<i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
782.	24750	<i>Platycercus zonarius</i> subsp. <i>semitorquatus</i> (Twenty-eight Parrot)			
783.	6249	<i>Platysace compressa</i> (Tapeworm Plant)			
784.	6253	<i>Platysace filiformis</i>			
785.	4524	<i>Platytheca galioides</i>			
786.	24843	<i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
787.	25509	<i>Pletholax gracilis</i> (Keeled Legless Lizard)			
788.	25007	<i>Pletholax gracilis</i> subsp. <i>gracilis</i> (Keeled Legless Lizard)			
789.	24382	<i>Pluvialis fulva</i> (Pacific Golden Plover)		IA	
790.	24383	<i>Pluvialis squatarola</i> (Grey Plover)		IA	
791.	578	<i>Poa porphyroclados</i>			
792.	25703	<i>Podargus strigoides</i> (Tawny Frogmouth)			
793.	25704	<i>Podiceps cristatus</i> (Great Crested Grebe)			
794.	8175	<i>Podolepis gracilis</i> (Slender Podolepis)			
795.	8182	<i>Podotheca angustifolia</i> (Sticky Longheads)			
796.	8183	<i>Podotheca chrysantha</i> (Yellow Podotheca)			
797.	8184	<i>Podotheca gnaphalioides</i> (Golden Long-heads)			
798.		<i>Podykipus collinus</i>			
799.	25510	<i>Pogona minor</i> (Dwarf Bearded Dragon)			
800.	24907	<i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
801.		<i>Pogona</i> sp.			
802.	24681	<i>Polioccephalus poliocephalus</i> (Hoary-headed Grebe)			
803.	582	<i>Polypogon monspeliensis</i> (Annual Beardgrass)	Y		
804.	25722	<i>Polytelis anthopeplus</i> (Regent Parrot)			
805.	4691	<i>Poranthera microphylla</i> (Small Poranthera)			
806.	44729	<i>Porostereum crassum</i>			
807.		<i>Porphyrio</i> (Porphyrio) <i>porphyrio</i>			
808.	25731	<i>Porphyrio porphyrio</i> (Purple Swamphen)			
809.	24767	<i>Porphyrio porphyrio</i> subsp. <i>bellus</i> (Purple Swamphen)			
810.	24769	<i>Porzana fluminea</i> (Australian Spotted Crane)			
811.	25732	<i>Porzana pusilla</i> (Baillon's Crane)			
812.	24771	<i>Porzana tabuensis</i> (Spotless Crane)			
813.	1670	<i>Prasophyllum drummondii</i> (Swamp Leek Orchid)			
814.	1672	<i>Prasophyllum fimbria</i> (Fringed Leek Orchid)			
815.	1673	<i>Prasophyllum gibbosum</i> (Humped Leek Orchid)			
816.	1677	<i>Prasophyllum macrostachyum</i> (Laughing Leek Orchid)			
817.	10853	<i>Prasophyllum plumiforme</i>			
818.	1681	<i>Prasophyllum regium</i> (King Leek Orchid)			
819.		<i>Prionosternum scutatum</i>			
820.	25511	<i>Pseudonaja affinis</i> (Dugite)			
821.	25259	<i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
822.	25433	<i>Pseudophryne guentheri</i> (Crawling Toadlet)			
823.	15426	<i>Pterostylis aspera</i>			
824.		<i>Pterostylis</i> sp.			
825.	1698	<i>Pterostylis vittata</i> (Banded Greenhood)			
826.	2718	<i>Ptilotus drummondii</i> (Narrowleaf Mulla Mulla)			
827.	11260	<i>Ptilotus drummondii</i> var. <i>drummondii</i> (Pussytail)			
828.	2751	<i>Ptilotus polystachyus</i> (Prince of Wales Feather)			
829.		<i>Ptycta cornigera</i>			Y
830.		<i>Ptycta emarginata</i>			Y
831.		<i>Ptycta improcera</i>			Y
832.	4177	<i>Pultenaea ochreatea</i>			
833.	4181	<i>Pultenaea reticulata</i>			
834.		<i>Pulvinaria</i> sp.			
835.		<i>Purpureicephalus spurius</i>			
836.	25008	<i>Pygopus lepidopodus</i> (Common Scaly Foot)			
837.	16367	<i>Pyrorchis nigricans</i> (Red beaks, Elephants ears)			
838.	8195	<i>Quinetia urvillei</i>			
839.	24243	<i>Rattus fuscipes</i> (Western Bush Rat)			
840.	24244	<i>Rattus norvegicus</i> (Brown Rat)	Y		
841.	24245	<i>Rattus rattus</i> (Black Rat)	Y		
842.		<i>Rattus</i> sp.			
843.		<i>Raveniella cirrata</i>			
844.		<i>Raveniella peckorum</i>			
845.	24776	<i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
846.	6012	<i>Regelia ciliata</i>			
847.	6014	<i>Regelia inops</i>			
848.	39081	<i>Reticularia lycoperdon</i>			
849.	4822	<i>Rhamnus alaternus</i> (Buckthorn)	Y		
850.	25613	<i>Rhipidura fuliginosa</i> (Grey Fantail)			
851.	25614	<i>Rhipidura leucophrys</i> (Willie Wagtail)			
852.	24454	<i>Rhipidura leucophrys</i> subsp. <i>leucophrys</i> (Willie Wagtail)			
853.		<i>Rostratula australis</i>			
854.	44608	<i>Rosulabryum billardieri</i>			
855.	2433	<i>Rumex crispus</i> (Curled Dock)	Y		
856.		<i>Rybaxis</i> sp.			
857.	40425	<i>Rytidosperma caespitosum</i>			
858.	7603	<i>Scaevola canescens</i> (Grey Scaevola)			
859.	13182	<i>Scaevola repens</i> var. <i>repens</i>			
860.	978	<i>Schoenus brevisetis</i>			
861.	979	<i>Schoenus caespititius</i>			
862.	982	<i>Schoenus clandestinus</i>			
863.	984	<i>Schoenus curvifolius</i>			
864.	992	<i>Schoenus grandiflorus</i> (Large Flowered Bogrush)			
865.	6033	<i>Scholtzia involucrata</i> (Spiked Scholtzia)			
866.		<i>Scleroderma</i> sp.			
867.		<i>Sclerorhinella crawshawii</i>			
868.		<i>Scolopendra laeta</i>			
869.		<i>Scutellinia scutellata</i>			
870.	6	<i>Selaginella gracillima</i> (Tiny Clubmoss)			
871.	25878	<i>Senecio condylus</i>			
872.	20663	<i>Senecio multicaulis</i> subsp. <i>multicaulis</i>			
873.	25534	<i>Sericornis frontalis</i> (White-browed Scrubwren)			
874.		<i>Servaea melaina</i>			
875.	24145	<i>Setonix brachyurus</i> (Quokka)		T	
876.	15972	<i>Silene gallica</i> var. <i>gallica</i>	Y		
877.	8225	<i>Siloxerus humifusus</i> (Procumbent Siloxerus)			
878.		<i>Simaetha tenuior</i>			
879.	25266	<i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
880.		<i>Smeringopus natalensis</i>			
881.	30948	<i>Smicromis brevirostris</i> (Weebill)			
882.	7022	<i>Solanum nigrum</i> (Black Berry Nightshade)	Y		
883.	9259	<i>Solanum nodiflorum</i> (Glossy Nightshade)			
884.	7037	<i>Solanum symonii</i>			
885.	45036	<i>Solidago chilensis</i>	Y		
886.	8231	<i>Sonchus oleraceus</i> (Common Sowthistle)	Y		
887.	1560	<i>Sparaxis pillansii</i> (Harlequin Flower)	Y		
888.	4205	<i>Sphaerolobium linophyllum</i>			
889.	4211	<i>Sphaerolobium vimineum</i> (Leafless Globe Pea)			
890.		<i>Sphenophorus brunnipennis</i>			
891.	4828	<i>Spyridium globulosum</i> (Basket Bush)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
892.	9069	<i>Stackhousia huegelii</i>			
893.		<i>Steatoda capensis</i>			
894.	2918	<i>Stellaria media</i> (Chickweed)	Y		
895.	39083	<i>Stemonitis fusca</i>			
896.	39088	<i>Stemonitis virginensis</i>			
897.	39090	<i>Stemonitopsis gracilis</i>			
898.	24528	<i>Sterna hybrida</i> subsp. <i>javanica</i> (Whiskered Tern)			
899.	24329	<i>Stictonetta naevosa</i> (Freckled Duck)			
900.	2316	<i>Stirlingia latifolia</i> (Blueboy)			
901.	25597	<i>Strepera versicolor</i> (Grey Currawong)			
902.	24426	<i>Strepera versicolor</i> subsp. <i>plumbea</i> (Grey Currawong)			
903.	25589	<i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
904.	25590	<i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
905.	44492	<i>Stuckenia pectinata</i>			
906.	25831	<i>Stylidium araeophyllum</i> (Stilt Walker)			
907.	7693	<i>Stylidium brunonianum</i> (Pink Fountain Triggerplant)			
908.	7756	<i>Stylidium longitubum</i> (Jumping Jacks)		P4	
909.	25800	<i>Stylidium paludicola</i>		P3	
910.	7774	<i>Stylidium piliferum</i> (Common Butterfly Triggerplant)			
911.	7777	<i>Stylidium preissii</i> (Lizard Triggerplant)			
912.	7785	<i>Stylidium repens</i> (Matted Triggerplant)			
913.	25806	<i>Stylidium scariosum</i>			
914.	7798	<i>Stylidium schoenoides</i> (Cow Kicks)			
915.		<i>Succinea</i> (<i>succinea</i>)			
916.		<i>Supunna funerea</i>			
917.		<i>Supunna picta</i>			
918.	25902	<i>Symphyotrichum squamatum</i> (Bushy Starwort)	Y		
919.	15532	<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>			
920.	33992	<i>Synemon gratiosa</i> (Graceful Sunmoth)		P4	
921.		<i>Synemon</i> sp.			
922.		<i>Synothele michaelsoni</i>			
923.	25705	<i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
924.	24682	<i>Tachybaptus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
925.	24185	<i>Tadarida australis</i> (White-striped Freetail-bat)			
926.	25552	<i>Tadorna radjah</i> (Radjah Shelduck)			
927.	24331	<i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
928.		<i>Talaurinus carbonarius</i>			
929.		<i>Talaurinus</i> sp.			
930.	24167	<i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
931.	4535	<i>Tetradlea hirsuta</i> (Black Eyed Susan)			
932.	10856	<i>Thelymitra benthamiana</i> (Leopard Orchid)			
933.	1702	<i>Thelymitra campanulata</i> (Shirt Orchid)			
934.	1710	<i>Thelymitra mucida</i> (Plum Orchid)			
935.	1716	<i>Thelymitra tigrina</i> (Tiger Orchid)			
936.	1717	<i>Thelymitra variegata</i> (Queen of Sheba)		P2	
937.	24844	<i>Threskiornis molucca</i> (Australian White Ibis)			
938.	24845	<i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
939.	33994	<i>Throscodectes xiphos</i> (cricket)		P1	Y
940.	1318	<i>Thysanotus arbuscula</i>			
941.	1319	<i>Thysanotus arenarius</i>			
942.	1338	<i>Thysanotus manglesianus</i> (Fringed Lily)			
943.	1351	<i>Thysanotus sparteus</i>			
944.	1357	<i>Thysanotus thyrsoides</i>			
945.	1358	<i>Thysanotus triandrus</i>			
946.	25203	<i>Tiliqua occipitalis</i> (Western Bluetongue)			
947.	25519	<i>Tiliqua rugosa</i>			
948.	25204	<i>Tiliqua rugosa</i> subsp. <i>aspera</i>			
949.	25207	<i>Tiliqua rugosa</i> subsp. <i>rugosa</i>			
950.		<i>Tinytrema yarra</i>			
951.	25549	<i>Todiramphus sanctus</i> (Sacred Kingfisher)			
952.	24309	<i>Todiramphus sanctus</i> subsp. <i>sanctus</i> (Sacred Kingfisher)			
953.		<i>Tomentella</i> sp.			
954.	6280	<i>Trachymene pilosa</i> (Native Parsnip)			
955.		<i>Tribonyx ventralis</i>			
956.	4383	<i>Tribulus terrestris</i> (Caltrop)	Y		
957.	39094	<i>Trichia affinis</i>			
958.	39095	<i>Trichia botrytis</i>			
959.	39096	<i>Trichia contorta</i>			
960.	39097	<i>Trichia decipiens</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
961.	39100 <i>Trichia persimilis</i>			
962.	<i>Trichia</i> sp.			
963.	39101 <i>Trichia varia</i>			
964.	39102 <i>Trichia verrucosa</i>			
965.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
966.	<i>Tricholoma</i> sp.			
967.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
968.	1361 <i>Tricoryne elatior</i> (Yellow Autumn Lily)			
969.	4289 <i>Trifolium angustifolium</i> (Narrowleaf Clover)	Y		
970.	4292 <i>Trifolium campestre</i> (Hop Clover)	Y		
971.	4309 <i>Trifolium scabrum</i> (Rough Clover)	Y		
972.	150 <i>Triglochin stowardii</i>			
973.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
974.	24808 <i>Tringa nebularia</i> (Common Greenshank)		IA	
975.	44444 <i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234)		P4	
976.	39103 <i>Tubifera ferruginosa</i>			
977.	25761 <i>Turnix varia</i> (Painted Button-quail)			
978.	98 <i>Typha domingensis</i> (Bulrush, Djandjidi)			
979.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
980.	<i>Urabunana</i> sp.			
981.	<i>Urodacus novaehollandiae</i>			
982.	8255 <i>Ursinia anthemoides</i> (Ursinia)	Y		
983.	25577 <i>Vanellus miles</i> (Masked Lapwing)			
984.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
985.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
986.	<i>Venator immansueta</i>			
987.	<i>Venatrix pullastra</i>			
988.	6077 <i>Verticordia drummondii</i> (Drummond's Featherflower)			
989.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
990.	11474 <i>Vicia sativa</i> subsp. <i>nigra</i>	Y		
991.	4325 <i>Viminaria juncea</i> (Swishbush, Koweda)			
992.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
993.	724 <i>Vulpia myuros</i> (Rat's Tail Fescue)	Y		
994.	7384 <i>Wahlenbergia capensis</i> (Cape Bluebell)	Y		
995.	7389 <i>Wahlenbergia preissii</i>			
996.	<i>Wahlenbergia</i> sp.			
997.	8282 <i>Waitzia suaveolens</i> (Fragrant Waitzia)			
998.	1567 <i>Watsonia meriana</i> (Bulbil Watsonia)	Y		
999.	39104 <i>Willkommia reticulata</i>			
1000.	<i>Xanthagrion erythroneurum</i>			
1001.	1256 <i>Xanthorrhoea preissii</i> (Grass tree, Palga)			
1002.	<i>Xanthorrhoea</i> sp.			
1003.	6289 <i>Xanthosia huegelii</i>			
1004.	2331 <i>Xylomelum occidentale</i> (Woody Pear, Djandjini)			
1005.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silveryeye)			

Conservation Codes

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

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

APPENDIX 5

Conservation Codes

Conservation Codes for Western Australian Flora and Fauna

Specially protected fauna or flora are species* which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected fauna and flora are:

T Threatened species – Schedules 1-4

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

- **Threatened fauna** is that subset of ‘Specially Protected Fauna’ declared to be ‘likely to become extinct’ pursuant to section 14(4) of the Wildlife Conservation Act.
- **Threatened flora** is flora that has been declared to be ‘likely to become extinct or is rare, or otherwise in need of special protection’, pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species – Schedule 1

Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EN Endangered species – Schedule 2

Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

VU Vulnerable species - Schedule 3

Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EX Presumed extinct species - Schedule 4

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

IA Migratory birds protected under an international agreement - Schedule 5

Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.

CD Conservation dependent fauna - Schedule 6

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.

OS Other specially protected fauna - Schedule 7

Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare: Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened: Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

A list of the current rankings can be downloaded from the Parks and Wildlife Threatened Species and Communities webpage at <http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities>

Commonwealth of Australia Conservation Codes

Threatened fauna and flora may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in any one of the following six categories:

Extinct

A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.

Extinct in the wild

A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:

- a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
- b) 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.

Critically endangered

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

Endangered

A taxon is Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing a very high risk of extinction in the wild.

Vulnerable

A taxon is Vulnerable when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing a high risk of extinction in the wild.

Conservation dependent

A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:

- a) 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; or
- b) the following subparagraphs are satisfied:
 - i. the species is a species of fish;

- ii. the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;
- iii. the plan of management is in force under a law of the Commonwealth or of a State or Territory;
- iv. cessation of the plan of management would adversely affect the conservation status of the species.

The EPBC Act does not provide for listing in a data deficient category. Where sufficient data (evidence) is unavailable to allow assessment by the Threatened Species Scientific Committee against the criteria for listing, the species are found to be ineligible. A recommendation is made to the Minister to not include the species in any category under the EPBC Act. For reasons of transparency and to inform future research, the Threatened Species Scientific Committee publishes the names of those species found to be data deficient. As data deficient is not a listing category under the EPBC Act, this has no statutory implications and the species is not considered to be listed under the EPBC Act.

APPENDIX 6

Native species recorded on the site

Lot 101/102 Jandakot Road – Provisional Flora List (Site inspection 6 May 2016)

Species Recorded in the Triangle of Banksia Woodland to the north of the factory and east of the nursery.

Monocotyledons

Amphipogon turbinatus
**Avena fatua*
Burchardia congesta
Conostylis aculeata
Dasypogon bromeliifolius
Desmocladius flexuosus
**Gladiolus caryophyllaceus*
Laxmannia squarrosa
Lepidosperma pubisquameum
Lomandra preissii
Lomandra ?suaveolens
Lyginia barbata
Patersonia occidentalis
Schoenus curvifolius
Thysanotus triandrus
**Ursinia anthemoides*

Dicotyledons

Acacia pulchella
Acacia stenoptera
Adenanthos cygnorum
Allocasuarina humilis
Banksia attenuata
Banksia menziesii
Beaufortia elegans
Bossiaea eriocarpa
Conostephium pendulum
Dampiera linearis
Eremaea pauciflora
Gompholobium tomentosum
Hemiandra pungens
Hibbertia hypericoides
Hibbertia subvaginata
Hypocalymma robustum
Jacksonia furcellata

Leucopogon conostephioides

Nuytsia floribunda

Petrophile linearis

Pimelea sp.

Scholtzia involucrata

Stirlingia latifolia

Stylidium repens

Additional local native species (not planted) recorded in revegetation areas including northern batter slopes and flat excavated area.

Eucalyptus tottiana

Synaphea spinulosa

APPENDIX 7

DPaW Fauna Database Search

NAME	SOURCE_CODE	SOURCE_ID	NAME_ID	FAMILY	GENUS	SPECIES	INFRARANK	INFRANAME	AUTHOR	VERNACULAR	KINGDOM	CONSERVATION_C ODE	CLASS	SITE_NAME	DAY	MONTH	YEAR	LOCALITY_NAME
Botaurus poiciloptilus	TFAUNA	8405	24345	Ardeidae	Botaurus	poiciloptilus			(Wagler)	Australasian Bittern	Animalia	T	BIRD	Lake Jandabup	01	12	1983	JANDABUP
Botaurus poiciloptilus	TFAUNA	8404	24345	Ardeidae	Botaurus	poiciloptilus			(Wagler)	Australasian Bittern	Animalia	T	BIRD	Lake Jandabup	01	07	1982	JANDABUP
Calyptorhynchus baudinii	BIRDATLAS2	708181	24733	Psittacidae	Calyptorhynchus	baudinii			Lear	Baudin's Cockatoo	Animalia	T	BIRD	Jandabup Lake	01	09	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	586877	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	25	03	2001	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	936418	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Jandabup Lake southeast	15	02	2008	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	686725	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Jandabup Lake	11	01	2003	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	604003	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	18	01	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	670733	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Jandabup lake	14	07	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	624953	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Hawkins Road	05	05	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	604001	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	18	01	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	501066	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	19	05	2001	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	680303	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Hawkins Rd, Jandabup	01	01	2003	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	501059	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	14	04	2001	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	604077	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	02	03	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	501051	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	09	03	2001	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	501074	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	16	06	2001	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	627742	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Jandabup Lake	14	04	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	627746	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Jandabup Lake	19	05	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	608346	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	28	12	2001	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	624950	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Jandabup	14	04	2002	JANDABUP
Calyptorhynchus latirostris	BIRDATLAS2	199660	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	18	01	1999	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	268014	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	01	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	686724	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Gnangara	11	01	2003	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	470175	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	03	2001	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	466649	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	08	2000	GNANGARA
Calyptorhynchus latirostris	TFAUNA	8184	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Gnangara, Alexander Dr (8399, 27278, 27279, 43901) (Site Number 20)	01	09	2003	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	277703	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	04	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	268009	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	12	1999	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	469472	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	12	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	466644	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	07	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	167211	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	04	1999	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	257837	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangarra	30	07	1999	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	469467	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	11	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	317441	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	04	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	469461	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	10	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	164400	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	10	1999	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	199656	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	18	10	1998	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	277694	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	29	02	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	167215	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	09	1999	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	470187	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	05	2001	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	469477	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	01	2001	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	317446	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	05	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	470181	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	04	2001	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	277698	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	31	03	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	268004	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	11	1999	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	466654	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	30	09	2000	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	470168	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Gnangara	28	02	2001	GNANGARA
Calyptorhynchus latirostris	BIRDATLAS2	636345	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Gnangara	03	08	2002	GNANGARA
Calyptorhynchus latirostris	TFAUNA	8182	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Landsdale Park, Landsdale Rd (24794) (Site Number 17)	01	09	2003	DARCH
Calyptorhynchus latirostris	BIRDATLAS2	773305	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Caravan Park	31	07	2004	MADELEY
Calyptorhynchus latirostris	WAMSPECIMENS	A28018	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD		08	02	2001	WANGARA
Calyptorhynchus latirostris	BIRDATLAS2	1027729	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Belgrade Park	15	04	2005	WANNEROO
Calyptorhynchus latirostris	BIRDATLAS2	708187	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Badgerup Lake	01	09	2002	WANNEROO
Calyptorhynchus latirostris	TFAUNA	8205	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Mary St Park, Mary St (44168) (Site Number 80)	01	09	2003	WANNEROO
Calyptorhynchus latirostris	BIRDATLAS2	680299	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Badgerup	21	12	2002	WANNEROO
Calyptorhynchus latirostris	TFAUNA	8204	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Edgar Griffiths Park, Garden Park Dr (36601) (Site Number 76)	01	09	2003	WANNEROO
Calyptorhynchus latirostris	BIRDATLAS2	529117	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Goollelal, Kingsley	26	06	2001	KINGSLEY
Calyptorhynchus latirostris	BIRDATLAS2	914916	24734	Psittacidae	Calyptorhynchus	latirostris			Carnaby	Carnaby's Cockatoo	Animalia	T	BIRD	Lake Goollelal	10	07	2007	KINGSLEY
Synemon gratioa	FAUNASURVEY	214990	33992	Castniidae	Synemon	gratioa				Graceful Sunmoth	Animalia	T	INVERT	Site 1	18	03	2011	GNANGARA
Synemon gratioa	FAUNASURVEY	214989	33992	Castniidae	Synemon	gratioa				Graceful Sunmoth	Animalia	T	INVERT	Site 1	03	11	2011	GNANGARA
Isodon obesulus subsp. fusciventer	TFAUNA	1512	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	Snake Swamp	12	12	1997	LANDSDALE
Isodon obesulus subsp. fusciventer	TFAUNA	8185	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	Lake Gnangara, Alexander Dr (8399, 27278, 27279, 43901) (Site Number 20)	01	09	2003	GNANGARA
Isodon obesulus subsp. fusciventer	TFAUNA	8183	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	Landsdale Park, Landsdale Rd (24794) (Site Number 17)	01	09	2003	DARCH
Isodon obesulus subsp. fusciventer	TFAUNA	8206	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	176 Mary St, Wanneroo (Site Number 82)	01	09	2003	PEARSALL
Isodon obesulus subsp. fusciventer	TFAUNA	8202	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	Little Bagerup Swamp, Badgerup Rd (8162 & 42870) (Site Number 69)	01	09	2003	WANNEROO
Isodon obesulus subsp. fusciventer	TFAUNA	5730	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	Badgerup Lake	12	12	1997	WANNEROO
Isodon obesulus subsp. fusciventer	TFAUNA	8203	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	Lake Joondalup, Ocean Reef Rd (Site Number 72)	01	09	2003	WANNEROO
Isodon obesulus subsp. fusciventer	TFAUNA	8207	24153	Peramelidae	Isodon	obesulus	subsp.	fusciventer	(Gray)	Southern Brown Bandicoot	Animalia	5	MAMMAL	212 Mary St, Wanneroo (Site Number 82)	01	09	2003	WANNEROO
Falcunculus frontatus subsp. leucogaster	TFAUNA	3870	24616	Pachycephalidae	Falcunculus	frontatus	subsp.	leucogaster	Gould		Animalia	4	BIRD	Wanneroo area	01	05	1943	SINAGRA
Hydromys chrysogaster	WAMSPECIMENS	M56290	24215	Muridae	Hydromys	chrysogaster			Geoffroy	Water-rat	Animalia	4	MAMMAL	LAKE GOOLLELAL	20	05	2004	KINGSLEY
Hydromys chrysogaster	FAUNASURVEY	73642	24215	Muridae	Hydromys	chrysogaster			Geoffroy	Water-rat	Animalia	4	MAMMAL	Lake Goollelal	06	07	2009	KINGSLEY
Ixobrychus minutus	TFAUNA	3270	25563	Ardeidae	Ixobrychus	minutus			(Linnaeus)	Little Bittern	Animalia	4	BIRD	Jandabup Lake, Wanneroo	01	01	1986	JANDABUP
Ixobrychus minutus	TFAUNA	6585	25563	Ardeidae	Ixobrychus	minutus			(Linnaeus)	Little Bittern	Animalia	4	BIRD	Jandabup Lake	19	11	1983	JANDABUP
Ixobrychus minutus	TFAUNA	5817	25563	Ardeidae	Ixobrychus	minutus			(Linnaeus)	Little Bittern	Animalia	4	BIRD	James spiers Drive, Wanneroo. Edge of artificial pond.	29	10	2001	WANNEROO
Ixobrychus minutus	TFAUNA	6465	25563	Ardeidae	Ixobrychus	minutus			(Linnaeus)	Little Bittern	Animalia	4	BIRD	James				



Appendix E

Bushfire Management Plan

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address: Lots 807 to 811 Jandakot Road, Jandakot

Site visit: Yes ☒ No ☐

Date of site visit (if applicable): Day 20th Month December Year 2022

Report author or reviewer: Ian Macleod

WA BPAD accreditation level (please circle):

Not accredited ☐ Level 1 BAL assessor ☐ Level 2 practitioner ☒ Level 3 practitioner ☐

If accredited please provide the following.

BPAD accreditation number: 39131 Accreditation expiry: Month November Year 2023

Bushfire management plan version number: 1.0

Bushfire management plan date: Day 5th Month January Year 2023

Client/business name: TJS Advisory

	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the bushfire protection criteria elements)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Is the proposal any of the following (see [SPP 3.7 for definitions](#))?

	Yes	No
Unavoidable development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Strategic planning proposal (including rezoning applications)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
High risk land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vulnerable land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>

None of the above ☐

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

A Method 2 Assessment (slope only) has been adopted for vegetation area 7 to achieve a more precise BAL calculation for the proposed Building 7 on Lot 811, and for the indicative location of a future Building 3 on Lot 809.

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author or reviewer

Ian Macleod

Date 5th January 2023



South Connect Industrial
Development

Bushfire Management Plan (BMP)

- ◇ Assessment of potential bushfire impact
- ◇ Environmental conservation
- ◇ Assessment of the **development's ability to** acceptably mitigate bushfire risk through application of required and/or additional bushfire protection measures
- ◇ Creation of responsibilities to implement and maintain protection measures

-32.11027, 115.86511, 7.6m, 73°

Produced to meet the relevant requirements of STATE PLANNING POLICY 3.7 Planning in Bushfire Prone Areas & Guidelines

Lot 807, Pt Lot 808, Lot 809, Lot 810 and Lot
811 Jandakot Road, Jandakot

City of Cockburn

Development Application

5 January 2023

Job Reference No: 190121

BPP GROUP PTY LTD T/A BUSHFIRE PRONE PLANNING

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		-		<input type="checkbox"/>	<input type="checkbox"/>
<p><i>Limitations: The protection measures that will be implemented based on information presented in this Bushfire Management Plan are minimum requirements and they do not guarantee that buildings or infrastructure will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating.</i></p> <p><i>This is substantially due to the unpredictable nature and behaviour of fire and fire weather conditions. Additionally, the correct implementation of the required protection measures (including bushfire resistant construction) and any other required or recommended measures, will depend upon, among other things, the ongoing actions of the landowners and/or operators over which Bushfire Prone Planning has no control.</i></p> <p><i>All surveys, forecasts, projections and recommendations made in this report associated with the proposed development are made in good faith based on information available to Bushfire Prone Planning at the time. All maps included herein are indicative in nature and are not to be used for accurate calculations.</i></p> <p><i>Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences whether or not due to the negligence of their consultants, their servants or agents, arising out of the services provided by their consultants.</i></p> <p><i>Copyright © 2022 BPP Group Pty Ltd: All intellectual property rights, including copyright, in format and proprietary content contained in documents created by Bushfire Prone Planning, remain the property of BPP Group Pty Ltd. Any use made of such format or content without the prior written approval of Bushfire Prone Planning, will constitute an infringement on the rights of the Company which reserves all legal rights and remedies in respect of any such infringement.</i></p>					

TABLE OF CONTENTS

SUMMARY STATEMENTS.....	3
1 PROPOSAL DETAILS AND THE BUSHFIRE MANAGEMENT PLAN.....	5
1.1 THE PROPOSED DEVELOPMENT/USE DETAILS, PLANS AND MAPS	5
1.2 THE BUSHFIRE MANAGEMENT PLAN (BMP).....	10
1.2.1 COMMISSIONING AND PURPOSE.....	10
1.2.1 OTHER DOCUMENTS WITH IMPLICATIONS FOR DEVELOPMENT OF THIS BMP.....	10
2 BUSHFIRE PRONE VEGETATION – ENVIRONMENTAL & ASSESSMENT CONSIDERATIONS	12
2.1 ENVIRONMENTAL CONSIDERATIONS – ‘DESKTOP’ ASSESSMENT	12
2.1.1 DECLARED ENVIRONMENTALLY SENSITIVE AREAS (ESA)	14
2.1.2 OTHER PROTECTED VEGETATION ON PUBLIC LAND	15
2.1.3 RESPONSE OF PROPOSED DEVELOPMENT TO IDENTIFIED ENVIRONMENTAL LIMITATIONS.....	16
2.2 BUSHFIRE ASSESSMENT CONSIDERATIONS.....	17
2.2.1 PLANNED ONSITE VEGETATION LANDSCAPING	17
2.2.2 PLANNED / POTENTIAL OFFSITE REHABILITATION OR RE-VEGETATION	17
2.2.3 IDENTIFIED REQUIREMENT TO MANAGE, MODIFY OR REMOVE ONSITE OR OFFSITE VEGETATION	17
2.2.4 VARIATIONS TO ASSESSED AREAS OF CLASSIFIED VEGETATION TO BE APPLIED	18
3 BUSHFIRE ATTACK LEVEL (BAL) ASSESSMENT	19
3.1 BAL ASSESSMENT SUMMARY (CONTOUR MAP FORMAT)	20
3.1.1 BAL DETERMINATION METHODOLOGY AND LOCATION OF DATA AND RESULTS.....	20
3.1.2 BAL RATINGS DERIVED FROM THE CONTOUR MAP (SEE FIGURES 3.2.1 AND 3.2.2).....	21
3.1.3 SITE ASSESSMENT DATA APPLIED TO CONSTRUCTION OF THE BAL CONTOUR MAP(S).....	22
3.1.4 CLASSIFIED VEGETATION AND TOPOGRAPHY MAP(S)	25
3.1.5 BAL CONTOUR MAP(S).....	27
4 IDENTIFICATION OF BUSHFIRE HAZARD ISSUES	29
5 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA (GUIDELINES V1.4)	30
5.1 BUSHFIRE PROTECTION CRITERIA ELEMENTS APPLICABLE TO THE PROPOSED DEVELOPMENT/USE	30
5.2 LOCAL GOVERNMENT VARIATIONS TO APPLY	30
5.3 ASSESSMENT STATEMENTS FOR ELEMENT 1: LOCATION.....	31
5.4 ASSESSMENT STATEMENTS FOR ELEMENT 2: SITING AND DESIGN.....	32
5.5 ASSESSMENT STATEMENTS FOR ELEMENT 3: VEHICULAR ACCESS.....	35
5.6 ASSESSMENT STATEMENTS FOR ELEMENT 4: WATER	38
5.7 ADDITIONAL BUSHFIRE PROTECTION MEASURES RECOMMENDED TO BE IMPLEMENTED.....	40
5.7.1 ADDITIONAL PROTECTION MEASURES TO REDUCE THE EXPOSURE AND/OR VULNERABILITY OF BUILDINGS/STRUCTURES TO BUSHFIRE THREATS.....	40

6.1	DEVELOPER/LANDOWNER RESPONSIBILITIES – PRIOR TO BUILDING AND OCCUPANCY OR OPERATION.....	41
6.2	LANDOWNER / OCCUPIER RESPONSIBILITIES – ONGOING MANAGEMENT	43
6.3	LOCAL GOVERNMENT RESPONSIBILITIES – ONGOING MANAGEMENT	44
APPENDIX A: DETAILED BAL ASSESSMENT DATA AND SUPPORTING INFORMATION		45
A1:	BAL ASSESSMENT INPUTS COMMON TO THE METHOD 1 AND METHOD 2 PROCEDURES	45
A1.1:	FIRE DANGER INDICES (FDI/FDI/GFDI)	45
A1.2:	VEGETATION ASSESSMENT AND CLASSIFICATION.....	45
A1.3:	EFFECTIVE SLOPE.....	57
A1.4:	SEPARATION DISTANCE	58
A2:	BAL ASSESSMENT INPUTS APPLIED USING THE METHOD 2 PROCEDURE	59
A2.1:	SUMMARY OF CALCULATION INPUTS APPLIED AND THE LEVEL OF JUSTIFICATION REQUIRED	60
A2.2:	FLAME TEMPERATURE	62
A2.3:	SITE SLOPE.....	63
A3:	BAL CALCULATOR – COPY OF INPUT/OUTPUT VALUES	64
APPENDIX B: ADVICE - ONSITE VEGETATION MANAGEMENT - THE APZ		67
B1:	ASSET PROTECTION ZONE (APZ) DIMENSIONS	67
B1.1:	THE APZ DIMENSIONS REQUIRED TO BE IMPLEMENTED BY THE LANDOWNER	69
B2:	THE STANDARDS FOR THE APZ AS ESTABLISHED BY THE GUIDELINES (DPLH, V1.4).....	70
B3:	THE STANDARDS FOR THE APZ AS ESTABLISHED BY THE LOCAL GOVERNMENT	71
B4:	VEGETATION AND AREAS EXCLUDED FROM CLASSIFICATION - ENSURE CONTINUED EXCLUSION.....	72
APPENDIX C: TECHNICAL REQUIREMENTS FOR VEHICULAR ACCESS.....		73
APPENDIX D: TECHNICAL REQUIREMENTS FOR FIREFIGHTING WATER SUPPLY.....		74
D1:	RETICULATED AREAS – HYDRANT SUPPLY	74

LIST OF FIGURES

Figure 1.1:	Proposed subdivision plan.....	6
Figure 1.2:	South Connect Industrial Development - Proposed development map.....	7
Figure 1.3:	South Connect Industrial Development – Lot 811 - Proposed development map.....	8
Figure 1.4:	Extract from Map of Bushfire Prone Areas (Office of Bushfire Risk Management, DFES)	9
Figure 2.1:	Land identified with known environmental, biodiversity and conservation values.	13
Figure 3.1.1:	Existing classified vegetation and topography map.	25
Figure 3.1.2:	Post Development classified vegetation map.....	26
Figure 3.2.1:	BAL Contour Map Post Development.....	27
Figure 3.2.2:	BAL Contour Map Post Development – Lot 811	28

SUMMARY STATEMENTS

THIS DOCUMENT – STATEMENT OF PURPOSE

The Bushfire Management Plan (BMP)

The BMP sets out the required package of bushfire protection measures to lessen the risks associated with a bushfire event. It establishes the responsibilities to implement and maintain these measures.

The BMP also identifies the potential for any negative impact on any environmental, biodiversity and conservation values that may result from the application of bushfire protection measures or that may limit their implementation.

Risks Associated with Bushfire Events

The relevant risks are the potential for loss of life, injury, or destroyed or damaged assets which results in personal loss and economic loss. For a given site, the level of that risk to persons and assets (the exposed elements) is a function of the potential threat levels generated by the bushfire hazard, and the level of exposure and vulnerability of the at risk elements to the threats.

Bushfire Protection Measures

The required package of protection measures is established by *State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7)*, its associated *Guidelines* and any other relevant guidelines or position statements published by the Department of Planning, Lands and Heritage. These measures are limited to those considered by the WA planning authorities as necessary to be addressed for the purpose of land use planning. They do not encompass all available bushfire protection measures as many are not directly relevant to the planning approval stage. For example:

- Protection measures to reduce the vulnerability of buildings to bushfire threats is primarily dealt with at the building application stage. They are implemented through the process of applying the Building Code of Australia (Volumes 1 and 2 of the national Construction Code) in accordance with WA building legislation and the application of construction requirements based on a building's level of exposure - determined as a Bushfire Attack Level (BAL) rating); or
- Protection measures to reduce the threat levels of consequential fire (ignited by bushfire and involving combustible materials surrounding and within buildings) and measures to reduce the exposure and vulnerability of elements at risk exposed to consequential fire, are not specifically considered.

The package of required bushfire protection measures established by the Guidelines includes:

- The requirements of the bushfire protection criteria which consist of:
 - Element 1: Location (addresses threat levels).
 - Element 2: Siting and Design of Development (addresses exposure levels of buildings).
 - Element 3: Vehicular Access (addresses exposure and vulnerability levels of persons).
 - Element 4: Water (addresses vulnerability levels of buildings).
 - Element 5: Vulnerable Tourism Land Uses (addresses exposure and vulnerability as per Elements 1-4 but in use specific ways and with additional considerations of persons exposure and vulnerability).
- The requirement to develop Bushfire Emergency Plans / Information for 'vulnerable' land uses for persons to prepare, respond and recover from a bushfire event (this addresses vulnerability levels).
- The requirement to assess bushfire risk and incorporate relevant protection measures into the site emergency plans for 'high risk' land uses (this addresses threat, exposure and vulnerability levels).

Compliance of the Proposed Development or Use with SPP 3.7 Requirements

The BMP assesses the capacity of the proposed development or use to implement and maintain the required 'acceptable' solutions and any additionally recommended bushfire protection measures - or its capacity to satisfy the policy intent through the justified application of additional bushfire protection measures as supportable 'alternative' solutions.

THE PROPOSED DEVELOPMENT/USE – BUSHFIRE PLANNING COMPLIANCE SUMMARY		
Environmental Considerations		Assessment Outcome
Will land with identified environmental, biodiversity and conservation values limit the full application of the required bushfire protection measures?		No
Will land with identified environmental, biodiversity and conservation values need to be managed in the implementation and maintenance of the bushfire protection measures - but not limit their application?		No
Required Bushfire Protection Measures The Acceptable Solutions of the Bushfire Protection Criteria (Guidelines)		Assessment Outcome
Element	The Acceptable Solutions	
1: Location	A1.1 Development location	Fully Compliant
2: Siting and Design of Development	A2.1 Asset Protection Zone (APZ)	Fully Compliant
3: Vehicular Access	A3.1 Public roads	Fully Compliant
	A3.2a Multiple access routes	Fully Compliant
	A3.2b Emergency access way	N/A
	A3.3 Through-roads	N/A
	A3.4a Perimeter roads	N/A
	A3.4b Fire service access route	N/A
	A3.5 Battle-axe legs	N/A
	A3.6 Private driveways	Fully Compliant
4: Water	A4.1 Identification of future water supply	N/A
	A4.2 Provision of water for firefighting purposes	Fully Compliant
Other Documents Establishing Bushfire Protection Measure Variations or Additions		Assessment Outcome
A 'Planning Approval' or a 'Notice of Determination' which contains 'Conditions' to be met.		N/A
A DPLH/WAPC 'Position Statement'		N/A

1 PROPOSAL DETAILS AND THE BUSHFIRE MANAGEMENT PLAN

1.1 The Proposed Development/Use Details, Plans and Maps

The Proposal's Planning Stage For which certain bushfire planning documents are required to accompany the planning application.		Development Application	
The Subject Land/Site		Lot 807, Pt Lot 808, Lot 809, Lot 810 and Lot 811 Jandakot Road, Jandakot	
Total Area of Subject Lot/Site		Lot 807 – 5.0651 ha Pt Lot 808 – 2.007 ha (approx.) Lot 809 – 6.1619 ha Lot 810 – 7.0849 ha Lot 811 – 8.1509 ha	
Primary Proposed Construction	Type(s)	New Building(s)	
	NCC Classification	Class 6 (building for sale of retail goods or supply of services)	Class 7b (warehouse/storage/wholesale)
The 'Specific' Land Use Type for Bushfire Planning When applicable, this classification establishes a requirement to conduct assessments and develop documents that are additional to this Bushfire Management Plan.		N/A	
Description of the Proposed Development/Use			
<p>This Bushfire Management Plan (BMP) is to accompany a Development Application for the construction of a warehouse and office complex on Lot 811 of the South Connect Industrial Development on Jandakot Road Jandakot. Lot 811 is to consist of 5 Warehouse/Office tenancies including service yards, parking areas and outdoor staff alfresco areas.</p> <p>The BMP also considers indicative building layouts for future development of Lots 807 to 810.</p>			
Description of Planned Staged Development and the Management of Potential Bushfire Planning Issues			
<p>The whole of the South Connect Industrial Development is under a single ownership and each lot is to be developed separately by the owner. The first stage of the project will be the development of Lot 811.</p> <p>Each stage of the development must comply with the requirements of the Guidelines for Planning in Bushfire Prone Areas, and this Bushfire Management Plan. This may require the creation of roads, temporary emergency access ways, management of land or installation of water supply lines outside a particular stage to achieve compliance.</p> <p>Vegetation on undeveloped lot(s) may adversely affect the indicative BAL ratings of lot(s) being developed. The required vegetation on the undeveloped lots must be managed and maintained until developed, or the indicative BAL ratings for the affected lots amended.</p>			

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FINAL LOT NUMBERS, DIMENSIONS & AREAS ARE SUBJECT TO APPROVAL.

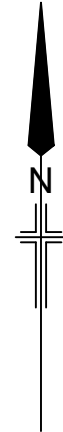
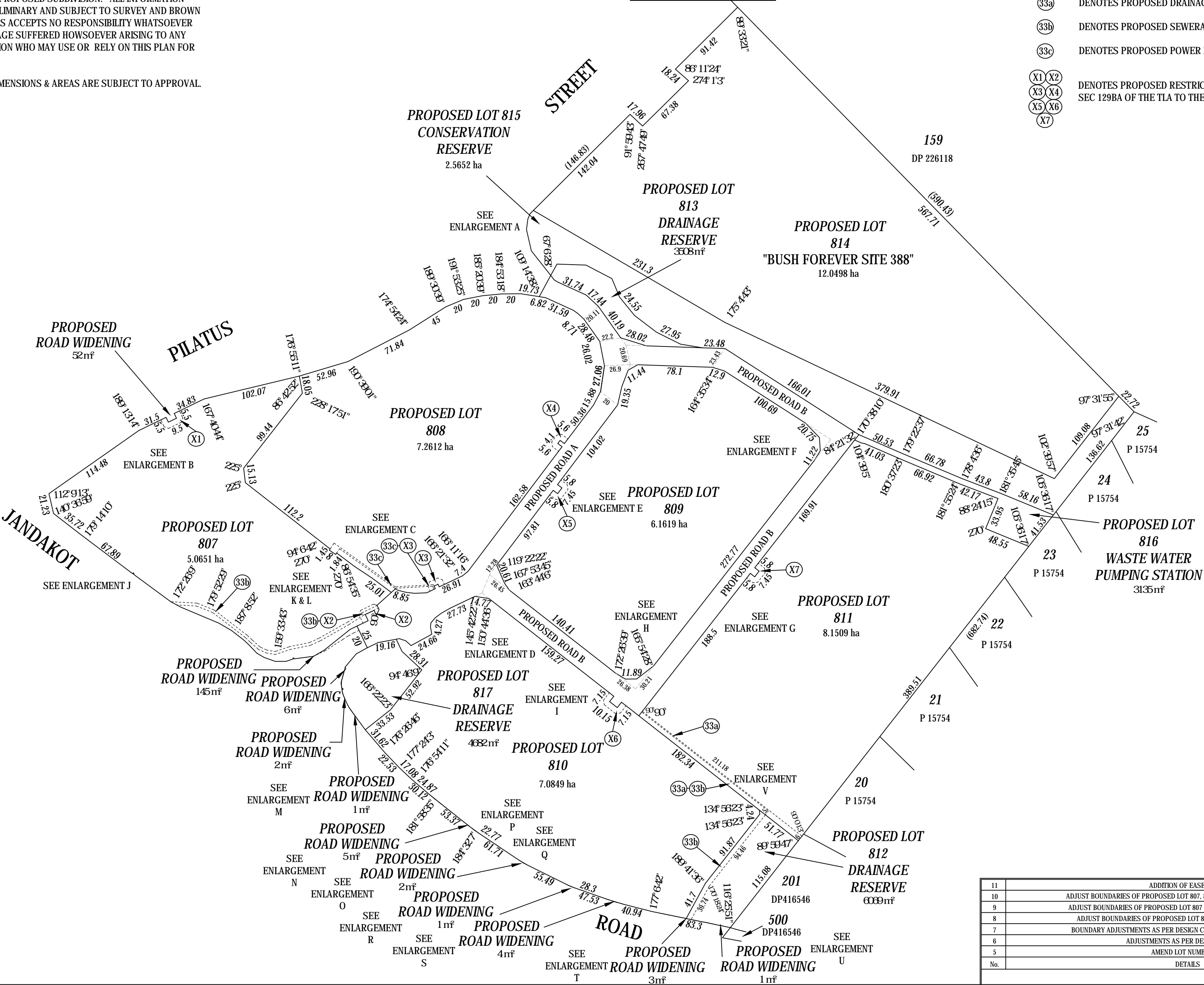


Figure 1.1

- (33a) DENOTES PROPOSED DRAINAGE EASEMENT PURSUANT TO SECTION 167 OF THE P & D ACT 2005 REG 33a
- (33b) DENOTES PROPOSED SEWERAGE EASEMENT PURSUANT TO SECTION 167 OF THE P & D ACT 2005 REG 33b
- (33c) DENOTES PROPOSED POWER EASEMENT PURSUANT TO SECTION 167 OF THE P & D ACT 2005 REG 33c
- (X1) (X2) (X3) (X4) (X5) (X6) (X7) DENOTES PROPOSED RESTRICTED COVENANTS FOR FIRE SEPARATION, PURSUANT TO SEC 129BA OF THE TLA TO THE BENEFIT OF ELECTRICITY NETWORKS CORPORATION



11	ADDITION OF EASEMENTS	12/10/2022	J.HUMPHREYS	T.PIZZI
10	ADJUST BOUNDARIES OF PROPOSED LOT 807, 808 & 810 AS PER DESIGN CHANGES	14/09/2022	J.HUMPHREYS	T.PIZZI
9	ADJUST BOUNDARIES OF PROPOSED LOT 807 & 813 AS PER ARCHITECTS DESIGN	27/06/2022	J.HUMPHREYS	T.PIZZI
8	ADJUST BOUNDARIES OF PROPOSED LOT 808 AS PER ARCHITECTS DESIGN	12/04/2022	T.PIZZI	T.PIZZI
7	BOUNDARY ADJUSTMENTS AS PER DESIGN CHANGES ALONG JANDAKOT ROAD	04/04/2022	T.PIZZI	T.PIZZI
6	ADJUSTMENTS AS PER DESIGN CHANGES	28/03/2022	J.HUMPHREYS	T.PIZZI
5	AMEND LOT NUMBERING	09/03/2022	J.HUMPHREYS	T.PIZZI
No.	DETAILS	DATE	DRAWN	CHECKED

REVISIONS

PRECALCULATION PLAN OF LOTS
704, 705 & 706 ON DP417614
JANDAKOT ROAD, JANDAKOT

Client SCHAFER CORPORATION

DATUM
HORIZONTAL - PCG 94
VERTICAL - N/A

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SCALE 1 : 3000

0 30 60 90 120 150

All distances in metres unless stated otherwise

ALL AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY AND EXAMINATION

THE BOUNDARIES WERE NOT RE-ESTABLISHED AS PART OF THIS SURVEY THEREFORE THIS PLAN DOES NOT GUARANTEE THEIR ACCURACY

FIELD INSPECTION IS RECOMMENDED FOR LOCATION OF SERVICES PRIOR TO ANY EXCAVATION

Brown McAllister Surveyors
Licensed Surveyors | Land Development & Strata Consultants | Engineering Surveyors
Email : admin@brownmcallister.com.au Tel: (08) 9386 9688
Address: 44 Hardey Road, Belmont, Western Australia, 6104

SHEET	A2
SURVEYED	
FIELD NOTES	
DRAWN	J.HUMPHREYS - 05/10/2020
CHECKED	
REFERENCE	11088-16PC_rev11(OPT1)

Figure 1.2
**Proposed Development
Site Map**

Lots 807 to 811 on Plan xxxx
Jandakot Road
JANDAKOT
CITY OF COCKBURN

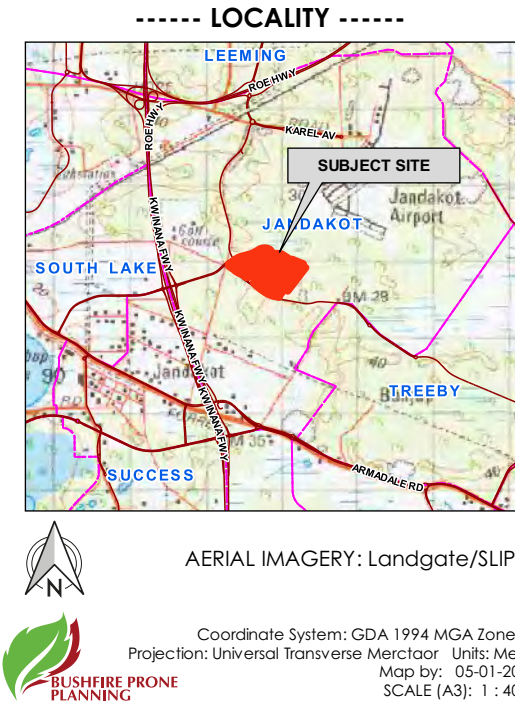
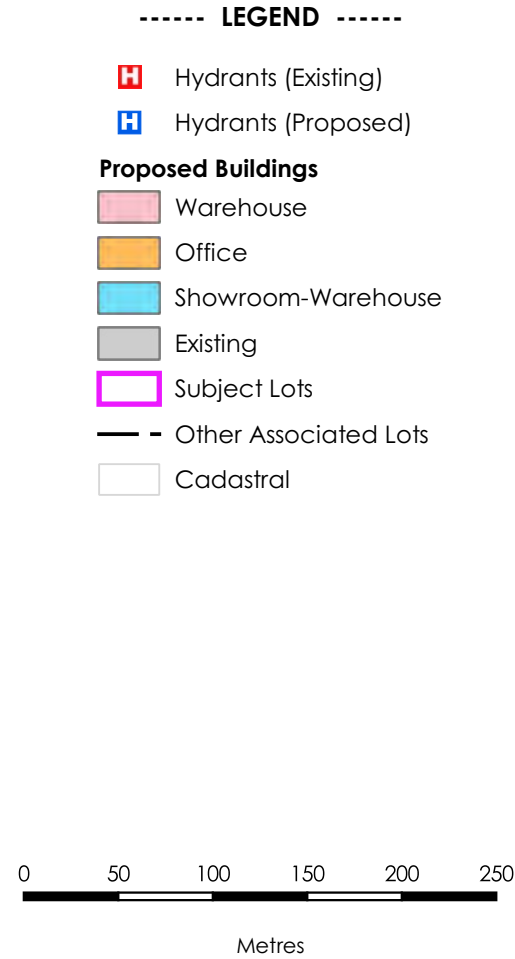
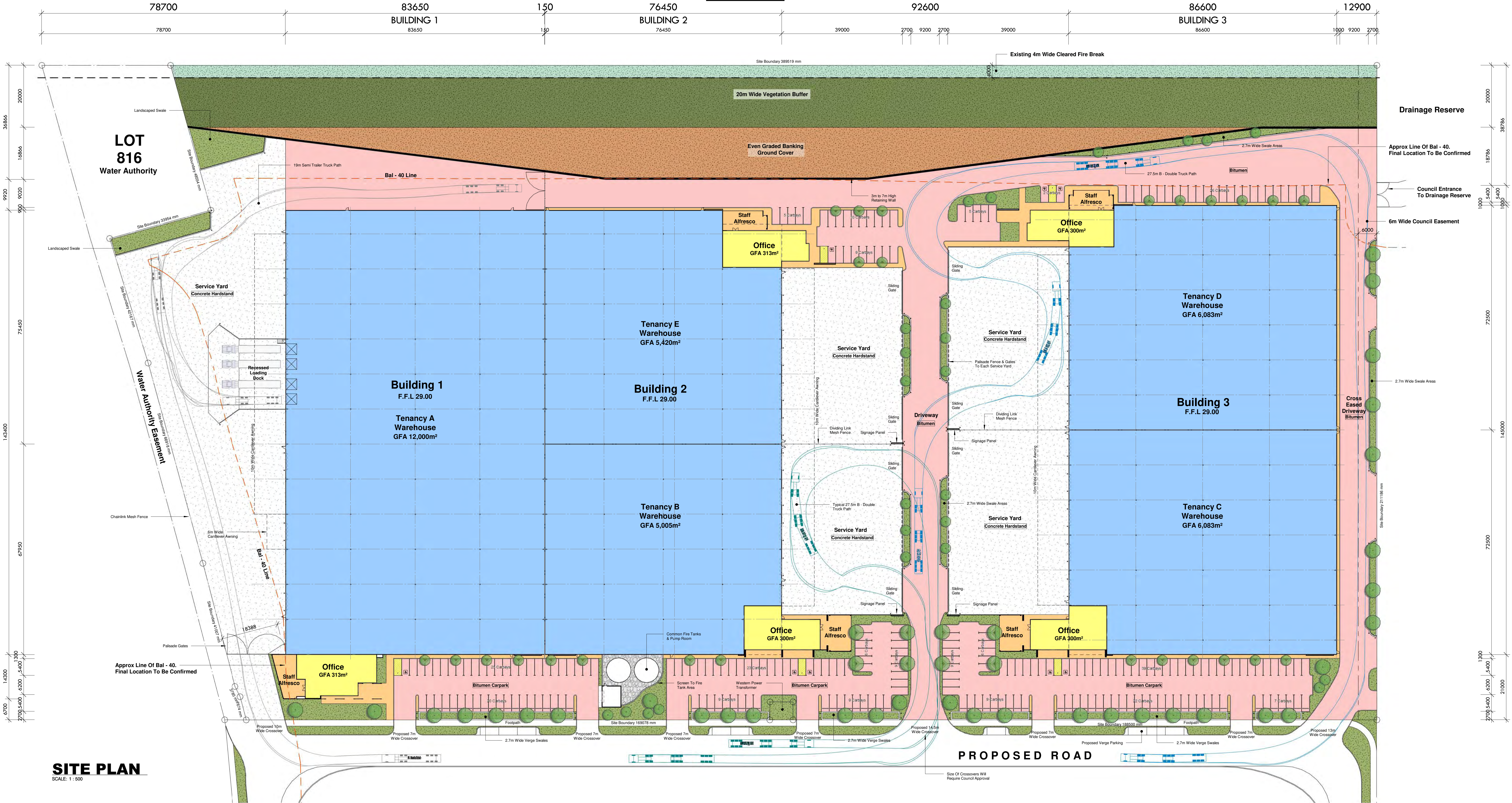


Figure 1.3



SITE PLAN

SCALE: 1 : 500

LEGEND

- BUILDING FOOTPRINT - WAREHOUSE
- BUILDING FOOTPRINT - OFFICE
- EXTENT OF CONCRETE HARDSTAND
- EXTENT OF RED BITUMEN PAVING
- EXTENT OF BRICK PAVING / CONCRETE PAVING
- EXTENT OF LANDSCAPING

SITE CRITERIA FOR LOT 801
PROPOSED DEVELOPMENT

1. Site Area (Site A)	81,510m²
2. Landscaping (Site C)	8,151m²
a. Required 10% of Site Area	8,151m²
b. Provided	15,281m²
Soft	1,813m²
Hard	17,094m² (20.97%)
3. Floor Area (GFA) (Overall)	
a. Office	1,526m²
b. Warehouse	34,591m²
Total	36,117m²
4. Carparking	
i. Cars Required	
a. Office	1,526m² @ 1/50
b. Warehouse	34,591m² @ 1/100
Total Car required	30.5 Cars
ii. Cars Provided	
a. On grade	250 Cars
b. Verge Parking	9 Cars
Total Car provided	259 Cars

Landscaping
A. Hard Landscaping
Defined as paved walkways either open or covered.
B. Soft Landscaping
Defined as vegetative landscaping.
Gross Floor Area - GFA
A. All Floor Areas on this plan are shown as GROSS FLOOR AREA.
Unless otherwise noted as Net Floor Area.
B. Definition of Gross Floor Area is defined as:
i. GROSS FLOOR AREA OF TENANCY:
Gross Floor Area of an individual Tenancy is defined as the area contained between the centre line of common tenancy walls and the outside edge of external walls.
ii. GROSS FLOOR AREA OF A BUILDING:
Gross Floor Area of a Building is defined as the total area contained between the outside edge of external walls.
Net Floor Area - NFA
A. Net Floor Area of a Tenancy on this plan is defined as the area between external or tenancy dividing walls.
B. This area is inclusive of toilets if the toilets are exclusive to the Tenancy.

PRELIMINARY

WHERE SPP 3.7 AND THE GUIDELINES ARE TO APPLY – DESIGNATED BUSHFIRE PRONE AREAS

All higher order strategic planning documents, strategic planning proposals, subdivisions and development applications located in designated bushfire prone areas need to address SPP 3.7 and its supporting Guidelines. This also applies where an area is not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard.

For development applications where only part of a lot is designated as bushfire prone and the proposed development footprint is wholly outside of the designated area, the development application will not need to address SPP 3.7 or the Guidelines. (Guidelines DPLH 2021 v1.4, s1.2).

For subdivision applications, if all the proposed lots have a BAL-LOW indicated, a BMP is not required. (Guidelines DPLH 2021 v1.4, s5.3.1).

Figure 1.4: Extract from Map of Bushfire Prone Areas (Office of Bushfire Risk Management, DFES)

1.2 The Bushfire Management Plan (BMP)

1.2.1 Commissioning and Purpose

Proponent:	TJS Advisory
Bushfire Prone Planning commissioned to produce the BMP by:	TJS Advisory
Purpose of the BMP:	To assess the proposal's ability to meet all relevant requirements established by State Planning Policy 3.7: Planning in Bushfire Prone Areas (SPP 3.7), the associated 'Guidelines and any relevant Position Statements; and To satisfy the requirement for the provision of a Bushfire Management Plan to accompany the development application.
BMP to be submitted to:	City of Cockburn

1.2.1 Other Documents with Implications for Development of this BMP

This section identifies any known assessments, reports or plans that have been conducted and prepared previously, or are being prepared concurrently, and are relevant to the planned proposal for the subject. They potentially have implications for the assessment of bushfire threats and the identification and implementation of the protection measures that are established by this Bushfire Management Plan.

Table 1.4: Other relevant documents that may influence threat assessments and development of protection measures.

RELEVANT DOCUMENTS					
Document	Relevant	Currently Exists	To Be Developed	Copy Provided by Proponent / Developer	Title
Structure Plan	No	N/A	N/A	N/A	-
Bushfire Management Plan	Yes	Yes	Yes	N/A	Bushfire Management Plan (Subdivision Application) Lots 701, 702 & 703 Jandakot Road, Jandakot v1.2 [Bushfire Prone Planning 18 Feb 2020].
Implications for this BMP: The existing BMP developed for the subdivision of the original lots is to be taken into consideration when developing this BMP, for the development of the lots created.					
Bushfire Emergency Plan or Information	No	No	No	N/A	-
Bushfire Risk Assessment and Management Report	No	No	No	N/A	-
Environmental Asset or Vegetation Survey	No	Unknown	No	N/A	-
Implications for the BMP: The whole of the proposed development site with the exception of the eastern vegetation buffer has been cleared of native vegetation.					

Landscaping and Revegetation Plan	Yes	Yes	Yes	Yes	-
Implications for the BMP: Preliminary landscape plans exist for the proposed development of Lot 811 and for the existing development on Lot 808. More detailed landscape plans are to be developed once DA approval is received for Lot 811.					

2 BUSHFIRE PRONE VEGETATION – ENVIRONMENTAL & ASSESSMENT CONSIDERATIONS

2.1 Environmental Considerations – ‘Desktop’ Assessment

This ‘desktop’ assessment must not be considered as a replacement for a full Environmental Impact Assessment. It is a summary of potential environmental values at the subject site, inferred from information contained in listed datasets and/or reports, which are only current to the date of last modification.

These data sources must be considered indicative where the subject site has not previously received a site-specific environmental assessment by an appropriate professional.

Many bushfire prone areas also have high biodiversity values. Consideration of environmental priorities within the boundaries of the land being developed can avoid excessive or unnecessary modification or clearing of vegetation. Approval processes (and exemptions) apply at both Commonwealth and State levels.

Any ‘modification’ or ‘clearing’ of vegetation to reduce bushfire risk is considered ‘clearing’ under the *Environmental Protection Act 1986* (EP Act) and requires a clearing permit under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations) – unless for an exempt purpose.

Clearing native vegetation is an offence, unless done under a clearing permit or the clearing is for an exempt purpose. Exemptions are contained in the EP Act or are prescribed in the Clearing Regulations (note: these do not apply in environmentally sensitive areas).

The *Department of Water and Environmental Regulation* (DWER) is responsible for issuing ‘clearing’ permits and the framework for the regulation of clearing. Approvals under other legislation, from other agencies, may also be required, dependent on the type of flora or fauna present.

Local Planning Policy or Local Biodiversity Strategy: Natural areas that are not protected by the above Act and Regulation (or any other National or State Acts) may be protected by a local planning policy or local biodiversity strategy. Permission from the local government will be required for any modification or removal of native vegetation in these Local Natural Areas (LNA’s). Refer to the relevant local government for detail.

For further Information refer to Guidelines v1.4, the Bushfire and Vegetation Factsheet - WAPC, Dec 2021 and <https://www.der.wa.gov.au/our-work/clearing-permits>

Figure 2.1
**Proposed Development
Environmental Considerations**
Lots 807 to 811 on Plan xxxx
Jandakot Road
JANDAKOT
CITY OF COCKBURN

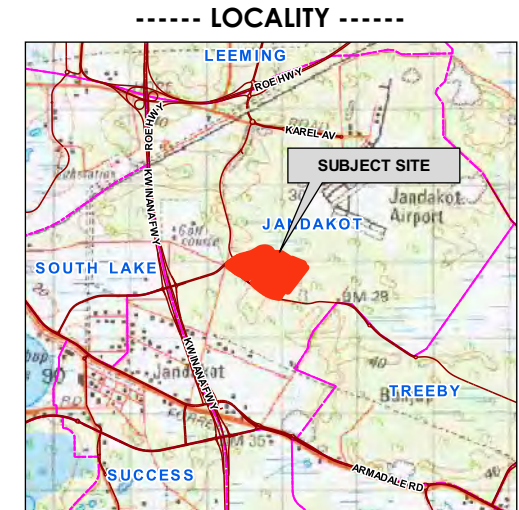
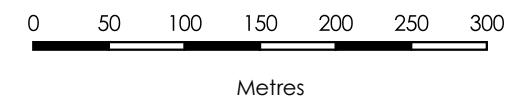
----- **LEGEND** -----

Proposed Buildings

- Warehouse
- Office
- Showroom-Warehouse
- Existing
- Subject Lots
- Bush Forever Areas 2000
- Clearing Regulations

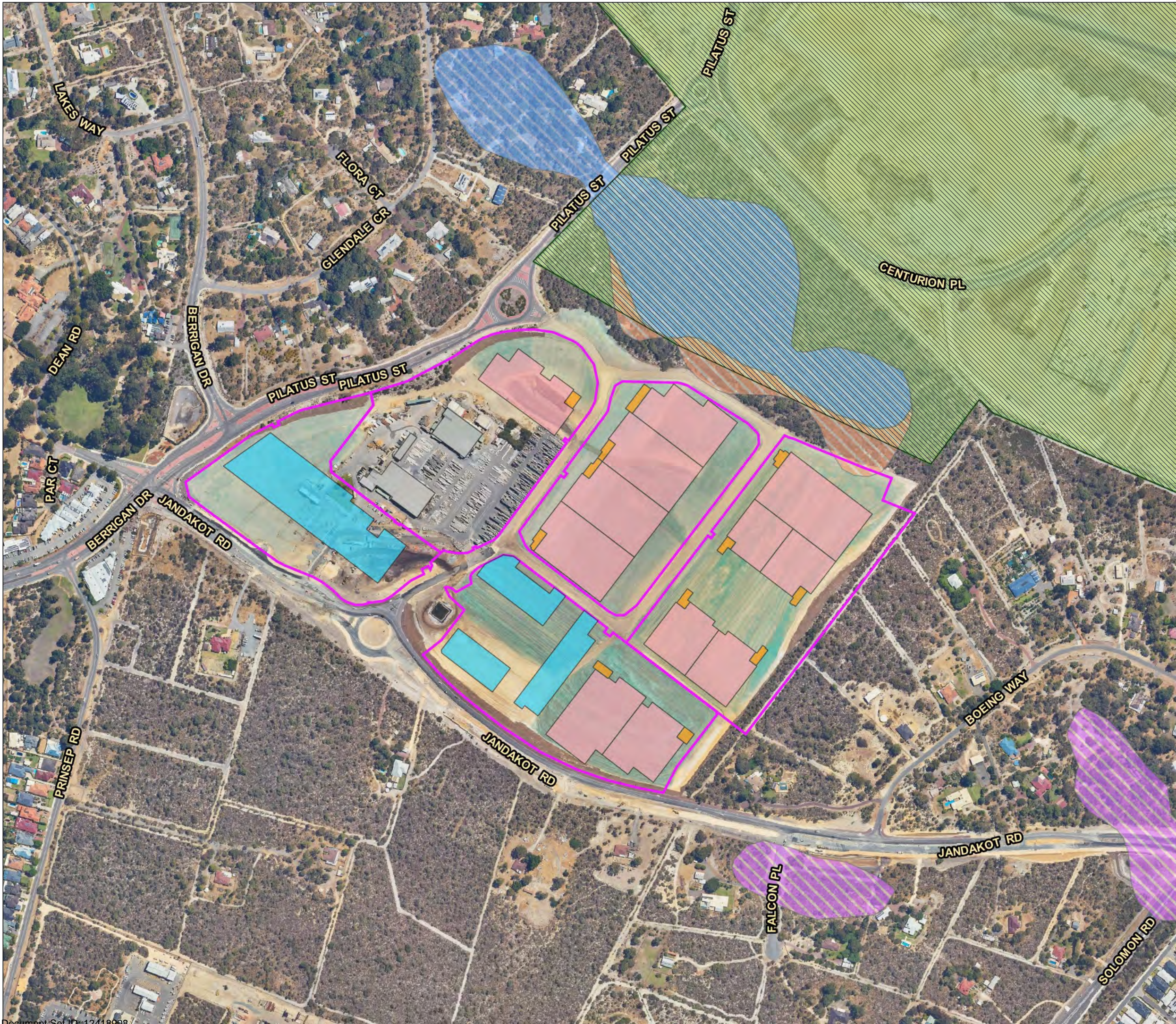
Geomorphic Wetlands Swan Coastal Plain

- Dampland
- Dryland
- Sumpland



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map by: 28-12-2022
SCALE (A3): 1 : 5000



2.1.1 Declared Environmentally Sensitive Areas (ESA)

IDENTIFICATION OF RELEVANT ENVIRONMENTALLY SENSITIVE AREAS							
ESA Class	Relevant to Proposal	Influence on Bushfire Threat Levels and / or Application of Bushfire Protection Measures	Relevant Dataset	Information Source(s) Applied to Identification of Relevant Vegetation			Further Action Required
				Dataset	Landowner or Developer	Environmental Asset or Vegetation Survey	
Wetlands and their 50m Buffer (Ramsar, conservation category and nationally important)	Yes	Yes - Minor	DBCA-010 and 011, 019, 040, 043, 044	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None
Bush Forever	Yes	Yes - Moderate	DPLH-022, SPP 2.8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None
Threatened and Priority Flora + 50m Continuous Buffer	Unknown	No	DBCA-036	Restricted Scale of Data Available (security)	<input type="checkbox"/>	<input type="checkbox"/>	Confirm with relevant agency
Threatened Ecological Community	No	N/A	DBCA-038		<input type="checkbox"/>	<input type="checkbox"/>	None
Heritage Areas National / World	No	N/A	Relevant register or mapping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None
Environmental Protection (Western Swamp Tortoise) Policy 2002	No	N/A	DWER-062	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None

DESCRIPTION OF THE IDENTIFIED ENVIRONMENTALLY SENSITIVE AREAS:

The wetland buffer for the Dampland area to the north of the development is contained within the Bush Forever Site (Lot 814) and the Conservation Reserve (Lot 815).

2.1.2 Other Protected Vegetation on Public Land

IDENTIFICATION OF PROTECTED VEGETATION ON PUBLIC LAND							
Land with Environmental, Biodiversity, Conservation and Social Values	Relevant to Proposal	Influence on Bushfire Threat Levels and / or Application of Bushfire Protection Measures	Relevant Dataset	Information Source(s) Applied to Identification of Relevant Vegetation			Further Action Required
				Dataset	Landowner or Developer	Environmental Asset or Vegetation Survey	
Legislated Lands (tenure includes national park/reserve, conservation park, crown reserve and state forest)	Yes	Yes - Moderate	DBCA-011	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None
Conservation Covenants	Unknown	Unknown	DPIRD-023	Only Available to Govt.	<input type="checkbox"/>	<input type="checkbox"/>	Confirm with relevant agency
National World Heritage Areas	No	N/A	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None
Designated Public Open Space	No	N/A	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None

DESCRIPTION OF THE IDENTIFIED AREA(S) OF VEGETATION

Vegetation within the Bush Forever Site and Conservation Reserve will affect the Bushfire threat levels to future buildings within the development. However, acceptable BAL ratings can be achieved by maintaining the required separation distances.

2.1.3 Response of Proposed Development to Identified Environmental Limitations

Consideration of the implications that identified protected areas of vegetation (i.e., those with environmental and subject to conservation) have for the proposed development.

PROPOSED DEVELOPMENT RESPONSE TO IDENTIFIED 'PROTECTED' VEGETATION	
The existence of 'protected' areas of vegetation has implications for the ability of the proposed development to reduce potential bushfire impact through modification or removal of vegetation.	Yes
Application of Design and/or Construction Responses to Limit Vegetation Modification or Removal	
Modify the development location to reduce exposure by increasing separation distance.	Considered and applied
Separation from protected areas of vegetation has been achieved by the placement of road reserves, driveways and increasing proposed building setbacks.	
Redesign development, structure plan or subdivision.	Not required
Reduction of lot yield where this can increase available separation distances.	Not required
Cluster development to limit modification or removal of vegetation.	Not required
Construct building(s) to the requirements corresponding to higher BAL ratings to reduce required separation distances.	Not required

2.2 Bushfire Assessment Considerations

2.2.1 Planned Onsite Vegetation Landscaping

Identification of areas of the subject site planned to be landscaped, creating the potential for increased or decreased bushfire hazard for proposed development.

PLANNED LANDSCAPING	
Relevant to Proposal:	Yes
All vegetation within Lot 811 and the remainder of the subdivided lots will be maintained to a low bushfire threat state per "Schedule 1: Standards for Asset Protection Zones" of the Guidelines for Planning in Bushfire Prone Areas v1.4.	

2.2.2 Planned / Potential Offsite Rehabilitation or Re-Vegetation

Identification of areas of land adjacent to the subject site on which re-vegetation (as distinct from natural re-generation) will or may occur and is likely to present a greater bushfire hazard for proposed development.

POTENTIAL RE-VEGETATION PROGRAMS		
Land with Environmental, Biodiversity, Conservation and Social Values	Relevant to Proposal	Description
Riparian Zones / Foreshore Areas	No	N/A
Wetland Buffers	Yes	Small portions of the southern boundary of Conservation Lot (Lot 815) may be revegetated, or self seed. This will be considered within this BMP an existing vegetation classifications in this area will be extended to the southern boundary of the lot (See Figure 3.1.2).
Legislated Lands	Yes	See above.
Public Open Space	No	N/A
Road Verges	Yes	All road verges within the industrial development will be maintained to a low bushfire threat state.
Other	Yes	Vegetation within the proposed drainage reserves and waste water pumping station will be planted and maintained as grasses and/or shrubs less than 2 metres in height.

2.2.3 Identified Requirement to Manage, Modify or Remove Onsite or Offsite Vegetation

Identification of native vegetation subject to management, modification or removal.

REQUIREMENT TO MANAGE, MODIFY OR REMOVE NATIVE VEGETATION	
Has a requirement been identified to manage, modify or remove <u>onsite</u> native vegetation to establish the required bushfire protection measures on the subject site?	Yes
All onsite vegetation within the industrial estate, with the exception of the eastern vegetation buffer, is required to be maintained to a low bushfire threat state.	
Is approval, from relevant state government agencies and/or the local government, to modify or remove <u>onsite</u> native vegetation required? (Note: if 'Yes' evidence of its existence should be provided in this BMP).	No

Has a requirement been identified to manage, modify or remove <u>offsite</u> native vegetation to establish the required bushfire protection measures on the subject site?	No
Is written approval required, from relevant state government agencies and/or the local government, that permits the landowner, or another identified party, to modify or remove <u>offsite</u> bushfire prone vegetation and/or conduct other works, to establish an identified bushfire protection measure(s)? If 'Yes', appropriate evidence of the approval or how it is to be established, shall be provided in this BMP as an addendum.	No
Is a written management agreement required that states the obligation of the landowner, or another responsible party, to manage defined areas of <u>offsite</u> bushfire prone vegetation, in perpetuity, to ensure the conditions of no fire fuels and/or low threat vegetation and/or vegetation managed in a minimal fuel condition, continue to be met? If 'Yes', appropriate evidence of the agreement or how it is to be established, shall be provided in this BMP as an addendum.	No

2.2.4 Variations to Assessed Areas of Classified Vegetation to be Applied

FOR THE PROPOSED DEVELOPMENT SITUATIONS TO BE ACCOUNTED FOR IN ASSESSING THE POTENTIAL BUSHFIRE IMPACT (BAL)	
Area(s) of land will be subject to future vegetation rehabilitation or re-vegetation that will require a change to a higher threat classification of vegetation on that land. (Note: this is not regeneration to the mature natural state which is accounted for in the 'existing state' assessment in accordance with AS 3959:2018).	Yes
The proposed drainage reserves and proposed waste water pumping station lot are expected to be revegetated with grasses and/or shrubs to two metres tall. These areas are assessed as shrubland for the purposes of the BAL Contour Map.	
Modification of existing area(s) of classified vegetation due to the implementation of the proposed development and/or prior to the site's occupancy or use. This modification will require a change to a lower threat classification (or exclusion from classification) for that area of vegetation.	Yes
With the exception of the 20 metre wide eastern vegetation buffer on Lot 811, the whole of the proposed lots 807 to 811 are to be managed to a low bushfire threat state as per "Schedule 1: Standards for Asset Protection Zones" of the Guidelines for Planning in Bushfire Prone Areas v1.4. This will require the modification of some vegetation along batters.	
Complete removal of existing area(s) of classified vegetation due to the implementation of the proposed development and/or prior to the site's occupancy or use. This modification will require an exclusion from classification for that area of vegetation.	No
The site has previously been cleared of vegetation.	

3 BUSHFIRE ATTACK LEVEL (BAL) ASSESSMENT

BUSHFIRE ATTACK LEVELS (BAL) - UNDERSTANDING THE RESULTS

The potential transfer (flux/flow) of radiant heat from the bushfire to a receiving object is measured in kW/m². The AS 3959:2018 BAL determination methodology establishes the ranges of radiant heat flux that correspond to each bushfire attack level. These are identified as BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ.

The bushfire performance requirements for certain classes of buildings are established by the Building Code of Australia (Vol. 1 & 2 of the NCC). The BAL will establish the bushfire resistant construction requirements that are to apply in accordance with AS 3959:2018 - *Construction of buildings in bushfire prone areas* and the NASH Standard – *Steel framed construction in bushfire areas (NS 300 2021)*, whose solutions are deemed to satisfy the NCC bushfire performance requirements.

DETERMINED BAL RATINGS

A BAL Certificate can be issued for a determined BAL. A BAL can only be classed as 'determined' for an existing or future building/structure when:

1. It's final design and position on the lot are known and the stated separation distance from classified bushfire prone vegetation exists and can justifiably be expected to remain in perpetuity; or
2. It will always remain subject to the same BAL regardless of its design or position on the lot after accounting for any regulatory or enforceable building setbacks from lot boundaries as relevant and necessary (e.g., R-codes, restrictive covenants, defined building envelopes) or the retention of any existing classified vegetation either onsite or offsite.

If the BMP derives determined BAL(s), the BAL Certificate(s) required for submission with building applications can be provided, using the BMP as the assessment evidence.

INDICATIVE BAL RATINGS

A BAL Certificate cannot be issued for an indicative BAL. A BAL will be classed as 'indicative' for an existing or future building/structure when the required conditions to derive a determined BAL are not met.

This class of BAL rating indicates what BAL(s) could be achieved and the conditions that need to be met are stated.

Converting the indicative BAL into a determined BAL is conditional upon the currently unconfirmed variable(s) being confirmed by a subsequent assessment and evidential documentation. These variables will include the future building(s) location(s) being established (or changed) and/or classified vegetation being modified or removed to establish the necessary vegetation separation distance. This may also be dependent on receiving approval from the relevant authority for that modification/removal.

BAL RATING APPLICATION – PLANNING APPROVAL VERSUS BUILDING APPROVAL

1. Planning Approval: SPP.3.7 establishes that where BAL- LOW to BAL-29 will apply to relevant future construction (or existing structures for proposed uses), the proposed development may be considered for approval (dependent on the other requirements of the relevant policy measures being met). That is, BAL40 or BAL-FZ are not acceptable on planning grounds (except for certain limited exceptions).

Because planning is looking forward at what can be achieved, as well as looking at what may currently exist, both determined and indicative BAL ratings are acceptable assessment outcomes on which planning decisions can be made (including conditional approvals).

2. Building Approval: The Building Code of Australia (Vol. 1 & 2 of the NCC) establishes that relevant buildings in bushfire prone areas must be constructed to the bushfire resistant requirements corresponding to the BAL rating that is to apply to that building. Consequently, a determined BAL rating and the BAL Certificate is required for a building permit to be issued - an indicative BAL rating is not acceptable.

3.1 BAL Assessment Summary (Contour Map Format)

INTERPRETATION OF THE BAL CONTOUR MAP

The BAL contour map is a diagrammatic representation of the results of the bushfire attack level assessment.

The map presents different coloured contours extending out from the areas of classified vegetation. Each contour represents a set range of radiant heat flux that potentially will transfer to an exposed element (building, person or other defined element), when it is located within that contour.

Each of the set ranges of radiant heat flux corresponds to a different BAL rating as defined by the AS 3959:2018 BAL determination methodology.

The width of each shaded BAL contour will vary dependant on both the BAL rating and the relevant parameters (calculation inputs) for the subject site. Their width represents the minimum and maximum vegetation separation distances that correspond to each BAL rating (refer to the relevant table below for these distances).

The areas of classified vegetation to be considered in developing the BAL contours, are those that will remain at the intended end state of the subject development once earthworks, clearing and/or landscaping and re-vegetation have been completed. Variations to this statement that may apply include:

- Both pre and post development BAL contour maps are produced; and/or
- Each stage of a development is assessed independently.

3.1.1 BAL Determination Methodology and Location of Data and Results

LOCATION OF DATA & RESULTS					
BAL Determination Methodology		Location of the Site Assessment Data			Location of the Results
AS 3959:2018	Applied to Assessment	Classified Vegetation and Topography Map(s)	Calculation Input Variables		Assessed Bushfire Attack Levels and/or Radiant Heat Levels
			Summary Data	Detailed Data with Explanatory and Supporting Information	
Method 1 (Simplified)	Yes	Figure 3.1.2	Table 3.2	Appendix A1	Table 3.1 Table 3.1 / BAL Contour Maps
Method 2 (Detailed)	Yes	Figure 3.1.2	Table 3.2	Appendix A2	
Reasons for the Application of the Method 2 Procedure					
1.	A more specific result is sought.				
Identification of the specific issues associated with the site and/or proposed development that have necessitated the use of the Method 2 procedure:					
To achieve the required planning BAL rating of BAL-29 for the northern buildings on Lot 811 a more precise 'effective slope' measurement, and Method 2 calculation is necessary.					

3.1.2 BAL Ratings Derived from the Contour Map (See Figures 3.2.1 and 3.2.2)

Table 3.1: Indicative and determined BAL(s) for proposed building works.

BUSHFIRE ATTACK LEVEL FOR PLANNED BUILDINGS/STRUCTURE ¹			
Lot Number	Building/Structure Description	Indicative BAL ²	Determined BAL ²
807	Building 1	BAL-29	N/A
808	Building 2	BAL-12.5	N/A
809	Building 3	BAL-40	N/A
809	Building 4	N/A	BAL-12.5
809	Building 5	N/A	BAL-LOW
809	Building 6	N/A	BAL-LOW
810	Building 12	BAL-29	N/A
810	Building 13	BAL-12.5	N/A
810	Building 14	BAL-12.5	N/A
810	Building 15	BAL-40	N/A
810	Building 16	BAL-12.5	N/A
811	Building 7	BAL-29	N/A
811	Building 8	BAL-19	N/A
811	Building 9	BAL-LOW	N/A
811	Building 10	BAL-12.5	N/A
811	Building 11	BAL-29	N/A
¹ The assessment data used to derive the BAL ratings is sourced from Table 3.2 and Figures 3.2.1 & 3.2.2 'BAL Contour Maps'. ² Refer to the start of Section 3 for an explanation of indicative versus determined BAL ratings.			

The BAL Assessments assume that each building, as numbered above and shown on Figure 3.2.1, is either freestanding or, where attached, is separated by an appropriate 60/60/60 fire rated wall.

Building locations on Lots 807 to 810 are indicative only. Final building locations will be established prior to approval.

It is a requirement of this BMP that all future habitable buildings be located in an area on each lot where the BAL rating will be BAL-29 or lower once development of that lot is complete.

3.1.3 Site Assessment Data Applied to Construction of the BAL Contour Map(s)

RELEVANT CLASSIFIED VEGETATION	
Identification of Classified Vegetation that is Relevant to the Production of the BAL Contour Map(s)	Relevant Vegetation Map
The relevant vegetation for the post-development BAL contour map will be any area of classified vegetation - both within the subject site (onsite) and external to the subject site (offsite) - that will remain at the intended end state of the subject development once earthworks, any clearing and/or landscaping and re-vegetation have been completed.	Figure 3.1.2
Supporting Assessment Details: None required.	

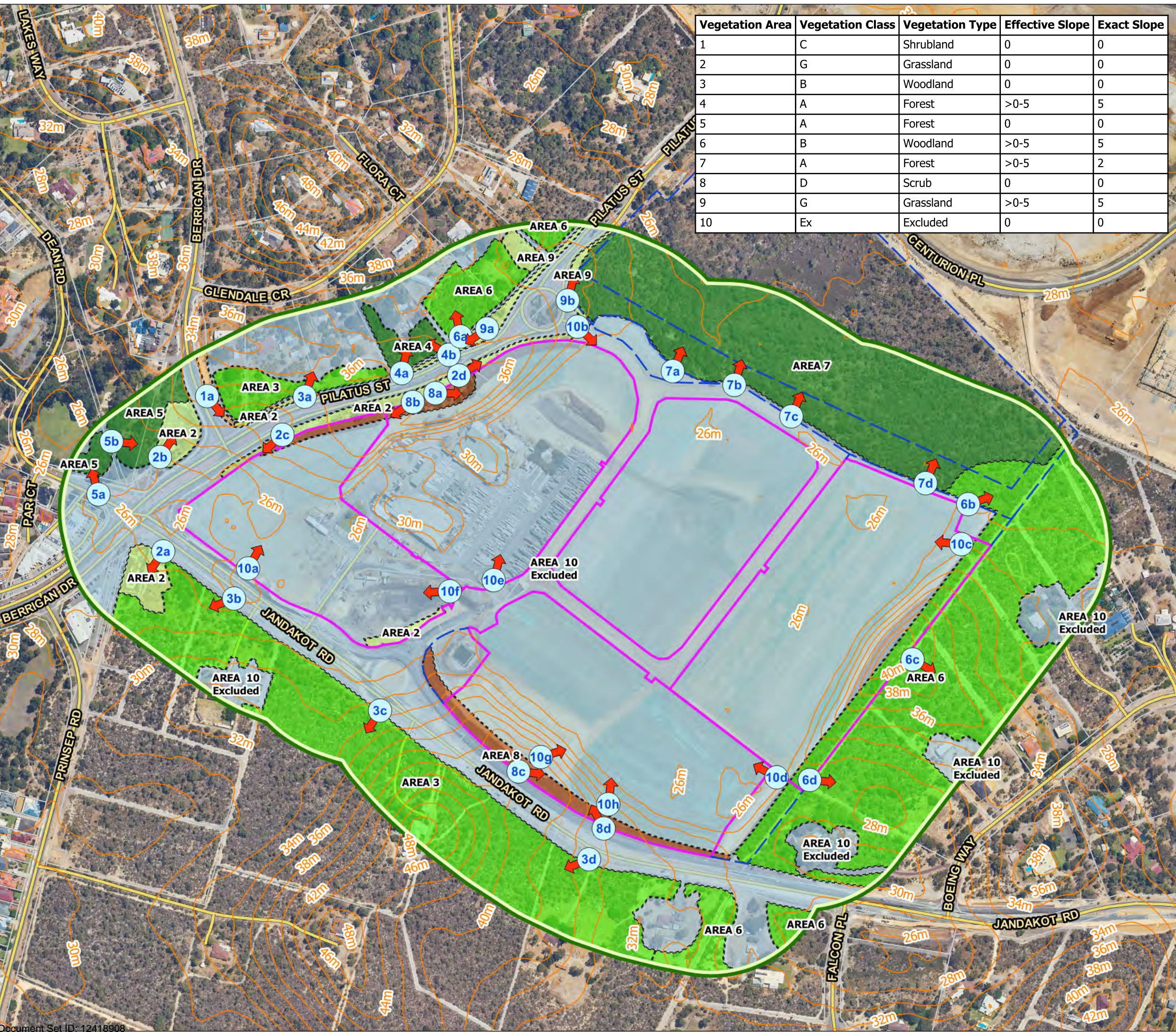
Table 3.2: The calculation inputs applied to determining the site specific separation distances corresponding to levels of potential radiant heat transfer (including BAL's).

SUMMARY OF CALCULATION INPUT VARIABLES APPLIED TO THE DETERMINATION OF SEPARATION DISTANCES CORRESPONDING TO RADIANT HEAT LEVELS ¹												
Applied BAL Determination Method		METHOD 1 - SIMPLIFIED PROCEDURE (AS 3959:2018 CLAUSE 2.2) AND METHOD 2 - DETAILED PROCEDURE (AS 3959:2018 APPENDIX B)										
The Calculation Variables Corresponding to the BAL Determination Method Applied												
Methods 1 and 2		Method 1			Method 2							
Vegetation Classification		FDI	Effective Slope		Site Slope	FFDI or GFDI	Flame Temp.	Elevation of Receiver	Flame Width	Fireline Intensity	Flame Length	Modified View Factor
			Applied Range	Measured								
Area	Class			degree range	degrees		degrees		K	metres	metres	kW/m
1	(C) Shrubland	80	Upslope or flat 0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	(G) Grassland	80	Upslope or flat 0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	(B) Woodland	80	Upslope or flat 0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	(A) Forest	80	Downslope >0-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	(A) Forest	80	Upslope or flat 0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	(B) Woodland	80	Downslope >0-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	(A) Forest	N/A	N/A	d/slope 2	flat 0	80	1090 K	Default	Default	Default	Default	Default
9	(G) Grassland	80	Downslope >0-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	(C) Shrubland	80	Downslope >0-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

¹ All data and information supporting the determination of the classifications and values stated in this table and any associated justification, is presented in Appendix A.
Where the values are stated as 'default' these are either the values stated in AS 3959:2018, Table B1 or the values calculated as intermediate or final outputs through application of the equations of the AS 3959:2018 BAL determination methodology. They are not values derived by the assessor.

Table 3.3: Vegetation separation distances corresponding to the radiant heat levels illustrated as BAL contours in Figure 3.2.

THE CALCULATED VEGETATION SEPARATION DISTANCES CORRESPONDING TO THE STATED LEVEL OF RADIANT HEAT ¹									
Vegetation Classification		Separation Distances Corresponding to Stated Level of Radiant Heat (metres)							
		Bushfire Attack Level						Maximum Radiant Heat Flux	
Area	Class	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW	10 kW/m ²	2 kW/m ²
1	(C) Shrubland	<7	7-<9	9-<13	13-<19	19-<100	>100	N/A	N/A
2	(G) Grassland	<6	6-<8	8-<12	12-<17	17-<50	>50	N/A	N/A
3	(B) Woodland	<10	10-<14	14-<20	20-<29	29-<100	>100	N/A	N/A
4	(A) Forest	<20	20-<27	27-<37	37-<50	50-<100	>100	N/A	N/A
5	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100	N/A	N/A
6	(B) Woodland	<13	13-<17	17-<25	25-<35	35-<100	>100	N/A	N/A
7	(A) Forest	<17.9	17.9-<23.8	23.8-<33.5	33.5-<45.4	45.4-<100	>100	N/A	N/A
9	(G) Grassland	>7	7 - <9	9-<14	14-<20	20-<50	>50	N/A	N/A
10	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	(C) Shrubland	<7	7-<10	10-<15	15-<22	22-<100	>100	N/A	N/A
¹ All calculation input variables are presented in Table 3.2. A copy of radiant heat calculator output for classified vegetation Area 7 is presented in Appendix A3.									



Vegetation Area	Vegetation Class	Vegetation Type	Effective Slope	Exact Slope
1	C	Shrubland	0	0
2	G	Grassland	0	0
3	B	Woodland	0	0
4	A	Forest	>0-5	5
5	A	Forest	0	0
6	B	Woodland	>0-5	5
7	A	Forest	>0-5	2
8	D	Scrub	0	0
9	G	Grassland	>0-5	5
10	Ex	Excluded	0	0

Figure 3.1.1

Existing Topography & Classified Vegetation

Lots 807 to 811 on Plan xxxx
Jandakot Road
JANDAKOT
CITY OF COCKBURN

----- LEGEND -----

- Photo and Direction
- Elevation (m)
- Subject Lots
- Other Associated Lots
- 150m_Assessment_Area
- Cadastral

Classified Vegetation

- Class A - Forest
- Class B - Woodland
- Class C - Shrubland
- Class D - Scrub
- Class G - Grassland
- Exclusion 2.2.3.2

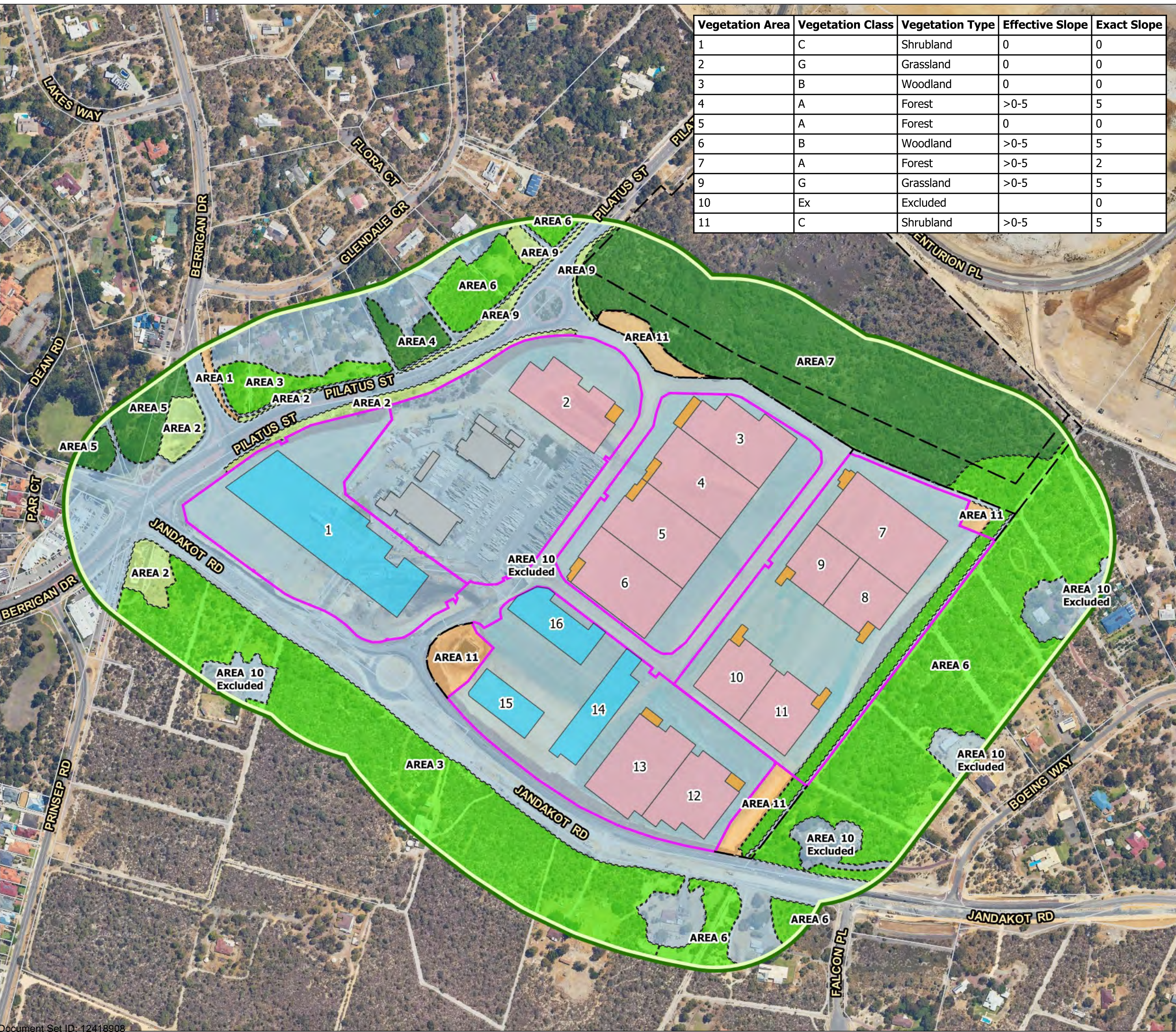
0 50 100 150 200 250

Metres

----- LOCALITY -----

AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map by: 28-12-2022
SCALE (A3): 1 : 4500



Vegetation Area	Vegetation Class	Vegetation Type	Effective Slope	Exact Slope
1	C	Shrubland	0	0
2	G	Grassland	0	0
3	B	Woodland	0	0
4	A	Forest	>0-5	5
5	A	Forest	0	0
6	B	Woodland	>0-5	5
7	A	Forest	>0-5	2
9	G	Grassland	>0-5	5
10	Ex	Excluded		0
11	C	Shrubland	>0-5	5

Figure 3.1.2
**Post Development
Classified Vegetation Map**
Lots 807 to 811 on Plan xxxx
Jandakot Road
JANDAKOT
CITY OF COCKBURN

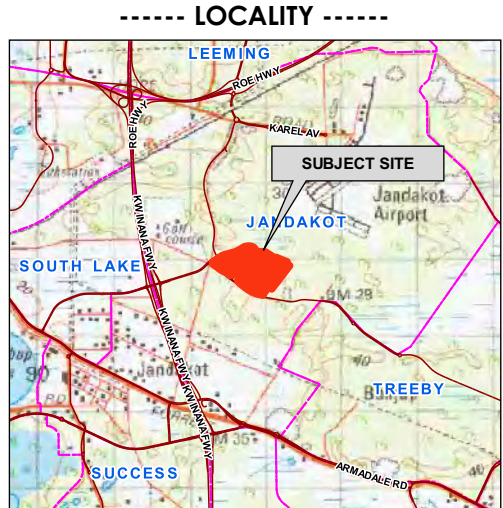
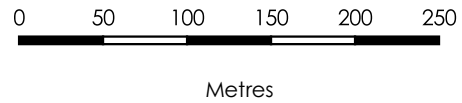
----- **LEGEND** -----

Proposed Buildings

- Warehouse
- Office
- Showroom-Warehouse
- Existing
- Subject Lots
- Other Associated Lots
- 150m_Assessment_Area
- Cadastral

Classified Vegetation Post Development

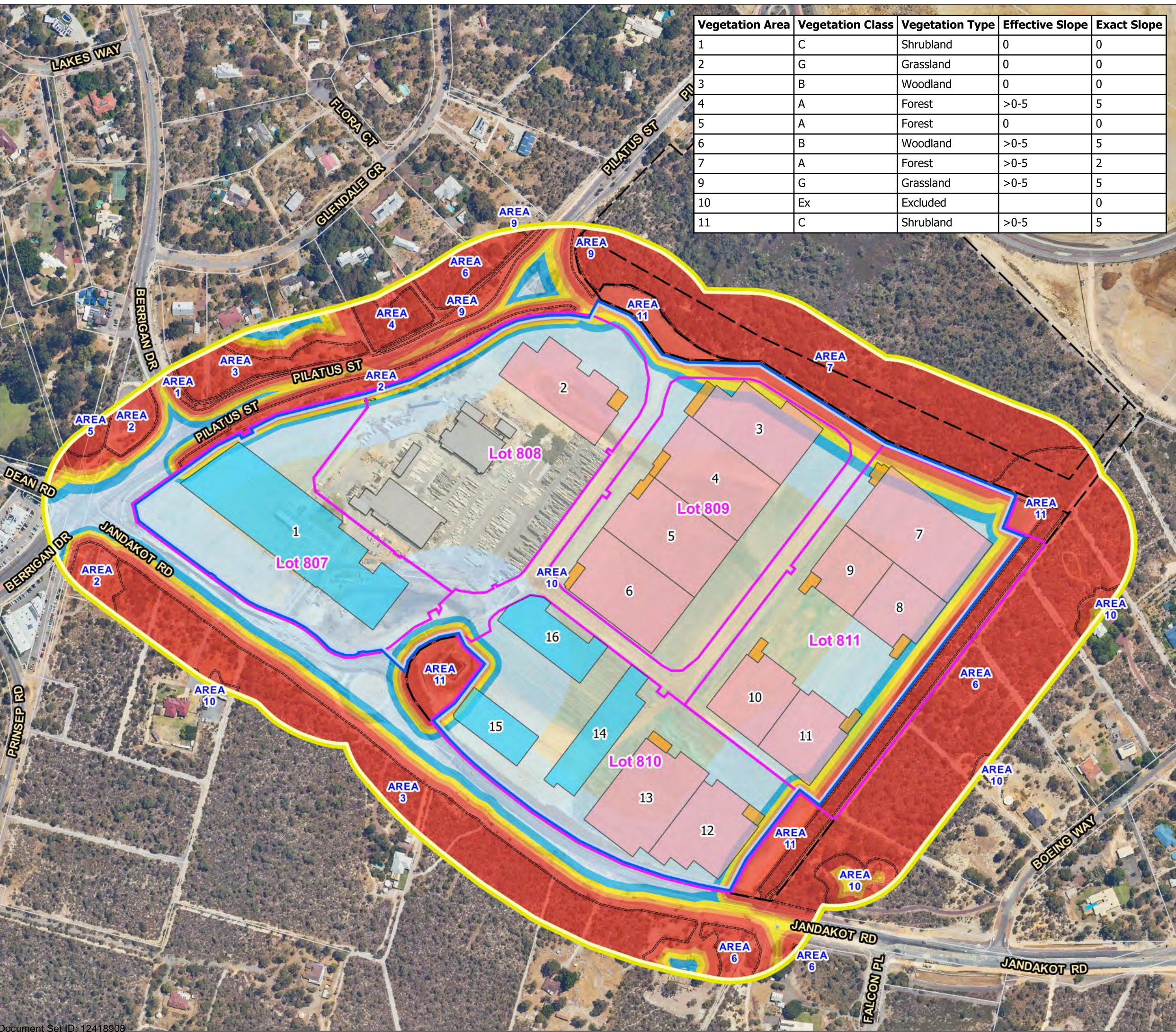
- Class A - Forest
- Class B - Woodland
- Class C - Shrubland
- Class G - Grassland
- Exclusion 2.2.3.2



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map by: 29-12-2022
SCALE (A3): 1 : 4500

BUSHFIRE PRONE PLANNING



Vegetation Area	Vegetation Class	Vegetation Type	Effective Slope	Exact Slope
1	C	Shrubland	0	0
2	G	Grassland	0	0
3	B	Woodland	0	0
4	A	Forest	>0-5	5
5	A	Forest	0	0
6	B	Woodland	>0-5	5
7	A	Forest	>0-5	2
9	G	Grassland	>0-5	5
10	Ex	Excluded		0
11	C	Shrubland	>0-5	5

Figure 3.2.1

Post Development BAL Contour Map

Lots 807 to 811 on Plan xxxx
Jandakot Road
JANDAKOT
CITY OF COCKBURN

----- **LEGEND** -----

Proposed Buildings

- Warehouse
- Office
- Showroom-Warehouse
- Existing
- Subject Lots
- Other Associated Lots
- Asset Protection Zone
- 100m BAL Buffer
- Cadastral
- Vegetation Outline

Bushfire Attack Levels

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

0 50 100 150 200 250

Metres

----- **LOCALITY** -----

AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map by: 29-12-2022
SCALE (A3): 1 : 4000

Figure 3.2.2
Post Development
BAL Contour Map- Lot 811

Lots 811 on Plan xxxx
Jandakot Road
JANDAKOT
CITY OF COCKBURN

----- LEGEND -----

Proposed Buildings

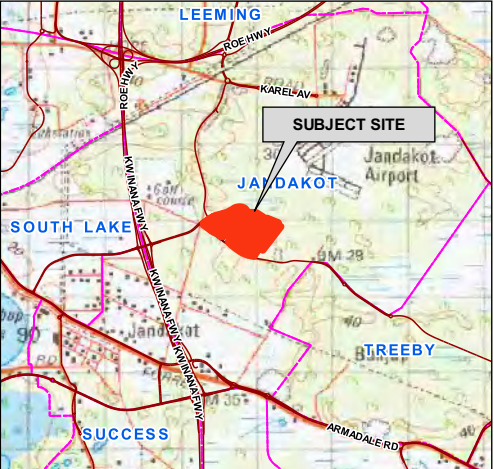
- Warehouse
- Office
- Showroom-Warehouse
- Subject Lots
- Other Associated Lots
- Asset Protection Zone
- 100m BAL Buffer
- Cadastral
- Vegetation Outline

Bushfire Attack Levels

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW



----- LOCALITY -----



AERIAL IMAGERY: Landgate/SLIP



Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map by: 29-12-2022
SCALE (A3): 1 : 1500

Vegetation Area	Vegetation Class	Vegetation Type	Effective Slope	Exact Slope
1	C	Shrubland	0	0
2	G	Grassland	0	0
3	B	Woodland	0	0
4	A	Forest	>0-5	5
5	A	Forest	0	0
6	B	Woodland	>0-5	5
7	A	Forest	>0-5	2
9	G	Grassland	>0-5	5
10	Ex	Excluded		0
11	C	Shrubland	>0-5	5

4 IDENTIFICATION OF BUSHFIRE HAZARD ISSUES

The Guidelines for Planning in Bushfire Prone Areas (WAPC 2021 v1.4), Appendix 5, establish that the application of this section of the BMP is intended to support strategic planning proposals. At the strategic planning stage there will typically be insufficient proposed development detail to enable all required assessments, including the assessment against the bushfire protection criteria.

Strategic Planning Proposals

For strategic planning proposals this section of the BMP will identify:

- Issues associated with the level of the threats presented by any identified bushfire hazard;
- Issues associated with the ability to implement sufficient and effective bushfire protection measures to reduce the exposure and vulnerability levels (of elements exposed to the hazard threats), to a tolerable or acceptable level; and
- Issues that will need to be considered at subsequent planning stages.

All Other Planning Proposals

For all other planning stages, this BMP will address what are effectively the same relevant issues but do it within the following sections:

- Section 2 – Bushfire Prone Vegetation - Environmental and Assessment Considerations: Assess environmental, biodiversity and conservation values;
- Section 3 – Potential Bushfire Impact: Assess the bushfire threats with the focus on flame contact and radiant heat; and
- Section 5 – Assessment Against the Bushfire Protection Criteria (including the guidance provided by the *Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2'*): Assess the ability of the proposed development to apply the required bushfire protection measures thereby enabling it to be considered for planning approval for these factors.

Is the proposed development a strategic planning proposal?

No

5 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA (GUIDELINES V1.4)

5.1 Bushfire Protection Criteria Elements Applicable to the Proposed Development/Use

APPLICATION OF THE CRITERIA, ACCEPTABLE SOLUTIONS AND PERFORMANCE ASSESSMENT

The criteria are divided into five elements – location, siting and design, vehicular access, water and vulnerable tourism land uses. Each element has an intent outlining the desired outcome for the element and reflects identified planning and policy requirements in respect of each issue.

The example acceptable solutions (bushfire protection measures) provide one way of meeting the element's intent. Compliance with these automatically achieves the element's intent and provides a straightforward pathway for assessment and approval.

Where the acceptable solutions cannot be met, the ability to develop design responses (as alternative solutions that meet bushfire performance requirements) is an alternative pathway that is provided by addressing the applicable performance principles (as general statements of how best to achieve the intent of the element).

A merit based assessment is established by the SPP 3.7 and the Guidelines as an additional alternative pathway along with the ability of using discretion in making approval decisions (sections 2.5, 2.6 and 2.7). This is formally applied to certain development (minor and unavoidable – sections 5.4.1 and 5.7). Relevant decisions by the State Administrative Tribunal have also supported this approach more generally.

Elements 1 – 4 should be applied for all strategic planning proposals, subdivision or development applications, except for vulnerable tourism land uses which should refer to Element 5. Element 5 incorporates the bushfire protection criteria in Elements 1 – 4 but caters them specifically to tourism land uses. (Guidelines DPLH 2021v1.4)

The Bushfire Protection Criteria	Applicable to the Proposed Development/Use
Element 1: Location	Yes
Element 2: Siting and Design	Yes
Element 3: Vehicular Access	Yes
Element 4: Water	Yes
Element 5: Vulnerable Tourism Land Uses	No

5.2 Local Government Variations to Apply

Local governments may add to or modify the acceptable solutions to recognise special local or regional circumstances (e.g., topography / vegetation / climate). These are to be endorsed by both the WAPC and DFES before they can be considered in planning assessments. (Guidelines DPLH 2021v1.4).

Do endorsed regional or local variations to the acceptable solutions apply to the assessments against the Bushfire Protection Criteria for the proposed development /use?	None known or identified
---	--------------------------

5.3 Assessment Statements for Element 1: Location

LOCATION			
Element Intent	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.		
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development		
Element Compliance Statement	The proposed development/use achieves the intent of this element by being fully compliant with all applicable acceptable solutions.		
Pathway Applied to Provide an Alternative Solution	N/A		
<p align="center">Acceptable Solutions - Assessment Statements</p> <p><i>All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.</i></p>			
Solution Component Check Box Legend	<input checked="" type="checkbox"/> Relevant & met	<input checked="" type="checkbox"/> Relevant & not met	<input type="checkbox"/> Not relevant
A1.1 Development location	Applicable:	Yes	Compliant: Yes
ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES			
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> The development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL-29 or below.			
<p>Supporting Assessment Details:</p> <p>For Lots 807 to 811: The proposed development will provide an area of land within each lot that can be considered suitable for development as BAL-40 or BAL-FZ construction requirements will not be required to be applied. This meets the requirements established by Acceptable Solution A1.1 and its associated explanatory note.</p> <p>It is a requirement of this BMP that all future habitable buildings be located in an area on each lot where the BAL rating will be BAL-29 or lower once development of that lot is complete.</p>			
ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)			
<p>"Consideration should be given to the site context where 'area' is the land both within and adjoining the subject site. The hazards remaining within the site should not be considered in isolation of the hazards adjoining the site, as the potential impact of a bushfire will be dependent on the wider risk context, including how a bushfire could affect the site and the conditions for a bushfire to occur within the site."</p> <p>Strategic Planning Proposals: Consider the threat levels from any vegetation <u>adjoining</u> and <u>within</u> the subject site for which the potential intensity of a bushfire in that vegetation would result in it being classified as an Extreme Bushfire Hazard Level (BHL). Identify any proposed design strategies to reduce these threats.</p> <p>Structure Plans (lot layout known) and Subdivision Applications: As for strategic planning proposals but <u>within</u> the subject site the relevant threat levels to consider are the radiant heat levels represented by BAL-FZ and BAL-40 ratings.</p>			
The planning proposal is a development application, consequently the referenced position statement is not applicable to this Element 1 assessment.			

5.4 Assessment Statements for Element 2: Siting and Design

SITING AND DESIGN OF DEVELOPMENT			
Element Intent	To ensure that the siting and design of development minimises the level of bushfire impact. (BPP Note: not building/construction design)		
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development		
Element Compliance Statement	The proposed development/use achieves the intent of this element by being fully compliant with all applicable acceptable solutions.		
Pathway Applied to Provide an Alternative Solution	N/A		
<p align="center">Acceptable Solutions - Assessment Statements</p> <p>All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.</p>			
Solution Component Check Box Legend	<input checked="" type="checkbox"/> Relevant & met	<input checked="" type="checkbox"/> Relevant & not met	<input type="checkbox"/> Not relevant
A2.1 Asset Protection Zone (APZ)	Applicable:	Yes	Compliant: Yes
<p>APZ DIMENSIONS – DIFFERENCES IN REQUIREMENTS FOR PLANNING ASSESSMENTS COMPARED TO IMPLEMENTATION</p> <p>A key required bushfire protection measure is to reduce the exposure of buildings/infrastructure (as exposed vulnerable elements at risk), to the direct bushfire threats of flame contact, radiant heat and embers and the indirect threat of consequential fires that result from the subsequent ignition of other combustible materials that may be constructed, stored or accumulate in the area surrounding these structures. This reduces the associated risks of damage or loss.</p> <p>This is achieved by separating buildings (and consequential fire fuels as necessary) from areas of classified bushfire prone vegetation. This area of separation surrounding buildings is identified as the Asset Protection Zone (APZ) and consists of no vegetation and/or low threat vegetation or vegetation continually managed to a minimal fuel condition. The required separation distances will vary according to the site specific conditions and local government requirements.</p> <p>The APZ dimensions stated and/or illustrated in this Report can vary dependent on the purpose for which they are being identified.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><i>Note: Appendix B 'Onsite Vegetation Management' provides further information regarding the different APZ dimensions that can be referenced, their purpose and the specifications of the APZ that are to be established and maintained on the subject lot.</i></p> </div> <p align="center">THE 'PLANNING BAL-29' APZ DIMENSIONS</p> <p>Purpose: To provide evidence of the development or use proposal's ability to achieve minimum vegetation separation distances. To achieve 'acceptable solution' planning approval for this factor, it must be demonstrated that the minimum separation distances corresponding to a maximum level of radiant transfer to a building of 29 kW/m², either exist or can be implemented (with certain exceptions). These separation distances are the 'Planning BAL-29' APZ dimensions.</p> <p><i>The 'Planning BAL-29' APZ is not necessarily the size of the APZ that must be physically implemented and maintained by a landowner. Rather, its sole purpose is to identify if an acceptable solution for planning approval can be met.</i></p>			

THE 'REQUIRED' APZ DIMENSIONS

Purpose: Establishes the dimensions of the APZ to be physically implemented by the landowner on their lot: These will be the minimum required separation distances from the subject building(s) to surrounding bushfire prone vegetation (identified by type and associated ground slope). These are established by:

- A. The 'BAL Rating APZ' of the subject building(s) when distances are greater than 'B' below (except when 'B' establishes a maximum distance); or
- B. The 'Local Government' APZ' derived from the Firebreak/Hazard Reduction Notice when distances are greater than 'A' above, other than when a maximum distance is established, in which case this will apply; or
- C. A combination of 'A' and 'B'.

Within this Report/Plan it is the 'Planning BAL-29' APZ that will be identified on maps, diagrams and in tables as necessary – unless otherwise stated.

The 'Required' APZ dimension information will be presented in Appendix B1.1 and on the Property Bushfire Management Statement, when required to be included for a development application.

ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES

<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	APZ Width: The proposed habitable building(s) on the lot(s) of the proposed development can be located within the developable portion of the lot and be surrounded by a 'Planning BAL-29' APZ of the required dimensions (measured from any external wall or supporting post or column to the edge of the classified vegetation), that will ensure their exposure to the potential radiant heat impact of a bushfire does not exceed 29 kW/m ² .
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Restriction on Building Location: It has been identified that the current developable portion of a lot(s) provides for the proposed future (or a future) building/structure location that will result in that building/structure being subject to a BA-40 or BAL-FZ rating. Consequently, it may be considered necessary to impose the condition that a restrictive covenant to the benefit of the local government pursuant to section 129BA of the Transfer of Land Act 1893, is to be placed on the certificate(s) of title of the proposed lot(s) advising of the existence of a restriction on the use of that portion of land (refer to Code F3 of Model Subdivision Conditions Schedule, WAPC June 2021 and Guidelines s5.3.2).
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be contained solely within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be partly established within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated. The balance of the APZ would exist on adjoining land that satisfies the exclusion requirements of AS 3959:2018 cl 2.2.3.2 for non-vegetated areas and/or low threat vegetation and/or vegetation managed in a minimal fuel condition.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	APZ Location: It can be justified that any adjoining (offsite) land forming part of a 'Planning BAL-29' APZ will: <ul style="list-style-type: none"> • If non-vegetated, remain in this condition in perpetuity; and/or • If vegetated, be low threat vegetation or vegetation managed in a minimal fuel condition in perpetuity.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	APZ Management: The area of land (within each lot boundary), that is to make up the required 'Landowner' APZ dimensions (refer to Appendix B, Part B1), can and will be managed in accordance with

	the requirements of the Guidelines Schedule 1 'Standards for Asset Protection Zones' (refer to Appendix B).
<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="radio"/>	<p>Subdivision Staging: There are undeveloped future stages of subdivision, containing bushfire prone vegetation, that have been taken into consideration for their potentially 'temporary' impact on the ability to establish a 'Planning BAL-29' APZ on adjoining developed lots. A staging plan is developed to manage this.</p>
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Firebreak/Hazard Reduction Notice: Any additional requirements established by the relevant local government's annual notice to install firebreaks and manage fuel loads (issued under s33 of the Bushfires Act 1954), can and will be complied with.</p>
<p>Supporting Assessment Details:</p> <p>The whole of the South Connect Industrial Development site, with the exception of drainage reserves, the waste water pumping station site and the eastern vegetation buffer, is to be maintained in a low bushfire threat state by the landowner. This is inclusive of road reserves.</p> <p>For Lot 811: The proposed buildings are located in an area where a BAL-29 or lower rating can be achieved upon completion of landscaping and establishment of the required Asset Protection Zone.</p> <p>The local government may require a restrictive covenant upon the lot prohibiting habitable buildings being constructed in areas assessed as having a BAL rating of BAL-40 or BAL-FZ.</p> <p>A portion of the required Asset Protection Zone (APZ) extends into the 6 metre wide access leg for the waste water pumping station (Lot 816). The access leg is expected to be sealed and maintained to a low bushfire threat state in perpetuity.</p> <p>The whole of Lot 811, with the exception of the 20 metre eastern vegetation buffer, will be managed to a low bushfire threat state in accordance with "Schedule 1: Standards for Asset Protection Zones" of the Guidelines for Planning in Bushfire Prone Areas v1.4.</p> <p>For Lots 807 to 810: Future building locations are indicative only. Building locations will be altered where a building has a BAL rating greater than BAL-29.</p> <p>The local government may require a restrictive covenant upon the lots prohibiting habitable buildings being constructed in areas assessed as having a BAL rating of BAL-40 or BAL-FZ.</p> <p>A portion of the required Asset Protection Zone (APZ) for future buildings may extend into neighbouring lots or road reserves. All lots and roads are to be maintained to a low bushfire threat state by the landowner.</p> <p>The whole of each lot will be managed to a low bushfire threat state in accordance with "Schedule 1: Standards for Asset Protection Zones" of the Guidelines for Planning in Bushfire Prone Areas v1.4.</p>	
<p>ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)</p>	
<p>Strategic Planning Proposals: "At this planning level there may not be enough detail to demonstrate compliance with this element. The decision-maker may consider this element is satisfied where A1.1 is met."</p> <p>Structure Plans (lot layout known) and Subdivision Applications: "Provided that Element 1 is satisfied, the decision-maker may consider approving lot(s) containing BAL-40 or BAL-FZ under the following scenarios.</p>	
<p>The planning proposal is a development application, consequently the referenced position statement is not applicable to this proposed development.</p>	

5.5 Assessment Statements for Element 3: Vehicular Access

VEHICULAR ACCESS			
Element Intent	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.		
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development		
Element Compliance Statement	The proposed development/use achieves the intent of this element by being fully compliant with all applicable acceptable solutions.		
Pathway Applied to Provide an Alternative Solution	N/A		
<p align="center">Acceptable Solutions - Assessment Statements</p> <p><i>All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.</i></p> <p><i>The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices 2 and 3. The local government will advise the proponent where different requirements are to apply and when any additional specifications such as those for signage and gates are to apply (these are included in the relevant appendix if requested by the local government).</i></p>			
Solution Component Check Box Legend <input checked="" type="checkbox"/> Relevant & met <input checked="" type="checkbox"/> Relevant & not met <input type="checkbox"/> Not relevant			
A3.1 Public roads		Applicable:	Yes
		Compliant:	Yes
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> The technical construction requirements of vertical clearance and weight capacity (Guidelines, Table 6) can and will be complied with (Refer also to Appendix C in this BMP).			
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> All other applicable technical requirements of trafficable width, gradients and curves, are required to be in "accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Ausroad Standards and/or any applicable standard in the local government area" (Guidelines, Table 6 and E3.1. Refer also to Appendix C in this BMP). The assessment conducted for the bushfire management plan indicates that it is likely that the proposed development can and will comply with the requirements. However, the applicable class of road, the associated technical requirements and subsequent proposal compliance, will need to be confirmed with the relevant local government and/or Main Roads WA.			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A traversable verge is available adjacent to classified vegetation (Guidelines, E3.1), as recommended.			
Supporting Assessment Details: Lots 807 to 811: Roads throughout the development site will be constructed to the technical requirements for industrial developments and to the satisfaction of the local government.			
A3.2a Multiple access routes		Applicable:	Yes
		Compliant:	Yes
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> For each lot, two-way public road access is provided in two different directions to at least two different suitable destinations with an all-weather surface.			

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="radio"/>	The two-way access <u>is</u> available at an intersection no greater than 200m from the relevant boundary of each lot, via a no-through road.		
<p>The two-way access is <u>not</u> available at an intersection within 200m from the relevant boundary of each lot. However, the available no-through road satisfies the established exemption for the length limitation in every case. These requirements are:</p>					
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="radio"/>	<ul style="list-style-type: none"> Demonstration of no alternative access (refer to A3.3 below); The no-through road travels towards a suitable destination; and The balance of the no-through road that is greater than 200m from the relevant lot boundary is within a residential built-out area or is potentially subject to radiant heat levels from adjacent bushfire prone vegetation that correspond to the BAL-LOW rating (<12.5 kW/m²). 		
<p>Supporting Assessment Details:</p> <p>Lots 807 to 811: All lots will have access/egress in two different directions within the development site to two different access/egress points. Access onto the existing public road network will be either via Jandakot Road or Pilatus Street. Both of these roads provide access egress in two different directions to two different destinations.</p>					
A3.2b Emergency access way		Applicable:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; background-color: #00a0e3; color: white; text-align: center;">No</td> <td style="width: 50%; background-color: #d3d3d3; text-align: center;">Compliant: N/A</td> </tr> </table>	No	Compliant: N/A
No	Compliant: N/A				
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="radio"/>	The proposed or existing EAW provides a through connection to a public road.		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="radio"/>	The proposed or existing EAW is less than 500m in length and will be signposted and gated (remaining unlocked) to the specifications stated in the Guidelines and/or required by the relevant local government.		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="radio"/>	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.2b. Refer also to Appendix C in this BMP), can and will be complied with.		
<p>Supporting Assessment Details: Acceptable Solution A3.2a can be achieved. Emergency Access Ways are not required.</p>					
A3.3 Through-roads		Applicable:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; background-color: #00a0e3; color: white; text-align: center;">No</td> <td style="width: 50%; background-color: #d3d3d3; text-align: center;">Compliant: N/A</td> </tr> </table>	No	Compliant: N/A
No	Compliant: N/A				
A3.4a Perimeter roads		Applicable:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; background-color: #00a0e3; color: white; text-align: center;">No</td> <td style="width: 50%; background-color: #d3d3d3; text-align: center;">Compliant: N/A</td> </tr> </table>	No	Compliant: N/A
No	Compliant: N/A				
A3.4b Fire service access route		Applicable:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; background-color: #00a0e3; color: white; text-align: center;">No</td> <td style="width: 50%; background-color: #d3d3d3; text-align: center;">Compliant: N/A</td> </tr> </table>	No	Compliant: N/A
No	Compliant: N/A				
A3.5 Battle-axe access legs		Applicable:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; background-color: #00a0e3; color: white; text-align: center;">No</td> <td style="width: 50%; background-color: #d3d3d3; text-align: center;">Compliant: N/A</td> </tr> </table>	No	Compliant: N/A
No	Compliant: N/A				
A3.6 Private driveways		Applicable:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; background-color: #76b82a; color: white; text-align: center;">Yes</td> <td style="width: 50%; background-color: #d3d3d3; text-align: center;">Compliant: Yes</td> </tr> </table>	Yes	Compliant: Yes
Yes	Compliant: Yes				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The private driveway to the most distant external part of the development site is within a lot serviced by reticulated water, is accessed via a public road with a speed limit of 70 km/hr or less and has a length is no greater than 70m (measured as a hose lay). No technical requirements need to be met.		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.6. Refer also to Appendix C in this BMP), can and will be complied with.		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Passing bays can and will be installed every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m.		

☒ ☐ ☐ The turnaround area requirements (Guidelines, Figure 28, and within 30m of the habitable building) can and will be complied with.

Supporting Assessment Details:

Lot 811: The rear of the development site is greater than 70 metres from a public road.

Vehicular access throughout the site, with the exception of the front parking areas, is designed to accommodate semi-trailer and B-Double trucks. This will exceed normal construction standards.

All access routes throughout the site are a minimum of 6 metres in width, therefore passing bays are not required.

Turnaround areas or loop roads, suitable for a 3.4 type fire appliance, are available throughout the site.

Lots 807 to 810: Internal driveways are to be constructed to the technical requirements stated above, including requirements for passing bays and turnaround areas.

5.6 Assessment Statements for Element 4: Water

FIREFIGHTING WATER			
Element Intent	To ensure water is available to enable people, property and infrastructure to be defended from bushfire.		
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development		
Element Compliance Statement	The proposed development/use achieves the intent of this element by being fully compliant with all applicable acceptable solutions.		
Pathway Applied to Provide an Alternative Solution	N/A		
<p align="center">Acceptable Solutions - Assessment Statements</p> <p><i>All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.</i></p> <p><i>The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices 2 and 3. The local government will advise the proponent where different requirements are to apply and when any additional specifications such as those for signage and gates are to apply (these are included in the relevant appendix if requested by the local government).</i></p>			
Solution Component Check Box Legend	<input checked="" type="checkbox"/> Relevant & met	<input checked="" type="checkbox"/> Relevant & not met	<input type="checkbox"/> Not relevant
A4.1 Identification of future firefighting water supply	Applicable:	No	Compliant: N/A
A4.2 Provision of water for firefighting purposes	Applicable:	Yes	Compliant: Yes
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A reticulated water supply is available to the proposed development. The existing hydrant connection(s) are provided in accordance with the specifications of the relevant water supply authority.			
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A reticulated water supply will be available to the proposed development. Hydrant connection(s) can and will be provided in accordance with the specifications of the relevant water supply authority.			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A static water supply (tank) for firefighting purposes will be installed on each lot that is additional to any water supply that is required for drinking and other domestic purposes.			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A strategic water supply (tank or tanks) for firefighting purposes will be installed within or adjacent to the proposed development that is additional to any water supply that is required for drinking and other domestic purposes. The required land will be ceded free of cost to the local government and the lot or road reserve where the tank is to be located will be identified on the plan of subdivision.			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> The strategic static water supply (tank or tanks) will be located no more than 10 minutes travel time from a subject site (at legal road speeds).			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> The technical requirements (location, number of tanks, volumes, design, construction materials, pipes and fittings), as established by the Guidelines (A4.2, E4 and Schedule 2) and/or the relevant local government, can and will be complied with.			

Supporting Assessment Details:

Lots 807 to 811: The South Connect Industrial Development is currently under construction. Fire hydrants will be located throughout the development site in accordance with the technical requirements (See Figure 1.2).

Refer to information contained in Appendix D for the firefighting water supply specifications and technical requirements.

5.7 Additional Bushfire Protection Measures Recommended to be Implemented

The following bushfire protection measures are recommended to be implemented and maintained. They are additional to, or a variation of, those established by the relevant acceptable solutions applied to the proposed development/use within Sections 5 of this BMP (as applicable to the proposed development).

The intent of their application is to improve the bushfire performance of the proposed development/use and reduce residual risk levels to persons and property from a bushfire event.

The development of these additional and/or varied protection measures originates from the following potential sources (not exhaustive):

1. Out of the relevant merit based assessment when the Section titled 'Non-compliance – Additional Assessments' has been used in this BMP;
2. Out of the relevant performance based assessment when Section titled 'Non-compliance – Additional Assessments' has been used in this BMP;
3. Out of the development of any other required bushfire planning documents. These include a Bushfire Emergency Plan and the Bushfire Risk Assessment and Management Report;
4. Out of any additional bushfire planning guidance documents or position statements issued by the WA Department of Planning, Lands and Heritage;
5. From any 'Conditions' which may be applied to a 'Planning Approval' or a 'Notice of Determination'; or
6. As a recommendation from the bushfire consultant.

The following table summarises the requirements/recommendations with the detail provided in the following sections.

When necessary, the implementation responsibility for these additional protection measures will be stated in Section 6 of this BMP and included in other operational documents as relevant.

5.7.1 Additional Protection Measures to Reduce the Exposure and/or Vulnerability of Buildings/Structures to Bushfire Threats

Additional Protection Measure: Bushfire Resilient Construction – Proposed Buildings/Structures Lot 811

The warehouse and office buildings are not required to comply with the bushfire performance requirements established by the Building Code of Australia (Vol. 1 & 2 of the National Construction Code) that are referenced by the Building Regulations 2012 (WA Building Act 2011).

However, it is recommended (by the bushfire consultant) that these building works be constructed to the requirements corresponding to their determined BAL rating to the greatest extent practical. Consideration may need to be given to the protection principles established by these requirements, rather than specific construction detail, when it does not directly apply to the proposed type of construction – and adjust construction requirements accordingly.

The bushfire construction requirements corresponding to BAL ratings are established by AS 3959:2018 – Construction of buildings in bushfire prone areas and/or the NASH Standard (NS 300 2021) – Steel framed construction in bushfire areas (for Class 1 buildings).

6 BUSHFIRE PROTECTION MEASURES - RESPONSIBILITY FOR IMPLEMENTATION CHECKLIST

6.1 Developer/Landowner Responsibilities – Prior to Building and Occupancy or Operation

DEVELOPER/LANDOWNER RESPONSIBILITIES – PRIOR TO BUILDING AND OCCUPANCY or OPERATION	
No.	Implementation Actions
1	<p>The local government may condition a development application approval with a requirement for the landowner/proponent to register a notification onto the certificate of title and deposited plan (with the required wording stated by the local government).</p> <p>This will be done pursuant to <i>Section 70A Transfer of Land Act 1893 (as amended)</i> as per 'Factors affecting use and enjoyment of land, notification on title'.</p> <p>This is to notify owners and prospective purchasers of the land that:</p> <ol style="list-style-type: none"> 1. The land is in a designated bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner; 2. The land is subject to a Bushfire Management Plan that establishes certain protection measures to manage bushfire risk that are to be implemented and continue to be applied at the owners cost; and 3. That additional planning and building requirements may apply to development on this land.
2	<p>Prior to relevant building work, inform the builder of the existence of this approved Bushfire Management Plan (BMP). The plan identifies that the development site is within a designated bushfire prone area and states the indicative (or determined) BAL rating(s) that may (or will) be applied to buildings/structures. A BAL assessment report may be required to confirm determined ratings and will be required when ratings are indicative. BAL certificates will need to be issued to accompany building applications.</p> <p>Compliance with the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), will require certain bushfire resistant construction requirements be applied to residential buildings in bushfire prone areas (i.e., Class 1, 2 and 3 and associated Class 10a buildings and decks). Other classes of buildings may also be required to comply with these construction standards when established by the relevant authority or if identified as an additional bushfire protection measure within the BMP.</p> <p>The deemed to satisfy solutions that will meet the relevant bushfire performance requirements are found in AS 3959 – Construction of Building in Bushfire Prone Areas (as amended) and the NASH Standard - Steel Framed Construction in Bushfire Areas (as amended).</p>
3	<p>It is recommended that building design and construction is to implement the bushfire protection measures that have been established within Section 5.7.1 of this BMP as measures additional to those established by the acceptable solutions.</p> <p>For the proposed development, building works are recommended to be constructed to the bushfire construction requirements corresponding to their determined BAL rating, to the greatest extent practical – even though the Building Code of Australia (NCC) does not require the proposed classes of the buildings to apply these requirements.</p> <p>Consideration may need to be given to the protection principles established by these requirements, rather than specific construction detail, when it does not directly apply to the proposed type of construction – and adjust construction requirements accordingly.</p>
4	<p>Prior to occupancy or operation establish the 'Required' Asset Protection Zone (APZ) around habitable buildings (and other structures as required) to satisfy:</p>

	<ul style="list-style-type: none"> • The minimum required dimensions established in Appendix B1; and • The requirements of this BMP. That is the whole of Lots 807 to 810, all road reserve, and the whole of Lot 811, excepting the eastern 20 metre vegetation buffer, are to be maintained to a low bushfire threat state per the following dot point. • The standards established by the Guidelines DPLH, 2021 v1.4, Schedule 1, or as varied by the local government through their annually issued firebreak / hazard reduction notice when the variations have been endorsed by the WAPC and DFES as per s4.5.3 of the Guidelines. <p>If native vegetation is required to be modified or removed, ensure that approval has been received from the relevant authority.</p>
5	It is a requirement of this BMP that all future habitable buildings be located in an area on each lot where the BAL rating will be BAL-29 or lower once development of that lot is complete.
6	<p>Prior to occupation or operation of the subject lots, each individual lot is to be compliant with current version of the City of Cockburn Fire Control Order issued under s33 of the Bushfires Act 1954.</p> <p>This may include standards for asset protection zones that differ from Schedule 1 in the Guidelines DPLH, 2021 v1.4, with the intent to better satisfy local conditions.</p> <p>[Refer to assessments against the Bushfire Protection Criteria the Element 2 'Siting and Design' and the information presented in Appendix B].</p>
7	Prior to occupancy, construct the private driveways to comply with the technical requirements referenced in the BMP.

6.2 Landowner / Occupier Responsibilities – Ongoing Management

LANDOWNER/OCCUPIER – ONGOING MANAGEMENT	
No.	Management Actions
1	<p>Maintain the 'Required' Asset Protection Zone (APZ) around habitable buildings (and other structures as required) to satisfy:</p> <ul style="list-style-type: none"> The minimum required dimensions established in Appendix B1; and The requirements of this BMP. That is the whole of Lots 807 to 810, all road reserve, and the whole of Lot 811, excepting the eastern 20 metre vegetation buffer, are to be maintained to a low bushfire threat state per the following dot point. The standards established by the Guidelines DPLH, 2021 v1.4, Schedule 1, or as varied by the local government through their annually issued firebreak / hazard reduction notice when the variations have been endorsed by the WAPC and DFES as per s4.5.3 of the Guidelines.
2	<p>Comply with the City of Cockburn Fire Control Order issued under s33 of the Bush Fires Act 1954. Check the notice annually for any changes.</p>
3	<p>Maintain vehicular access routes within the lot to comply with the technical requirements referenced in the BMP and the relevant local government's annual firebreak / hazard reduction notice.</p>
4	<p>Ensure that builders engaged to construct buildings, additions and/or other relevant structures on the lot, are aware of the existence of this approved Bushfire Management Plan (BMP). The plan identifies that the development site is within a designated bushfire prone area and states the indicative (or determined) BAL rating(s) that may (or will) be applied to buildings/structures.</p> <p>A BAL assessment report may be required to confirm determined ratings and will be required when ratings are indicative. BAL certificates will need to be issued to accompany building applications.</p> <p>Compliance with the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), will require certain bushfire resistant construction requirements be applied to residential buildings in bushfire prone areas (i.e., Class 1, 2 and 3 and associated Class 10a buildings and decks). The deemed to satisfy solutions that will meet the relevant bushfire performance requirements are found in AS 3959 – Construction of Building in Bushfire Prone Areas (as amended) and the NASH Standard - Steel Framed Construction in Bushfire Areas (as amended).</p> <p>As an additional bushfire protection measure, other classes of buildings may also be required to comply with these construction requirements when established by the relevant authority or if identified as an additional bushfire protection measure within the BMP. The BMP may also establish that construction requirements to be applied will be those corresponding to a specified higher BAL rating. When applicable, these requirements will be identified in Section 5.7.</p>
5	<p>Ensure all future buildings the landowner has responsibility for, are designed and constructed in full compliance with:</p> <ul style="list-style-type: none"> The bushfire resistant construction requirements of the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), as established by the Building Regulations 2012 (WA Building Act 2011); and Any additional bushfire protection measures this Bushfire Management Plan has established.

6.3 Local Government Responsibilities – Ongoing Management

LOCAL GOVERNMENT – ONGOING MANAGEMENT	
No.	Management Actions
1	<p>Monitor landowner compliance with the annual City of Cockburn Fire Control Order and with any bushfire protection measures that are:</p> <ul style="list-style-type: none"> Established by this BMP; Are required to be maintained by the landowner/occupier; and Are relevant to local government operations.

APPENDIX A: DETAILED BAL ASSESSMENT DATA AND SUPPORTING INFORMATION

A1: BAL Assessment Inputs Common to the Method 1 and Method 2 Procedures

A1.1: FIRE DANGER INDICES (FDI/FDI/GFDI)

When using Method 1 the relevant FDI value required to be applied for each state and region is established by AS 3959:2018, Table 2.1. Each FDI value applied in Tables 2.4 – 2.7 represents both the Forest Fire Danger Index (FFDI) and a deemed equivalent for the Grassland Fire Danger Index (GFDI), as per Table B2 in Appendix B. When using Method 2, the relevant FFDI and GFDI are applied.

The values may be able to be refined within a jurisdiction, where sufficient climatological data is available and in consultation with the relevant authority.

Relevant Jurisdiction:	WA	Region:	Whole State	Method 1	Applied FDI:	80
				Method 2	Applied FFDI:	80
					Applied GFDI:	N/A

A1.2: VEGETATION ASSESSMENT AND CLASSIFICATION

Vegetation Types and Classification

In accordance with AS 3959:2018 clauses 2.2.3 and C2.2.3.1, all vegetation types within 100 metres of the 'site' (defined as "the part of the allotment of land on which a building stands or is to be erected"), are identified and classified. Any vegetation more than 100 metres from the site that has influenced the classification of vegetation within 100 metres of the site, is identified and noted. The maximum excess distance is established by AS 3959: 2018 cl 2.2.3.2 and is an additional 100 metres.

Classification is also guided by the Visual Guide for Bushfire Risk Assessment in WA (WA Department of Planning February 2016) and any relevant FPA Australia practice notes.

Modified Vegetation

The vegetation types have been assessed as they will be in their natural mature states, rather than what might be observed on the day. Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its expected re-generated mature state. Modified areas of vegetation can be excluded from classification if they consist of low threat vegetation or vegetation managed in a minimal fuel condition, satisfying AS 3959:2018 s2.2.3.2(f), and there is sufficient justification to reasonable expect that this modified state will exist in perpetuity.


The Influence of Ground Slope





Where significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.




THE INFLUENCE OF VEGETATION GREATER THAN 100 METRES FROM THE SUBJECT SITE

Vegetation area(s) within 100m of the site whose classification has been influenced by the existence of bushfire prone vegetation from 100m – 200m from the site:



N/A




VEGETATION AREA 1							
Classification	C. SHRUBLAND						
Types Identified	Open heath C-11						
Exclusion Clause	N/A						
Effective Slope	Measured	flat 0 degrees		Applied Range (Method 1)		Upslope or flat 0 degrees	
Foliage Cover (all layers)	<30%	Shrub/Heath Height		>1m		Tree Height	N/A
Dominant & Sub-Dominant Layers (species as relevant)	Recent revegetation of road verge. Low shrubs and sparse sandy areas.						
Understorey:	Sparse grasses						
Additional Justification:	Not Required.						
Post Development Assumptions:	N/A						
<div></div>							
PHOTO ID: 1a							


VEGETATION AREA 2						
Classification	G. GRASSLAND					
Types Identified	Tussock grassland G-22					
Exclusion Clause	N/A					
Effective Slope	Measured	flat or upslope	Applied Range (Method 1)		Upslope or flat 0 degrees	
Foliage Cover (all layers)	<30%	Shrub/Heath Height	N/A		Tree Height	N/A
Dominant & Sub-Dominant Layers (species as relevant)	Photos 2a and 2b: Tussock grasses in vacant lot and drainage reserve. Photo 2c: Tussock grasses along abutting road verge. Photo 2d: Recently cleared verge, expected to reseed with tussock grasses.					
Understorey:						
Additional Justification:	Not Required.					
Post Development Assumptions:	Nil					
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PHOTO ID: 2a			PHOTO ID: 2b			
<div><div></div><div></div></div>						
PHOTO ID: 2c			PHOTO ID: 2d			





VEGETATION AREA 3						
Classification	B. WOODLAND					
Types Identified	Low woodland B-07					
Exclusion Clause	N/A					
Effective Slope	Measured	flat or upslope	Applied Range (Method 1)		Upslope or flat 0 degrees	
Foliage Cover (all layers)	>30%	Shrub/Heath Height	<2m	Tree Height	Up to 8m	
Dominant & Sub-Dominant Layers (species as relevant)	Photos 3a and 3b: Banksias and Christmas trees, occasional eucalypt, grass understorey. Photos 3c and 3d: Banksias, occasional eucalypt, shrub understorey.					
Understorey:	Grasses and shrubs.					
Additional Justification:	Can possibly be assessed as Scrub adopting the Visual Guide for Bushfire Risk Assessment in Western Australia. However, assessed as Woodland adopting the precautionary principle.					
Post Development Assumptions:	Nil					
						
PHOTO ID: 3a			PHOTO ID: 3b			
						
PHOTO ID: 3c			PHOTO ID: 3d			
						



VEGETATION AREA 4						
Classification	A. FOREST					
Types Identified	Open forest A-03					
Exclusion Clause	N/A					
Effective Slope	Measured	d/slope 2 degrees	Applied Range (Method 1)		Downslope >0-5 degrees	
Foliage Cover (all layers)	>30%	Shrub/Heath Height	>2m	Tree Height	Up to 12m	
Dominant & Sub-Dominant Layers (species as relevant)	Eucalypts, scrub, shrubs.					
Understorey:	Grasses and shrubs.					
Additional Justification:	Not required.					
Post Development Assumptions:	Nil					
<div style="display: flex; justify-content: space-around;">   </div>						
PHOTO ID: 4a			PHOTO ID: 4b			


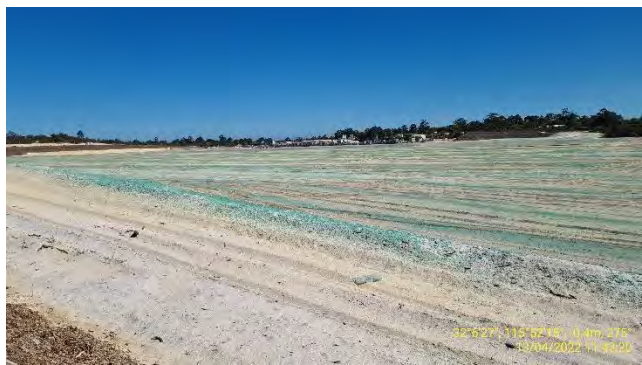

VEGETATION AREA 5					
Classification	A. FOREST				
Types Identified	Open forest A-03				
Exclusion Clause	N/A				
Effective Slope	Measured	flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees	
Foliage Cover (all layers)	>30%	Shrub/Heath Height	>2m	Tree Height	Up to 20m
Dominant & Sub-Dominant Layers (species as relevant)	Eucalypts, banksia, scrub, shrubs.				
Understorey:	Grasses.				
Additional Justification:	Not required.				
Post Development Assumptions:	Nil				
<div style="display: flex; justify-content: space-around;">   </div>					
PHOTO ID: 5a			PHOTO ID: 5b		





VEGETATION AREA 6					
Classification	B. WOODLAND				
Types Identified	Low woodland B-07				
Exclusion Clause	N/A				
Effective Slope	Measured	d/slope 2 degrees	Applied Range (Method 1)		Downslope >0-5 degrees
Foliage Cover (all layers)	>30%	Shrub/Heath Height	<2m	Tree Height	Up to 8m
Dominant & Sub-Dominant Layers (species as relevant)	Banksias, occasional eucalypt, shrub understorey.				
Understorey:	Grasses and shrubs.				
Additional Justification:	Can possibly be assessed as Scrub adopting the Visual Guide for Bushfire Risk Assessment in Western Australia. However, assessed as Woodland adopting the precautionary principle.				
Post Development Assumptions:	Nil				
					
PHOTO ID: 6a			PHOTO ID: 6b		
					
PHOTO ID: 6c			PHOTO ID: 6d		
					

VEGETATION AREA 7					
Classification	A. FOREST				
Types Identified	Open forest A-03				
Exclusion Clause	N/A				
Effective Slope	Measured	d/slope 2 degrees	Applied Range (Method 1)		N/A
Foliage Cover (all layers)	>30%	Shrub/Heath Height	<2m	Tree Height	Up to 12m
Dominant & Sub-Dominant Layers (species as relevant)	Eucalypts, banksias, juvenile trees, scrub and shrubs.				
Understorey:	Grasses and shrubs.				
Additional Justification:	None required.				
Post Development Assumptions:	Expected to reseed over time and extend slightly south to managed development boundary.				
					
PHOTO ID: 7a			PHOTO ID: 7b		
					
PHOTO ID: 7c			PHOTO ID: 7d		

VEGETATION AREA 8					
Classification	D. SCRUB				
Types Identified	Open scrub D-14				
Exclusion Clause	N/A				
Effective Slope	Measured	flat or upslope	Applied Range (Method 1)		Upslope or flat 0 degrees
Foliage Cover (all layers)	<30%	Shrub/Heath Height	>2m	Tree Height	N/A
Dominant & Sub-Dominant Layers (species as relevant)	Photos 8a and 8b: Juvenile scrub, shrubs. Assessed in mature state. Photos 8c and 8d: Recently planted shrubs and scrubs on batters. Assessed in mature state.				
Understorey:	Grasses.				
Additional Justification:	None required.				
Post Development Assumptions:	To be managed and maintained to a low bushfire threat state.				
<div><div><p>32.11678, 115.86389, 3.5m, 91° 20/12/2022 09:14:49</p></div><div><p>32.11695, 115.86389, 4.1m, 336° 20/12/2022 09:18:59</p></div></div>					
PHOTO ID: 8a			PHOTO ID: 8b		
<div><div><p>32.11637, 115.86541, 7.8m, 96° 20/12/2022 09:39:01</p></div><div><p>32.11684, 115.86626, 5.1m, 332° 20/12/2022 09:42:50</p></div></div>					
PHOTO ID: 8c			PHOTO ID: 8d		

VEGETATION AREA 9					
Classification	G. GRASSLAND				
Types Identified	Tussock grassland G-22				
Exclusion Clause	N/A				
Effective Slope	Measured	d/slope 2 degrees	Applied Range (Method 1)	Downslope >0-5 degrees	
Foliage Cover (all layers)	<30%	Shrub/Heath Height	N/A	Tree Height	N/A
Dominant & Sub-Dominant Layers (species as relevant)	Sparse grasses on road verges				
Understorey:	Grasses.				
Additional Justification:	None required.				
Post Development Assumptions:	Nil.				
<div><div></div><div></div></div>					
PHOTO ID: 9a			PHOTO ID: 9b		

VEGETATION AREA 10						
Classification	N/A					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) non-vegetated areas and (f) vegetation managed in a minimal fuel condition.					
Effective Slope	Measured	N/A		Applied Range (Method 1)		N/A
Foliage Cover (all layers)	N/A	Shrub/Heath Height		N/A		Tree Height N/A
Dominant & Sub-Dominant Layers (species as relevant)	N/A					
Understorey:	N/A					
Additional Justification:	Subject lots cleared for development.					
Post Development Assumptions:	To be managed and maintained to a low bushfire threat state.					
<div><div></div><div></div></div>						
PHOTO ID: 10a				PHOTO ID: 10b		
<div><div></div><div></div></div>						
PHOTO ID: 10c				PHOTO ID: 10d		

VEGETATION AREA 10						
Classification	N/A					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) non-vegetated areas and (f) vegetation managed in a minimal fuel condition.					
Effective Slope	Measured	N/A		Applied Range (Method 1)		N/A
Foliage Cover (all layers)	N/A	Shrub/Heath Height		N/A	Tree Height	N/A
Dominant & Sub-Dominant Layers (species as relevant)	N/A					
Understorey:	N/A					
Additional Justification:	Photo 10e: Existing industrial site. Low threat bitumen area. Photos 10f to 10h: Subject lots cleared for development.					
Post Development Assumptions:	To be managed and maintained to a low bushfire threat state.					
<div><div></div><div></div></div>						
PHOTO ID: 10e				PHOTO ID: 10f		
<div><div></div><div></div></div>						
PHOTO ID: 10g				PHOTO ID: 10h		

A1.3: EFFECTIVE SLOPE

Measuring

Effective slope refers to the slope “under the classified vegetation which most significantly influences bushfire behaviour (AS 3959:2018, clause B4, CB4). It is not the average slope.

It is described as upslope, flat or downslope when viewed from the exposed element (e.g., building) looking towards the vegetation – and measured in degrees. Ground slope has a direct and significant influence on a bushfire's rate of spread and intensity, which increases when travelling up a slope.

The slope under the vegetation in closest proximity to the exposed element(s), over the distance that will most likely carry the entire depth of the flaming front, will be a significant consideration in the determination of the effective slope. This distance is determined as a function of the potential quasi-steady rate of spread and expected residence time (i.e., the flaming combustion period at a single point on the ground), of a bushfire in the specific vegetation type/landscape scenario.

Slope Variation Within Areas of Vegetation

Where a significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

Slope Variation Due to Multiple Development Sites

When the effective slope, under a given area of bushfire prone vegetation, will vary significantly relative to multiple proposed development sites (exposed elements), then the effective slopes corresponding to each of the different locations, are separately identified.

The relevant (worst case) effective slope is determined in the direction corresponding to the potential directions of fire spread towards the subject building(s).

Differences in Application of Effective Slope - AS 3959:2018 Method 1 versus Method 2 Procedures

The Method 1 procedure provides five different slope ranges from flat (including all upslopes) to 20 degrees downslope to define the effective slope and bushfire behaviour model calculations apply the highest value in each range (i.e., 0°, 5°, 10°, 15° or 20°).

The Method 2 procedure requires an actual slope (up or down in degrees) to be determined. AS 3959:2018, clause B1 limits the effective slope that can be applied to 30 degrees downslope and 15 degrees upslope. Where any upslope is greater than 15 degrees, then 15 degrees is to be used.

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

The effective slopes determined from the site assessment are recorded in Table 3.2 of this Bushfire Management Plan.

A1.4: SEPARATION DISTANCE

Measuring

The separation distance is the distance in the horizontal plane between the receiver (building/structure or area of land being considered) and the edge of the classified vegetation (AS 3959:2018, clause 2.2.4)

The relevant parts of a building/structure from which the measurement is taken is the nearest part of an external wall or where a wall does not exist, the supporting posts or columns. Certain parts of buildings are excluded including eaves and roof overhangs.

The edge of the vegetation, for forests and woodlands, will be determined by the unmanaged understorey rather than either the canopy (drip line) or the trunk (AS 3959:2018, clause C2.2.5).

Measured Separation Distance as a Calculation Input

If a separation distance can be measured because the location of the building/structure relative to the edge of the relevant classified vegetation is known, this figure can be entered into the BAL calculation. The result is a determined BAL rating.

Assumed Separation Distance as a Calculation Input

When the building/structure location within the lot is not known, an assumed building location may be applied that would establish the closest positioning of the building/structure relative to the relevant area of vegetation.

The assumed location would be based on a factor that puts a restriction on a building location such as:

- An established setback from the boundary of a lot, such as a residential design code setback or a restrictive covenant; or
- Within an established building envelope.

The resultant BAL rating would be indicative and require later confirmation (via a Compliance Report) of the building/structure actual location relative to the vegetation to establish the determined BAL rating.

Separation Distance as a Calculation Output

With the necessary site specific assessment inputs and using the AS 3959:2018 bushfire modelling equations, the range of separation distances that will correspond to each BAL rating (each of which represents a range of radiant heat flux), can be calculated. This has application for bushfire planning scenarios such as:

- When the separation distance cannot be measured because the exact location of the exposed element (i.e., the building, structure or area), relative to classified vegetation, is yet to be determined.

In this scenario, the required information is the identification of building locations onsite that will correspond to each BAL rating. That is, indicative BAL ratings can be derived for a variety of potential building/structure locations; or

- The separation distance is known for a given building, structure or area (and a determined BAL rating can be derived), but additional information is required regarding the exposure levels (to the transfer of radiant heat from a bushfire), of buildings or persons, that will exist at different points within the subject site.

The calculated range of separation distances corresponding to each BAL rating can be presented in a table and/or illustrated as a BAL Contour Map – whichever is determined to best fit the purpose of the assessment.

For additional information refer to the information boxes in Section 3 'Bushfire Attack Levels (BAL) - Understanding the Results and Section 3.2. 'Interpretation of the BAL Contour Map'.

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

For the subject development/use the applicable separation distances values are derived from calculations applying the assessed site data. They are an output value, not an input value and therefore are not presented or justified in this appendix.

The derived values are presented in Section 3, Table 3.1 and illustrated as BAL contour maps in Figures 3.2.1 and 3.2.2.

A2: BAL Assessment Inputs Applied Using the Method 2 Procedure

STATING AND JUSTIFYING THE METHOD 2 CALCULATION INPUT VARIABLES APPLIED

As 3959:2018 Bal Determination Procedures: AS 3959:2018 establishes the official methodology to determine the radiant heat flux (RHF) a receiver (e.g., a building, structure, person or specified location), will potentially be exposed to from a fully developed bushfire within any adjacent classified vegetation. The methodology accounts for the configuration of a specific site and its surrounds.

The model calculations are complex. Consequently, AS 3959:2018 establishes two pathways to apply the methodology - a simplified procedure (Method 1) and a detailed procedure (Method 2).

Method 1: This procedure has limitations to both its scope and the degree to which site specific conditions can be applied. However, it requires minimal site assessment inputs and provides a standardised output that is satisfactory for many situations.

A moderate level of justification for some of the assessed inputs applied is required. This will demonstrate how the procedure detailed within AS 3959:2018 for Method 1 (Section 2) has been followed.

Method 2: This procedure is used when the site conditions are out of the scope of Method 1 or when it is necessary to produce a more specific result. Higher levels of justification will be required for many of the input variables that are able to be modified using Method 2 (AS 3959:2018 Appendix B).

Section A2.1 below identifies the input variables that have been assessed for the proposed development and indicates the level of justification required for their application. The information contained within this Appendix will provide this justification information to the degree necessary.

A2.1: SUMMARY OF CALCULATION INPUTS APPLIED AND THE LEVEL OF JUSTIFICATION REQUIRED

AS 3959:2018 BUSHFIRE ATTACK LEVEL (BAL) DETERMINATION PROCEDURES INPUT VARIABLES FOR THE FIRE BEHAVIOUR AND RADIATION MODELS						
✓	Indicates which site specific variables have been assessed and applied to the assessment of the proposed development/use.	IDENTIFICATION OF THE CALCULATION INPUT VARIABLES ASSESSED AND/OR MODIFIED FOR THE PROPOSED DEVELOPMENT/USE				
	Indicates an AS 3959 methodology or jurisdiction default variable (or a methodology calculated variable in the case of EOR or flame angle). No justification required.					
	Indicates a variable that either must or can have an assessor value applied. Requires justification.					
	Indicates a variable that can have an assessor value applied. Requires detailed justification.	Using Method 1		Using Method 2		
ASSESSOR QUALIFICATION REQUIRED ¹		BPAD Level 1		BPAD Level 3		
LEVEL OF JUSTIFICATION REQUIRED TO APPLY ²		None	Moderate	None	Moderate	High
Fire weather	Fire danger index (FDI/FFDI/GFDI)	✓		✓		
	Wind speed					
	Ambient temperature					
	Relative humidity					
Bushfire Prone Vegetation and slope of the land it grows on	Vegetation classification ³		✓		✓	
	Effective slope		✓		✓	
	Understorey and total fuel loads ⁴					
	Vegetation height					
	Fuel age					
	Fuel moisture					
Receiver (building) positioning parameters	Site slope				✓	
	Separation distance		✓		✓	
	Elevation of the receiver (EOR).					
Bushfire flame parameters	Flame temperature ⁵			✓		
	Flame width					
	Flame angle					
	Flame emissivity					
	Heat of combustion					
INTERMEDIATE OUTPUT FROM THE FIRE BEHAVIOUR AND RADIATION MODELS						
Rate of Spread - derived from fuel loads, fuel type, fuel height, FDI, effective slope and wind speed.						
Fire Intensity – derived from fuel loads, rate of spread and heat of combustion ⁶						
Path Length – derived from flame angle and separation distance.						
Transmittance – derived from ambient temperature and relative humidity.						
View Factor – derived from flame length, flame width, flame angle, separation distance, elevation of receiver and site slope.						
FINAL OUTPUT OF THE FIRE BEHAVIOUR AND RADIATION MODELS						
Flame Length – derived from fuel loads, ROS (for Forest, Woodland) and fire intensity (for Scrub, Shrubland, Grassland) ⁶						
Radiant Heat Flux and the Corresponding Bushfire Attack Level (BAL) – derived from view factor, flame emissivity, flame temperature, transmittance and corresponding to the worst possible flame angle.						
TABLE NOTES (see next page)						

¹ Authority to Use Method 2: Within WA, use of this procedure is restricted to bushfire practitioners who hold the BPAD Level 3 accreditation as issued by the Fire Protection Association Australia (FPAA) through their Bushfire Planning and Design Accreditation Scheme (BPAD Scheme) that complies with the Western Australian Bushfire Accreditation Framework.

² Level of Justification Required in Applying Method 2: AS 3959:2018 Appendix B establishes the detailed procedure for the Method 2 determination of BAL(s) as consisting of 10 steps. When justification is required for an assessed variable value to be applied, the required level of justification can vary. The level definitions used in this table are:

Moderate: Requires the provision of readily available and understood argument and evidence such as when:

1. The methodology step requires or allows for an input variable to be a site assessed value; or
2. A methodology step requires a jurisdictionally determined value which the relevant authority may change for different land use scenarios; or

High: Requires a detailed argument, appropriate evidence and justification when:

1. The variable is derived from the methodology step that applies an AS 3959:2018 default value or determines an intermediate output value (i.e. the result of applying a step's equations).

³ Applying a Different Vegetation Classification: This approach may be justified when certain characteristics of the site's local vegetation complex align with the broad based descriptions of AS 3959:2018, but expert knowledge identifies characteristics that would result in the applied AS 3959 bushfire behaviour model not being properly representative of a fire in the local vegetation. This potential outcome is in part due to the ecological classification of vegetation that is used in AS 3959 rather than a classification more aligned with fuel structure/fire behaviour.

The justification of using a different classification is predicated on the fact that the intent of classifying vegetation in the BAL determination methodology of AS 3959:2018, is to identify the most appropriate fire behaviour model equations to apply.

For example, with respect to contribution to potential fire behaviour, it is often more important to consider vegetation structure rather than canopy cover, yet canopy cover is a key classification factor applied in AS 3959:2018.

Also findings from more recent bushfire behaviour research is not yet incorporated into the current version of the Standard. Certain currently applied bushfire behaviour models within AS 3959:2018 are outdated and may under or over predict radiant heat flux and flame length.

⁴ Modifying Fuel Loads: Potential steady state maximum fuel loads at a specific site for a given vegetation classification may vary significantly (above and below) from those that are to be applied as the default values in AS 3959:2018.

The Standard only provides the single set of ecological descriptors and corresponding fuel loads that are to be applied to vegetation complexes across Australia, hence its accuracy for all situations will be questionable. The relevant authority for a jurisdiction can establish different fuel loads to be applied.

However, fuel loads for the purposes of determining expected fire behaviour have not currently been determined to the degree necessary in WA, which results in the default values both over and underestimating fuel loads for WA vegetation types. WA DFES in providing advice to decision makers, will currently not accept any assessment and subsequent variation of the default fuel loads. If any variation was to be applied in an assessment, it would need to be argued for based on appropriate evidence and the development of a merit based case to the satisfaction of the decision maker.

The one circumstance where Bushfire Prone Planning will reduce fuel loads is in the calculations associated with a short fire run in forest type vegetation – in which the developing fire will not crown. Therefore, most bark and all canopy fuels can justifiably be excluded from total fuel load.

Note ⁵ - Flame Temperature: The Guidelines (DPLH 2021, v1.4) Section 5.5.3.1.3 and the relevant acceptable solutions within the bushfire protection criteria, establish that the higher flame temperature of 1200 K is to be applied when determining the availability of suitable onsite sheltering options for tourism vulnerable land uses.

Note ⁶ – Fireline Intensity and Flame Length: These values are determined as intermediate and final outputs of the AS 3959:2018 modelling. Changing these values would not be a valid use of the methodology for a fully developed fire. However, for the circumstance of a developing fire in small patches or corridors of vegetation, there may be justification when an authoritative source is identified to provide an override value.

A2.2: FLAME TEMPERATURE

FLAME TEMPERATURE APPLIED				
ESTABLISHED BY AS 3959:2018				
<p>The AS 3959:2018 radiation modelling assumes an effective flame temperature of 1090 K and that it is sustained for a 2 minute period over a fire front width of 100 m. It states that instantaneous flame temperature may peak above 1090 K (AS 3959:2018 Table B1, clause B2 and clause 1.5.17).</p> <p>Existing scientific literature suggests that flame temperatures for determining flame emissive power vary greatly and the majority fall between 1000 K and 1200 K. An appropriate flame temperature is chosen from this range in accordance with the minimum level of stringency or safety required by the relevant authority having jurisdiction (AS 3959:2018, CB10.2).</p>				
ESTABLISHED BY THE GUIDELINES				
<p>The Guidelines (DPLH 2021, v1.4) Section 5.5.3.1.3 and the relevant acceptable solutions within the bushfire protection criteria, establish that the higher flame temperature of 1200 K is to be applied when determining the availability of suitable onsite sheltering options for tourism vulnerable land uses.</p>				
Relevant Site	Relevant Vegetation		Flame Temperature Applied (Kelvin)	Explanation and Justification
	Area	Class		
South Connect Industrial Development	7	(A) Forest	1090 K	The development is not a vulnerable land use and a higher flame temperature is not required for the Method 2 calculations.

A2.3: SITE SLOPE

SITE SLOPE APPLIED

MEASURING

Site slope is the 'line of sight' slope (upslope [-] or downslope [+] degrees) between the 'site' and the edge of the relevant area of classified vegetation (AS 3959:2018 clause B5). The 'site' being "the part of the allotment of land on which a building stands or is to be erected" (AS 3959:2018 clause 1.5.30). In other words, it is the slope between the base of the potential bushfire and the base of the receiver in a straight line – irrespective of changes in slope or any other physical obstructions between these two points.

Method 2 allows for the determination of the actual site slope (degrees) and it is independent of effective slope (Method 1 assumes the site slope is the same as the effective slope that is applied when a given range of effective slope is used).

PURPOSE

Site slope is applied to position the building relative to the modelled bushfire (the radiant heat panel) and affects the calculated 'view factor' for a given (or default height) of the 'elevation of receiver'. This in turn influences the calculated level of radiant heat that will potentially be transferred from the bushfire to the building.

LIMITATIONS

AS 3959:2018 clause B1 limits site slope to 20° but explains that this limitation due to the considered impracticality managing any vegetation to ensure it is low threat vegetation or vegetation managed in a minimal fuel condition in perpetuity on steeper slopes. This is likely to result in an inability to maintain the assessed separation distance between the building and the classified vegetation. Consequently, where the maintenance of vegetation is not a limiting factor, the application of a greater site slope can be justified to position the building relative to the bushfire more accurately.

Relevant Site	Relevant Vegetation		Separation Distance	Site Slope ¹	
				Measured	Calculated
	Area	Class	metres	degrees	degrees
Lot 811 – Building 7	7	(A) Forest	24.3	flat 0	N/A
Lot 809 – Building 3	7	(A) Forest	22	flat 0	N/A

¹ When it is not possible to measure on site (physical obstructions) the slope is calculated, including through use of relative heights and compiled distances.

A3: BAL Calculator – Copy of Input/Output Values

CALCULATION OF BUSHFIRE ATTACK LEVELS – METHOD 2

Lot 811 Building 7 (Refer to Figure 3.2.1 & 3.2.2)



Calculated December 30, 2022, 11:16 am (BALc v.4.9)

Lot 811 Building 7

Bushfire Attack Level calculator – AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.75 km/h
Vegetation classification	Forest	Flame length	22.1 m
Understorey fuel load	25 t/ha	Flame angle	61 °
Total fuel load	35 t/ha	Panel height	19.33 m
Vegetation height	n/a	Elevation of receiver	9.66 m
Effective slope	2 °	Fire intensity	49,822 kW/m
Site slope	0 °	Transmissivity	0.834
Distance to vegetation	24.3 m	Viewfactor	0.4447
Flame width	100 m	Radiant heat flux	28.2 kW/m ²
Windspeed	n/a	Bushfire Attack Level	BAL-29
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Lot 809 Building 3 (Refer to Figure 3.2.1)



Calculated December 30, 2022, 11:18 am (BALc v.4.9)

Lot 809 Building 3

Bushfire Attack Level calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.75 km/h
Vegetation classification	Forest	Flame length	22.1 m
Understorey fuel load	25 t/ha	Flame angle	58 °
Total fuel load	35 t/ha	Panel height	18.74 m
Vegetation height	n/a	Elevation of receiver	9.369999999999999 m
Effective slope	2 °	Fire intensity	49,822 kW/m
Site slope	0 °	Transmissivity	0.842
Distance to vegetation	22 m	Viewfactor	0.4949
Flame width	100 m	Radiant heat flux	31.71 kW/m ²
Windspeed	n/a	Bushfire Attack Level	BAL-40
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

MINIMUM DISTANCE CALCULATIONS – METHOD 2

Vegetation Area 7



Calculated December 30, 2022, 11:23 am (MDC v.4.9)

Vegetation Area 7

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.75 km/h
Vegetation classification	Forest	Flame length	22.1 m
Understorey fuel load	25 t/ha	Flame angle	51 °, 61 °, 68 °, 72 °, 73 ° & 80 °
Total fuel load	35 t/ha	Elevation of receiver	8.59 m, 9.66 m, 10.24 m, 10.51 m, 10.57 m & 10.88 m
Vegetation height	n/a	Fire intensity	49,822 kW/m
Effective slope	2 °	Transmissivity	0.86, 0.835, 0.806, 0.78, 0.768 & 0.712
Site slope	0 °	Viewfactor	0.6106, 0.4548, 0.3088, 0.2104, 0.1707 & 0.046
Flame width	100 m	Minimum distance to < 40 kW/m ²	17.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m ²	23.8 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m ²	33.5 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m ²	45.4 m
		Minimum distance to < 10 kW/m ²	52.8 m

Rate of Spread - McArthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

APPENDIX B: ADVICE - ONSITE VEGETATION MANAGEMENT - THE APZ

THE ASSET PROTECTION ZONE (APZ) - DESCRIPTION

This is an area surrounding a habitable building containing low threat fire fuel fuels (including vegetation), or vegetation managed in a minimal fuel condition, no fire fuels or any combination. The primary objectives include:

- To ensure the building is sufficiently separated from the bushfire hazard to limit the impact of its direct attack mechanisms. That is, the dimensions of the APZ will, for most site scenarios, remove the potential for direct flame contact on the building, reduce the level of radiant heat to which the building is exposed and ensure some reduction in the level of ember attack (with the level of reduction being dependent on the vegetation types of present);
- To ensure any vegetation retained within the APZ is low threat and/or is managed in a minimum fuel condition and prevents surface fire spreading to the building;
- To ensure other combustible materials that can result in consequential fire (typically ignited by embers) within both the APZ and parts of the building, are eliminated, minimised and/or appropriately located or protected. (Note: The explanatory notes in the Guidelines provide some guidance for achieving this objective and other sources are available. Research shows that consequential fire, ignited by embers, is the primary cause of building loss in past bushfire events); and
- To provide a defensible space for firefighting activities.

B1: Asset Protection Zone (APZ) Dimensions

APZ DIMENSIONS – DIFFERENCES IN REQUIREMENTS FOR PLANNING ASSESSMENTS COMPARED TO IMPLEMENTATION

THE 'PLANNING BAL-29' APZ DIMENSIONS

The 'Planning BAL-29' APZ is not necessarily the size of the APZ that must be physically implemented and maintained by a landowner. Rather, its purpose is to identify if an acceptable solution for planning approval can be met i.e., can a specified minimum separation distance from bushfire prone vegetation exist.

An assessment against the Bushfire Protection Criteria is conducted for planning approval purposes. To satisfy 'A2.1: Asset Protection Zone', it must be demonstrated that certain minimum separation distances between the relevant building/structure and different classes of bushfire prone vegetation, either exist or can be created and will remain in perpetuity. These minimum separation distances determine the 'Planning BAL-29' APZ dimensions.

Dimensions: The minimum dimensions are those that will ensure the potential radiant heat impact on subject buildings does not exceed 29 kW/m². These dimensions will vary dependent on the vegetation classification, the slope of the land they are growing on and certain other factors specific to the subject site.

Note: For certain purposes associated with vulnerable land uses, the 'Planning BAL-29' APZ may be replaced with dimensions corresponding to radiant heat impact levels of 10 kW/m² and 2 kW/m² and calculated using 1200K flame temperature.

Location: The identified 'Planning BAL-29' APZ must not extend past lot boundaries onto land the landowner has no control over either now or potentially at some point in the future. Limited exceptions include:

- When adjoining land is not vegetated (e.g., built out, roads, carparks, drainage, rock, water body etc.);
- When adjoining land currently or, will in the short term, contain low threat vegetation and or vegetation managed in a minimal fuel condition as per AS 3959:2018 cl. 2.2.3.2. It must be reasonable (justifiable) to expect this low threat vegetation and/or level of management will continue to exist or be conducted in perpetuity and require no action from the owner of the subject lot.

Such areas of land include formally managed areas of vegetation (e.g., public open space / recreation areas / services installed in a common section of land). For specific scenarios, evidence of the formal

commitment to manage these areas to a certain standard may be required and would be included in the BMP.

These areas of land can also be part of the required APZ on a neighbouring lot for which the owner of that lot has a recognised responsibility to establish and maintain; and

- When there is a formalised and enforceable capability and responsibility created for the subject lot owner, or any other third party, to manage vegetation on land they do not own in perpetuity. This would be rare, and evidence of the formal authority would be included in the BMP.

The bushfire consultant's 'Supporting Assessment Detail', that is presented in the assessment against the acceptable solution A2.1, will identify and justify how any adjoining land within the 'Planning BAL-29 APZ will meet the APZ standards. Or otherwise, explain how this condition cannot be met.

THE 'BAL RATING' APZ DIMENSIONS

The applicable BAL rating will have been stated in the BAL Assessment Data section of the BAL Assessment Report or BMP (as relevant). The BAL rating can be assessed as 'determined' or 'indicative' or be 'conditional', dependent of the specific conditions associated with the site and the stage of assessment or planning. It is the eventual assessment of the 'Determined' BAL that will establish both the BAL rating that is to apply and its corresponding 'BAL Rating' APZ dimensions.

Dimensions: The minimum dimensions of the 'BAL Rating' APZ to be established and maintained will be those that correspond to the determined BAL rating for the subject building/structure that has accounted for surrounding vegetation types, the slope of the land they are growing on and certain other factors specific to the subject site and surrounding land.

Establishing the 'BAL Rating' APZ will ensure that the potential radiant heat exposure of the building/structure will be limited to the level that the applied construction requirements are designed to resist when that building/structure is required to be constructed to the standard corresponding to the Determined BAL.

Note: For certain purposes associated with vulnerable land uses, the 'BAL Rating' APZ dimensions may be replaced with dimensions corresponding to the specific radiant heat impact levels of 10 kW/m² and 2 kW/m² and calculated using 1200K flame temperature.

Location: The same conditions will apply as for the 'Planning BAL-29' APZ.

THE 'LOCAL GOVERNMENT' APZ DIMENSIONS

Some Local Government's establish the dimensions of the APZ that must be established surrounding buildings in their annual Firebreak/Hazard Reduction Notice. Or for a specific site they may establish a maximum allowable dimension (typically that corresponding to BAL-29). When established, the landowner will need to be comply with these.

THE 'REQUIRED' APZ DIMENSIONS

This is the APZ that is to be established and maintained by the landowner within the subject lot and surrounding the subject building(s). It will be identified on the Property Bushfire Management Statement when it is required to be included in this Report/Plan.

Dimensions: The 'Required APZ' dimensions are the minimum (or maximum when relevant) distances away from the subject building(s) that the APZ must extend. These distances will not necessarily be the same all around the building(s). They can vary and are dependent on the different vegetation types (and their associated ground slope) that can exist around the building(s), and specific local government requirements. The dimensions to implement are determined by:

- A. The 'BAL Rating APZ' of the subject building(s) when distances are greater than 'B' below (except when 'B' establishes a maximum distance); or
- B. The 'Local Government' APZ' derived from the Firebreak/Hazard Reduction Notice when distances are greater than 'A' above, other than when a maximum distance is established, in which case this will apply; or
- C. A combination of 'A' and 'B'.

Location: The same conditions will apply as for the 'Planning BAL-29' APZ.

B1.1: THE APZ DIMENSIONS REQUIRED TO BE IMPLEMENTED BY THE LANDOWNER

DETERMINATION OF THE 'REQUIRED' APZ DIMENSIONS TO BE IMPLEMENTED AND MAINTAINED BY LANDOWNER WITHIN THEIR LOT													
Relevant Buildings(s)	Vegetation Classification [Refer to Fig 3.1]		Minimum Required Separation Distances from Building to Vegetation (metres)										
			Established by the 'BAL Rating' APZ Dimension					Established by the "Local Government" APZ Dimension		The 'Required' APZ Dimensions [see note]			
			Determined Radiant Heat Impact	Stated 'Indicative' or 'Conditional' BAL				Firebreak / Hazard Reduction Notice	Maximum Allowed				
	Area	Class		BAL-29	BAL-19	BAL-12.5	BAL-LOW						
Lot 811 Buildings 7 to 11	6	(B) Woodland	N/A	17-<25	25-<35	35-<100	>100	3 metres	N/A	The whole of Lots 807 to 811 and all roads within the South Connect Industrial Development are required to be managed and maintained to APZ specifications.			
	7	(A) Forest		23.8-<33.5	33.5-<45.4	45.4-<100	>100						
	11	(C) Shrubland		10-<15	15-<22	22-<100	>100						
Lots 807 to 810 Buildings 1 to 6 and 12 to 16	1	(C) Shrubland	N/A	9-<13	13-<19	19-<100	>100				3 metres	N/A	The whole of Lots 807 to 811 and all roads within the South Connect Industrial Development are required to be managed and maintained to APZ specifications.
	2	(G) Grassland		8-<12	12-<17	17-<50	>50						
	3	(B) Woodland		14-<20	20-<29	29-<100	>100						
	4	(A) Forest		27-<37	37-<50	50-<100	>100						
	5	(A) Forest		21-<31	31-<42	42-<100	>100						
	6	(B) Woodland		17-<25	25-<35	35-<100	>100						
	7	(A) Forest		23.8-<33.5	33.5-<45.4	45.4-<100	>100						
	9	(G) Grassland		9-<14	14-<20	20-<50	>50						
	11	(C) Shrubland		10-<15	15-<22	22-<100	>100						
Note: The 'Required' APZ Dimension corresponding to each area of vegetation is the greater of the 'BAL Rating' or the 'Firebreak/Hazard Reduction Notice' APZ dimensions unless a local government maximum distance(s) is established as a result of their environmental assessment of the subject site. The area of the APZ will also be limited to the subject lot boundary unless otherwise justified in this Report/Plan. Final determination of the dimensions will require that any indicative or conditional BAL becomes a 'Determined' BAL.													

B2: The Standards for the APZ as Established by the Guidelines (DPLH, v1.4)

Within the Guidelines (source: <https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas>), the management Standards are established by:

- Schedule 1: Standards for Asset Protection Zones (see extract below) established by the Guidelines; and
- The associated explanatory notes (Guidelines E2) that address (a) managing an asset protection zone (APZ) to a low threat state (b) landscaping and design of an asset protection zone and (c) plant flammability.

Guidelines for
Planning in
Bushfire
Prone Areas

71

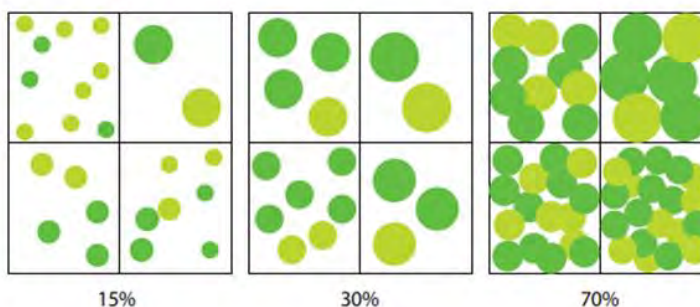


ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	<ul style="list-style-type: none"> • Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	<ul style="list-style-type: none"> • Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	<ul style="list-style-type: none"> • Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.

Figure 19: Tree canopy cover – ranging from 15 to 70 per cent at maturity



Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	<ul style="list-style-type: none"> • Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	<ul style="list-style-type: none"> • Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
Grass	<ul style="list-style-type: none"> • Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	<ul style="list-style-type: none"> • Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	<ul style="list-style-type: none"> • Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

* Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes

B3: The Standards for the APZ as Established by the Local Government

Refer to the firebreak / hazard reduction notice issued annually (under s33 of the Bushfires Act 1954) by the relevant local government. It may state Standards that vary from those established by the Guidelines and that have been endorsed by the WAPC and DFES as per Section 4.5.3 of the Guidelines.

A copy of the applicable notice is not included here as they are subject to being reviewed and modified prior to issuing each year. Refer to ratepayers notices and/or the local government's website for the current version.

B4: Vegetation and Areas Excluded from Classification - Ensure Continued Exclusion

AS 3959:2018 establishes the methodology for determining a bushfire attack level (BAL). The methodology includes the classification of the subject site's surrounding vegetation according to their 'type' and the application of the corresponding relevant bushfire behaviour models to determine the BAL.

Certain vegetation can be considered as low threat or managed in a minimal fuel condition and can be excluded from classification. Where this has occurred in assessing the site, the extract from AS3959:2018 below states the requirements that must continue to exist for the vegetation on those areas of land to be excluded from classification (including the size of the vegetation area if relevant to the assessment).

15

AS 3959:2018

2.2.3.2 Exclusions—Low threat vegetation and non-vegetated areas

The following vegetation shall be excluded from a BAL assessment:

- (a) Vegetation of any type that is more than 100 m from the site.
- (b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.
- (c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.
- (d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.
- (e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.
- (f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

- 1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).
- 2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

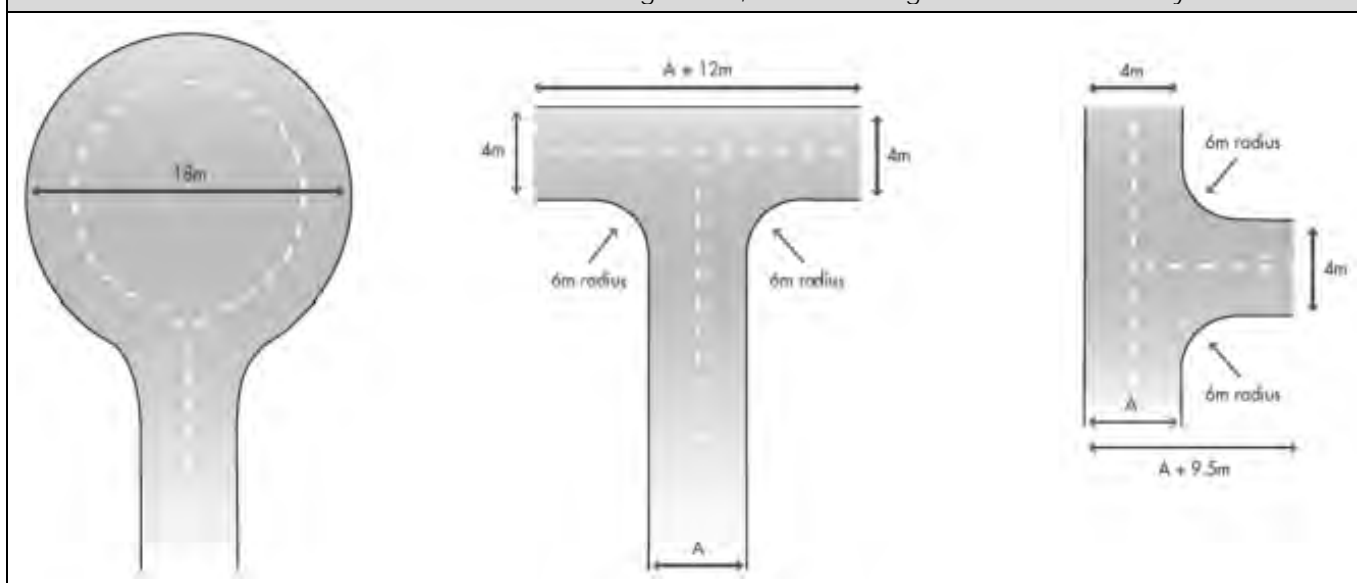
APPENDIX C: TECHNICAL REQUIREMENTS FOR VEHICULAR ACCESS

The design/layout requirements for access are established by the acceptable solutions of the Guidelines (DPLH, 2021 v1.4) Element 3 and vary dependent on the access component, the land use and the presence of 'vulnerable' persons. Consequently, the best reference source are the Guidelines. The technical requirements that are fixed for all components and uses are presented in this appendix.

GUIDELINES TABLE 6, EXPLANATORY NOTES E3.3 & E3.6 AND RELEVANT ACCEPTABLE SOLUTIONS

Technical Component	Vehicular Access Types / Components			
	Public Roads	Emergency Access Way ¹	Fire Service Access Route ¹	Battle-axe and Private Driveways ²
Minimum trafficable surface (m)	In accordance with A3.1	6	6	4
Minimum Horizontal clearance (m)	N/A	6	6	6
Minimum Vertical clearance (m)	4.5			
Minimum weight capacity (t)	15			
Maximum Grade Unsealed Road ³	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum Grade Sealed Road ³		1:7 (14.3%)		
Maximum Average Grade Sealed Road		1:10 (10%)		
Minimum Inner Radius of Road Curves (m)		8.5		

Turnaround Area Dimensions for No-through Road, Battle-axe Legs and Private Driveways ⁴



Passing Bay Requirements for Battle-axe leg and Private Driveway

When the access component length is greater than the stated maximum, passing bays are required every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum 6m).

Emergency Access Way – Additional Requirements

Provide a through connection to a public road, be no more than 500m in length, must be signposted and if gated, gates must be open the whole trafficable width and remain unlocked.

¹ To have crossfalls between 3 and 6%.

² Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

³ Dips must have no more than a 1 in 8 (12.5% or 7.1 degree) entry and exit angle.

⁴ The turnaround area should be within 30m of the main habitable building.

APPENDIX D: TECHNICAL REQUIREMENTS FOR FIREFIGHTING WATER SUPPLY

D1: Reticulated Areas – Hydrant Supply

The Guidelines state “where a reticulated water supply is existing or proposed, hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority.”

The main scheme water suppliers / authorities in WA are The Water Corporation, AqWest – Bunbury Water Corporation and Busselton Water Corporation. Various local authority exists in other non-scheme and regional areas. However, most existing fire hydrants are connected to Water Corporation water mains.

Consequently, the hydrant location specifications from The Water Corporation’s ‘No 63 Water Reticulation Standard’ (Ver 3 Rev 15) are provided in the extract below with the key distances relevant to bushfire planning assessments being highlighted. This Standard is deemed to be the baseline criteria for developments and should be applied unless different local water supply authority conditions apply. Other applicable specification will be found in the Standard.

Note: The maximum distance from a hydrant to the rear of a lot/building is generally interpreted as not applicable to large lot sizes where the maximum distance becomes an impractical limitation i.e., typically rural residential areas.

Design Standard DS 63
Water Reticulation Standard



2.2.1.5 Appurtenances

c. Hydrants

Hydrants shall be screw-down hydrant with built-in isolation valve and installed only on DN100 or larger pipes. Hydrants shall be located:

- so that the maximum distance between a hydrant and the rear of a building envelope, (or in the absence of a building envelope the rear of the lot) shall be 120m;
- so that spacing (as measured by hose-run) between hydrants in non-residential or mixed use areas shall be maximized and no greater than 100m;
- so that spacing (as measured by hose-run) between hydrants in residential areas with lots per dwelling <10,000m² shall be maximized and no greater than 200m;
- so that spacing between hydrants (as measured by hose-run) in rural residential areas where minimum lots per dwelling is >10,000 m² (1ha) shall be maximized and no greater than 400m;
- centrally along the frontage of a lot to avoid being under driveways, unless the lot features a frontage 6m or less, in which case it shall be placed to the side opposite the driveway;
- at lots that have the widest frontage in the local area;
- where appropriate at the truncation of road junctions or intersections so that they can serve more than one street and can be readily located;
- on both sides of the major roads at staggered intervals where there are mains on both sides of the road;
- at major intersections on dual multi-lane roads, where two hydrants are to be sited on diagonally opposite corners;
- hydrants should be located at least 20m from traffic calming devices i.e., median slow points or chokers, chicanes, mini traffic circles, and intersection ‘pop-outs’ to ensure traffic is not impeded;
- in a position not less than 10m from any high voltage main electrical distribution equipment such as transformers and distribution boards, liquefied petroleum gas or other combustible storage;
- directly on top of the main using a tee unless proved to be impractical.

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Page 17 of 49

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Appendix F

Estate Transport Impact Assessment

PTG/00135

Transport Impact Assessment South Connect, Jandakot

30th July 2024 | Revision C

Prepared for Schaffer Corporation Ltd

CONTENTS

REPORT DETAILS	3
1 Introduction.....	4
1.1 Background	4
2 Proposed Development.....	5
2.1 Site Location	5
2.2 Proposed Land Uses	5
3 Existing Situation	7
3.1 Existing Land Uses.....	7
3.2 Existing Road Network.....	7
3.3 Existing Pedestrian / Cycle Networks.....	9
3.4 Existing Public Transport Services.....	9
3.5 Traffic Flows on Surrounding Roads and Intersections	10
4 Changes to Internal Transport Networks	14
4.1 Existing Internal Road Network.....	14
4.2 Road Reservation Widths.....	14
4.3 Road Cross Sections and Speed Limits.....	14
4.4 Intersection Layouts and Controls	16
4.5 Pedestrian / Cycle Networks and Crossing Facilities.....	20
4.6 Public Transport Services	20
5 Changes to External Transport Networks	21
5.1 Existing External Road Network	21
5.1.1 Jandakot Eastern Link Road.....	21
5.2 Intersection Layouts and Controls	21
5.3 Pedestrian / Cycle Networks and Crossing Facilities.....	21
5.4 Public Transport Services	22
6 Analysis of Internal Transport Networks.....	22
6.1 Assessment Years and Time Periods	22
6.2 Development Generated Traffic.....	22
6.3 Development Generated Traffic Distribution	24
6.4 Existing Background Traffic Flows.....	25
6.5 Existing Background and 'With Development' Traffic Flows	26
6.6 Access Strategy	26
6.7 Impact on Surrounding External Roads and Intersections	27
7 Summary and Conclusions.....	28
Appendix A	30
Appendix B	33
Appendix C	35

REPORT DETAILS

Unique Document Identification

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Document Title	South Connect Transport Impact Assessment
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Client	Schaffer Corporation Ltd

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Rev A	16/7/2024	For issue	AW	RC
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Rev C	30/7/2024	For issue	AW	RC

1 INTRODUCTION

1.1 Background

PTG Consulting WA (PTG) has been commissioned by **Schaffer Corporation Ltd** ('the Client') to prepare a Traffic Impact Assessment (TIA) for the proposed South Connect Estate development located in the suburb of Jandakot, within the City of Cockburn ('the Site').

This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) Transport Assessment Guidelines for Developments: Volume 2- Planning Schemes, Structure Plans and Activity Centre Plans (2016) and the Transport Impact Assessment (TIA) Checklist is included at **Appendix A**.

Specifically, this report aims to assess the proposed internal transport networks' accessibility, circulation, and safety for all modes of transportation. It also seeks to evaluate the level of transport integration between the masterplan area and surrounding land uses, along with determining the impacts of generated traffic on both the surrounding land uses and transport networks.

This report also outlines the requirements and opportunities associated with traffic and transport within the development, referencing relevant Council and WAPC policies and guidelines as well as best-practice planning within Western Australia.

2 PROPOSED DEVELOPMENT

2.1 Site Location

The Site comprises of Lots 807, 808, 809, 810, and 811 Jandakot Road and is located in the suburb of Jandakot, within the City of Cockburn. **Figure 1** shows the location of the Site.

Figure 1 Site Location



Source: Google Maps

2.2 Proposed Land Uses

The proposed development is summarised in **Table 1** for each of the Lots and illustrated in **Figure 2**.

Table 1 Proposed Land Uses

	Description	Yield (m ²)
Lot 807	Showroom / Vet / Health Centre / Gym Studio	12,644
	Showroom Warehouse	2,231
	Medical Centre / Office / Consulting Rooms	2,000
	Fast Food	810
	Retail	1,500
Lot 808	Urbanstone - Existing Office/Warehouse	6,105
	Office/Warehouse	8,300
Lot 810	Showroom	12,750
	Showroom Warehouse	2,250
	Office/Warehouse	17,323
Lot 811	Office/Warehouse	38,652
Lot 809	Office/Warehouse	39,410

Figure 2 Proposed Site Plan

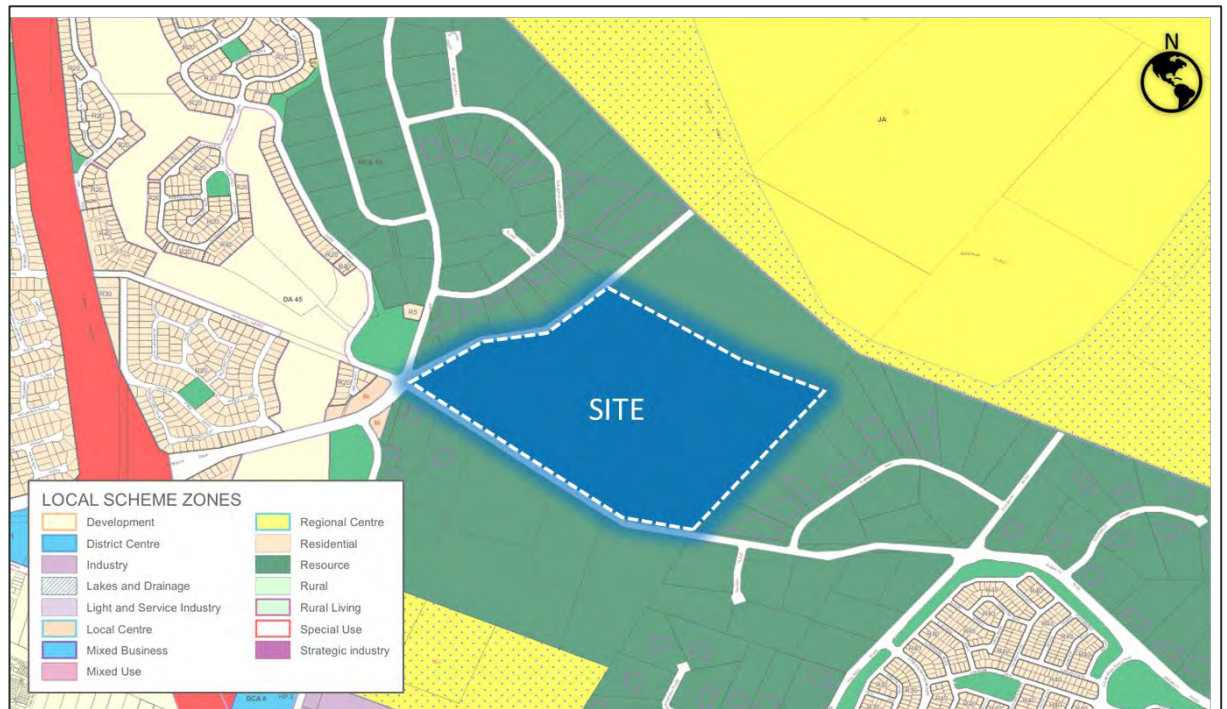


3 EXISTING SITUATION

3.1 Existing Land Uses

The Site is located in the City of Cockburn. As seen in **Figure 3**, the Site is bounded by mostly Resource and a small Local Centre to the west.

Figure 3 Existing Land Uses



Source: City of Cockburn Town Planning Scheme No. 3

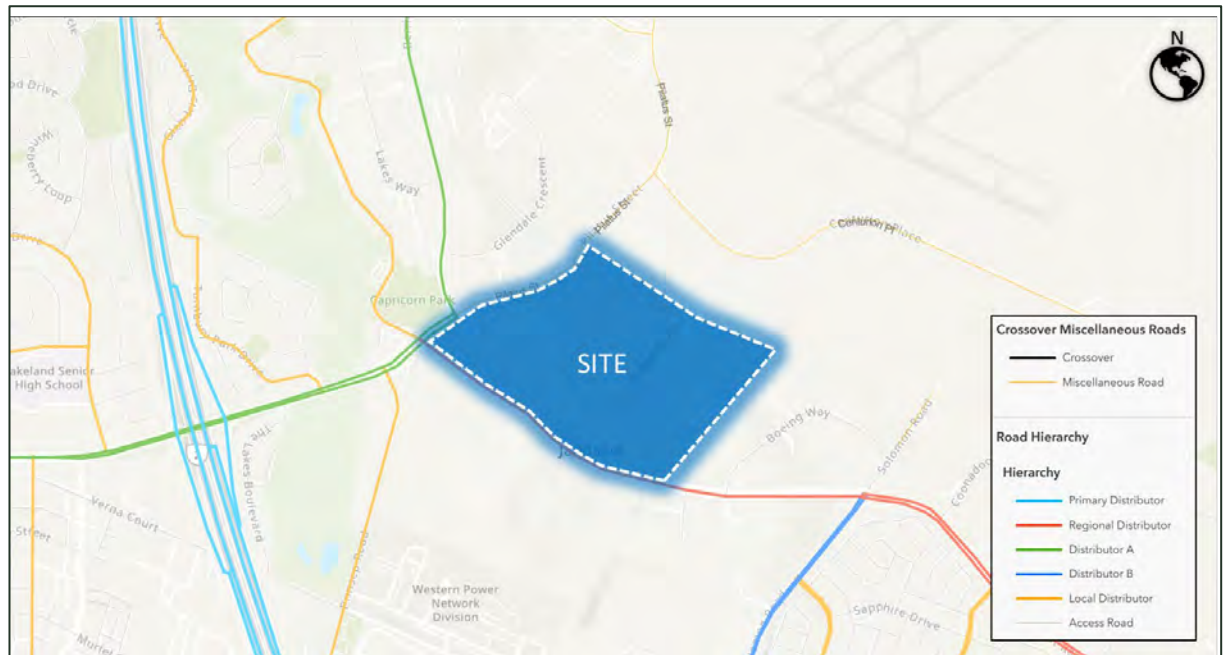
3.2 Existing Road Network

Road Classifications are defined in the Main Roads Functional Hierarchy as follows:

- » Primary Distributors (light blue): Form the regional and inter-regional grid of Main Roads WA traffic routes and carry large volumes of fast-moving traffic. Some are strategic freight routes and all are National or State roads. They are managed by Main Roads.
- » Regional Distributors (red): Roads that are not Primary Distributors, but which link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas. They are managed by Local Government.
- » District Distributor A (green): These carry traffic between industrial, commercial and residential areas and connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property. They are managed by Local Government.
- » District Distributor B (dark blue): Perform a similar function to District Distributor A but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property. These are often older roads with traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and not through them, forming a grid that would ideally be around 1.5 kilometres apart. They are managed by Local Government.
- » Local Distributors (orange): Carry traffic within a cell and link District Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks. They are managed by Local government.
- » Access Roads (grey): Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly. They are managed by Local government.

Figure 4 shows the surrounding area road hierarchy and the characteristics of the surrounding road network are summarised in Table 2.

Figure 4 Existing Road Network



Source: MRWA Road Information Mapping

Table 2 Existing Road Network

Road Name	Hierarchy	Lanes	Foot paths	Width (m)	Speed Limit (km/h)
Kwinana Freeway	Primary Distributor	6	-	54-82	100
Jandakot Road	Regional Distributor	4	2	19-23	70
Berrigan Drive	Distributor A	4	2	16-20	60-70
Dean Road	Local Distributor	2	1	7.5	50
Pilatus Street	Miscellaneous Road	2	1	7-17	60-70

3.3 Existing Pedestrian / Cycle Networks

Figure 5 shows the pedestrian/cycle networks within the surrounding area of the Site. Jandakot Road currently provides PSPs on both the northern and southern side, while Pilatus Street provides on-street cycle lanes on both sides, as well as a 2.5m pedestrian on the northern/western side.

Figure 5 Existing Pedestrian / Cycle Networks



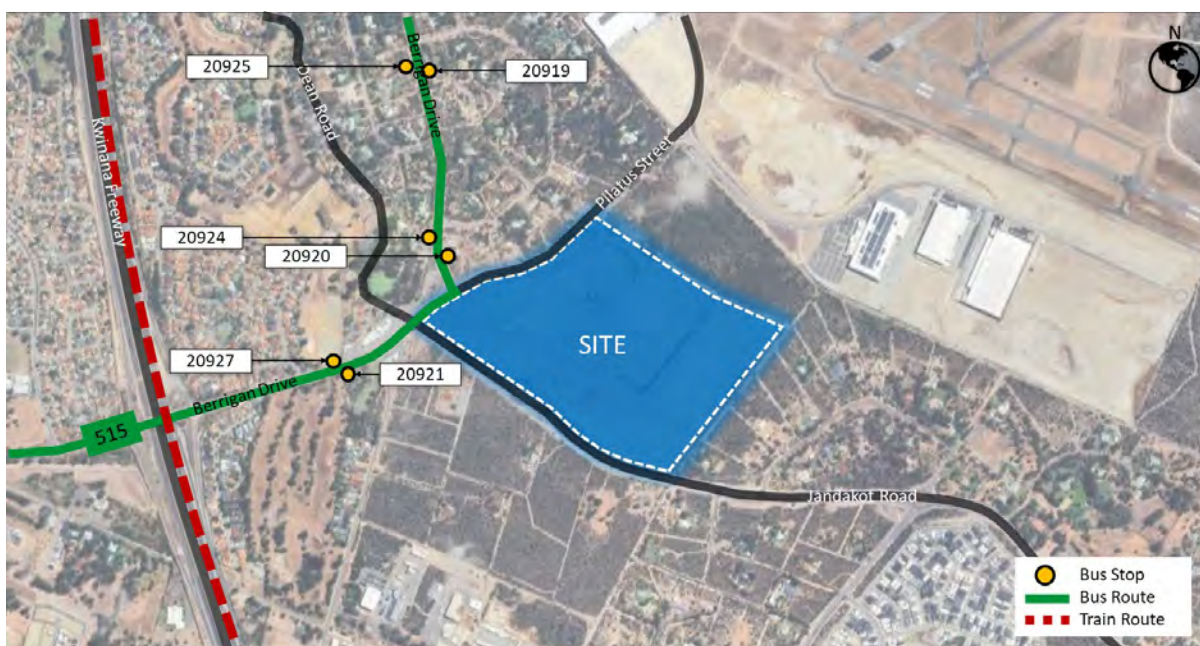
Source: Department of Transport Cockburn and Rockingham Comprehensive Bike Map

3.4 Existing Public Transport Services

The nearest bus stops to the site are shown in Figure 6 and include:

- » Stop No. 20919 – Berrigan Dr After Glendale Cr
- » Stop No. 20920 – Berrigan Dr Before Glendale Cr
- » Stop No. 20921 – Berrigan Dr Before Turnbull Park Dr
- » Stop No. 20924 – Berrigan Dr After Pilatus St
- » Stop No. 20925 – Berrigan Dr Before Glendale Cr
- » Stop No. 20927 – Berrigan Dr After Turnbull Park Dr

Figure 6 Existing Public Transport Services and Stops



Source: Transperth

3.5 Traffic Flows on Surrounding Roads and Intersections

Existing traffic volumes were sourced from Main Roads WA Traffic Map and are summarised in **Table 3**.

Table 3 Traffic Volumes

Road Name	Date	Average Daily Traffic Volume	AM Peak Hour	PM Peak Hour
Berrigan Drive east of Kwinana Freeway	2021/22	25,968	2,172	2,296
Jandakot Road east of Berrigan Drive	2019/20	18,261	1,680	1,559
Pilatus Street east of Berrigan Drive	2019/20	7,588	1,002	757

In addition to the above data, traffic video surveys were also undertaken on the 1st of May 2024 for the following intersections:

- Jandakot Road / Berrigan Drive / Pilatus Street / Dean Street
- Berrigan Drive / Pilatus Street

The AM peak hour, PM peak hour, and 24-hour volumes for the above intersections are shown in **Figure 7** through **Figure 12**.

Figure 7 Existing Intersection Volumes for Pilatus Street / Jandakot Road - AM Peak Hour

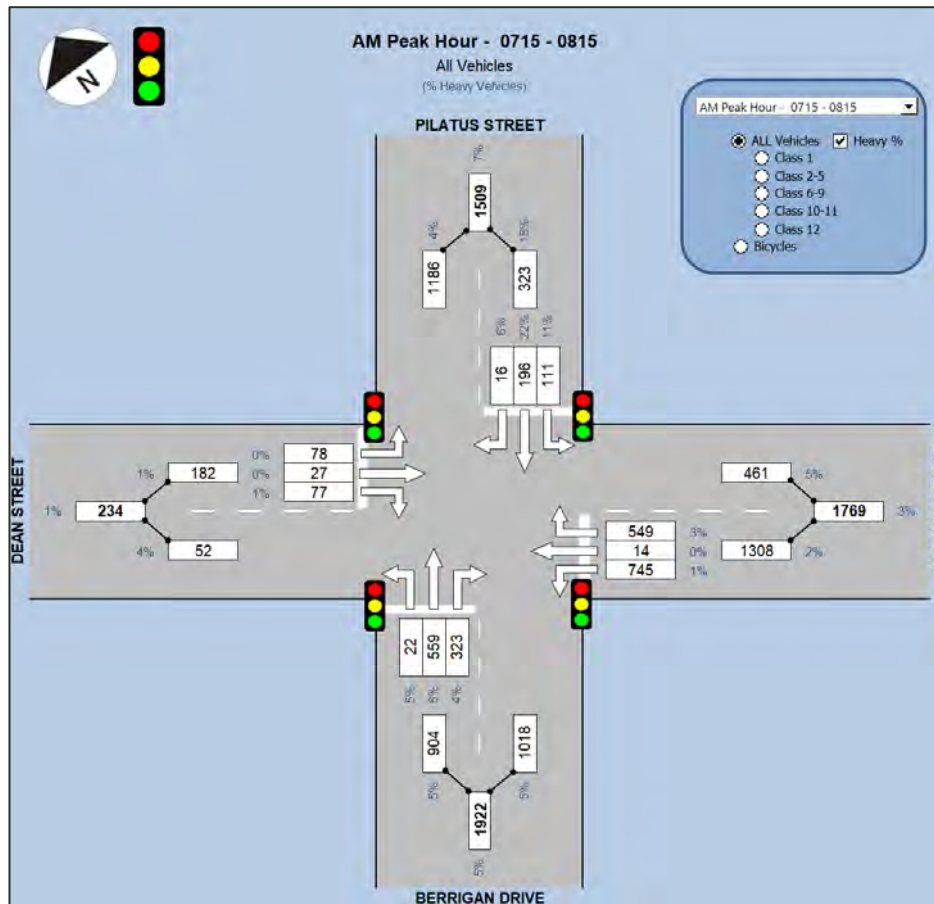


Figure 8 Existing Intersection Volumes for Pilatus Street / Jandakot Road - PM Peak Hour

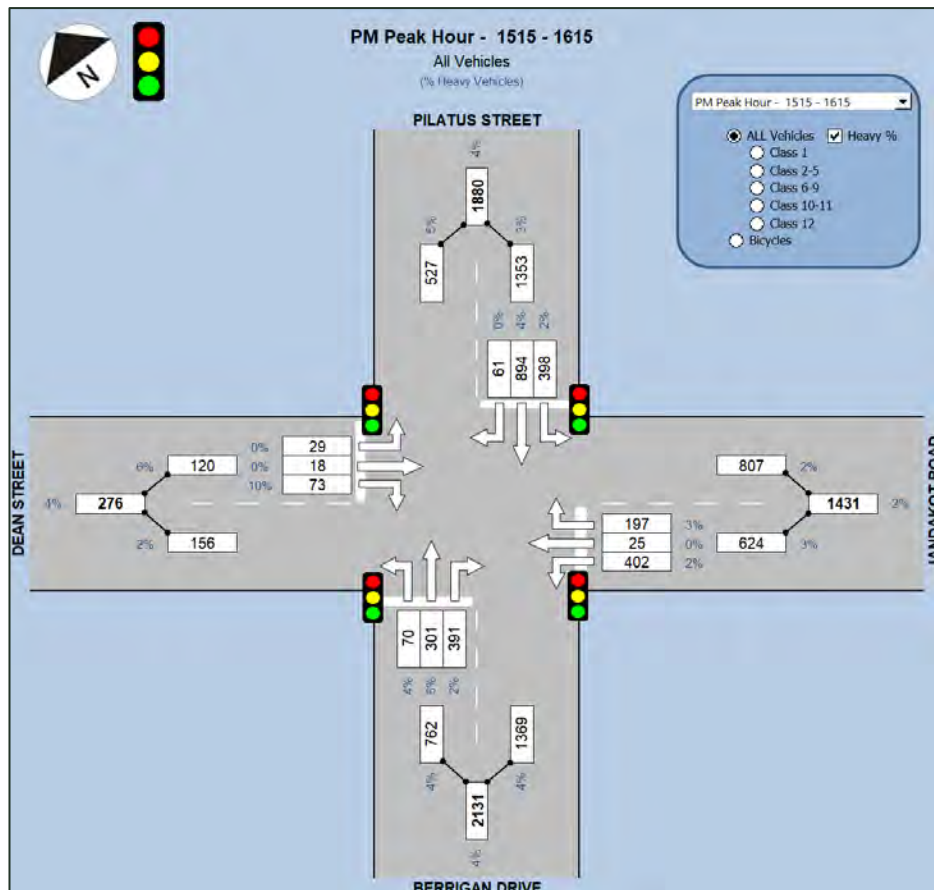


Figure 9 Existing Intersection Volumes for Pilatus Street / Jandakot Road - 24-Hour Period

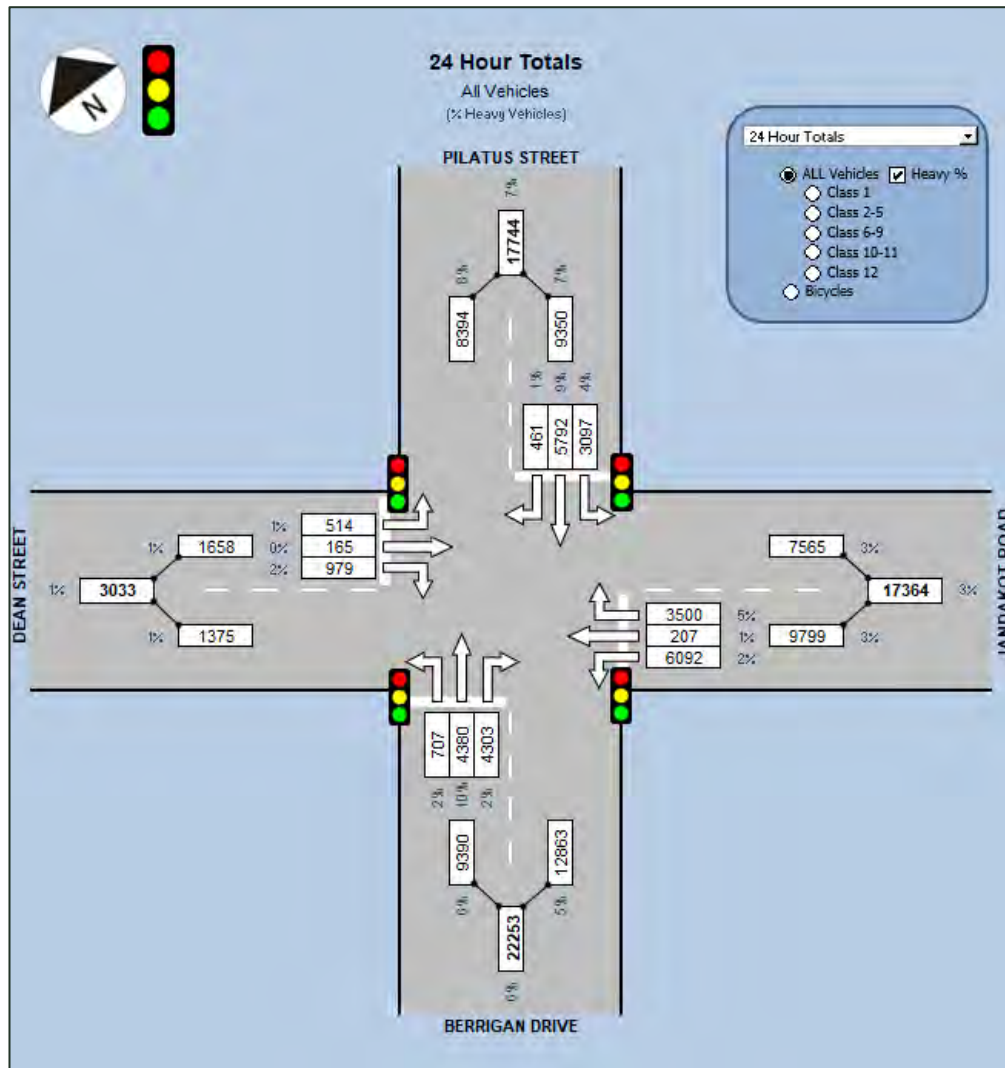


Figure 10 Existing Intersection Volumes for Pilatus Street / Berrigan Drive - AM Peak Hour

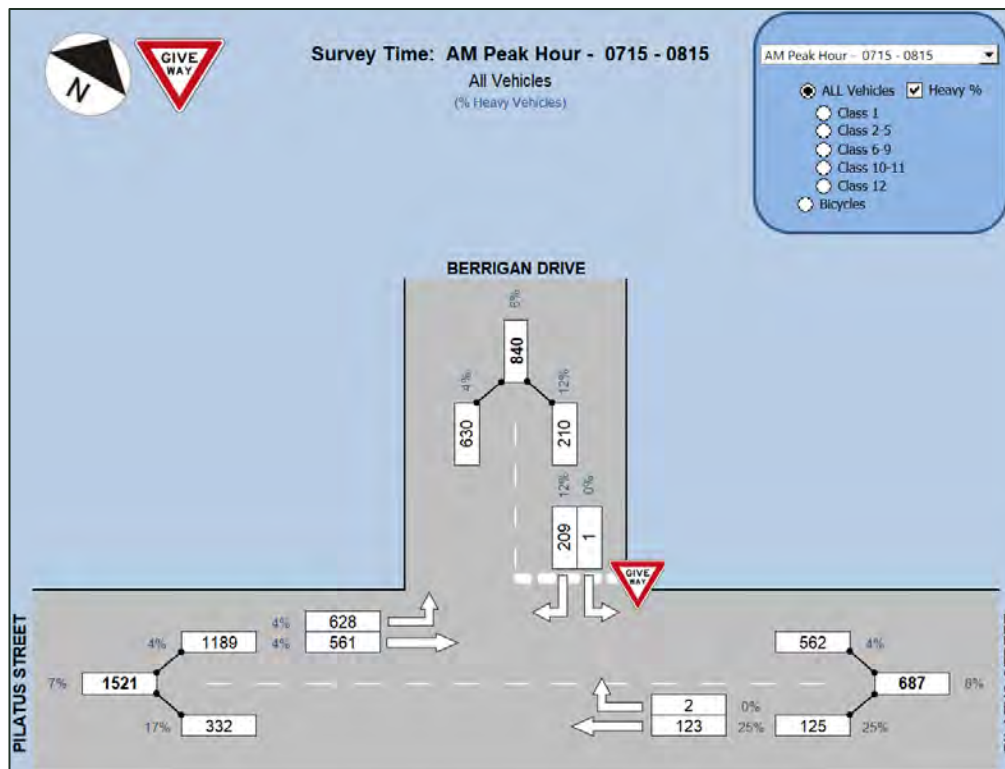


Figure 11 Existing Intersection Volumes for Pilatus Street / Berrigan Drive - PM Peak Hour

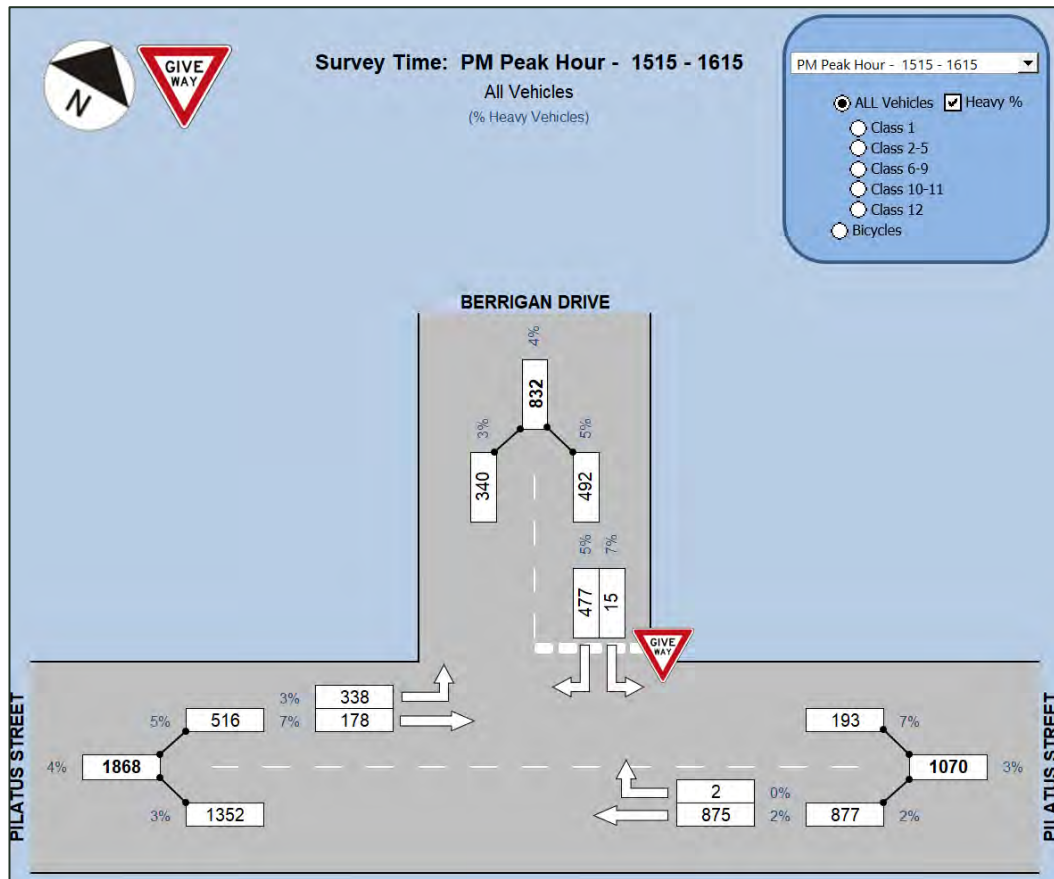
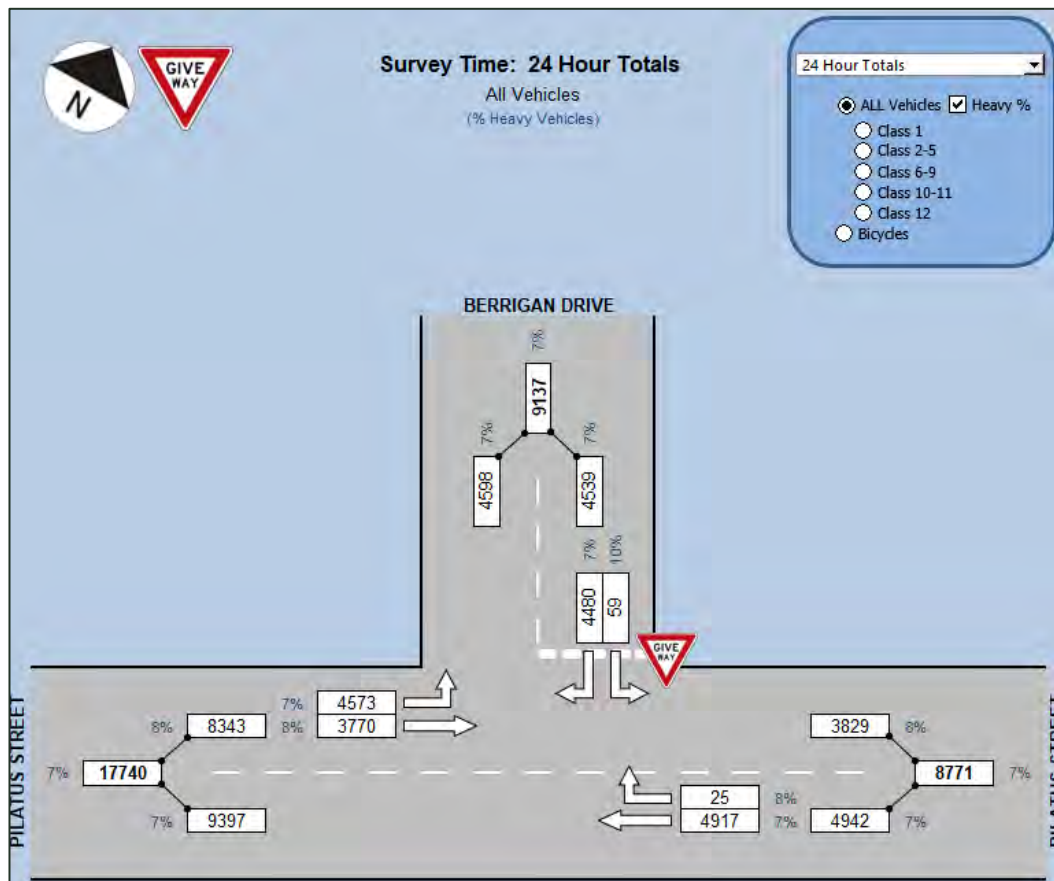


Figure 12 Existing Intersection Volumes for Pilatus Street / Berrigan Drive - 24-Hour Period



4 CHANGES TO INTERNAL TRANSPORT NETWORKS

4.1 Existing Internal Road Network

As shown in **Figure 13**, the internal roads within the Site have already been constructed in accordance with the proposed Site layout shown in **Figure 2**.

Figure 13 Existing Internal Road Network



Source: Nearmap (image dated 1st June 2024)

4.2 Road Reservation Widths

The internal roads are proposed to have 20m road reservation widths, with appropriate truncations to be provided at the intersections.

4.3 Road Cross Sections and Speed Limits

The internal roads are proposed to have a pavement width of 10m kerb-to-kerb, with occasional on-street parking facilities provided, as well as footpaths on at least 1 side of the road. The remaining road reservation will consist of verge. An example of the internal road cross-sections is provided in **Figure 14** and **Figure 15**.

The internal roads are proposed to have a posted speed of 50km/hr.

Figure 14 Proposed Pavement Width and Cross-Section for Internal Roads



Source: Nearmap (image dated 1st June 2024)

Figure 15 Example of Cross-Section for Existing Internal Road



Source: Nearmap (image dated 1st June 2024)

4.4 Intersection Layouts and Controls

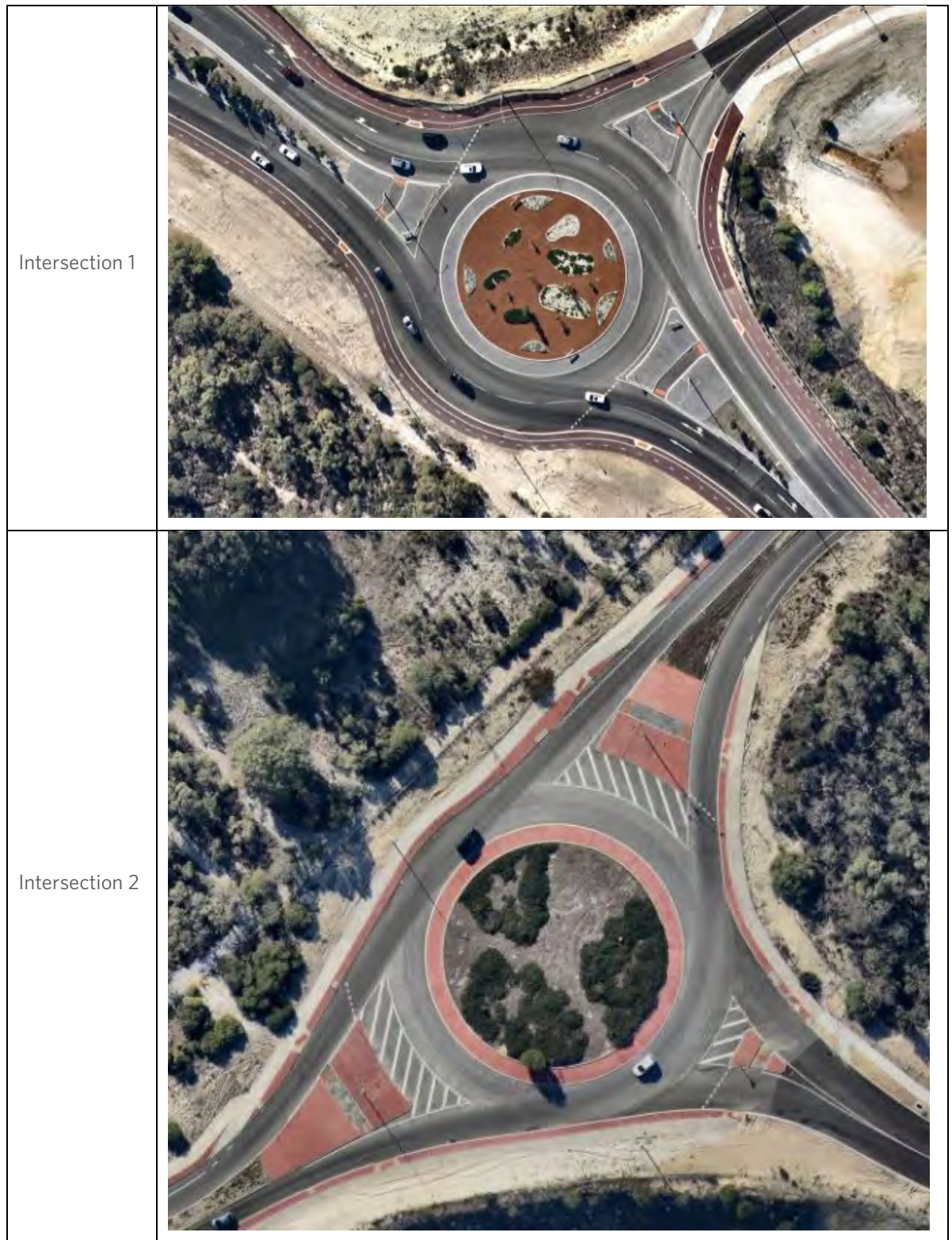
The proposed internal and external intersections are shown on the plan in **Figure 16**, while each of the constructed intersections are shown in **Figure 17**.

It is noted that each of the intersections are designed to accommodate up to RAV4 trucks, although Intersection 3 is only designed to accommodate the RAV4 northbound and southbound through movements as the proposed land-uses within Lots 807 and 810 do not require RAV4 access.

Figure 16 Proposed Internal and External Intersections



Figure 17 Internal and External Intersections



Intersection 3



Intersection 4



<p>Intersection 5</p>	
<p>Intersection 6</p>	

4.5 Pedestrian / Cycle Networks and Crossing Facilities

Pedestrian connections have been or will be provided on both sides of the internal road between intersections 1 and 3 and tie in to the existing Principal Shared Path (PSP) on the northern side of Jandakot Road. Pedestrian paths will also be constructed along the orange sections of the internal roads shown in **Figure 18**.

Pedestrian cut-through crossings have also been provided at Intersections 1-3.

Figure 18 Proposed Pedestrian Footpaths along Internal Roads



4.6 Public Transport Services

No public transport services are proposed within the Site.

5 CHANGES TO EXTERNAL TRANSPORT NETWORKS

5.1 Existing External Road Network

PTG contacted the City of Cockburn and received the following advice related to potential changes to the external road network:

The Jandakot Road was recently upgraded to 4 lanes from Berrigan to Solomon Road.

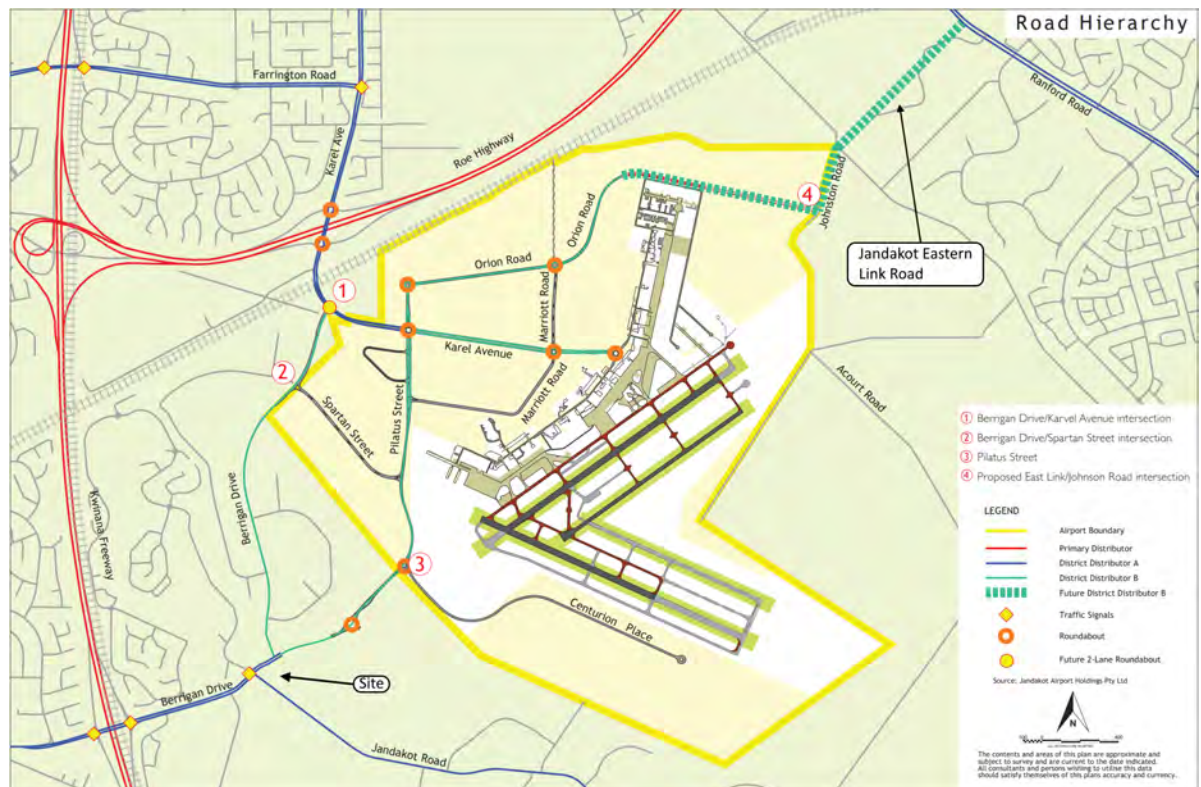
Glen Iris Golf Course redevelopment resulted in the proposal for Traffic Signals near the current Turnbury Park Drive.

The City has no commitments to further upgrades.

5.1.1 Jandakot Eastern Link Road

As part of the Jandakot Airport Master Plan, a new road link is proposed between Johnston Road and Ranford Road. This link is shown in **Figure 19** and is referred to as the Jandakot Eastern Link Road (JELR). There are currently only 2 roads that can be used to access Jandakot Airport (Karel Avenue and Berrigan Drive) and the purpose of the JELR is to provide an additional connection to Jandakot Airport, via Ranford Road. If the JELR is constructed, this will likely result in a reduction of the traffic volumes on both Pilatus Street and Karel Avenue.

Figure 19 Proposed Jandakot Eastern Link Road



Source: Jandakot Airport Master Plan (Part 2); 210909_Jandakot_Airport_Master_Plan_FINAL_compressed_Part-2.pdf (jandakotairport.com.au)

5.2 Intersection Layouts and Controls

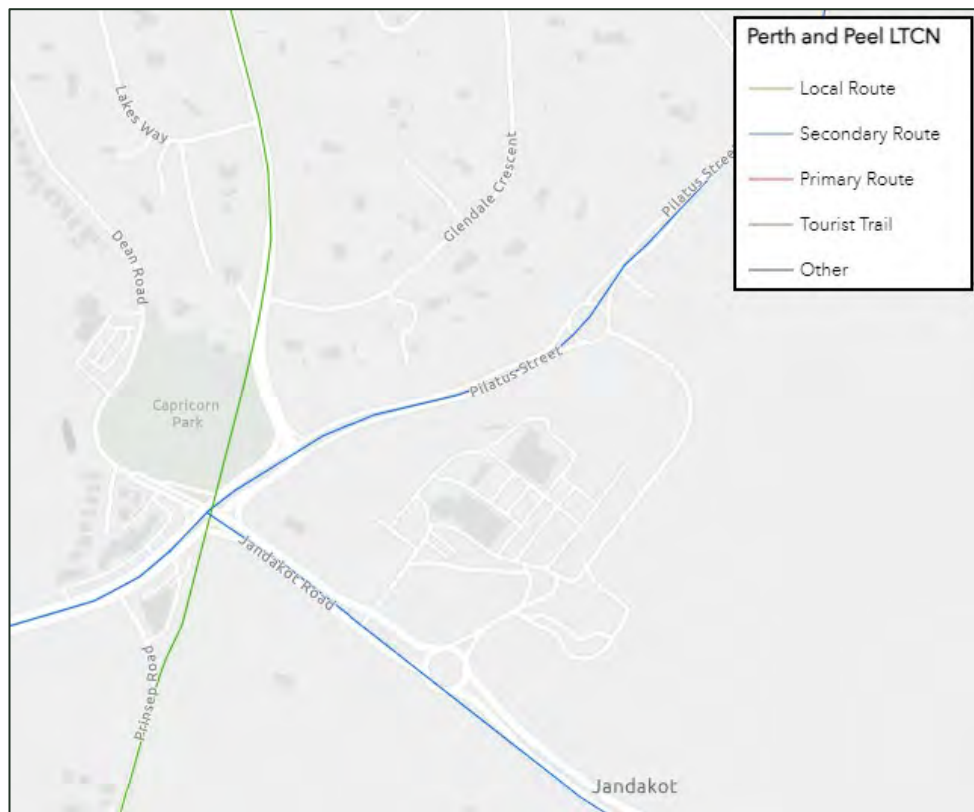
No changes to the external intersection layouts or controls are proposed.

5.3 Pedestrian / Cycle Networks and Crossing Facilities

As shown in **Figure 20**, both Jandakot Road and Pilatus Street are Secondary Routes under the Perth and Peel Long Term Cycle Network.

Jandakot Road currently provides PSPs on both the northern and southern side, while Pilatus Street provides on-street cycle lanes on both sides, as well as a 2.5m pedestrian on the northern/western side. As Secondary Routes, no further changes or upgrades are considered required under the LTCN.

Figure 20 Long Term Cycle Network near Site



Source: Department of Transport (*Perth and Peel Long-Term Cycle Network (arcgis.com)*)

5.4 Public Transport Services

PTG contacted the Public Transport Authority (PTA) and received the following advice related to potential changes to the public transport services:

There are no short to medium term plans for any major changes. The current 515 service is very poorly patronised and is therefore a low priority for investment at this time. Longer term the service will be extended to Cockburn Central on a full time daily basis and operate as future route 521.

6 ANALYSIS OF INTERNAL TRANSPORT NETWORKS

6.1 Assessment Years and Time Periods

For the purpose of the assessment undertaken, it was assumed that the Site will be fully developed and operational by 2033.

Assessment was undertaken for the network AM and PM peak hours, which were identified as:

- > Weekday AM: 07:15 to 08:15
- > Weekday PM: 15:15 to 16:15

6.2 Development Generated Traffic

Traffic generation was calculated using trip generation rates from the Institute of Transportation Engineers (ITE) 'Trip Generation' 11th Edition, as well as the RTA Guide to Traffic Generating Developments for the network AM and PM peak hours. Trip generation rates for each of the proposed land-uses are detailed in **Table 4**, while the trip in/out distribution assumptions are summarised in **Table 5** and the total trips generated are summarised in **Table 6**.

It is noted that it was conservatively assumed that all development-generated trips would be new trips on the network (i.e., no passing trade was assumed).

Table 4 Development Trip Generation Rates

Land Use	Source	AM Peak Rate	PM Peak Rate
Warehousing	ITE Category 150	0.17 trips/1000 sqft	0.18 trips/1000 sqft
Gym / Wellness	ITE Category 492	1.31 trips/1000 sqft	3.45 trips/1000 sqft
Medical Clinic	ITE Category 630	2.75 trips/1000 sqft	3.69 trips/1000 sqft
Veterinary Clinic	ITE Category 640	3.64 trips/1000 sqft	3.53 trips/1000 sqft
Office	ITE Category 715	1.85 trips/1000 sqft	1.76 trips/1000 sqft
Retail	ITE Category 850	2.86 trips/1000 sqft	8.95 trips/1000 sqft
Bulky Goods ¹	RMS	0.675 trips/100m ²	2.7 trips/100m ²
Fast Food with Drive-Through Facilities	RMS (Hungry Jack's Data)	5.1 trips/100m ²	21.5 trips/100m ²

¹ RMS data does not provide trip rates for bulky goods during the AM peak (07:15 – 08:15), as bulky goods stores often do not open at that time. However, for this assessment, it is assumed that the bulky goods land use would generate 25% of the PM peak traffic during the AM peak.

Table 5 Directional Distribution

Land Use	AM Peak		PM Peak	
	IN	OUT	IN	OUT
Warehousing	65%	35%	24%	76%
Gym / Wellness	51%	49%	57%	43%
Medical Clinic	81%	19%	30%	70%
Veterinary Clinic	67%	33%	40%	60%
Office	89%	11%	15%	85%
Retail	59%	41%	50%	50%
Bulky Goods	50%	50%	50%	50%
Fast Food with Drive-Through Facilities	50%	50%	50%	50%

Table 6 Total Trip Generation

Lot	Land Use	AM Peak		PM Peak	
		IN	OUT	IN	OUT
807	Showroom	34	34	137	137
	Vet	17	8	10	14
	Health Centre / Gym Studio	14	13	40	30
	Warehouse	3	1	1	3
	Medical Centre	48	11	24	56
	Fast Food	21	21	87	87
	Retail	27	19	72	72
808	Office/Warehouse	12	3	5	12
809	Warehouse	56	17	21	55
810	Showroom	43	43	172	172
	Showroom Warehouse	8	8	30	30
	Warehouse	24	7	9	24
811	Warehouse	54	16	21	54
TOTAL		562		1376	

6.3 Development Generated Traffic Distribution

For the purpose of this assessment, the following traffic distribution was estimated from the main residential areas and proximity to the main arterial roads adjacent to the Site:

- 35% to/from Berrigan Drive (west)
- 35% to/from Jandakot Road (east)
- 30% to/from Pilatus Street (north)

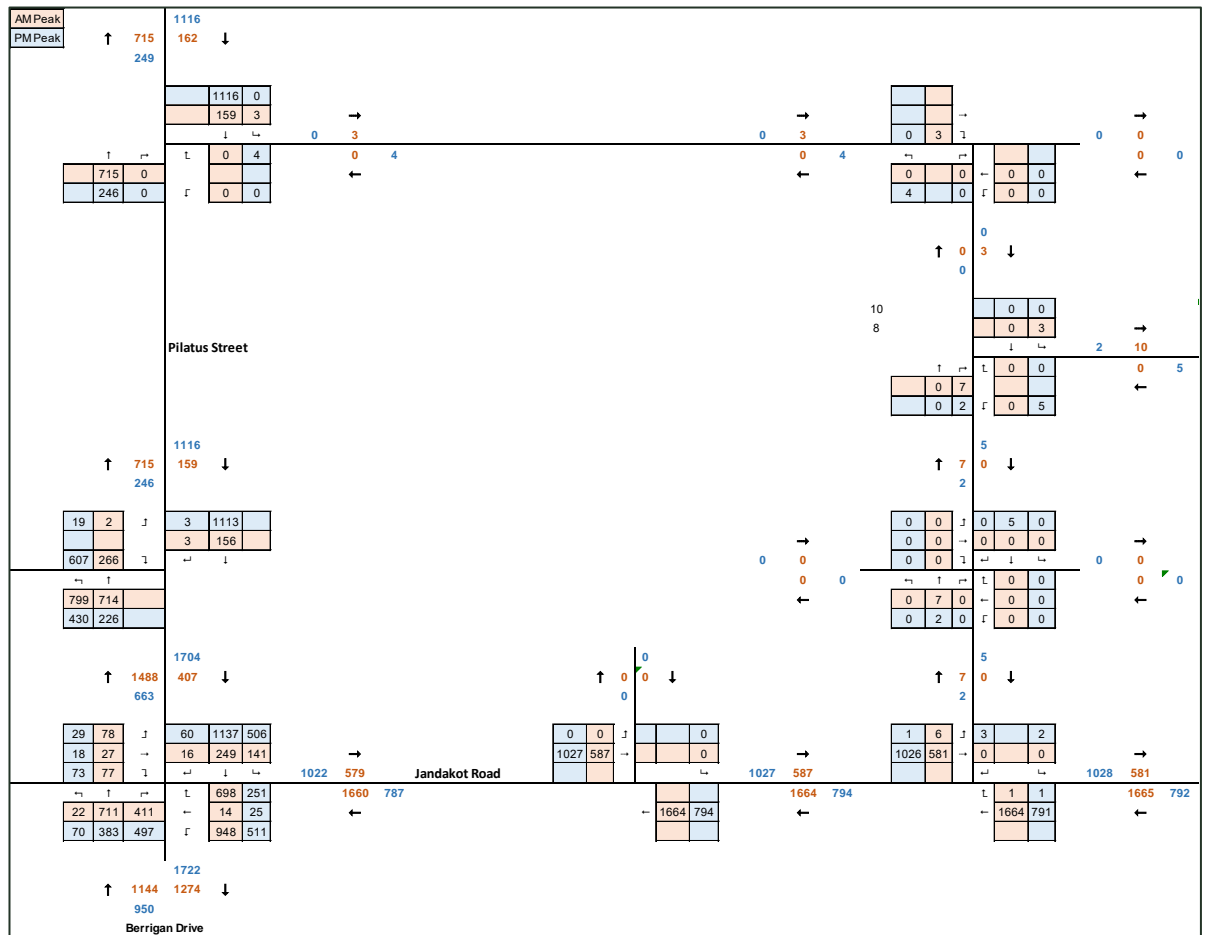
6.4 Existing Background Traffic Flows

The background (non-development) traffic volumes were based on the video surveys described in **Section 3.5**, with a 3.025% per annum growth rate applied to increase the 2024 AM and PM observed volumes (with the exception of traffic going to/from Dean Road) to the estimated 2033 background volumes. This background traffic growth rate is consistent with the growth rate adopted in the TIA for the original Masterplan, which was calculated from outputs from the Main Roads WA Regional Operations Model (ROM)²⁴. It is noted that none of the modelled scenarios assume the JELR connection to Ranford Road, which is considered likely to reduce the background traffic volumes on Pilatus Street.

The 2033 background traffic volumes are shown in **Figure 21**.

To assess the impact of the proposed land-uses, a separate “No Development” scenario has also been assessed as part of this TIA.

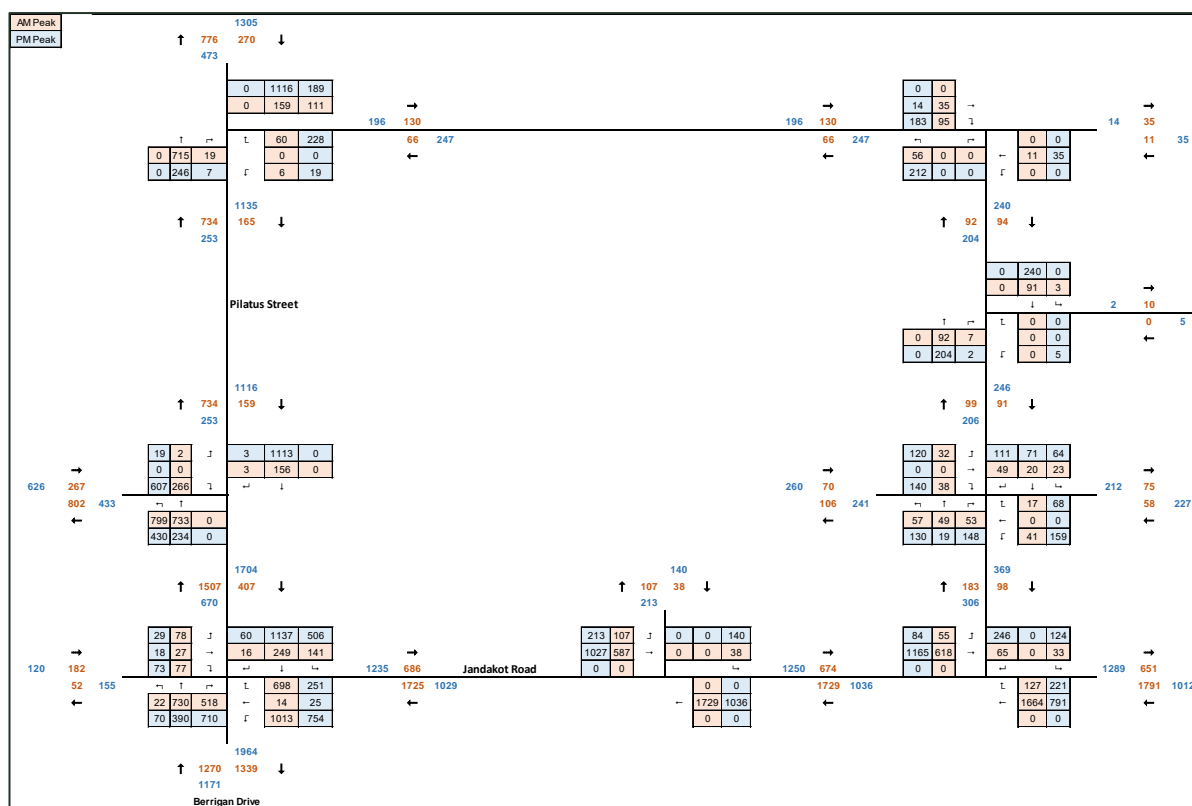
Figure 21 2033 Background Traffic Volumes



6.5 Existing Background and 'With Development' Traffic Flows

The combined Background and Development Traffic Volumes for the 2033 model horizon are shown in Figure 22.

Figure 22 Combined Background and Development Traffic Volumes



6.6 Access Strategy

Access to South Connect will be limited to at the roundabouts on Jandakot Road and Pilatus Street. Lot 807 will also have a left-in, left-out priority-controlled access to Jandakot Road.

6.7 Impact on Surrounding External Roads and Intersections

SIDRA LOS and DOS diagrams are included in **Appendix C**, with a summary of the model results for each of the key intersection provided below:

- **Jandakot Road / Berrigan Drive / Dean Road**
 - o The additional development-generated traffic was only found to result in an increase of approximately 2 seconds to the average intersection delay by for the 2033 AM peak scenario, and an increase of the intersection DOS from 0.78 to 0.82.
 - o For the 2033 PM peak, the additional development-generated traffic was found to increase the average intersection delay by approximately 8 seconds, and an increase of the intersection DOS from 0.77 to 0.87.
 - o In both scenarios, the intersection was considered to operate satisfactorily, considering the 2033 model horizon represents full build-out of the entire masterplan area.
- **Jandakot Road / Distribution Drive**
 - o As the No-Development scenario assumes negligible traffic to/from Distribution Drive, the intersection was found to operate at DOS of 0.52 for the 2033 AM peak and 0.30 for the 2033 PM peak, and intersection LOS A for both 2033 scenarios.
 - o The additional development-generated traffic was found to result in a minor increase to the average intersection delay of approximately 1 second in the 2033 AM peak, while the DOS was found to increase from 0.52 to 0.63.
 - o For the 2033 PM peak scenarios, the additional development-generated traffic was found to increase the average intersection delay by approximately 3.5 seconds.
 - o While the intersection DOS was found to increase from 0.30 to 0.73 for the 2033 PM peak, it is noted that this DOS represents the DOS for the worst approach (i.e., the northern approach, which is the internal access road).
 - The DOS for the Jandakot Road approaches was found to increase to 0.51, which indicates that the intersection has capacity to accommodate further increases to the background traffic volumes.
 - The 95th percentile queue lengths on the northern approach were not found to extend to the internal roundabout located approximately 80m north in any of the modelled scenarios.
- **Pilatus Street / Berrigan Drive**
 - o The intersection of Pilatus Street / Berrigan Drive was found to have insufficient capacity to accommodate the high volume of right-turning vehicles from Berrigan Drive to Pilatus Street for any of the 2033 PM scenarios. This was found to occur as a result as a combination of the assumed background traffic growth resulting from the increased development of the Jandakot Airport and surrounding residential and industrial areas traffic utilising Berrigan Drive (north of Pilatus Street), as well as the substantial volumes of traffic using Berrigan Drive as a 'rat-run' route to get to the Kwinana Freeway.
 - o Potential mitigation measures for this intersection have not been assessed as part of this assessment as the proposed development is only expected to have a very minor impact on this intersection.
- **Pilatus Street / Distribution Drive**
 - o The intersection of Pilatus Street / Distribution Drive was found to operate at LOS A for all scenarios, while the DOS was found to be within the WAPC-recommended thresholds.
- **Jandakot Road / Lot 807 Access (LILO)**
 - o The LILO access from Jandakot Road to Lot 807 was found to operate at LOS A and DOS less than 0.50 for all scenarios.
- **Internal intersections**
 - o All internal intersections were found to operate at LOS A and DOS less than 0.50 for all modelled scenarios.

7 SUMMARY AND CONCLUSIONS

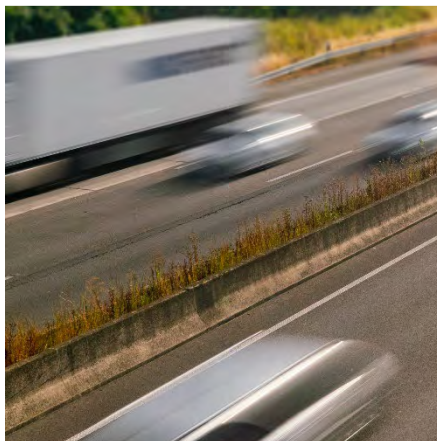
This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) Transport Assessment Guidelines for Developments: Volume 2- Planning Schemes, Structure Plans and Activity Centre Plans (2016); the checklist is included at **Appendix A**.

The following conclusions can be drawn from this TIA:

- » The proposed land-uses within the Site will complement the growing urban development occurring in the Jandakot and Treeby localities.
- » The proposed land-uses within the Site are estimated to generate a total of 562 trip in the AM peak and 1,376 trips in the PM peak.
- » While the Site has reasonably good connectivity to the surrounding walking and cycle network, the vast majority of trips to/from the Site are expected to be by private vehicle due to the nature of the proposed land-uses (for example, bulky goods, warehousing, retail, medical clinics, etc).
- » All modelled intersections connecting to the Site were found to operate within WAPC recommended thresholds across all scenarios.
- » The Jandakot Road / Berigan Drive / Dean Road signalised intersection was found to operate satisfactorily for all modelled scenarios, including 2033 which represents the ultimate build-out horizon when the Site is assumed to be fully developed.
- » It is noted that none of the modelled scenarios assume the Jandakot Eastern Link connection to Ranford Road, which is considered likely to reduce the background traffic volumes on Pilatus Street.
- » The intersection of Pilatus Street and Berrigan Drive was found to have insufficient capacity to accommodate the high volume of right-turning vehicles from Berrigan Drive to Pilatus Street in the 2033 PM peak as a result of the assumed background traffic growth.
 - Potential mitigation measures for this intersection have not been assessed as part of this assessment, as the proposed development is only expected to have a very minor impact on this intersection.

Appendix A

WAPC CHECKLIST PLANNING
SCHEMES, STRUCTURE PLANS AND
ACTIVITY CENTRE PLANS -
TRANSPORT IMPACT ASSESSMENT



APPENDIX A

Item	Status	Comments/Proposal
Summary	Section 9	
Introduction/Background	Section 1	
Structural plan proposal	Section 2	
regional context	Section 2.1	
proposed land uses	Section 2.2	
table of land uses and quantities	Section 2.2	
major attractors/generators	Section 2.3	
specific issues	Section 2.4	
Existing situation	Section 3	
existing land uses within structure plan	Section 3.1	
existing land uses within 800 metres of structure plan area	Section 3.1	
existing road network within structure plan area	Section 3.2	
existing pedestrian/cycle networks within structure plan area	Section 3.3	
existing public transport services within structure plan area	Section 3.4	
existing road network within 2 (or 5) km of structure plan area	Section 3.2	
traffic flows on roads within structure plan area (PM and/or AM peak hours)	Section 3.5	
traffic flows on roads within 2 (or 5) km of structure plan area (AM and/ or PM peak hours)	Section 3.5	
existing pedestrian/cycle networks within 800m of structure plan area	Section 3.3	
existing public transport services within 800m of structure plan area	Section 3.4	
Proposed internal transport networks	Section 4	
changes/additions to existing road network or proposed new road network	Section 4.1	
road reservation widths	Section 4.2	
road cross-sections & speed limits	Section 4.3	
intersection controls	Section 4.4	
pedestrian/cycle networks and crossing facilities	Section 4.5	
public transport routes	Section 4.6	
Changes to external transport networks	Section 5	
road network	Section 5.1	
intersection controls	Section 5.2	
pedestrian/cycle networks and crossing facilities	Section 5.3	
public transport services	Section 5.4	
Integration with surrounding area	Section 6	
trip attractors/generators within 800 metres	Section 6.1	
proposed changes to land uses within 800 metres	Section 6.2	

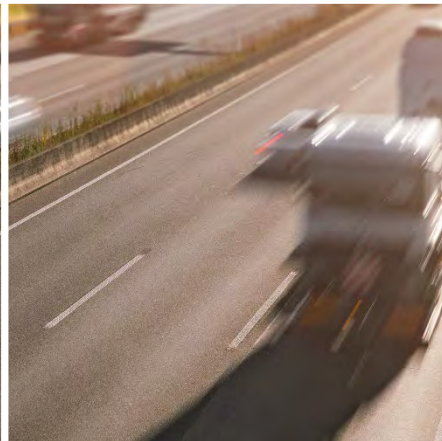
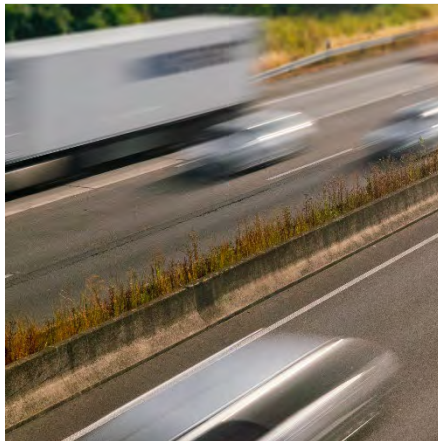
travel desire lines from structure plan to these attractors/generators	Section 6.3	
adequacy of external transport networks	Section 6.4	
deficiencies in external transport networks	Section 6.5	
remedial measures to address deficiencies	Section 6.5	
Analysis of internal transport networks	Section 7	
assessment year(s) and time period(s)	Section 7.1	
structure plan generated traffic	Section 7.2	
extraneous (through) traffic	Section 7.3	
design traffic flows (that is, total traffic)	Section 7.4	
road cross-sections	Section 7.6	
intersection controls	Section 7.6	
access strategy	Section 7.5	
pedestrian/cycle networks	Section 7.6	
safe routes to schools	Section 7.6	
pedestrian permeability & efficiency	Section 7.6	
access to public transport	Section 7.6	
Analysis of external transport networks	Section 8	
extent of analysis	Section 8.1	
base flows for assessment year(s)	Section 8.2	
total traffic flows	Section 8.3	
road cross-sections	Section 8.4	
intersection layouts & controls	Section 8.4	
pedestrian/cycle networks	Section 8.4	
Conclusions	Section 9	

1.



Appendix B

Site Plans



SITE CRITERIA

1. LOT 807	
i. Site Area	50,804m ²
ii. Total GFA	2,185m ²
iii. Total Warehouse GFA	11,754m ²
2. LOT 808	
i. Site Area	72,540m ²
ii. Total Office GFA	550m ²
iii. Total Warehouse GFA	11,204m ²
Total GFA:	11,754m ²
3. LOT 809	
i. Site Area	61,630m ²
ii. Total Office GFA	1,400m ²
iii. Total Warehouse GFA	28,010m ²
Total GFA:	29,410m ²
4. LOT 810	
i. Site Area	70,910m ²
ii. Total Office GFA	600m ²
iii. Total Warehouse GFA	16,709m ²
iv. Total Showroom GFA	16,428m ²
v. Total GYM GFA	2,000m ²
vi. Total Cafe GFA	150m ²
Total GFA:	35,887m ²
5. LOT 811	
i. Site Area	81,510m ²
ii. Total Office GFA	2,793m ²
iii. Total Warehouse GFA	35,859m ²
Total GFA:	38,652m ²



MASTER SITE PLAN
SCALE: 1 : 1200

2.

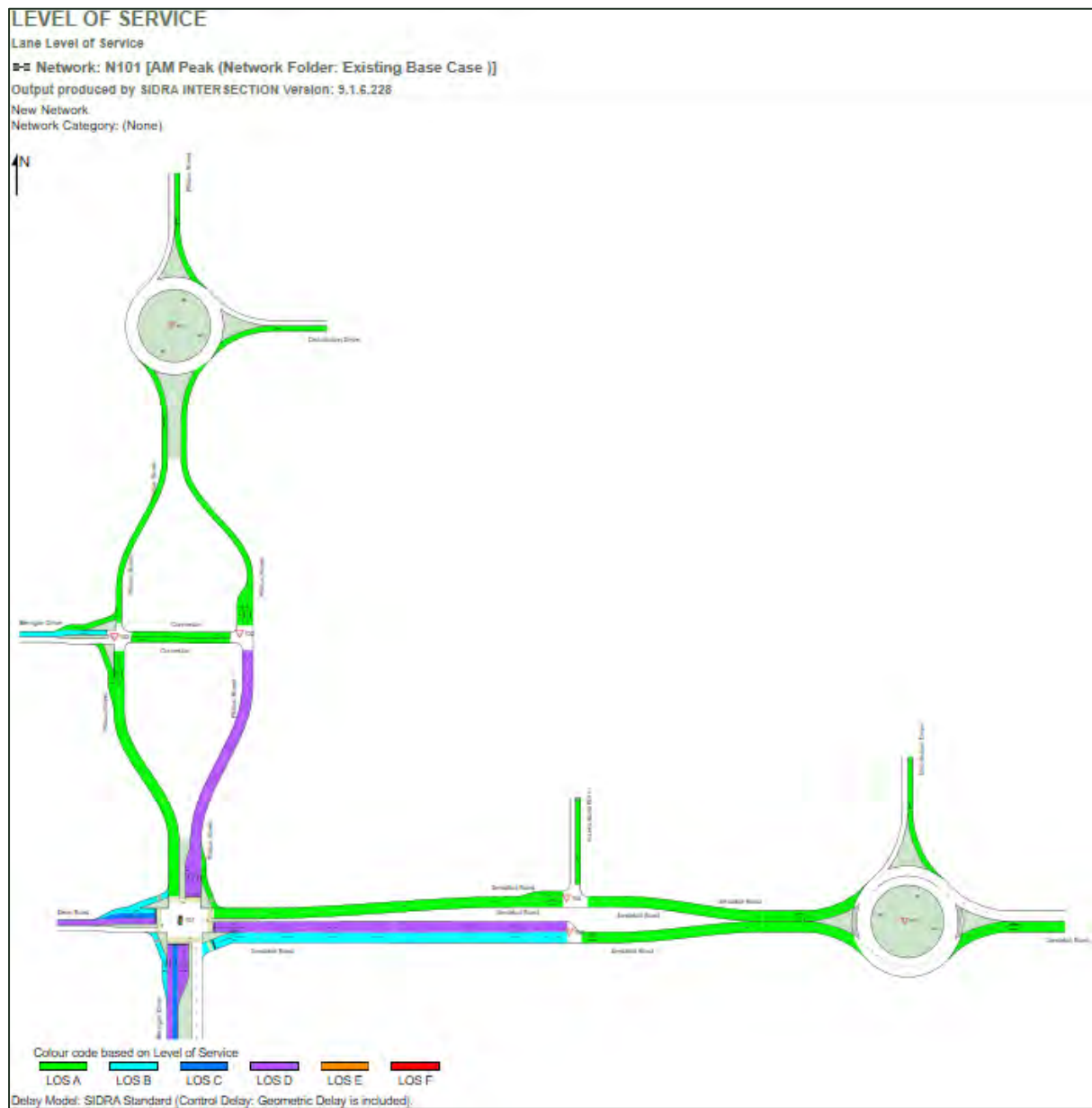


Appendix C

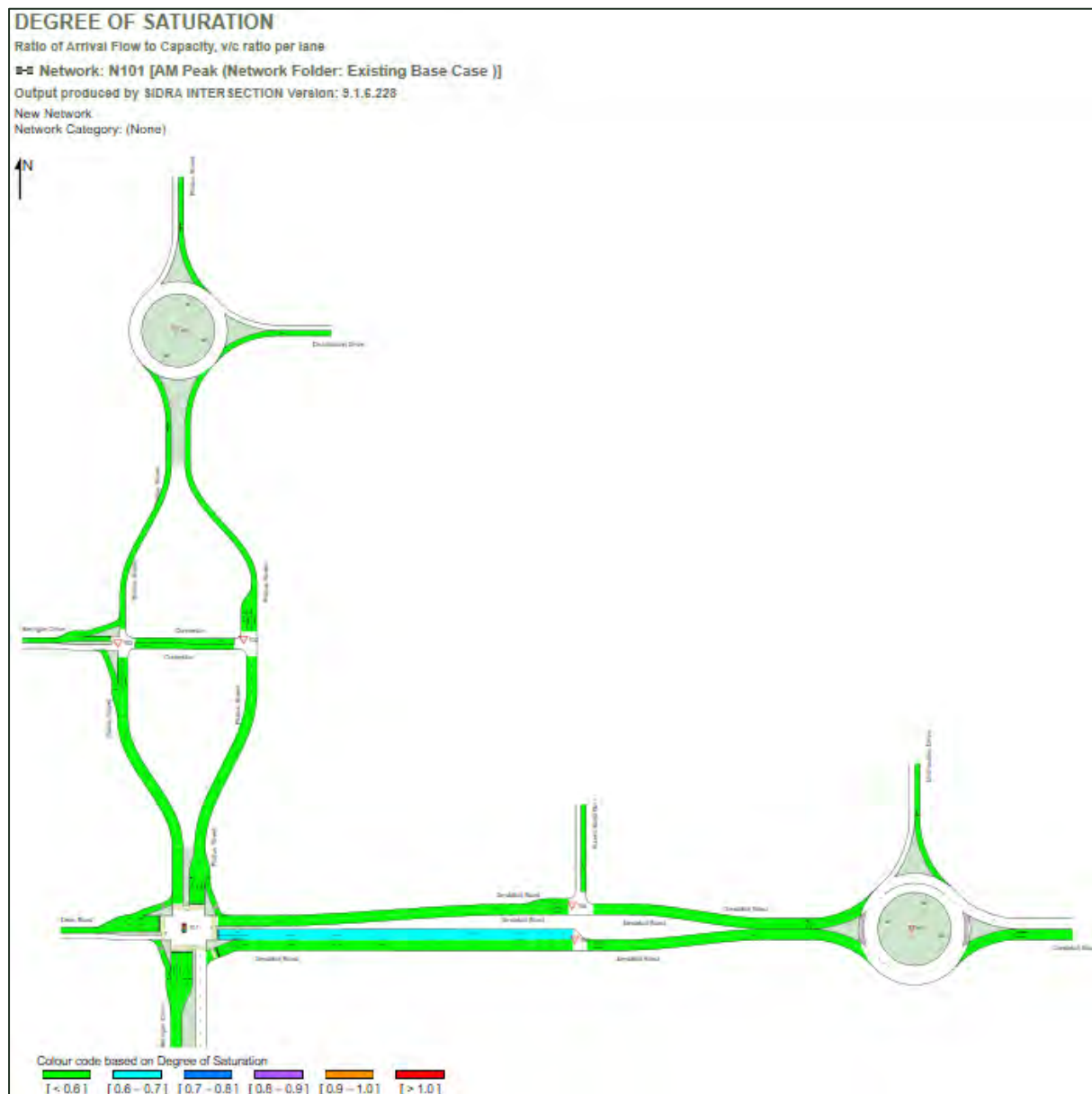
SIDRA Output Tables



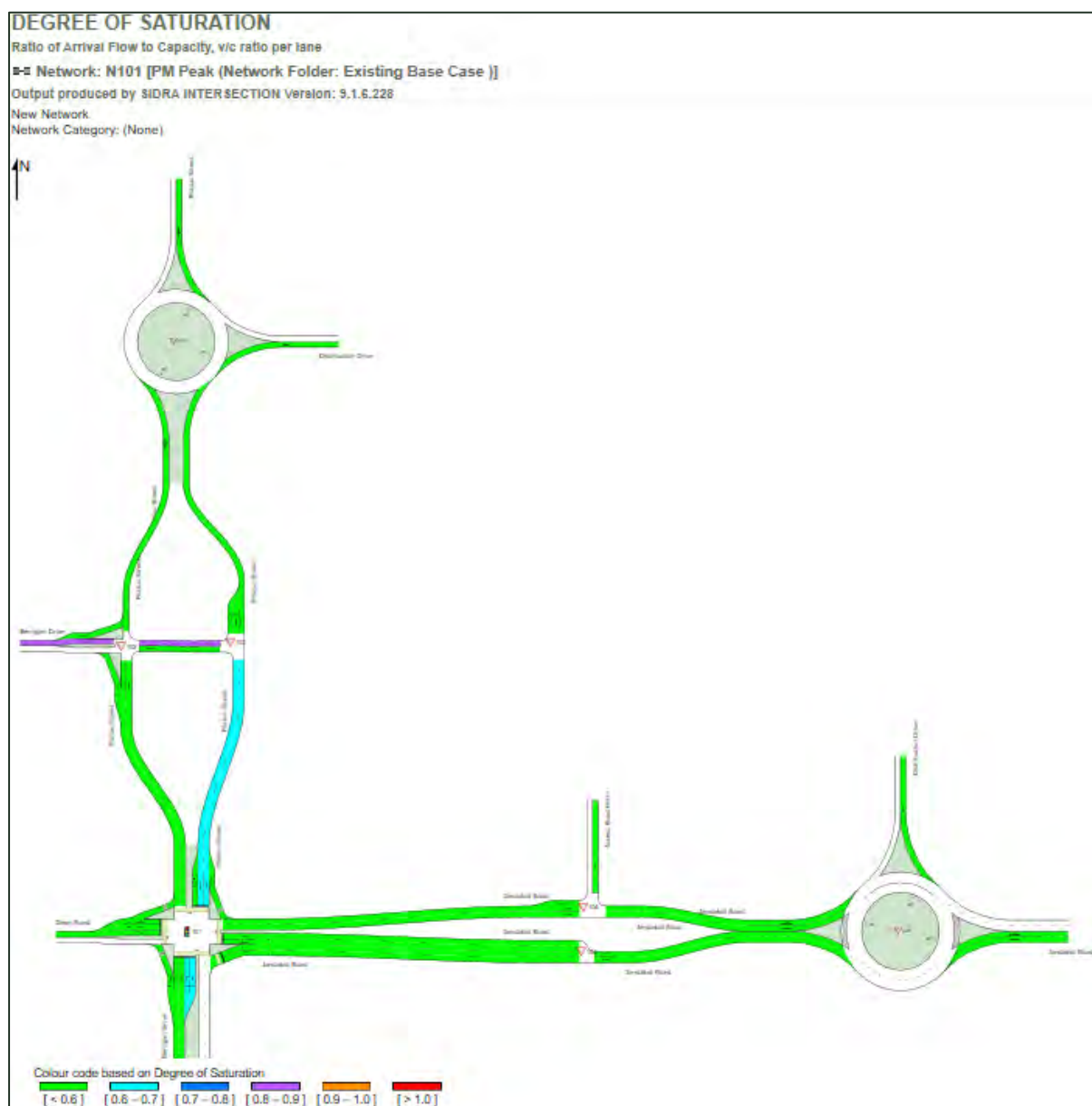
SIDRA LOS Diagram for 2024 AM Peak Hour



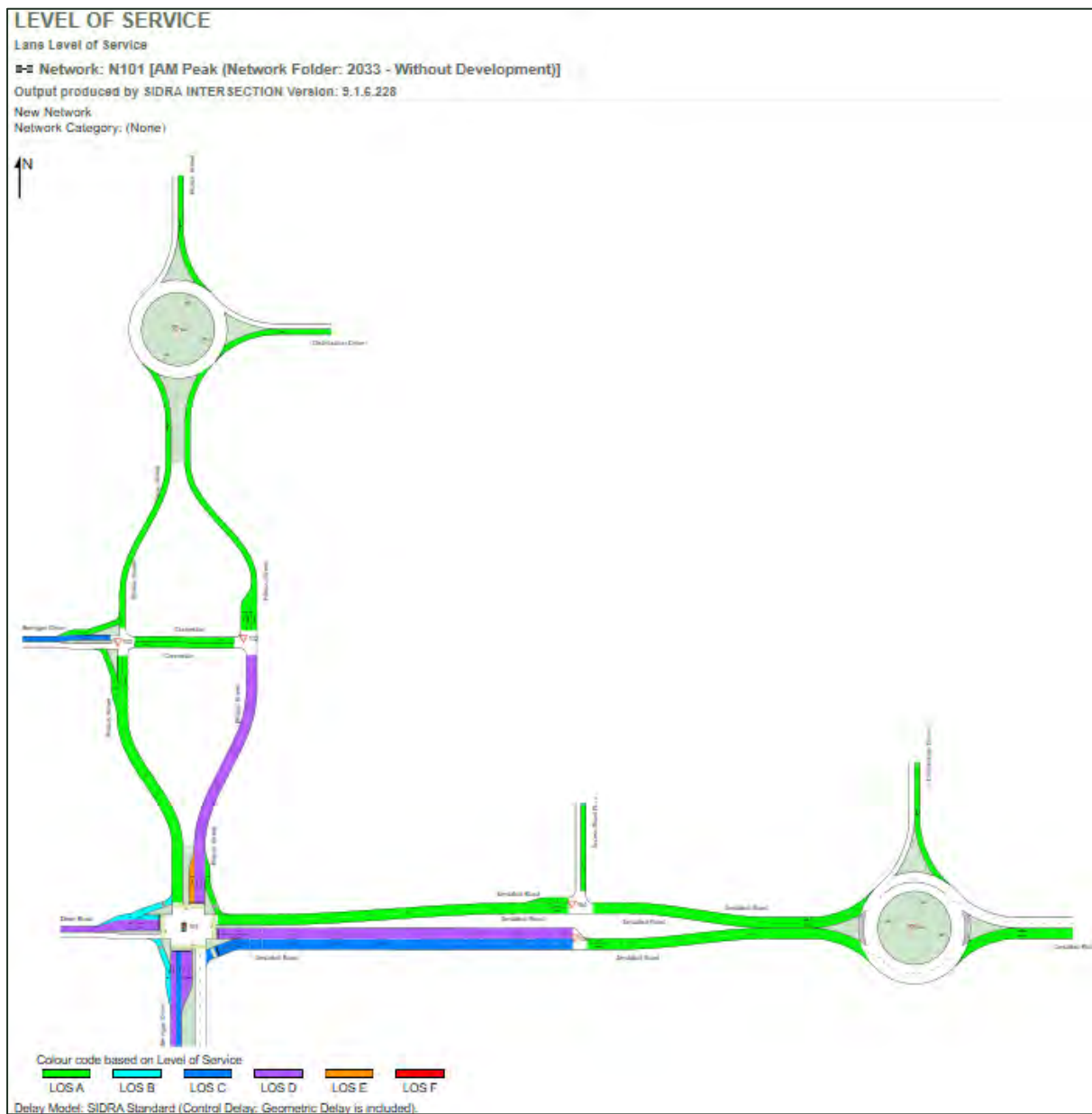
SIDRA DOS Diagram for 2024 AM Peak Hour



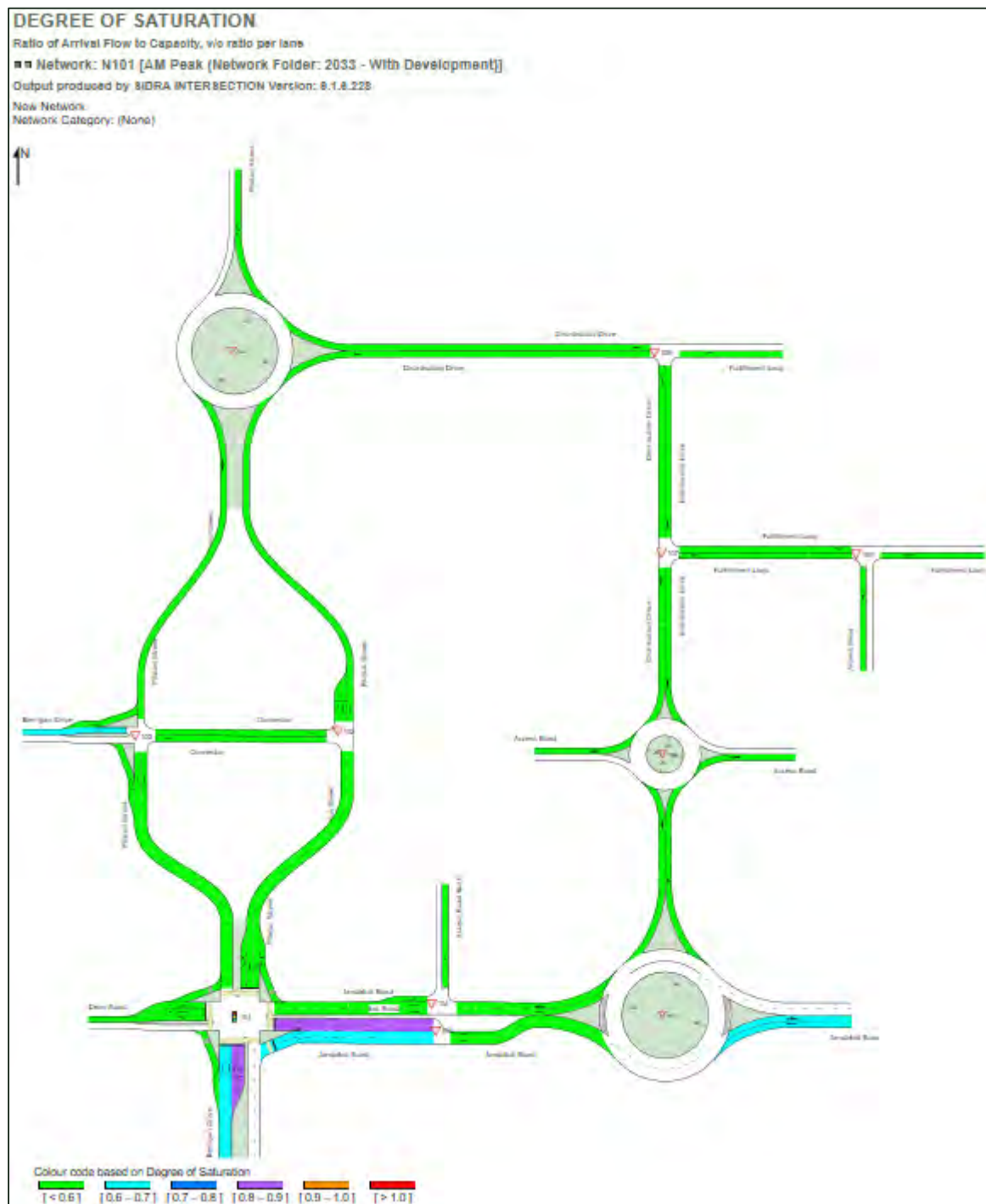
SIDRA DOS Diagram for 2024 PM Peak Hour



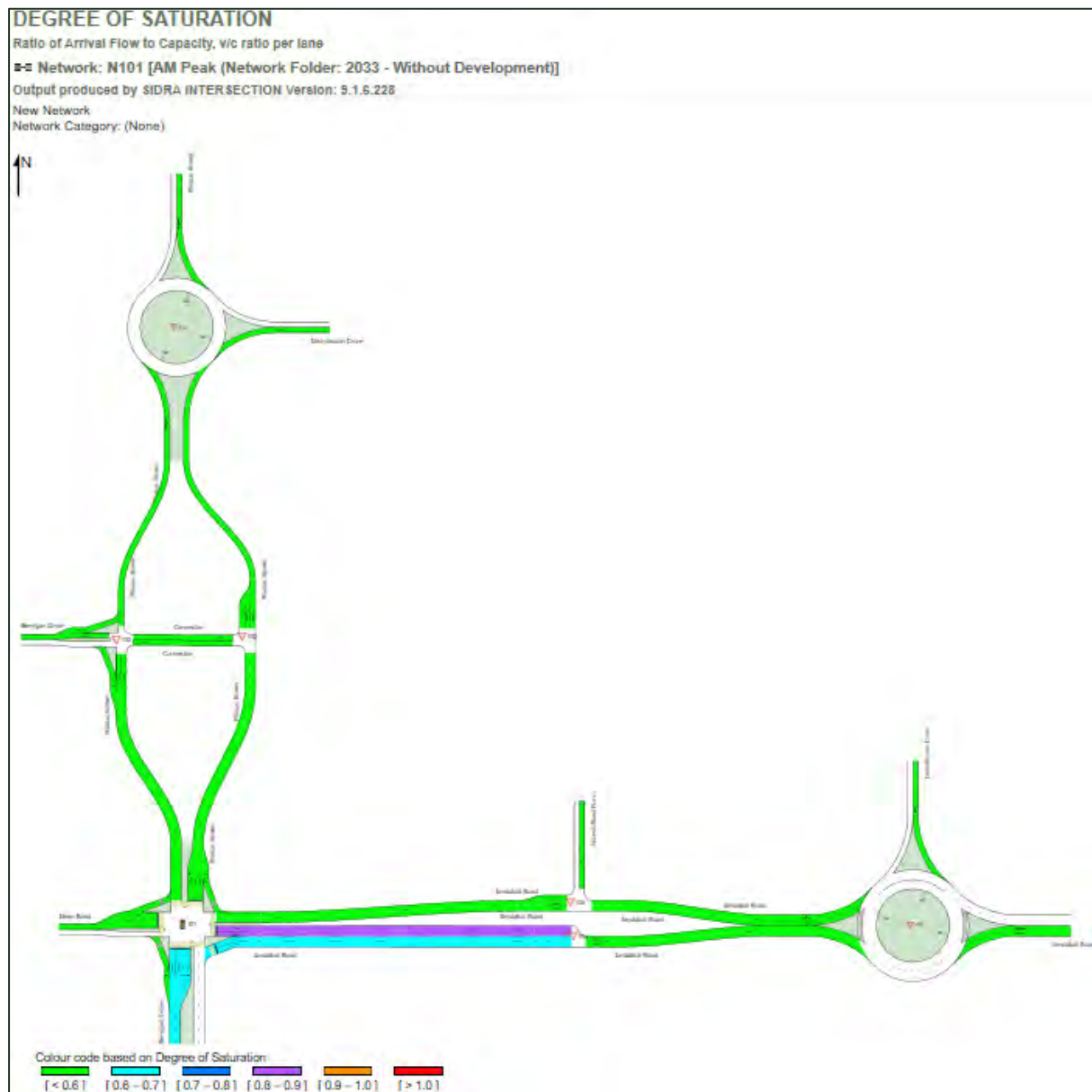
SIDRA LOS Diagram for 2033 AM Peak Hour – Without Development



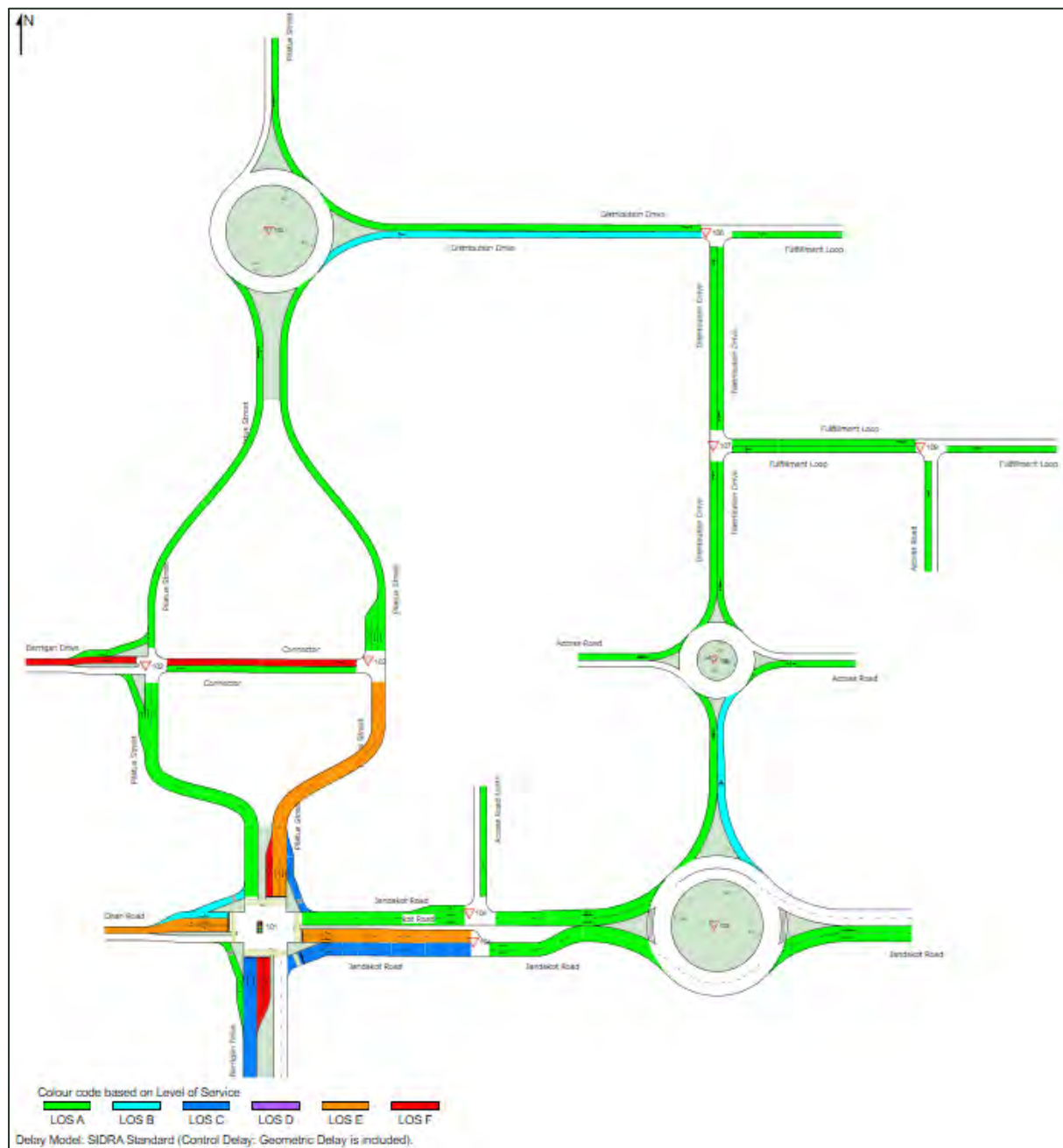
SIDRA DOS Diagram for 2033 AM Peak Hour – With Development



SIDRA DOS Diagram for 2033 AM Peak Hour – Without Development

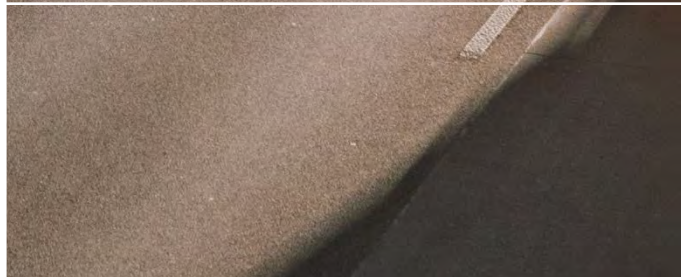


SIDRA LOS Diagram for 2033 PM Peak Hour – With Development



SIDRA LOS Diagram for 2033 PM Peak Hour – Without Development





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Appendix G

Approved Urban Water Management Plan

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road

Project No: EP21-014(01)

**Prepared for Schaffer Corporation Ltd
October 2021**

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Document Control

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	Submitted to City of Cockburn				
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	Submitted to City of Cockburn				
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	Submitted to City of Cockburn				
D	September 2021	April Irwin	AJI	David Coremans	DPC
	Submitted to City of Cockburn				

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Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Executive Summary

Schaffer Corporation Limited (the 'proponent') propose to develop Lot 701, 702 and 703 on Jandakot Road (referred to herein as 'the site') for industrial purposes. The 51.9 ha site is located within the City of Cockburn (CoC) and is proposed to be subdivided into 11 industrial lots with lot sizes ranging between 2.0 ha to 7.1 ha, and a further 12.05 ha of Bush Forever to be set aside for conservation purposes. This Urban Water Management Plan (UWMP) is intended to support subdivision approval (WAPC application no. 157597) for the site.

There are a number of State Government policies of relevance to the development of the site. In addition to these policies, there are a number of published guidelines and standards available that provide direction regarding the water discharge characteristics that urban developments should achieve. These are key inputs that relate either directly or indirectly to the site and have been referenced when preparing this UWMP.

This UWMP summarises the existing environmental features that are relevant to water management within the site, which include:

- The site is located in an area of moderate to high rainfall, receiving an average of 824 mm annually with the majority of rainfall received between May and August.
- The centre of the site is generally flat with significant sand embankments to the south, east and west. Elevations range from 42 m AHD to 27 m AHD.
- Regional geological mapping indicates that the majority of the site is underlain by Bassendean Sand (S8) with some peaty clay (Cps) towards the north of the site.
- Sandy soils beneath the site are highly permeable, with measured permeability ranging from 8.3 m/day to 90 m/day.
- Acid sulfate soil (ASS) risk mapping classifies the majority of the site as having 'moderate to low risk' of ASS occurring within 3 m of natural soil surface. Pockets of 'high to moderate' risk of ASS classifications are present within the north east region of the site.
- There are no existing surface water features within the site, and given the high permeability of soils all runoff is assumed to be retained and infiltrated within the site.
- The site is within a Priority 2 public drinking water source area (P2 PDWSA).
- Calibrated maximum groundwater levels for the site range between 25.1 m AHD and 26.4 m AHD, and groundwater flows in a westerly direction.
- Groundwater quality beneath the site displays generally low to moderate nutrient concentrations. The exception is one location in the western portion of the site which has significantly elevated pH, electrical conductivity (EC), ammonia (NH₃), oxides of nitrogen (NO_x), total nitrogen (TN), and total phosphorous (TP) concentrations
- A conservation category wetland (CCW) (UFI 16042) is located within the northern portion of the site.
- A resource enhancement wetland (REW) (UFI 16043) is located immediately northwest of the site. Two REWs (UFIs 6881 and 6877) are located 100 m and 350 m south east of the site
- Bush Forever Site # 388 intercepts a section of the site to the north, encompassing the CCW.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Water management criteria have been developed based on the existing site characteristics, and address water conservation, surface water management and groundwater management.

The small rainfall event (i.e. first 15 mm) runoff from lots will infiltrate on site into the highly permeable underlying sandy soils either in lot soakwells or other permeable portions of lots. Runoff over road surfaces will be directed to bio-retention areas (BRAs) within each catchment. The small rainfall event will receive treatment via infiltration, where the adsorption of nutrients to sand particles will remove particulate pollutants, via uptake of nutrients by vegetation and via other processes which occur within the soil column (e.g. mineralisation).

Rainfall events greater than the small rainfall event and up to the 1% AEP event will be retained within the site. Individual lots will have sufficient permeable area and soakwells that the major event will be retained within lots and infiltrate within the underlying sand soil. Runoff from road reserves will be conveyed to the BRAs, which are co-located with flood storage areas (FSAs) downstream of catchments to ensure that the post-development environment mimics the existing hydrological regime. The manner in which the detail designs achieve compliance with the design criteria is provided in **Table E1**.

Post-development management objectives have been developed with ongoing maintenance actions, timing and responsibility for the development provided. A summary of the management objectives and maintenance actions relevant to the site is provided in **Table E1** and **Table E2**.

The elements addressed in **Table E1** and **Table E2** demonstrate that detailed earthworks and drainage designs have been developed in accordance with the criteria detailed in this UWMP and that the hydrological characteristics of the site will be maintained by the proposed development.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table E1: Water management criteria and compliance

Management element	Criteria number	Criteria description	Manner in which compliance has been achieved	Responsibility for implementation	When implemented
Water conservation	WC1	Minimise the use of water within the development.	The site does not contain any public open space areas, therefore irrigation is only required for the vegetated basins within the first two years post-development. Landscaping of basins will adopt waterwise landscaping practices to minimise irrigation requirements.	Proponent for road reserve landscaping/BRA's	During subdivisional works Building approval and post construction
	WC2	Maintain a maximum irrigation rate of 7,500 kL/ha/year in drainage reserves.	The only irrigation requirements are establishment phase irrigation of the FSAs (drainage reserves) and street trees. Native waterwise species will be used and will have minimal irrigation requirements. The estimated irrigation requirements for the establishment phase is 6,750 kL/ha/year and will be supplied via scheme water.	Proponent	Building approvals and post construction
Stormwater management	SW1	Treat runoff from the small event (i.e. first 15 mm) within the site at source or as close to source as practicably possible.	Small event runoff from road surfaces will be directed to BRA's co-located within FSAs located within the site. Runoff will infiltrate into the soil profile, receiving treatment via filtration, nutrient stripping vegetation and other natural processes. Small event runoff within individual lots will infiltrate within the soil profile either in soakwells or pervious areas, receiving treatment via filtration.	Proponent Lot owners for lot-based measures	Detailed drainage design implementation Building approval and post construction

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table E1: Water management criteria and compliance (continued)

Management element	Criteria number	Criteria description	Manner in which compliance has been achieved	Responsibility for implementation	When implemented
	SW2	All runoff up to the 1% AEP event is to be retained on site.	Individual lots will have sufficient permeable area and soakwells that the major event will be retained on site and infiltrate within the underlying sandy soil, mimicking the existing hydrological regime. The FSAs will be located downstream of catchments within the site, and are designed to retain runoff from road reserves up to the 1% AEP event.	Proponent	Detailed drainage design implementation
	SW3	Finished lot levels must have a minimum of 500 mm clearance above the major event top water levels (TWLs) in drainage basins.	The modelled TWL of each basin is 28.16 m AHD, 26.95 m AHD and 26.95 m AHD in Basins 1, 2 and 3, respectively. The adjacent finished lot levels are 29.2 m AHD, 28.7 m AHD and 28.7 m AHD, respectively. Therefore, providing a minimum clearance of 1.04 m.	Proponent	Detailed earthworks, drainage design, and implementation
	SW4	Reduce nutrient loads by applying appropriate non-structural measures.	The following non-structural measures will reduce the application of nutrients within the site and treat stormwater runoff prior to infiltration: <ul style="list-style-type: none"> • Construction stage measures (e.g. silt fences, other temporary measures). • BRAs will be vegetated and underlain by a 300 mm to 500 mm layer of soil media suitable for nutrient removal. • Lot owners are encouraged to adopt a contemporary approach to lot landscaping, using a waterwise landscaping approach. • Ongoing use of waterwise landscaping practices in drainage and road reserve areas. • Street sweeping will occur to prevent sediments accumulating in FSAs. Maintenance of nutrient stripping vegetation and removal of sediments within FSAs.	Proponent	Maintenance implementation

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table E1: Water management criteria and compliance (continued)

Management element	Criteria number	Criteria description	Manner in which compliance has been achieved	Responsibility for implementation	When implemented
Groundwater Management	GW1	Inverts of drainage basins to maintain a minimum clearance of 500 mm from MGL.	The invert of basin 1, 2 and 3 is 27 m AHD, 26 m AHD, and 26.75 m AHD, respectively. The clearance from the MGL beneath each basin is 1.75 m, 0.5 m, and 0.5 m, respectively, thereby achieving a minimum clearance of 500 mm.	Proponent	Detailed earthworks, drainage design, and implementation
	GW2	Groundwater quality underlying the site will be maintained or improved.	<p>Maintaining the groundwater quality will be achieved by reducing the total nutrient load reaching groundwater that originates from the development through management of fertiliser use and treatment of surface runoff. The reduction of nutrient loads to groundwater from the site will be achieved by:</p> <ul style="list-style-type: none"> • Use of high PRI soils/treatment media within FSAs. • Treatment of surface water runoff through infiltration and adsorption of nutrients to soil media, uptake of nutrients by vegetation. • Management and minimisation of fertiliser application (i.e. slow release fertiliser). • Use of native species, xeriscaping, and limitation of turf area. • Educating lot in relation to fertiliser use and WWG principles. • Application of non-structural measure to reduce nutrient loads. 	Proponent	Detailed drainage design and implementation

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table E2: Ongoing management and maintenance actions, timing and responsibility

Management element	Management actions	Timing	Location	Responsibility	Duration of responsibility
Nutrients and water quality	Fertilise native species with eight to nine-month slow release low phosphorous fertiliser	When planted	landscaped portions of FSAs and street scapes (i.e. street trees)	Proponent / landscape contractor until handover, then CoC	At time of planting and once a year following
	Provide information to lot owners regarding fertiliser application and reducing usage to maintain groundwater quality	At point of sale	For entire development site	Proponent	
Gross pollutants, sediments, and erosion	Inspect for gross pollutants and sediments	Monthly	Co-located BRAs and FSAs	Proponent and maintenance contractor	The proponent until handover (i.e. 2 years), then CoC
	Remove gross pollutants and sediments	In response to observations	Co-located BRAs and FSAs		
	Dispose of waste to an approved facility	Following removal of gross pollutants	Offsite disposal facility		
	Street sweeping and manual litter collection	After construction and then as required	Road network and co-located BRAs and FSAs		
	Inspect for erosion	After construction and quarterly	Co-located BRAs and FSAs and erosion control structures		
	Repair of erosion control structures	As required in response to observations	Co-located BRAs and FSAs and erosion control structures		
	Infill planting	As required in response to damage caused by erosion	Co-located BRAs and FSAs	Proponent and landscape contractor	

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table of Contents

1	Introduction	1
1.1	Background	1
1.2	Town planning context	1
1.3	Purpose of this report	1
1.4	Guiding documents	2
2	Proposed Development	3
3	Pre-development Environment	4
3.1	Sources of information	4
3.2	Climate	4
3.3	Geotechnical conditions	4
3.3.1	Topography	4
3.3.2	Soils and geology	4
3.3.3	Acid sulfate soils	5
3.4	Hydrology	5
3.4.1	Surface water quantity	5
3.4.2	Surface water quality	5
3.4.3	Public drinking water source areas	5
3.4.4	Groundwater levels	6
3.4.5	Groundwater quality	7
3.5	Environmental assets and water dependent ecosystems	8
3.5.1	Wetlands	8
3.5.2	Bush Forever	8
3.6	Current and historical land uses	8
3.7	Summary of existing environment	8
4	Design Criteria and Objectives	9
4.1	Water conservation	9
4.2	Stormwater management	9
4.3	Groundwater management	9
5	Water Conservation	10
5.1	Fit-for-purpose water and water conservation	10
5.1.1	Scheme water	10
5.1.2	Water wise landscaping	10
5.2	Wastewater servicing	10
5.3	Development water usage	10
5.4	Demonstration of compliance	11
6	Stormwater Management	12
6.1	Lot drainage	12
6.2	Development drainage	12
6.2.1	Bio-retention areas	12
6.2.2	Flood storage areas	12
6.3	Demonstration of compliance	13
7	Groundwater Management	15
7.1	Demonstration of compliance	15
8	Management and maintenance	16

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



8.1	Management objectives	16
8.2	Construction.....	16
8.3	Nutrients and water quality	17
8.4	Gross pollutants and sediments.....	17
8.5	Vegetation.....	18
8.5.1	Weeds	18
8.5.2	Infill planting	18
8.6	Nuisance pests	19
8.7	Maintenance schedule.....	19
9	Monitoring.....	21
9.1	Condition monitoring.....	21
9.2	Groundwater quality monitoring	21
9.3	Post-development trigger values	22
9.3.1	Contingency action plan.....	22
10	Implementation Plan	24
10.1	Reporting	24
10.2	Roles and responsibilities.....	24
10.3	Completion criteria	24
10.4	Funding	24
10.5	Review.....	24
11	References	25
11.1	General references	25
11.2	Online references.....	26

List of Tables

Table 1:	Average groundwater quality data.....	7
Table 2:	The design volumes and the modelled 1% AEP volumes	13
Table 3:	Clearance between finished lot levels and drainage basins TWL	14
Table 4:	Clearance between drainage basin inverts and MGL.	15
Table 5:	Nutrients and water quality ongoing management and maintenance	17
Table 6:	Gross pollutant and sediment management and maintenance	17
Table 7:	Vegetation ongoing management and maintenance	19
Table 8:	Maintenance schedule and responsibility for management actions.....	20
Table 9:	Condition monitoring parameters and remedial action	21
Table 10:	Monitoring program summary	22
Table 11:	Post development monitoring trigger values	22

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Figures

- Figure 1: Site Location.
- Figure 2: Topography.
- Figure 3: Geological Mapping
- Figure 4: Acid Sulfate Soil Mapping
- Figure 5: Public Drinking Water Source Areas
- Figure 6: Pre-development Hydrology
- Figure 7: Environmental Features
- Figure 8: Stormwater Management Plan

Appendices

Appendix A

Subdivision Plan

Appendix B

WAPC Approval

Appendix C

Bore logs – Emerge Associates

Appendix D

Infiltration testing locations

Appendix E

Amendment 112 to City of Cockburn Local Planning Scheme

Appendix F

Landscape plans – EPCAD 2021

Appendix G

Modelling assumptions report – Emerge Associates

Appendix H

Civil designs

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
ANZECC	Australian and New Zealand Environment and Conservation Council
DEP	Department of Water and Environmental regulation
BoM	Bureau of Meteorology
CMP	Construction Management Plan
WAPC	Western Australian Planning Commission
CoC	City of Cockburn

Table A2: Abbreviations – General terms

General terms	
ASS	Acid sulfate soils
BUWP	Better Urban Water Management
CCW	Conservation category wetland
MGL	Maximum groundwater level
UWMP	Urban water management plan
POS	Public open space
WEFA	Water efficient fixtures and appliances
WWG	Waterwise gardening
UFI	Unique feature identifier
CCW	Conservation category wetland

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table A3: Abbreviations – units of measurement

Units of measurement	
cm	Centimetre
ha	Hectare
m	Metre
m ²	square metre
m AHD	m in relation to the Australian height datum
m BGL	m below ground level
mm	Millimetre

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



1 Introduction

1.1 Background

Schaffer Corporation Limited (the proponent) proposes to develop Lots 701, 702, and 703 Jandakot Road, Jandakot (herein referred to as 'the site'), for industrial purposes. The site covers an area of approximately 51.9 ha and is located approximately 17 km south of Perth's central business district, within the City of Cockburn (CoC). The location of the site is shown in **Figure 1**.

This site is bound by Jandakot Road to the south, Pilatus Street to the west, Jandakot Airport to the north and rural-residential lots to the east. Lot 701 is currently used for industrial purposes, Lot 702 is currently used for commercial purposes, and Lot 703 has previously been substantially cleared with some remnant vegetation along the eastern and southern boundary. An aerial photograph illustrating the current condition and cadastral boundaries of the site is provided in **Figure 1**.

1.2 Town planning context

The site is currently zoned as 'Rural - water protection' under the Metropolitan Region Scheme (MRS) (WAPC 2017). Under the CoC Town Planning Scheme (TPS) 3 (CoC 2003), the site is zoned 'Additional Use 1', 'Development Contribution Area 13' and 'Resource Zone'.

Land uses permitted within Additional Use area AU1 include nursery, masonry, production, showrooms, warehouse and storage; given that the conditions of the local development plan (LDP) are met.

An LDP has been approved for the site by the CoC addressing the requirements of developments with respect to the protection of the underlying groundwater and Bush Forever Area 388 (CoC 2018). The subdivision plan is provided in **Appendix A**.

1.3 Purpose of this report

This document is intended to satisfy Condition 8 of Western Australian Planning Commission (WAPC) subdivision approval (Approval # 157597, provided in **Appendix B**) which requires the preparation of an urban water management plan (UWMP). This UWMP is intended to support the subdivision designs and to provide guidance to both the proponent and contractors as to their obligations to ensure that potential impacts are minimised.

This UWMP presents pre-development, existing environmental information related to the structure planning area as well as the information specific to site. This ensures that the progression of water management within the development is addressed in a holistic and integrated manner.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



1.4 Guiding documents

There are a number of State Government policies of relevance to the site. These policies include:

- *State Water Strategy* (Government of WA 2003)
- *State Planning Policy 1: State Planning Framework (DPLH 2017a)*
- *State Planning Policy 2.9 Water Resources* (WAPC 2006a)
- *State Water Plan* (Government of WA 2007)
- *Guidance Statement No. 33: Environmental Guidance for Planning and Development* (EPA 2008)
- *State Planning Policy 2.3 – Jandakot Groundwater Protection (DPLH 2017b)*
- *Statement of Policy No. 3: Urban Growth and Settlement* (WAPC 2006b)
- *Liveable Neighbourhoods (4th Edition)* (WAPC 2007, 2015)
- *City of Cockburn Town Planning Scheme No. 3* (CoC 2003)
- *Planning Bulletin No. 64: Acid Sulfate Soils* (WAPC 2009)
- *Water quality protection note no. 25: Land use compatibility tables for public drinking water source areas* (DoW 2016).

In addition to the above policies, there are a number of published guidelines and standards available that provide direction regarding the water management characteristics that urban developments should aim to achieve.

These are key inputs that relate either directly or indirectly to the site and include:

- *Australian Rainfall and Runoff* (Engineers Australia 2016)
- *National Water Quality Management Strategy* (ANZECC 2000)
- *Stormwater Management Manual for Western Australia* (DoW 2007)
- *Decision Process for Stormwater Management in Western Australia* (DWER 2017)
- *Better Urban Water Management* (WAPC 2008)
- *Australian Runoff Quality* (Engineers Australia 2006)
- *On-site Drainage Requirements (Industrial and Commercial lots)* (CoC 2019)

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



2 Proposed Development

Lots 701, 702 and 703 cover an area of 51.9 ha and is proposed to be developed into 11 industrial lots ranging in size between 2.0 ha to 7.1 ha. A Bush Forever site (12.05 ha) located in the northern extent of the site will remain untouched for conservation purposes.

There are three drainage basins proposed within the site, one nearby Pilatus Street one in the south-east corner of the site and one along Jandakot Road.

The water management approach for the site includes the following:

- The small rainfall event (i.e. first 15 mm) within lots will infiltrate on site into the highly permeable underlying sandy soils or be directed to onsite infiltration which will be sized to provide retention up to the 1% AEP event.
- Road reserve runoff will be conveyed to co-located bio-retention areas (BRAs) and flood storage areas (FSAs) and will infiltrate the 1% AEP event to ensure post-development peak flow rates mimic the existing hydrological regime.
- Runoff captured from road reserves will receive treatment in the BRAs via filtration of fine particles and sediments, and the removal of nutrients adsorbed to them.
- The infiltration areas will be vegetated, providing additional water quality treatment.
- All drainage infrastructure will be asset above the underlying groundwater.

The proposed subdivision plan is provided in **Appendix A**.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



3 Pre-development Environment

3.1 Sources of information

The following sources of information were used to provide a broad regional environmental context for the site:

- *Weather and Climate Statistics data* (Bureau of Meteorology 2021)
- *Perth Groundwater Atlas* (DWER 2021)
- *Perth Metropolitan Region 1:50,000 Environmental Geology Series* (Gozzard 1986)
- *GeoVIEW WA* (DMP 2021)
- *Water Information Reporting* (DWER 2021)
- *Water Register* (DWER 2021)
- *National Water Quality Management Strategy (NWQMS)* (ANZECC and ARMCANZ 2000).

The above studies have been reviewed to determine any existing hydrological constraints. This is important, as it can have implications for the stormwater management measures and the extent of the earthworks that may be required to facilitate subdivision.

3.2 Climate

The site experiences a dry Mediterranean climate of hot dry summers and cool wet winters. Long term climatic averages indicate that the site is located in an area of moderate to high rainfall, receiving an average of 824 mm annually (BoM 2018) with the majority of rainfall received between May and August. The region receives 83 days of rainfall per annum on average.

3.3 Geotechnical conditions

3.3.1 Topography

The topography of the site is generally flat in the centre of the site, however has significant sand embankments to the south, east and west due to previous earthworks. The site ranges in elevation from 42 m Australian height datum (AHD) to 27 m AHD (DWER 2018a). Topographic contours across the site are shown in **Figure 2**.

3.3.2 Soils and geology

Regional geological mapping indicates that the majority of the site is underlain by Bassendean Sand (S8) with some peaty clay (Cps) towards the north of the site (Gozzard 1986). These soils are described as follows:

- S8: Sand (Bassendean Sand Qpb), light grey at the surface and yellow at depths, highly permeable, fine to medium grained, medium well sorted, sub rounded quartz.
- Cps: Peaty Clay (Swamp deposits Qhw), dark grey and black with variable sand content of lacustrine origin.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



The site is situated within the Bassendean Dune geomorphological classification, which is understood to exhibit a moderate Phosphorous Retention Index (PRI) (5) (DWER 2018b). Geological mapping is shown in **Figure 3**.

Four monitoring bores installed within the site by Emerge Associates recorded bore logs, describing the soil profile as white to light brown sand soil, measuring down to 10 m in depth. See **Appendix C** for bore logs.

Infiltration testing has been conducted by Emerge Associates within the proposed basin locations during June 2018. The measured infiltration rates in the south eastern and northern proposed basin locations (E-INFIL02 and E-INFIL03) were both greater than 60 m/day. The average measured infiltration rate in the south western proposed basin location (E-INFIL01) was 8.3 m/day. Infiltration testing locations are shown on **Figure 3**. A permeability assessment conducted by Douglas Partners across the site also indicated high soil permeability, with an infiltration rate of 8.6 m/day (D Reaveley 2021, pers. Comm., 8 March). Infiltration testing locations are shown in **Appendix D**.

3.3.3 Acid sulfate soils

The Perth Groundwater Map (DWER 2018a) acid sulfate soil (ASS) risk mapping classifies the majority of the site as having 'moderate to low risk' of ASS occurring within 3 m of natural soil surface. Pockets of 'high to moderate' risk of ASS classifications are present within the north east region of the site. ASS risk mapping is shown in **Figure 4**.

3.4 Hydrology

3.4.1 Surface water quantity

Any previously existing streamlines and other natural flow paths have been permanently disrupted by historic land clearing and earthworks. It is expected that runoff from major rainfall events will infiltrate in local depressions within the site with some potential sheet flows towards the low-lying wetland to the north of the site. Stormwater runoff will infiltrate rapidly into the sandy underlying soils.

The Conservation Category Wetland (CCW) within the site is classified as a Dampland Wetland (DBCA 2018), indicating that the wetland exhibits seasonal waterlogging without becoming inundated.

3.4.2 Surface water quality

There are no sustained or seasonal surface water bodies present within the site. Therefore, no surface water quality data is available.

3.4.3 Public drinking water source areas

The entirety of the site is located within a Priority 2 (P2) public drinking water source area (PDWSA), which is a subset of the Jandakot Underground Water Pollution Control Area. P2 areas are designated to protect water sources from increased risk of pollution in areas of development (DoW 2009). Developments within P2 areas are required to be designed in accordance with the requirements of P2-PDWSAs, as detailed in Water quality protection note 25: Land use compatibility

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



tables for public drinking water areas (DoW 2016). The site is adjacent to a Priority 1 (P1) PDWSA area to the north east and a Priority 3 (P3) PDWSA is located approximately 80 m to the west. A small portion of the sites eastern boundary also enters a wellhead protection zone. PDWSAs are shown in **Figure 5**.

Prior to Amendment 112 to the City of Cockburn Local Planning Scheme (see **Appendix E**), the land was zoned "Resource" allowing subdivision into 2ha lots serviced by aerobic treatment units (ATU). However, the land was under airport flight paths and this was deemed inappropriate. The land accommodated the Urbanstone plant which included a factory, storage areas and a display and sales area. In addition, there was a nursery business which included storage of soils and mulch, display and sales of hydroponic equipment. The land was therefore used for the production of masonry products, storage (warehousing) plus display and sales of goods of a bulky nature (showrooms) as well as a nursery.

Policy indicated that the pre-existing nonconforming uses on a property above P2 water resources could be permitted to expand, as long as it remains consistent with State Planning Policy 2.3 – Jandakot Groundwater Protection (DPLH 2017b) and this was therefore the intent of Amendment 112, to enable the expansion of these existing uses. Amendment 112 was referred to the *Environmental Protection Authority* (EPA) resulting in a decision not to formally review but, advice was given and has been followed. The then Department of Water was also consulted and advice adopted. Requirements included the ceding of the Bush Forever area, provision for wetlands and the preparation and implementation of associated management plans.

The subject land is identified as "Industrial investigation" in the South Metropolitan Peel Sub Regional Planning Framework. Should the Western Australia Planning Commission (WAPC) resolve to rezone the land to industrial this will also align with the City's TPS text and the subdivision.

3.4.4 Groundwater levels

A review of the Perth Groundwater Map (DWER 2018a) historical maximum groundwater contour dataset shows groundwater elevations reaching approximately 28 m AHD in the north east corner of the site and 26 m AHD to the west of the site. Historic groundwater contours are shown in **Figure 6**.

Four monitoring bores were installed on site by Emerge Associates during pre-development monitoring (E-MB01, E-MB02, E-MB03 and E-MB04, shown on **Figure 6**). Observations from five monitoring rounds from March to November in 2018 in conjunction with high frequency measurements from a pressure transducer placed in E-MB04 are considered to have sufficiently captured the 2018 seasonal maximum groundwater level (MGL). These measurements indicate that maximum groundwater level (MGL) within the site ranges from 24.7 m AHD within the centre of the site to 26 m AHD along the south-eastern boundary.

The DWER maintains groundwater level information at a number of sites across the Perth metropolitan region within their Water Information Reporting (WIR) database (DWER 2018c). One DWER monitoring bore from this database with long term groundwater level records is relevant to the site and located within the vicinity of the site, approximately 600 m south east of the site (Site Reference 61410243). MGLs obtained from the available datasets indicate maximum groundwater elevations of 27.25 m AHD.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Site specific MGL contours have been derived from the four Emerge Associates monitoring bores and the DWER monitoring bore. Based on historic data and derived site-specific data, MGL across the site ranges from 25.1 m AHD in the western portion to 26.4 m AHD in the eastern portion of the site. MGL contours are shown in **Figure 6**.

3.4.5 Groundwater quality

Groundwater quality monitoring was undertaken out by Emerge Associates from March to October 2018. The in-situ physio-chemical parameters were recorded and a sample of groundwater from each monitoring bore was collected and submitted to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of nutrients. The average results of the in-situ measurements and laboratory analysis are summarised in **Table 1**. The default trigger values for surface water from the National Water Quality Management Strategy (NWQMS) (ANZECC 2000) guidelines for fresh and marine water quality are also provided to provide context to the analytical results.

Table 1: Average groundwater quality data

Parameter	Units	NWQMS	E-MW01	E-MW02	E-MW03	E-MW04
Physio-chemical Parameters (in-situ)						
pH	pH unit	6.8 - 8.0	6.72	7.37	6.58	6.36
Electrical Conductivity (EC)	µS/cm	300	314	401.5	166	353.5
Dissolved Oxygen	mg/L		4.90	0.77	2.33	2.34
Reduction-Oxidation Potential (Redox)	mV		-108	-202	-82	-49
Nutrients (laboratory)						
Ammonia as N (NH ₃)	mg/L	0.08	0.05	0.16	0.09	0.29
Nitrite as N (NO ₂)	mg/L		<0.01	<0.01	<0.01	0.01
Nitrate as N (NO ₃)	mg/L		1.09	1.10	0.02	18.23
Nitrite + Nitrate as N (NO _x)	mg/L	0.15	1.09	1.10	0.02	18.23
Total Kjeldahl Nitrogen as N (TKN)	mg/L		0.33	1.10	0.25	3.57
Total Nitrogen as N (TN)	mg/L	1.20	1.43	2.20	0.25	21.8
Filterable Reactive Phosphorous as P	mg/L		<0.01	<0.01	<0.01	<0.01
Total Phosphorous as P (TP)	mg/L	0.065	0.03	0.06	0.04	0.33

Bold numbering indicates parameters exceeding the respective trigger value.

The majority of the monitoring bores have recorded either below or slightly above the NWQMS default trigger values, except for monitoring bore E-MB04, exceeding the respective default trigger values of pH, EC, NH₃, NO_x, TN, and TP. This can potentially be explained by surrounding land uses, including a plant nursery and aquaponics business approximately 200 m west of the monitoring bore.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



3.5 Environmental assets and water dependent ecosystems

3.5.1 Wetlands

A review of the Geomorphic Wetlands, Swan Coastal Plain (DBCA 2018) dataset shows that a CCW (UFI 16042) is located within the northern region of the site. A resource enhancement wetland (REW) (UFI 16043) is located immediately northwest of the site, with two additional REWs (UFIs 6881 and 6877) located 100 m and 350 m south east of the site. Geomorphic wetlands are shown in **Figure 7**.

3.5.2 Bush Forever

Bush Forever Area 388 is situated within the northern region of the site and extends to the north-east (DPI 2016). The bush forever area encompasses the CCW present in the site, as shown in **Figure 7**.

3.6 Current and historical land uses

The western corner of the site was previously used for industrial purposes including soil and stone supply with hardstand covering approximately 5 ha. A review of historical aerial imagery indicates that the western corner was cleared and utilised for soil excavation prior to 1983. By 1995 the stone supply warehouse was established and the site had been extensively cleared and leveled. The cleared area was allowed to naturally revegetate to the current extent, with the exception of clearing for the expansion of the stone supply grounds in 2013.

3.7 Summary of existing environment

In summary, the environmental investigations conducted to date indicate that:

- The site is located in an area of moderate to high rainfall, receiving an average of 824 mm annually with the majority of rainfall received between May and August.
- The site is generally flat with elevations ranging from 42 m AHD to 27 m AHD.
- Regional geological mapping indicates that the majority of the site is underlain by Bassendean Sand (S8) with some peaty clay (Cps) towards the north of the site.
- The indicative infiltration rate within the site is 8.6 m/day.
- Risk mapping classifies the majority of the site as having 'moderate to low risk' of ASS occurring within 3 m of natural soil surface. Pockets of 'high to moderate' risk of ASS classifications are present within the north east region of the site.
- The site is within a Priority 2 public drinking water source area (P2-PDWSA).
- Calibrated maximum groundwater levels for the site range between 25.1 m AHD and 26.4 m AHD, and groundwater flows in a westerly direction.
- Groundwater quality indicates significantly elevated pH, EC, NH₃, NO_x, TN, and TP concentrations at monitoring bore E-MB04 located within the western portion of the site. The other three monitoring bores were either below or slightly above the guideline values.
- A CCW (UFI 16042) is located within the northern region of the site.
- REW (UFI 16043) is located immediately northwest of the site. Two REWs (UFIs 6881 and 6877) are located 100 m and 350 m south east of the site
- Bush Forever Area 388 intercepts a section of the site to the north, encompassing the CCW.

4 Design Criteria and Objectives

The design criteria for this UWMP to be met by the civil designs provided below, including the site-specific attributes and contemporary design requirements of the CoC and the Department of Water and Environmental Regulation (DWER).

The proposed design criteria summarised below is consistent with the guiding documents outlined in **Section 1.4**.

4.1 Water conservation

The design criteria for water conservation management include:

Criteria WC1 Minimise the use of water within the development.

Criteria WC2 Maintain a maximum irrigation rate of 7,500 kL/ha/year in open space areas.

The manner in which the above objectives will be achieved is further detailed in **Section 5**.

4.2 Stormwater management

The design criteria for stormwater management include:

Criteria SW1 Treat runoff from the small event (i.e. first 15 mm) within the site at source or as close as practicably possible.

Criteria SW2 All runoff up to the major event (1% AEP) is to be retained on site.

Criteria SW3 Finished lot levels must have a minimum of 500 mm clearance above the major event top water levels (TWLs) in drainage basins.

Criteria SW4 Reduce nutrient loads by applying appropriate non-structural measures.

The manner in which these objectives will be achieved is further detailed in **Section 6**.

4.3 Groundwater management

The design criteria for groundwater management include:

Criteria GW1 Inverts of drainage basins to maintain a minimum clearance of 500 mm from MGL.

Criteria GW2 Groundwater quality beneath the site will be maintained or improved.

The manner in which these objectives will be achieved is further detailed in **Section 7**.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



5 Water Conservation

5.1 Fit-for-purpose water and water conservation

To minimise the waste of scheme water, the conservation of water through fit-for-purpose use and best management is strongly encouraged.

The measures outlined below will assist in achieving **Criteria WC1** and **WC2**.

5.1.1 Scheme water

Scheme water will be supplied by Water Corporations Integrated Water Supply System (IWSS). The site will be serviced by extension on the existing reticulation main along Jandakot Road.

Scheme water is proposed to be used for potable uses and provide irrigation to vegetated basins during establishment of the first two years post-development.

5.1.2 Water wise landscaping

Reductions in water use for irrigation by employing water efficiency measures can significantly reduce the total water usage (WC 2003). The following water efficiency measures will be used:

- Adoption of waterwise species, with a focus on using local native waterwise species.
- Where required, soil shall be improved with soil conditioner certified to Australian Standard AS4454 to a minimum depth of 150 mm where turf is to be planted and a minimum depth of 300 mm for garden beds.
- Street trees to be mulched to 75 mm with a product certified to Australian Standard AS4454.
- Implement conservative water requirements for establishing vegetation within swales.
- Minimising turf areas where possible.

Water wise landscaping will be utilised within basins and road reserves with an average establishment irrigation rate of 7,500 kL/ha/year maintained.

5.2 Wastewater servicing

The site will be connected to the Water Corporation sewer network. A pumping station and pressure main is proposed to be constructed within the site to discharge sewerage offsite to the existing sewer main in Berrigan Drive.

5.3 Development water usage

The water usage has been determined by the irrigation requirements of the drainage basins and street trees within the site that require irrigation within the first two years of vegetation establishment. There is approximately 3,304 m² of basin area and an estimated 150 street trees within the development that will require some measure of irrigation.

The basins will incorporate native vegetation to remove nutrients (as described in **Section 6.2.1**).

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Temporary water allocation for dust suppression during construction will also be required, however this is envisaged to be supplied by either a temporary groundwater allocation or via scheme water.

The above measures will assist in achieving **Criteria WC1 and WC2**.

5.4 Demonstration of compliance

Criteria WC 1 Minimise the use of water within the development.

No public open space (POS) areas are proposed within the site, and therefore it is only the vegetated drainage basins and street trees that require a small amount of irrigation within the first two years of establishment, therefore the water use within the site will be significantly reduced.

Landscaping of basins and verges (i.e. street trees) will be designed utilising waterwise landscaping measures, including waterwise native species, minimal turf within the site and the application of soil conditioner to increase water retention in soils beneath basins (see landscape drawings in **Appendix F**). These waterwise measures along with the irrigation requirements, will assist vegetated basins to establish during the first two years post-development and then to no longer require irrigation.

Implementing water conservation measures will not be mandated within the site, however adopting water conservation measures to minimise water use for potable and non-potable will be encouraged. Provision of information/brochures can be given to lot owners, such as those prepared by the Department of Water and Environmental regulation (DWER) discussing water efficiency measures

On this basis, **Criteria WC1** will be achieved.

Criteria WC 2 Maintain a maximum irrigation rate of 7,500 kL/ha/year in open space areas.

There are no POS areas proposed within the site, however drainage basins containing vegetation and street trees will require irrigation. Irrigation will be minimal as native waterwise species will be utilised and irrigations requirements will cease after two years post-development, once vegetation has established. The estimated irrigation requirements for basins and street trees as advised by the project Landscape Architect is 6,750 kL/ha/year, (M Howard 2021, pers. Comm., 13 April).

On this basis, **Criteria WC2** will be achieved.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



6 Stormwater Management

The stormwater management strategy for the site is to retain surface flows and to infiltrate the stormwater runoff as close to source as possible. The water sensitive urban design (WSUD) measures that are proposed within the site include:

- On lot (at source) infiltration.
- BRAs.
- FSAs.

6.1 Lot drainage

All rainfall up to the 1% AEP event falling on pervious areas within lots will infiltrate directly at-source into the highly permeable underlying soils described in **Section 3.3.2**. Runoff from impervious areas (roof and hardstand) up to the 1% AEP event will be directed to soakwells where it will infiltrate into the underlying sandy soils and ultimately to groundwater, thereby mimicking the existing hydrological regime.

6.2 Development drainage

Runoff up to the 1% AEP event from road reserves is proposed to be conveyed to BRAs co-located within downstream FSAs. Surface runoff modelling using XPSWMM has been undertaken to inform the design of stormwater infrastructure based on detailed drainage designs and the catchment analysis. The modelling assumptions are detailed in **Appendix G**.

6.2.1 Bio-retention areas

BRAs will exhibit side slope and base surface area consistent with the design of the associated FSA. BRAs will be vegetated with plant species suitable for the removal of nutrients from surface runoff, consistent with the *Vegetation guidelines for stormwater biofilters in the south-west of Western Australia* (Monash University 2014). Infiltration of runoff through the underlying soils will provide further treatment via the adsorption of nutrients to sand particles.

BRA inverts (and therefore, also FSA inverts) will maintain a minimum 500 mm clearance from MGL (see invert levels in drawings **6151-EW1-200-0** and **6151-EW1-201-0** in **Appendix H**). The infiltration rate of Swale 2 will be 5.3 m/day (based on the Geotech recommendation of 8.6 m/day, as mentioned in **Section 3.3.2** with a 50% clogging factor. Swale 1 and 3 locations have measured the on-site infiltration rates of 79.40 m/day and 90.71 m/day, respectively. Considering the high infiltration rates measured beneath these basins, the 50% clogging factor has not been applied and the infiltration rate of 8.3 m/day has been adopted.

6.2.2 Flood storage areas

All surface runoff from impervious road areas up to the major event, is proposed to be retained within FSAs resulting in no off-site discharge, thereby maintaining the pre-development hydrological regime.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



FSAs will be designed with side slopes ranging from 1:2 or 1:6 side slopes and an overall maximum depth of 1.1 m and will maintain a minimum 500 mm clearance from MGL to ensure adequate drainage following a rainfall event. FSAs will be designed to maintain a 500 mm clearance from the 1% AEP event top water level to the earthworked lot levels.

As discussed with the CoC, Swale 2 will be fenced as per the City's design requirements to safely manage the 1:2 side slopes. It is noted that the depth of the swale is very shallow (i.e. 300 mm) and therefore the proposed side slopes are unlikely to cause any safety considerations.

6.3 Demonstration of compliance

Criteria SW1 Treat runoff from the small event (i.e. first 15 mm) within the site at source or as close as practicably possible.

Lots will retain and treat runoff generated from the small event within lot boundaries through infiltration of stormwater into underlying permeable soils, as per the existing hydrological regime. Runoff infiltrating within underlying soils will be filtered to remove nutrients adsorbed to fine particles.

Stormwater runoff received from road reserves within the site will be directed towards BRAs downstream, where treatment will be provided. As indicated above, the base on downstream co-located BRAs will be vegetated with plant species suitable for the removal of nutrients from surface runoff and infiltration within underlying soils will provide further filtration to remove nutrients.

On this basis, **Criteria SW1** will be achieved.

Criteria SW2 All runoff up to major event (1% AEP) is to be retained on site.

Individual lots will have sufficient permeable area and soakwells that the major event will be retained on site and infiltrate within the underlying sandy soil, mimicking the existing hydrological regime.

Co-located BRAs and FSAs will provide the required storage volumes in order to fully retain road reserve runoff from up to the major event not retained higher in the catchment, as informed by surface water runoff modelling. The modelling assumptions report (see **Appendix G**) details the catchment area sizes used within the XPSWMM model.

The design volumes and modelled 1% AEP volumes are shown in **Table 2**.

Table 2: The design volumes and the modelled 1% AEP volumes

Basin	Catchment	Design volume (m ³)	Modelled 1% AEP volume (m ³)
Basin 1	Ct1	451	451
Basin 2	Ct2	962	962
Basin 3	Ct3	194	193.4

The runoff catchments, surface flow direction and basin sizing is shown in **Figure 8**. The modelling assumptions report (details the catchment area details

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



On this basis, **Criteria SW2** will be achieved.

Criteria SW3 Finished lot levels must have a minimum of 500 mm clearance above the major event top water levels (TWLs) in drainage basins.

The finished lot levels and TWLs in drainage basins will provide a greater clearance than 500 mm, with the minimum clearance of 1.04 m at Basin 1. **Table 3** shows the drainage basin TWLs compared to the adjacent finished lot level for each proposed basin. See drawings **6151-00-SK56-H** and **6154-00-SK59-H** in **Appendix H** for the proposed contouring of each basin.

Table 3: Clearance between finished lot levels and drainage basins TWL

Basin	Drainage basin TWL (m AHD)	Finished lot levels (m AHD)	Clearance (m)
Basin 1	28.16	29.2	1.04
Basin 2	26.95	28.7	1.75
Basin 3	26.95	28.7	1.75

On this basis, **Criteria SW3** will be achieved.

Criteria SW4 Reduce nutrient loads by applying appropriate non-structural measures.

Reducing nutrient loads will be achieved minimising the presence of open spaces within the site and treating stormwater runoff prior to infiltration. **Criteria SW4** will be achieved by the following non-structural measures:

- Construction stage measures (i.e. silt fence, other temporary measures).
- BRAs will be vegetated and underlain by a 300 mm to 500 mm layer of soil media suitable for nutrient removal. Soil media will have a 50% clogging factor, achieving an infiltration rate of 4.3 m/day.
- Lot owners are encouraged to adopt a contemporary approach to lot landscaping, using a WWG approach as promoted by the State Government.
- Ongoing use of WWG practices in POS areas.
- Street sweeping will occur to prevent sediments accumulating in FSAs downstream.
- Maintenance of nutrient stripping vegetation and removal of sediments within basins.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



7 Groundwater Management

The groundwater management objectives for the site aim to ensure minimal impact on the quality of the underlying groundwater. The demonstration of how the detailed designs will achieve this is presented below.

7.1 Demonstration of compliance

Criteria GW1 Inverts of drainage basins to maintain a minimum clearance of 500 mm from MGL.

The invert of drainage basins will provide a minimum of 500 mm clearance to MGL. Most basins will provide more clearance than this, and up to 1.75 m. The clearance between drainage basin invert and MGL will therefore achieve the recommended 500 mm clearance. **Table 4** shows the clearance between the drainage basin invert and MGL.

Table 4: Clearance between drainage basin invert and MGL.

Basin	Drainage basin invert (m AHD)	MGL (m AHD)	Clearance (m)
Basin 1	27	25.25	1.75
Basin 2	26	25.5	0.5
Basin 3	26.75	26.25	0.5

On this basis, **Criteria GW1** will be achieved.

Criteria GW2 Groundwater quality beneath the site will be maintained or improved.

Maintaining the groundwater quality will be achieved by reducing the total nutrient load reaching groundwater that originates from the development through management of fertiliser use and treatment of surface runoff. The reduction of nutrient loads to groundwater from the site will be achieved by:

- Use of high PRI soils/treatment media beneath FSAs
- Treatment of surface water runoff through filtration and adsorption of nutrients to soil media, and uptake of nutrients by vegetation.
- Management and minimisation of fertiliser application (i.e. slow release fertiliser).
- Use of native species, xeriscaping, and limitation of turf area.
- Educating lot owners on the importance of reducing fertiliser use through the provision of brochures prepared by DWER. These include *Living and working in public drinking water source areas* and *Protecting groundwater*.
- Application of non-structural measure to reduce nutrient loads.

On this basis, **Criteria GW2** will be achieved.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



8 Management and maintenance

8.1 Management objectives

The design and construction of the subdivision has been undertaken in a manner which facilitates the long-term health and protection of stormwater and groundwater management systems. These structures often require ongoing management, particularly in the first two years after construction, to ensure they continue to provide their intended functions.

Ongoing management incorporates a monitoring regime to provide guidance to the management actions which will ensure that the overall objectives are met. The overall management objectives are:

- Construction.
- Nutrients and water quality.
- Gross pollutants and sediments.
- Vegetation.
- Nuisance pests.

8.2 Construction

Prior to civil works being approved by the CoC, a site evaluation may be required to be completed in accordance with A guide of managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities (DEC 2011). The site evaluation along with a construction management plan (CMP) will be submitted to the City for approval by the contractor.

The above guideline takes into account the proximity and type of surrounding land uses, the nuisance potential of soil when disturbed, the area and type of works, the existing topography as well as the effect of prevailing winds on the site. Results of the site evaluation will determine the requirement for wind fencing at the site, in addition to water cart operations and stabilisation procedures.

The final CMP will also provide direction for dealing with public queries and complaints. Other issues that should be addressed in the CMP include:

- Sediment control – temporary sediment control structures and their proposed locations (where provided)
- Weeds – weed control measures to ensure that all equipment is clean of soil and plant material upon arrival at the site
- Vegetation – controls to ensure that clearing is minimised to that which is required
- Noise – operation hours to minimise disturbances to the amenity of the area
- Preventative measures – to control surface water runoff resulting from storm events during construction works
- Contingency measures – measures to address water quality issues that may arise during construction.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



8.3 Nutrients and water quality

Nutrient inputs will be managed to ensure that groundwater quality does not decline. Ongoing measures that will be utilised to control nutrient inputs and therefore groundwater quality include:

At time of landscape backfilling, apply eight to nine-month slow release, low phosphorous fertiliser at the base of planted native species.

- Provide information to lot owners concerning fertiliser application and groundwater quality at point of sale.
- These actions and the manner in which they should be implemented are detailed in **Table 5**.

Table 5: Nutrients and water quality ongoing management and maintenance

Action	Timing	Location	Responsibility
Fertilise native species with eight to nine month slow release low phosphorous fertiliser	When planted	BRAs and verges	Proponent / landscape contractor until handover, then CoC
Provide information to lot owners regarding fertiliser application and importance of reducing usage to maintain groundwater quality	At point of sale	For entire development site	Proponent

8.4 Gross pollutants and sediments

While the swales will trap gross pollutants, ongoing management and maintenance of the stormwater management system will include:

- Gross pollutant traps will be installed at the receiving headwall of Swale 1 & 2.
- Periodic visual inspection of the entire site, including retention basins.
- Removal of gross pollutants to an offsite disposal facility in response to observations.
- Street sweeping and manual litter collection.
- Visual inspection of erosion control measures (spalling, erosion control matting and planting) with repairs to be completed where necessary.

These actions and the manner in which they should be implemented are detailed in **Table 6**.

Table 6: Gross pollutant and sediment management and maintenance

Action	Timing	Location	Responsibility
Inspect for gross pollutants and sediments	Monthly	Swales, pit and pipe network and soakwells	Initial responsibility with proponent and contracted landscaper until handover to CoC
Remove gross pollutants	In response to observations		
Sediment removal			

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table 6: Gross pollutant and sediment management and maintenance (continued)

Action	Timing	Location	Responsibility
Dispose of waste to an approved facility	Following removal of gross pollutants	Offsite disposal facility	Initial responsibility with proponent and contracted landscaper until handover to CoC
Street sweeping and manual litter collection	After construction and then as required	Road network	
Inspect for erosion	After construction and quarterly	Swales and erosion control structures	
Repair of erosion control structures	As required in response to observations	Swales and erosion control structures	
Infill planting	As required in response to damage caused by erosion	Co-located BRAs	

8.5 Vegetation

8.5.1 Weeds

An assessment of the bulk earthworks areas did not identify any declared pest species known to be common to the wider area. If any isolated occurrences of declared pest species are encountered during bulk earthworks, then we propose that they will be cleared and stockpiled with other cleared vegetation within the site. Spread of any potential declared pests will be avoided by ensuring all cleared plant material is stockpiled onsite and is not transported offsite.

Heavy growth of terrestrial weeds can impair the aesthetic values of the drainage basins. The primary means of monitoring and detecting weed growth will be regular visual inspections by maintenance contractors. Management of weeds will therefore include:

- Visual monitoring for presence of weeds. The information gained will then be used to direct the need for any remedial actions.
- Manual removal of weeds as deemed necessary.
- Application of approved herbicides (Round-up, Fusilade or similar) to terrestrial weeds.
- Provide information to lot owners concerning preferred lot scale landscaping and weed control.

These actions and the manner in which they should be implemented are detailed in **Table 7**.

8.5.2 Infill planting

Some plants can be subject to theft and vandalism. Additionally, there is the potential for some plants to perish prior to establishing deeper root systems. To manage this potential issue, infill planting will be conducted to maintain the required plant densities as per the future detailed landscape design. Any infill planting required in response to damage from erosion (following repair of erosion control measures as needed) will also occur.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Management of infill planting will include:

- Visual inspections of swales for infill planting requirements. The information gained during inspections will be used to guide the need for infill planting.
- Conduct infill planting where required.

These actions and the manner in which they should be implemented are detailed in **Table 7**.

Table 7: Vegetation ongoing management and maintenance

Action	Timing	Location	Responsibility
Visually monitor for terrestrial weeds	Three-monthly basis	Drainage basins	Initial responsibility with proponent and contracted landscaper until handover to CoC
Manually remove weeds	In response to visual inspections		
Apply herbicide to weeds at manufacturer's recommended rates	In response to visual inspections		
Visually monitor for infill planting requirements	Three-monthly basis		
Conduct infill planting	In response to visual inspections		
Maintain irrigation system	As required		
Maintain appropriate irrigation controls	Verify fortnightly		
Provide information to lot owners	At point of sale	For entire development site	Proponent

8.6 Nuisance pests

An important objective of the stormwater drainage system design is to avoid creating mosquito habitat, as determined in the *Guidance Statement for Management of Mosquitoes for Land Proponents* (EPA 2003). This is achieved by minimising changes to the existing hydrological regime and ensuring that infiltration throughout the site is maximised such that runoff is infiltrated in less than 96 hours; the critical time for utilisation of surface water for mosquito breeding (DoH 2011). Due to the high infiltration rate of the sand profile, the maximum infiltration rate for drainage infrastructure within the site is approximately 36 hours.

Direct intervention methods, such as chemical treatment, are the responsibility of CoC and should be a part of a regional integrated approach to mosquito management. The proponent will work with CoC in such cases where the potential mosquito problem is likely to affect the development.

8.7 Maintenance schedule

Site maintenance and management will remain the responsibility of the proponent for a period of two years from practical completion of the POS. The schedule of management actions and the responsibility for carrying out each action is summarised in **Table 8**.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Table 8: Maintenance schedule and responsibility for management actions

Management Action	Proposed Scheduling	Location	Responsibility
Fertilise native species with eight to nine month slow release fertiliser	When planted	Around bases of planted native species	Initial responsibility with proponent and contracted landscaper/maintenance until handover to the Shire
Visually monitor for erosion	Quarterly	Conveyance swales & FSA	
Visually monitor for weeds	Quarterly	Conveyance swales & FSA	
Monitor for infill planting requirements			
Manually remove weeds and apply herbicide at manufacturer’s recommended rates	Quarterly – as deemed necessary from visual inspection		
Conduct infill planting			
Remove gross pollutants and dispose to appropriate facility	As deemed necessary for visual inspection	Conveyance swales & FSA	
Removal of sediments			
Inspection for gross pollutants and sediment layer	Monthly	Conveyance swales & FSA	
Street sweeping	After construction, then as required	Road network	Proponent and maintenance contractor until handover to the Shire
Provide literature to low owners concerning: fertiliser rates and water quality, weeds, preferred landscaping and water conservation	At point of sale	Entire development	Proponent

The management and maintenance required to maintain swales and the FSA until handover will be detailed as part of formal handover of these areas to the Shire consistent with landscape approvals. No formal reporting is required in relation to this UWMP.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



9 Monitoring

It will be necessary to confirm that the structural management measures that are implemented are able to fulfil their intended management purpose and are in a satisfactory condition at a point of management hand over to the Shire.

9.1 Condition monitoring

It is proposed that the overall condition of the development will be monitored on a bi-annual basis. This monitoring will be implemented after the completion of the civil and landscaping works, and will continue for a period of two years to ensure high amenity value of the final development is maintained appropriately.

A visual assessment will be undertaken to monitor the overall condition of the development, with the aim to ascertain the maintenance activities are achieving the objectives of the monitoring plan. The parameters that will be monitored and remedial actions that will be implemented if required are detailed in **Table 9**.

Condition monitoring summaries will be provided to the proponent via email following each monitoring occasion.

Table 9: Condition monitoring parameters and remedial action

Parameter	Trigger for remedial action	Remedial action
Gross pollutants	If present	Remove gross pollutants and dispose of at approved facility
Sediments	If present	Remove sediment
Terrestrial weeds	Excessive weed growth	Apply herbicide at manufacturer's recommended rate
		Manually remove weeds
Vegetation density	If significant number of plant death/theft occur	Remove dead plants
		Conduct infill planting to maintain species densities
Paths, benches, walkways, and other infrastructure	Damage to, theft or vandalism of infrastructure	Repair or replace damaged infrastructure

9.2 Groundwater quality monitoring

The pre-development monitoring bore locations (shown in **Figure 6**) will be retained where possible or be reinstalled on site to the satisfaction of the CoC and used within post-development monitoring to provide direct comparison (as detailed in **Table 10**).

Post-development groundwater monitoring aims to demonstrate groundwater quality is maintained or improved, through comparison of groundwater quality from the site itself with established trigger values which will then inform on-site management practices.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Groundwater quality will be conducted on a quarterly basis at key locations upstream and downstream of drainage basins within the site for comparison of water quality data, to ensure swales are effectively removing nutrients from stormwater runoff. A summary of the post-development monitoring program is shown in **Table 10**. Post-development monitoring will be conducted for two years, commencing on completion of the POS.

Table 10: Monitoring program summary

Monitoring Type	Locations	Frequency	Parameters	Length of monitoring
Groundwater	Bores upstream and downstream of drainage basins	Quarterly (typically Jan, April, July, Oct).	In situ pH, EC, temperature. Sample TSS, TN, TKN, NH ₄ , NOX, TP, FRP	From landscape completion to handover (minimum 2 years)
				Duration of works and 2 years post-completion of final stage
Condition	Swales	Quarterly (typically Jan, April, July, Oct).	Presence of weeds, evidence of erosion or sedimentation, infill planting requirements	From landscape completion to handover (minimum 2 years)

9.3 Post-development trigger values

Groundwater quality trigger values for the site have been derived in consideration of the pre-development monitoring (see **Table 11**).

Table 11: Post development monitoring trigger values

Analyte	TN (mg/L)	TP (mg/L)	TKN (mg/L)	NH ₃ (mg/L)	pH	EC (uS/cm)
Groundwater trigger value	1.29	0.04	0.56	0.1	6.58 – 7.37	166 - 401.5
SCWQIP targets	1 - 2	0.1 – 0.2	-	-	-	-
ANZECC trigger values	1.2	0.06	-	-	6.5 – 8.5	1200 - 3000

Trigger values have been derived from the average between monitoring bores E-MB01 to E-MB03.

9.3.1 Contingency action plan

If the results from a monitoring occasion indicate that nutrient concentrations exceed the nominated trigger values, a number of contingency measures will be employed.

The first action that will be undertaken if groundwater trigger criteria are exceeded is to repeat the monitoring to remove the potential for sampling error. If the repeat monitoring still shows results which exceed the trigger value, the next action will be to compare the upstream (incoming) nutrient concentrations with the outgoing (downstream) nutrient concentrations.

If the downstream nutrient concentrations are >20% higher than the upstream nutrient concentrations, the following actions will be undertaken:

1. Review nutrient application practices to identify source if possible.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



2. Conduct surveillance of subdivision area to determine any other potential and obvious nutrient inputs.
3. Remove source if possible (e.g. fertiliser input, etc.).
4. Remove sediment-bound nutrients by removing accumulated sediments in POS areas.
5. Manual removal of plant material from POS areas to facilitate further nutrient uptake.

If the upstream nutrient concentrations are significantly exceeding the trigger values, the same actions listed above will need to be taken to identify and remove the source of the nutrients inputs.

If the downstream nutrient concentrations are found to be generally consistent with the immediately upstream concentrations the next action will be to conduct a site-specific comparison of background data collected within the site prior to development. There is some amount of variability (both spatially and temporally) in nutrient concentrations experienced across the development area and the trigger values may need to be modified following additional monitoring. This information should then be used as a management tool in consultation with CoC/DWER to determine if the trigger values should be revised, and the proponent will seek to work with DWER and CoC to determine if the results are representative of a broader catchment management issue, and whether any additional contingency actions need to be implemented on site.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



10 Implementation Plan

10.1 Reporting

A post-development monitoring report will be prepared on an annual basis until the conclusion of the monitoring period (two years). Interim results (spreadsheet) can be provided to CoC and/or, DWER on request during the monitoring program. Results of all monitoring and maintenance activities detailed in **Section 8** and **Section 9** (including any contingency monitoring) will be included in the post-development monitoring reports.

10.2 Roles and responsibilities

The responsibility for working within the framework outlined in this UWMP rests with the proponent and their contractors, although it is anticipated the future management actions beyond the proposed management timeframes will be the responsibility of the CoC.

10.3 Completion criteria

The overall criteria for successful completion and establishment of the development in context to water management will be to satisfy the design and management criteria outlined in this UWMP.

If at the end of the maintenance period the proponent has satisfied the objectives and criteria highlighted within this document, the development will be considered to be in a suitable condition for management handover to CoC. If the overall management objectives are not met during this period, the proponent is to undertake a review of the system to determine why the objectives are not being met. On completion of the review, the CoC and proponent are to agree on the recommended course of action(s) to be undertaken by the proponent to ensure the objectives are met to the satisfaction of the CoC.

10.4 Funding

The proponent will be responsible for funding and implementing the management strategies outlined in this UWMP, with the exception of lot owner responsibilities.

10.5 Review

It is not necessary to review this document unless significant change to the subdivision layout and/or the approach to stormwater management.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



11 References

11.1 General references

Australian and New Zealand Environment and Conservation Council (ANZECC) 2000, *Australia and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy* Australian and New Zealand Environment and Conservation Council.

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC and ARMCANZ) 2000, *National Water Quality Management Strategy - Australian Guidelines for Urban Stormwater Management*.

City of Cockburn (CoC) 2003, *Town Planning Scheme Number 3*, Cockburn.

City of Cockburn (CoC) 2019, *On-site drainage requirements (Industrial and Commercial lots)*, Cockburn.

Department of Environment and Conservation (DEC) 2011, *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*, Perth.

Department of Health (DoH) 2011, *Mosquito Management Manual*, Perth.

Department of Water (DoW) 2007, *Stormwater Management Manual for Western Australia*.

Department of Water (DoW) 2016, *Water quality protection note no. 25: land use compatibility tables for public drinking water source areas*, Perth.

L. a. H. Department of Planning (DPLH) 2017a, *State Planning Policy 1: State Planning Framework*, Perth.

L. a. H. Department of Planning (DPLH) 2017b, *State Planning Policy 2.3 - Jandakot Groundwater Protection*, Perth.

Department of Water and Environmental Regulation (DWER) 2017, *Decision Process for Stormwater Management in Western Australia*, Government of Western Australia, Perth.

Engineers Australia 2006, *Australian Runoff Quality: A guide to Water Sensitive Urban Design*, National Committee for Water Engineering, Engineers Australia, Canberra.

Engineers Australia 2016, *Australian Rainfall and Runoff*, National Committee for Water Engineering, Canberra.

Environmental Protection Authority (EPA) 2008, *Guidance Statement No. 33: Environmental Guidance for Planning and Development*, Environmental Protection Authority.

Government of WA 2007, *State Water Plan*, Perth.

Gozzard, J. R. 1986, *Perth Metropolitan Region Geological Survey of Western Australia*, Perth.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



Monash University 2014, *Vegetation Guidelines for Stormwater Biofilters within South-west of Western Australia* Melbourne.

Western Australian Planning Commission (WAPC) 2006a, *State Planning Policy 2.9: Water Resources*, Gazetted in December 2006. Western Australian Planning Commission.

Western Australian Planning Commission (WAPC) 2006b, *Statement of Planning Policy 3: Urban Growth and Settlement*, State of Western Australia, Perth.

Western Australian Planning Commission (WAPC) 2007, *Liveable Neighbourhoods (Edition 4)*, Western Australian Planning Commission and Department for Planning and Infrastructure, Perth.

Western Australian Planning Commission (WAPC) 2008, *Better Urban Water Management*, Western Australian Planning Commission.

Western Australian Planning Commission (WAPC) 2009, *Planning Bulletin No. 64 Acid Sulfate Soils*, January 2009, Perth.

Western Australian Planning Commission (WAPC) 2015, *Draft Liveable Neighbourhoods*, Department of Planning, Perth.

Water Corporation (WC) 2003, *Domestic Water Use Study in Perth, Western Australia 1998-2001*, Perth.

11.2 Online references

Bureau of Meteorology (BoM) 2021, *Climate Averages*, viewed 12 February 2021, <<http://www.bom.gov.au/climate/data/>>.

Department of Water and Environmental Regulation (DWER) 2021, *Perth Groundwater Map*, viewed 12 February 2019, <<https://maps.water.wa.gov.au/#/webmap/gwm>>.

Department of Planning, Lands and Heritage (DPLH) 2021, *Bush Forever Areas 2000*, viewed February 2021, <<https://www2.landgate.wa.gov.au/bmvf/app/waatlas/>>.

Department of Planning, Lands and Heritage (DPLH) 2020, *Metropolitan Region Scheme Map*, viewed February 2021, <<https://www.dplh.wa.gov.au/>>.

Department of Water and Environmental Regulation (DWER) 2021, *Acid Sulfate Soil – Swan Coastal Plain Database*, viewed February 2021, <<https://catalogue.data.wa.gov.au/dataset/acid-sulphate-soil-risk-map-swan-coastal-plain>>.

Department of Water and Environmental Regulation (DWER) 2021, *Water Information Reporting*, viewed February 2021, <<http://wir.water.wa.gov.au/Pages/Water-Information-Reporting.aspx>>.

Department of Water and Environmental Regulation (DWER) 2021, *Water Register*, viewed February 2021, <<https://maps.water.wa.gov.au/#/webmap/register>>.

Department of Mines and Petroleum (DMP) 2021, *GeoVIEW.WA*, viewed February 2021, <<https://geoview.dmp.wa.gov.au/GeoViews/?Viewer=GeoVIEW>>.

Urban Water Management Plan

Lots 701, 702 and 703 Jandakot Road



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Figures

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Figure 1: Site Location.

Figure 2: Topography.

Figure 3: Geological Mapping

Figure 4: Acid Sulfate Soil Mapping

Figure 5: Public Drinking Water Source Areas

Figure 6: Pre-development Hydrology

Figure 7: Environmental Features

Figure 8: Stormwater Management Plan

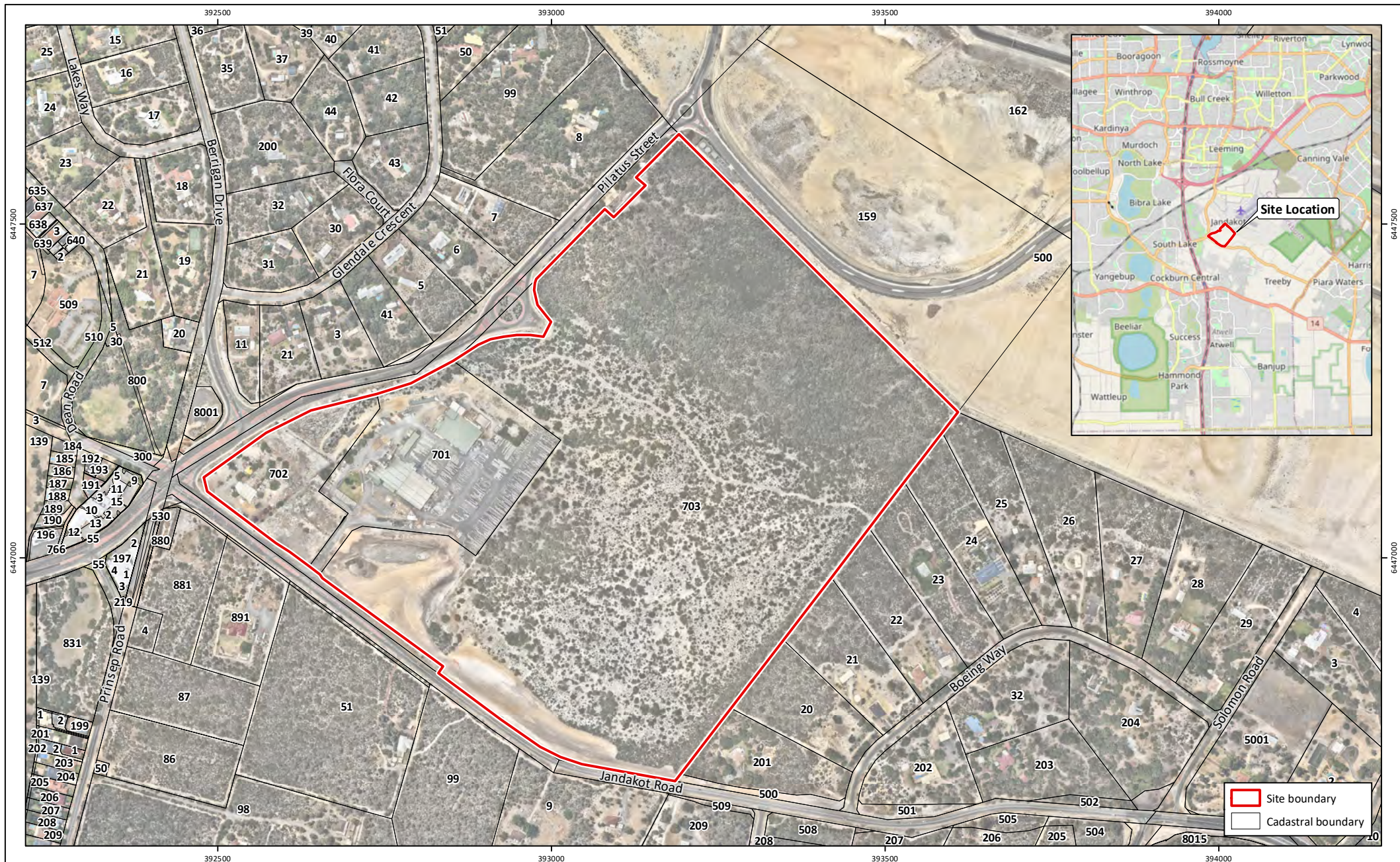


Figure 1: Site Location

Project: Urban Water Management Plan
Lots: 701, 702 and 703 Jandakot Road
Client: Schaffer Corporation Ltd

Plan Number:
 EP21-014(01)-F01
Drawn: GAR
Date: 23/02/2021
Checked: AJI
Approved: DPC
Date: 26/03/2021



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 GDA 1994 MGA Zone 50

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 ASSOCIATES

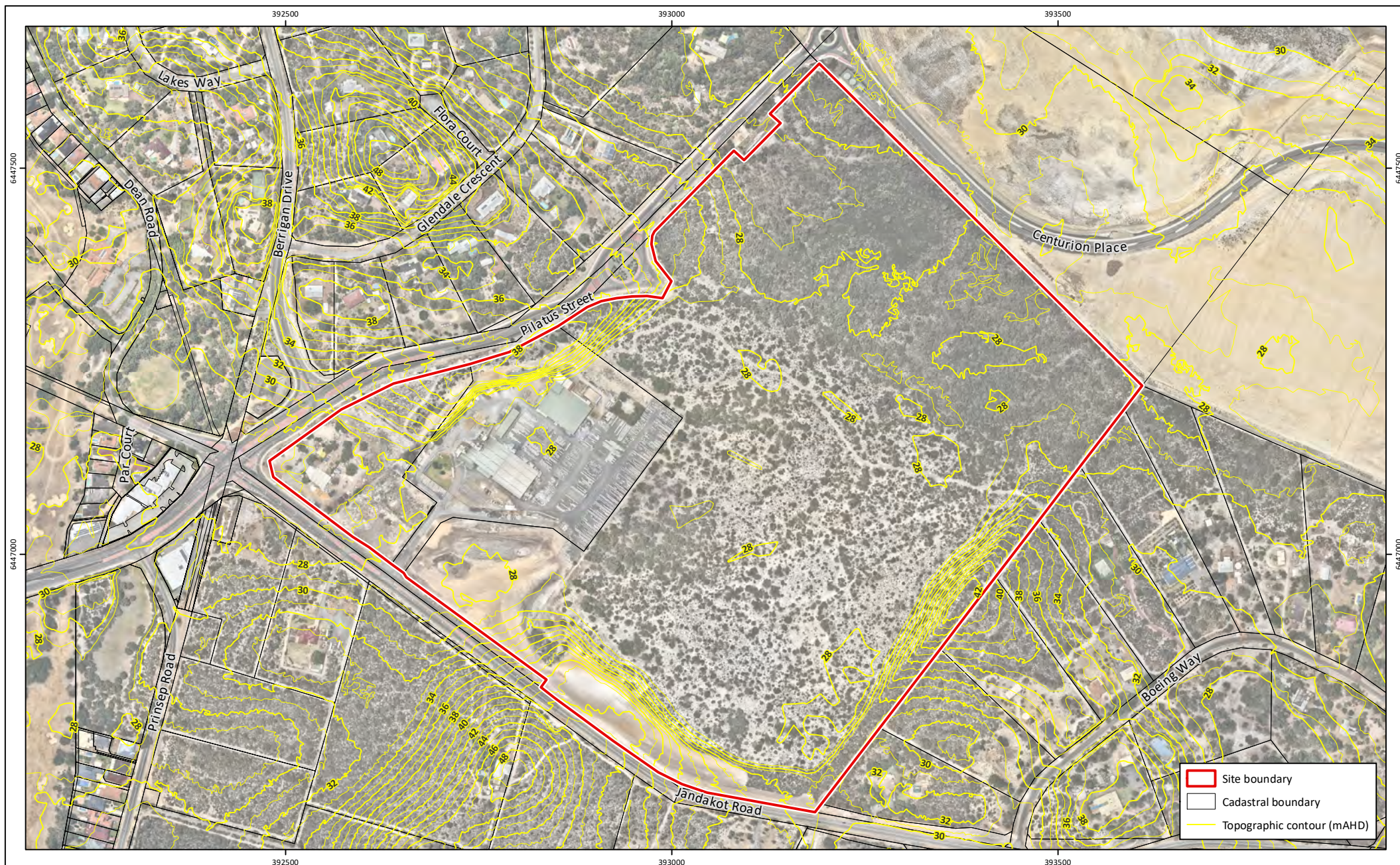


Figure 2: Topography

Project: Urban Water Management Plan
Lots 701, 702 and 703 Jandakot Road
Client: Schaffer Corporation Ltd

Plan Number:
 EP21-014(01)-F02
Drawn: GAR
Date: 23/02/2021
Checked: AJI
Approved: DPC
Date: 26/03/2021



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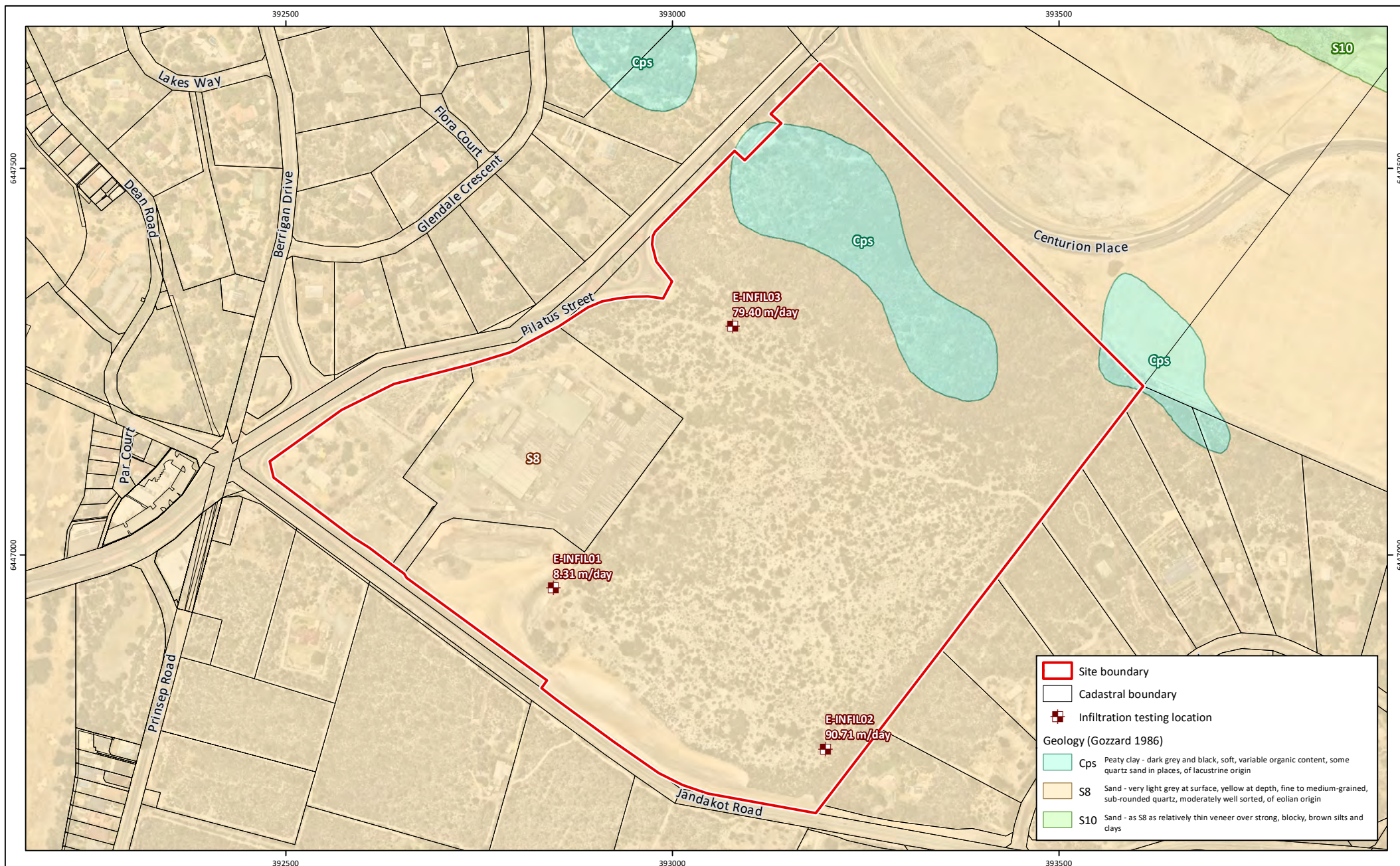


Figure 3: Geological Mapping

Project: Urban Water Management Plan
 Lots 701, 702 and 703 Jandakot Road
Client: Schaffer Corporation Ltd

Plan Number:
 EP21-014(01)-F03
Drawn: GAR
Date: 23/02/2021
Checked: AJI
Approved: DPC
Date: 26/03/2021



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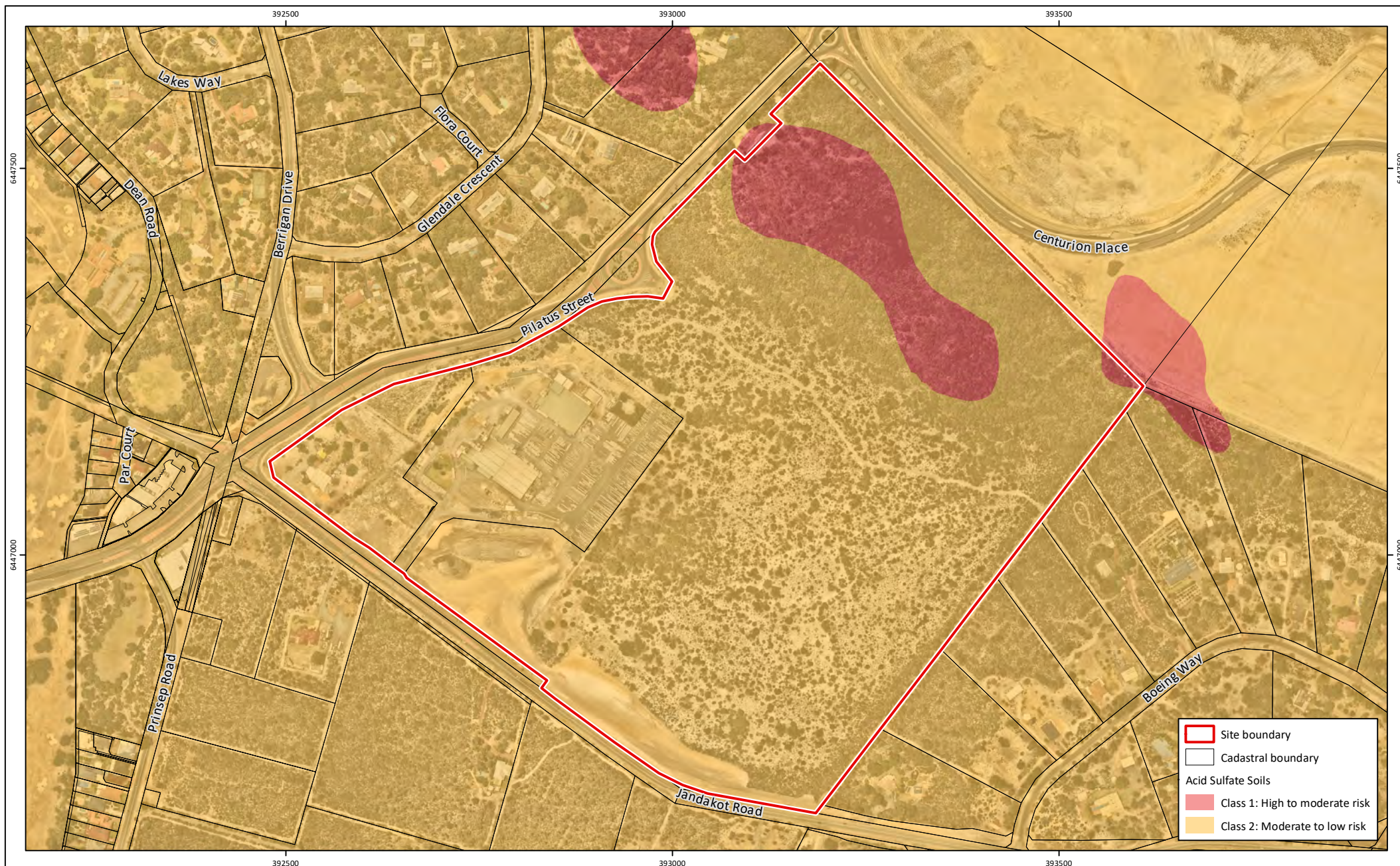


Figure 4: Acid Sulfate Soil Risk Mapping

Project: Urban Water Management Plan
 Lots 701, 702 and 703 Jandakot Road
Client: Schaffer Corporation Ltd

Plan Number:
 EP21-014(01)-F04
Drawn: GAR
Date: 23/02/2021
Checked: AJI
Approved: DPC
Date: 26/03/2021



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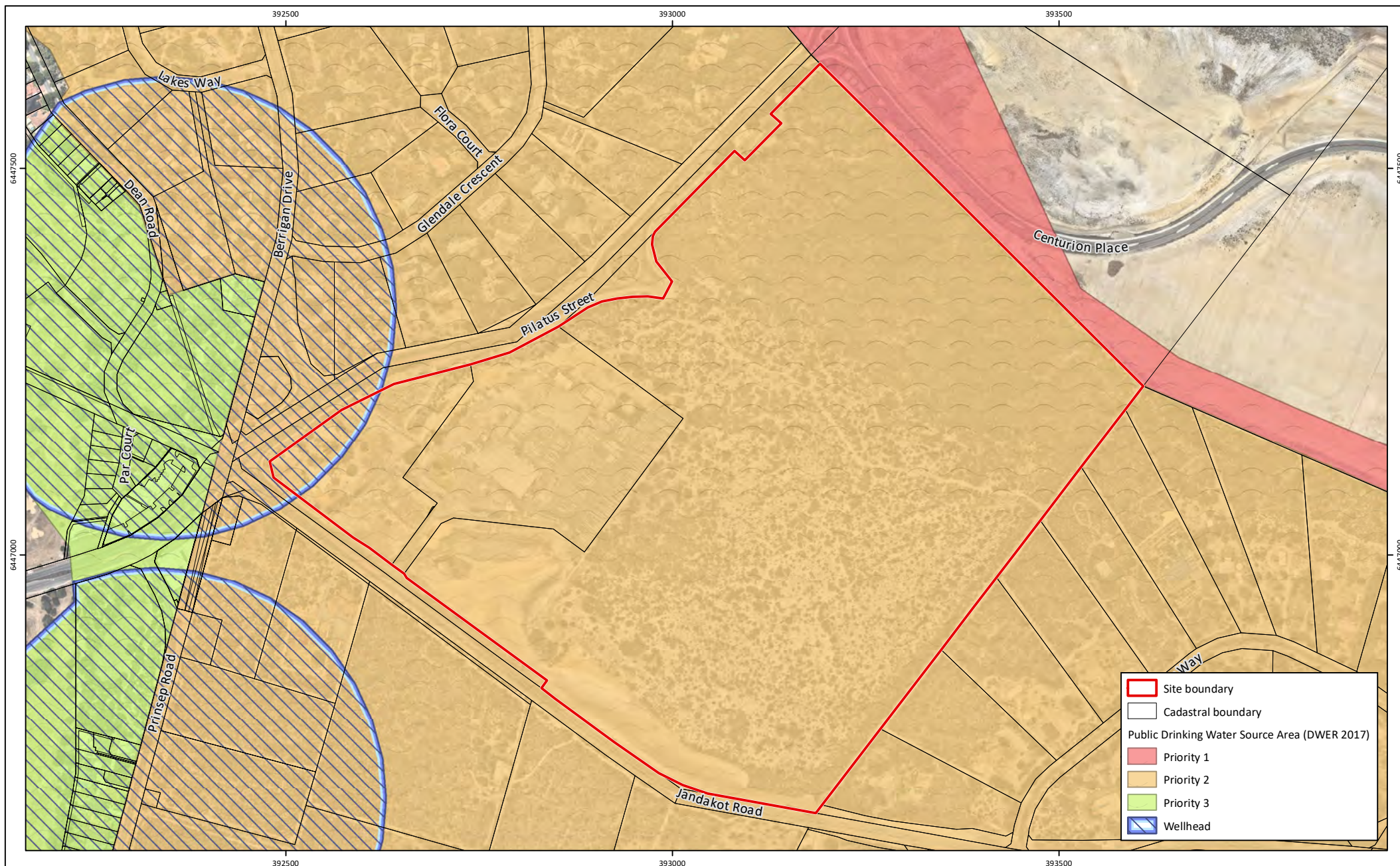


Figure 5: Public Drinking Water Source Areas and Wellhead Protection Zones

Project: Urban Water Management Plan
 Lots 701, 702 and 703 Jandakot Road
Client: Schaffer Corporation Ltd

Plan Number:
 EP21-014(01)-F05
Drawn: GAR
Date: 23/02/2021
Checked: AJI
Approved: DPC
Date: 26/03/2021



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 GDA 1994 MGA Zone 50



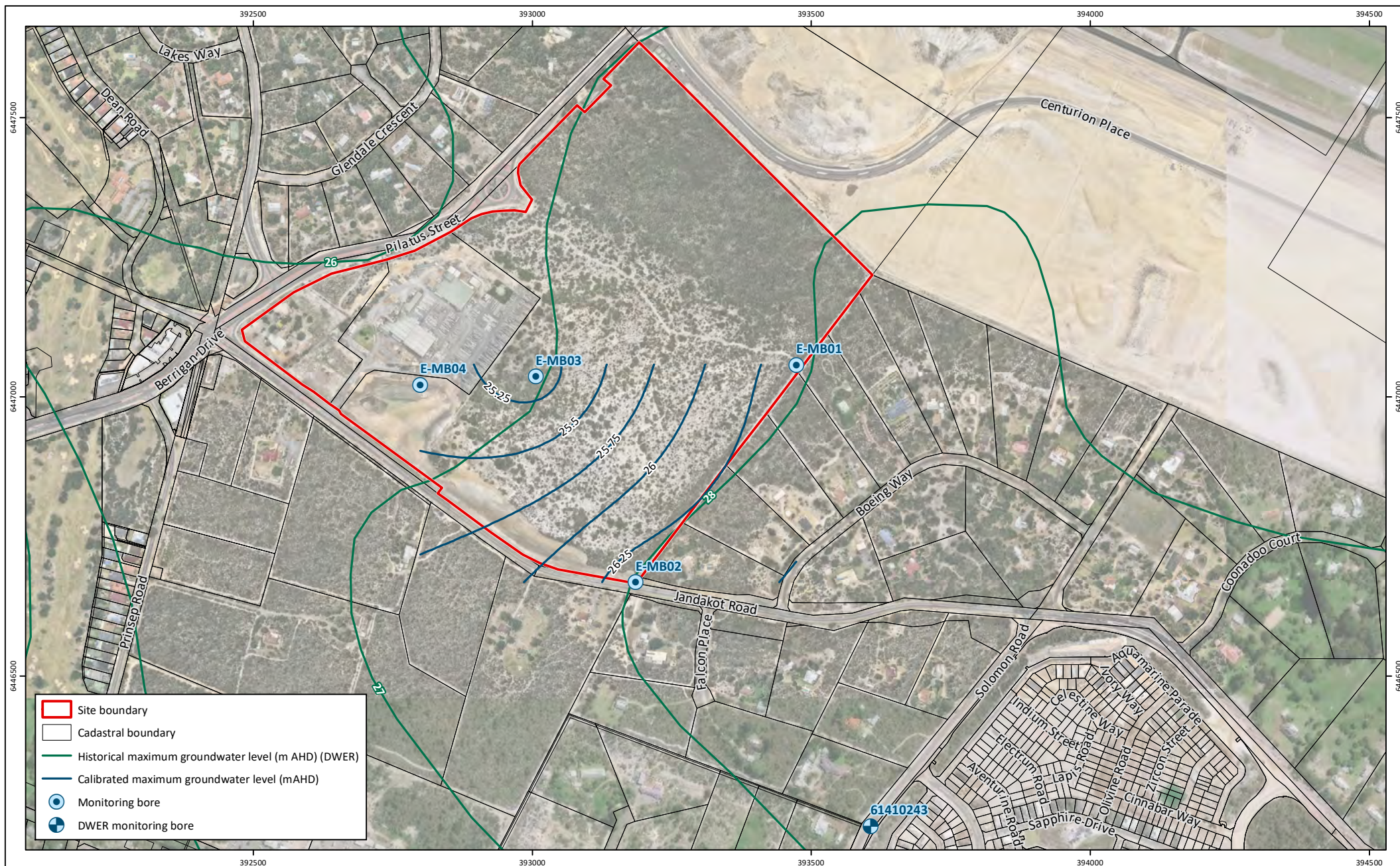


Figure 6: Pre-Development Hydrology

Project: Urban Water Management Plan
Lots 701, 702 and 703 Landakot Road
Client: Schaffer Corporation Ltd

Plan Number:
EP21-014(01)-F06
Drawn: GAR
Date: 23/02/2021
Checked: AJI
Approved: DPC
Date: 26/03/2021



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GDA 1994 MGA Zone 50



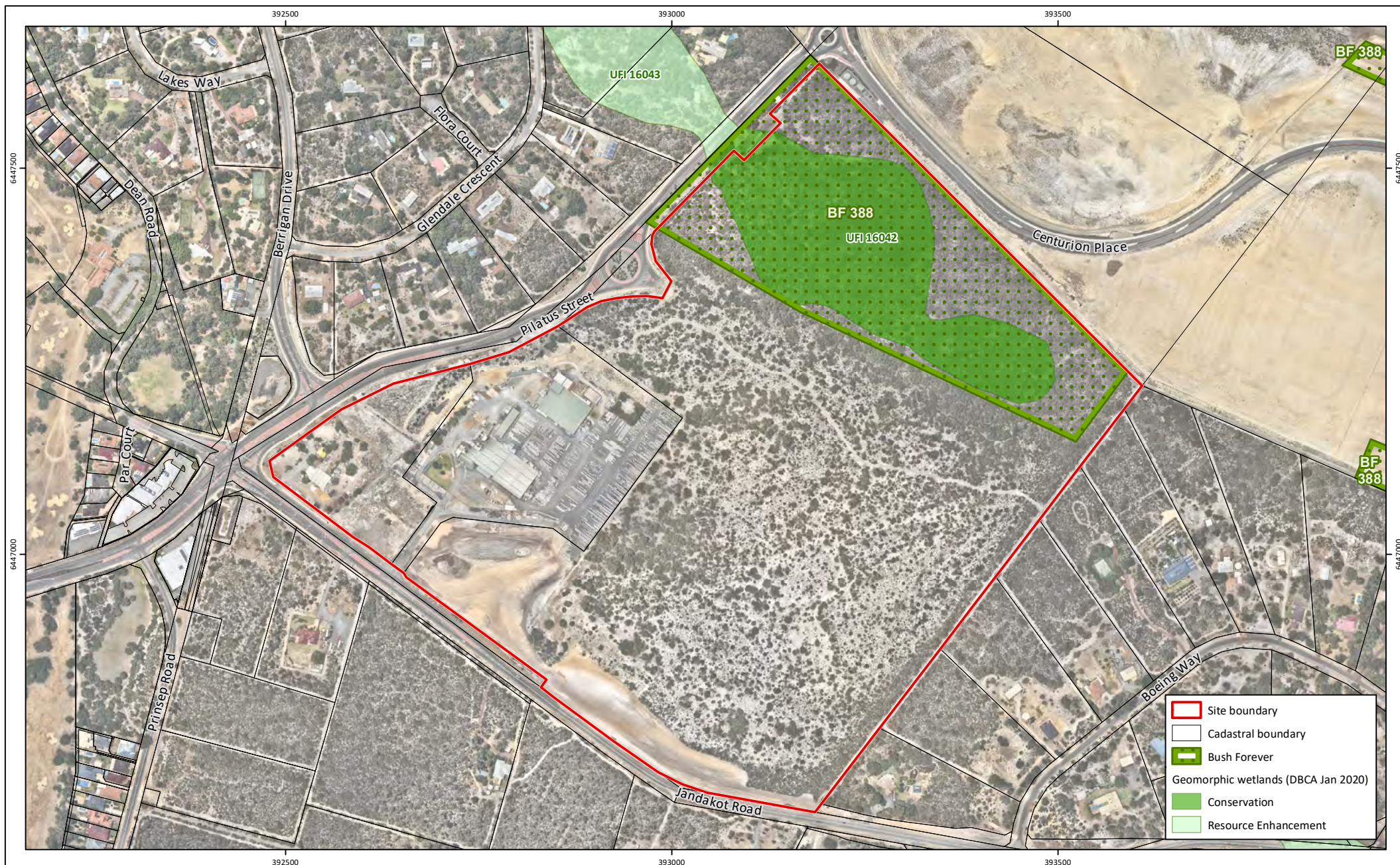


Figure 7: Environmental Features

Project: Urban Water Management Plan
 Lots 701, 702 and 703 Jandakot Road
Client: Schaffer Corporation Ltd

Plan Number:
 EP21-014(01)-F07
Drawn: GAR
Date: 23/02/2021
Checked: AJI
Approved: DPC
Date: 26/03/2021



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 GDA 1994 MGA Zone 50

emerge
 ASSOCIATES

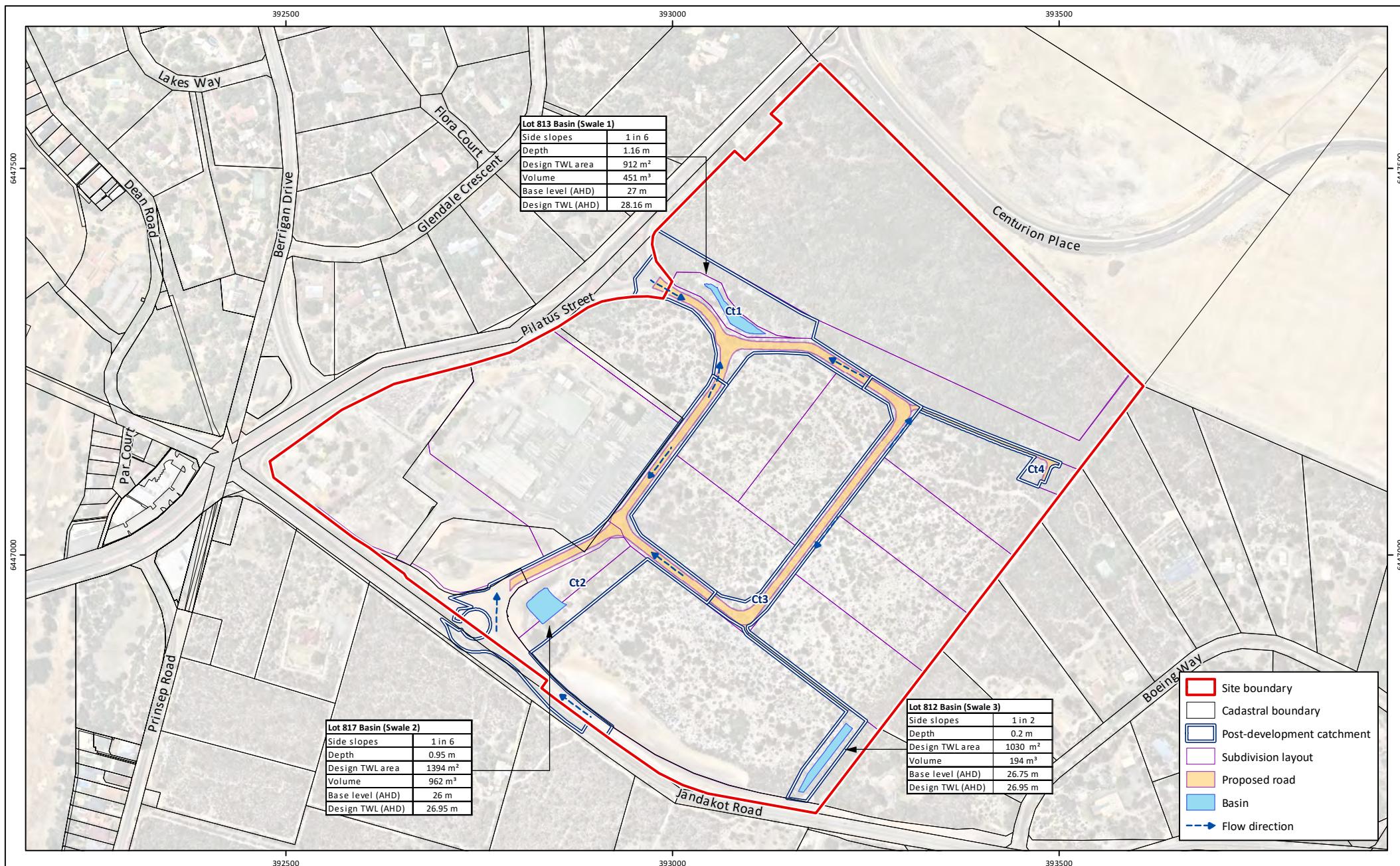


Figure 8: Stormwater Management Plan

Project: Urban Water Management Plan
 Lots 701, 702 and 703 Jandakot Road
Client: Schaffer Corporation Ltd

Plan Number:
 EP21-014(01)-F08c
Drawn: GAR
Date: 07/10/2021
Checked: AJH
Approved: DPC
Date: 07/10/2021



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 Metres
 Scale: 1:6,500@A4
 GDA 1994 MGA Zone 50



Appendix A

Subdivision Plan



ALL BUILDINGS AND STRUCTURES TO BE RETAINED

- EXISTING BOUNDARY
 - PROPOSED BOUNDARY
 - CONTOUR (INTERVAL OF 1.0m)
 - EXISTING BUILDINGS
 - FENCE
 - KERB
 - EDGE OF BITUMEN
 - FOOTPATH
 - UNDERGROUND HIGH VOLTAGE CABLE
- APPLICATION AREA

ORIGINAL AREAS:

LOT 704	= 3.2215 ha
LOT 705	= 6.1878 ha
LOT 706	= 43.6438 ha
TOTAL	= 53.0531 ha

LOCAL GOVERNMENT: CITY OF COCKBURN

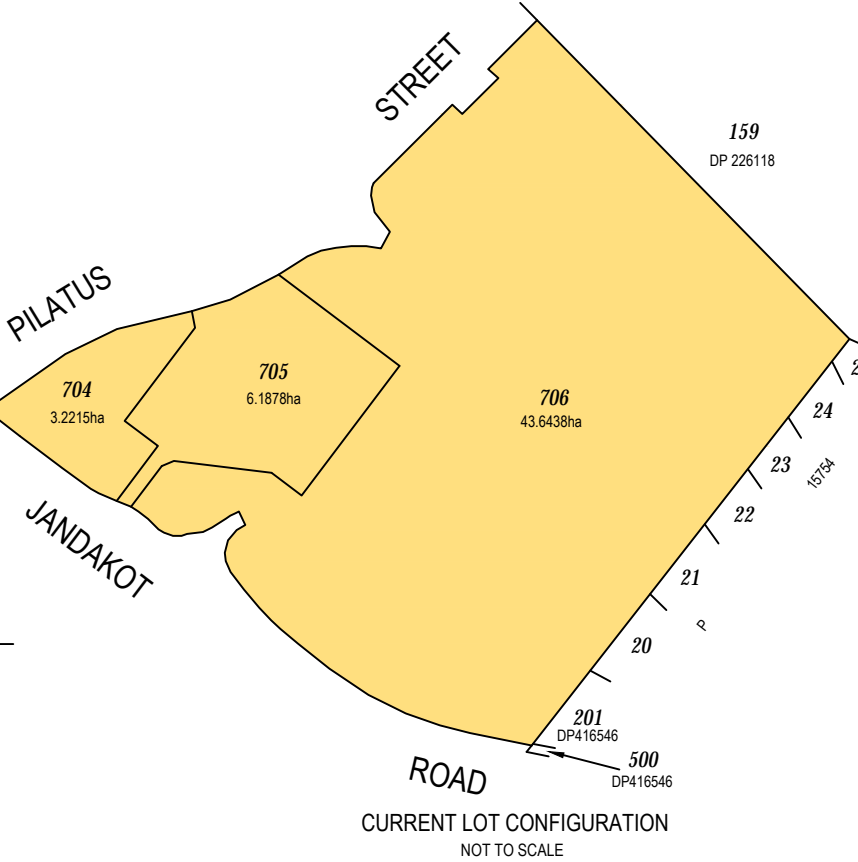
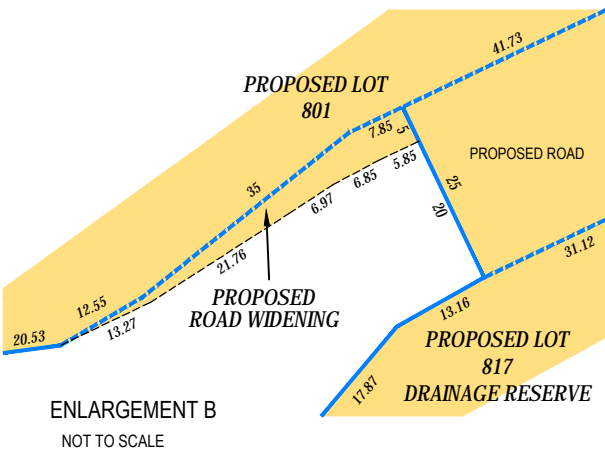
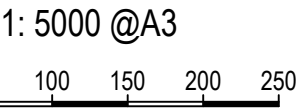


THE BOUNDARIES WERE NOT RE-ESTABLISHED AS PART OF THIS SURVEY THEREFORE THIS PLAN DOES NOT GUARANTEE THEIR ACCURACY

EXISTING BOUNDARY DIMENSIONS AND LOT AREAS HAVE BEEN TAKEN FROM LANDGATE RECORD DP408444 & DP410341

FIELD INSPECTION IS RECOMMENDED FOR LOCATION OF SERVICES PRIOR TO ANY EXCAVATION

ALL AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY AND EXAMINATION



PROPOSED AREAS

LOT 801	= 5.1086 ha
LOT 802	= 5.2786 ha
LOT 803	= 2.0124 ha
LOT 804	= 7.1609 ha
LOT 805	= 2.0083 ha
LOT 806	= 2.0012 ha
LOT 807	= 2.0001 ha
LOT 808	= 2.0011 ha
LOT 809	= 2.0131 ha
LOT 810	= 2.0843 ha
LOT 811	= 2.0513 ha
LOT 812	= 0.7310 ha
LOT 813	= 0.3466 ha
LOT 814	= 12.0494 ha
LOT 815	= 2.5649 ha
LOT 816	= 0.3275 ha
LOT 817	= 0.4610 ha
ROAD	= 2.8381 ha
ROAD WIDENING	= 0.0147 ha
TOTAL	= 53.0531 ha

8	PROPOSED BOUNDARY ADJUSTMENTS	03/06/2021	T. PIZZI	T. PIZZI
No.	REVISION DETAILS	DATE	DRAWN	CHECKED

PROPOSED FREEHOLD SUBDIVISION OF LOTS 704, 705 & 706 ON DP417614 JANDAKOT ROAD, JANDAKOT

Client: SCHAFER CORPORATION

DATUM
HORIZONTAL - PCG 94
VERTICAL - AHD

COPYRIGHT OF ALL THIS PLAN IS RESERVED BY BROWN McALLISTER SURVEYORS AND REMAINS THE PROPERTY OF THE FOREMENTIONED AND SHALL BE RETURNED UPON REQUEST. USE OF ALL OR PART OF THIS PLAN IS RESTRICTED WITHOUT PRIOR WRITTEN PERMISSION.

Brown McAllister Surveyors
Licensed Surveyors | Land Development & Strata Consultants | Engineering Surveyors

Email: admin@brownmcallister.com.au Tel: (08) 9386 9688
Address: 12B Pepler Avenue, Salter Point, Western Australia, 6152

SHEET	A3
SURVEYED	M.WALL - 06/2016
FIELD NOTES	
DRAWN	J.HUMPHREYS - 17/12/2018
CHECKED	
REFERENCE	11088-12SK_rev8

Appendix B

WAPC Approval





Your Ref : Lots 701, 702 and 703 Jan

Schaffer Corporation Limited
1305 Hay Street
WEST PERTH WA 6005

**Approval Subject To Condition(s)
Freehold (Green Title) Subdivision (Amended Plan)**

Application No : 157597

Planning and Development Act 2005

Applicant	:	Schaffer Corporation Limited 1305 Hay Street WEST PERTH WA 6005
Owner	:	Schaffer Corporation Limited 1305 Hay Street WEST PERTH WA 6005
Application Receipt	:	11 January 2019

Lot Number	:	701-703
Diagram / Plan	:	P408444, P410341
Location	:	-
C/T Volume/Folio	:	2913/258, 2913/259, 2917/108
Street Address	:	Jandakot Road, Cockburn
Local Government	:	City of Cockburn

The Western Australian Planning Commission has considered the application referred to and is prepared to endorse a deposited plan in accordance with the amended plan date-stamped **11 January 2019** once the condition(s) set out have been fulfilled.

This decision is valid for **four years** from the date of this advice, which includes the lodgement of the deposited plan within this period.

The deposited plan for this approval and all required written advice confirming that the requirement(s) outlined in the condition(s) have been fulfilled must be submitted by **17 April 2024** or this approval no longer will remain valid.

140 William Street, Perth, Western Australia 6000, Locked Bag 2506 Perth, 6001
Tel: (08) 6551 8002; Fax: (08) 6551 9001; Infoline: 1800 626 477
e-mail: info@dph.wa.gov.au; web address <http://www.dph.wa.gov.au>
ABN 35 482 341 493



Reconsideration - 28 days

Under section 151(1) of the *Planning and Development Act 2005*, the applicant/owner may, within 28 days from the date of this decision, make a written request to the WAPC to reconsider any condition(s) imposed in its decision. One of the matters to which the WAPC will have regard in reconsideration of its decision is whether there is compelling evidence by way of additional information or justification from the applicant/owner to warrant a reconsideration of the decision. A request for reconsideration is to be submitted to the WAPC on a Form 3A with appropriate fees. An application for reconsideration may be submitted to the WAPC prior to submission of an application for review. Form 3A and a schedule of fees are available on the WAPC website: <http://www.planning.wa.gov.au>

Right to apply for a review - 28 days

Should the applicant/owner be aggrieved by this decision, there is a right to apply for a review under Part 14 section 251 of the *Planning and Development Act 2005*. The application for review must be submitted in accordance with part 2 of the *State Administrative Tribunal Rules 2004* and should be lodged within 28 days of the date of this decision to: the State Administrative Tribunal, Level 6, State Administrative Tribunal Building, 565 Hay Street, PERTH, WA 6000. It is recommended that you contact the tribunal for further details: telephone 9219 3111 or go to its website: <http://www.sat.justice.wa.gov.au>

Deposited plan

The deposited plan is to be submitted to the Western Australian Land Information Authority (Landgate) for certification. Once certified, Landgate will forward it to the WAPC. In addition, the applicant/owner is responsible for submission of a Form 1C with appropriate fees to the WAPC requesting endorsement of the deposited plan. A copy of the deposited plan with confirmation of submission to Landgate is to be submitted with all required written advice confirming compliance with any condition(s) from the nominated agency/authority or local government. Form 1C and a schedule of fees are available on the WAPC website: <http://www.planning.wa.gov.au>

Condition(s)

The WAPC is prepared to endorse a deposited plan in accordance with the plan submitted once the condition(s) set out have been fulfilled.

The condition(s) of this approval are to be fulfilled to the satisfaction of the WAPC.

The condition(s) must be fulfilled before submission of a copy of the deposited plan for endorsement.

The agency/authority or local government noted in brackets at the end of the condition(s) identify the body responsible for providing written advice confirming that the WAPC's requirement(s) outlined in the condition(s) have been fulfilled. The written advice of the agency/authority or local government is to be obtained by the applicant/owner. When the written advice of each identified agency/authority or local government has been obtained, it should be submitted to the WAPC with a Form 1C and appropriate fees and a copy of the deposited plan.

If there is no agency/authority or local government noted in brackets at the end of the

140 William Street, Perth, Western Australia 6000, Locked Bag 2506 Perth, 6001
Tel: (08) 6551 8002; Fax: (08) 6551 9001; Infoline: 1800 626 477
e-mail: info@dplh.wa.gov.au; web address <http://www.dplh.wa.gov.au>
ABN 35 482 341 493



condition(s), a written request for confirmation that the requirement(s) outlined in the condition(s) have been fulfilled should be submitted to the WAPC, prior to lodgement of the deposited plan for endorsement.

Prior to the commencement of any subdivision works or the implementation of any condition(s) in any other way, the applicant/owner is to liaise with the nominated agency/authority or local government on the requirement(s) it considers necessary to fulfil the condition(s).

The applicant/owner is to make reasonable enquiry to the nominated agency/authority or local government to obtain confirmation that the requirement(s) of the condition(s) have been fulfilled. This may include the provision of supplementary information. In the event that the nominated agency/authority or local government will not provide its written confirmation following reasonable enquiry, the applicant/owner then may approach the WAPC for confirmation that the condition(s) have been fulfilled.

In approaching the WAPC, the applicant/owner is to provide all necessary information, including proof of reasonable enquiry to the nominated agency/authority or local government.

The condition(s) of this approval, with the accompanying advice, are:

CONDITION(S):

1. A notification, pursuant to Section 165 of the *Planning and Development Act 2005* is to be placed on the certificates of title of the proposed lot(s) advising of the existence of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:

'This lot is situated in the vicinity of Jandakot Airport, and is currently affected, or may in the future, be affected by aircraft noise. Noise exposure levels are likely to increase in the future as a result of increases in numbers of aircraft using the airport, changes in aircraft type or other operational changes. Further information about aircraft noise, including development restrictions and noise insulation requirements for noise-affected properties, are available on request from the relevant local government offices.' (Western Australian Planning Commission)
2. The landowner/applicant shall make arrangements to ensure that prospective purchasers of lots subject of a Local Development Plan are advised in writing that Local Development Plan provisions apply (Local Government).
3. The proposed reserve(s) shown on the approved plan of subdivision being shown on the diagram or plan of survey (deposited plan) as reserve(s) for drainage and/or conservation and vested in the Crown under Section 152 of the *Planning and Development Act 2005*, such land to be ceded free of cost and without any payment of compensation by the Crown. (Local Government)

4. The proposed Lot 816 shown on the approved plan of subdivision being shown on the diagram or plan of survey (deposited plan) as reserve(s) for sewerage infrastructure and vested in the Crown under Section 152 of the *Planning and Development Act 2005*, such land to be ceded free of cost and without any payment of compensation by the Crown. (Water Corporation)
5. Engineering drawings and specifications are to be submitted, approved, and works undertaken in accordance with the approved engineering drawings, specifications and approved plan of subdivision, for grading and/or stabilisation of the site to ensure that:
 - a) lots can accommodate their intended use; and
 - b) finished ground levels at the boundaries of the lot(s) the subject of this approval match or otherwise coordinate with the existing and/or proposed finished ground levels of the land abutting.
(Local Government)
6. The land being filled, stabilised, drained and/or graded as required to ensure that
 - a) lots can accommodate their intended development; and
 - b) finished ground levels at the boundaries of the lot(s) the subject of this approval match or otherwise coordinate with the existing and/or proposed finished ground levels of the land abutting; and
 - c) stormwater is contained on-site, or appropriately treated and connected to the local drainage system.
(Local Government)
7. Prior to the commencement of subdivisional works, the landowner/applicant is to provide a pre-works geotechnical report certifying that the land is physically capable of development or advising how the land is to be remediated and compacted to ensure it is capable of development; and in the event that remediation works are required, the landowner/applicant is to provide a post geotechnical report certifying that all subdivisional works have been carried out in accordance with the pre-works geotechnical report. (Local Government).
8. Prior to the commencement of subdivisional works, an urban water management plan is to be prepared and approved, in consultation with the Department of Water and Environmental Regulation, consistent with any approved Local Water Management Strategy or/and Water Management Plan. (Local Government)
9. Drainage easements and reserves as may be required by the local government for drainage infrastructure being shown on the diagram or plan of survey (deposited plan) as such, granted free of cost, and vested in that local government under Sections 152 and 167 of the *Planning and Development Act 2005*. (Local Government)

10. Arrangements being made to the satisfaction of the Western Australian Planning Commission for the filling and/or capping of any bores and/or wells, or the identification of any bore and/or well to be retained on the land. (Local Government)
11. All septic sewer systems including all tanks and pipes and associated drainage systems (soak wells or leach drains) and any stormwater disposal systems are to be decommissioned, in accordance with the Health (Treatment of Sewerage and Disposal of Effluent and Liquid Waste) Regulations 1974, removed, filled with clean sand and compacted. Proof of decommissioning is to be provided in the form of either certification from a licensed plumber or a statutory declaration from the landowner/applicant, confirming that the site has been inspected and all septic tanks, soak wells, leach drains and any associated pipework have been removed. (Local Government)
12. Prior to the commencement of subdivision works a bushland and wetland management plan for the Bush Forever Site 388 and the proposed Lot 815 conservation reserve is to be prepared and approved to ensure the protection and management of the sites environmental assets with satisfactory arrangements being made for the implementation of the approved plan (Local Government)
13. Prior to the commencement of subdivision works a wildlife management plan for the site is to be prepared and approved, in consultation with the Department of Biodiversity, Conservation and Attractions, to ensure the protection and management of the sites environmental assets with satisfactory arrangements being made for the implementation of the approved plan (Local Government)
14. Measures being taken to ensure the identification and protection of any vegetation on the site worthy of retention that is not impacted by subdivisional works, prior to commencement of subdivisional works. (Local Government).
15. Measures being taken to ensure no vegetation within Bush Forever Site No. 388 and proposed Lot 815 is removed or disturbed during subdivisional works, other than as approved in a Bushland and Wetland Management Plan which may include any secondary impacts from works to provide service infrastructure and drainage to implement the approved plan of subdivision. (Local Government)
16. A fence restricting vehicular, pedestrian and feral animal access to Bush Forever Site 388 and proposed Lot 815 is to be constructed on the boundaries shown on the plan dated 9 April 2019 (attached); to protect native vegetation. (Local Government)
17. A revegetation plan being prepared, approved and implemented for revegetation of drainage reserves, the proposed pump station site and areas of lots identified in an approved local development plan for revegetation, with appropriate native species to the specifications of the Local Government (Local Government)
18. An acid sulphate soils self-assessment form and, if required as a result of the self-assessment, an acid sulphate soils report and an acid sulphate soils management plan shall be submitted to and approved by the Department of Water and Environmental Regulation before any subdivision works or development are



commenced. Where an acid sulphate soils management plan is required to be submitted, all subdivision works shall be carried out in accordance with the approved management plan. (Department of Water and Environmental Regulation)

19. Information is to be provided to demonstrate that the measures contained in Section 6; Table 6.1 of the bushfire management plan for Lots 701, 702 and 703 Jandakot Road, version 1.2 dated 18 February 2020 (as amended) have been implemented during subdivisional works. This information should include a completed 'Certification by Bushfire Consultant' from the bushfire management plan. (Local Government)
20. A notification, pursuant to Section 165 of the *Planning and Development Act 2005* is to be placed on the certificate(s) of title of the proposed lot(s) with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:

"This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and may be subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land". (Western Australian Planning Commission)

21. Engineering drawings and specifications are to be submitted, approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications, to ensure that those lots not fronting an existing road are provided with frontage to a constructed road(s) connected by a constructed road(s) to the local road system and such road(s) are constructed and drained at the landowner/applicant's cost.

As an alternative, and subject to the agreement of the Local Government the Western Australian Planning Commission (WAPC) is prepared to accept the landowner/applicant paying to the local government the cost of such road works as estimated by the local government and the local government providing formal assurance to the WAPC confirming that the works will be completed within a reasonable period as agreed by the WAPC. (Local Government)

22. Engineering drawings and specifications are to be submitted and approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications to ensure that:
 - (a) street lighting is installed on all new subdivisional roads to the standards of the relevant licensed service provider and/or
 - (b) roads that have been designed to connect with existing or proposed roads abutting the subject land are coordinated so the road reserve location and width connect seamlessly and/or

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- (c) temporary turning areas are provided to those subdivisional roads that are subject to future extension to the satisfaction of the Western Australian Planning Commission. (Local Government)
23. Engineering drawings and specifications are to be submitted, approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications, for the provision of shared paths through and connecting to the application area in accordance with the plan dated 9 April 2019 (attached). The approved shared paths are to be constructed by the landowner/applicant. (Local Government)
24. Satisfactory arrangements being made with the local government for the additional cost of construction of a dual-lane roundabout at the intersection of Jandakot Road/new access road in accordance with the Transcore report dated 20 June 2017 (ref: t15.281-r02d). (Local Government).
25. Satisfactory arrangements being made with the local government for the partial cost of upgrading of the intersection of Jandakot Road/Berrigan Drive. The upgrade includes the duplication of the left turn lane from Jandakot Road into Berrigan Drive (with any and all associated modifications to the rest of the intersection as a result) in accordance with the Transcore technical note 3a (ref: t15.281, dated 9 September 2019). (Local Government).
26. An agreement for the acquisition of the land within the subdivision required for the road widening shown on the approved plan (attached) between the landowner and the local government is to be executed. The land required for road widening is to be shown as 'Road Widening' on the agreement for the acquisition and the diagram or plan of survey (deposited plan). (Local Government)
27. Any land required for installation of the roundabout at the intersection of Jandakot Road and the proposed access road, in accordance with the approved plan of subdivision and the roundabout plan designed by the City of Cockburn plan dated 7 December 2018 (attached) by the landowner transferring the land required to the Crown free of cost for the purpose of the widening Jandakot Road.
28. All local streets within the subdivision being truncated in accordance with the Western Australian Planning Commission's *Development Control Policy 4.1 Industrial Subdivision*. (Local Government)
29. Arrangements being made to the satisfaction of the Western Australian Planning Commission and to the specification of Western Power for the provision of an underground electricity supply to the lot(s) shown on the approved plan of subdivision. (Western Power)
30. The transfer of land as a Crown reserve free of cost to Western Power for the provision of electricity supply infrastructure. (Western Power)
31. Arrangements being made with a licensed water provider for the provision of a suitable water supply service to each of the lot(s) shown on the approved plan of

subdivision.
(Water Corporation)

32. Arrangements being made with the Water Corporation for the provision of a sewerage service to each of the lot(s) shown on the approved plan of subdivision. (Water Corporation)
33. The provision of easements for existing or planned future water, sewerage and/or drainage infrastructure as may be required by the Water Corporation being granted free of cost to that body. (Water Corporation)

ADVICE:

1. Condition 9 has been imposed in accordance with *Better Urban Water Management Guidelines (WAPC 2008)*. Further guidance on the contents of urban water management plans is provided in *'Urban Water Management Plans: Guidelines for preparing and complying with subdivision conditions'* (Published by the then Department of Water 2008).
2. Condition 18 makes reference to an 'acid sulphate soils self-assessment form'. This form can be downloaded from the Western Australian Planning Commission's website. The 'acid sulphate soils self-assessment form' makes reference to the Department of Water and Environment Regulation's 'Identification and Investigation of Acid Sulphate Soils' guideline. This guideline can be obtained from the Department of Water and Environment Regulation's website www.dwer.wa.gov.au
3. The landowner/applicant and the local government are advised to refer to the Institute of Public Works Engineering Australia Local Government Guidelines for Subdivisional Development (current edition). The guidelines set out the minimum best practice requirements recommended for subdivision construction and granting clearance of engineering conditions imposed.
4. In regard to Condition 21-27, the landowner/applicant is advised that the road reserves, including the constructed carriageways, laneways, truncations, footpaths/dual use paths and car embayments, are to be generally consistent with the approved plan of subdivision.
5. With regard to Condition 25, the City of Cockburn advises the landowner/applicant that it agrees to a contribution of 37% towards the upgrading of the Jandakot Road and Berrigan Drive intersection.
6. With regard to Condition 26, the City of Cockburn advises the landowner/applicant that the land required for road widening is subject to the final roundabout design.
7. The landowner/applicant is advised that the Department of Water and Environmental Regulation has prepared dust control guidelines for development sites, which, outline the procedures for the preparation of dust management plans. The dust management plans are generally approved, and their implementation overseen, by

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ABN 35 482 341 493



the Local Government. Further information on the guidelines can be obtained from the Department of Water and Environmental Regulation's website: www.dwer.wa.gov.au under air quality publications.

An application for approval of a dust management plan may be obtained from the City of Cockburn website. The landowner/applicant is advised to liaise with the City of Cockburn in this regard.

8. In regard to Condition 29, Western Power provides only one underground point of electricity supply per freehold lot.
9. In regard to Conditions 31-33, the landowner/applicant shall make arrangements with the Water Corporation for the provision of the necessary services. On receipt of a request from the landowner/applicant, a Land Development Agreement under Section 83 of the *Water Services Act 2012* will be prepared by the Water Corporation to document the specific requirements for the proposed subdivision.
10. In regard to Condition 32, the implementation of planning for the provision of wastewater infrastructure to service this area is dependent on frontal and orderly development. The Water Corporation requests that the development liaise with the Water Corporation to determine the Corporation's planning and funding requirements.
11. In regard to Condition 32, the Water Corporation advises that clearance of subdivision conditions will not be issued until the sewer headworks construction has been taken over by the Water Corporation.
12. The Department of Biodiversity, Conservation and Attractions advises the landowner/applicant that the land contains remnant vegetation that may support habitat suitable for Carnaby's Black Cockatoo, Baudin's Black Cockatoo and the Forest Red-tailed Black Cockatoo. These species are listed as threatened (ranked endangered and 'vulnerable, respectively) under the *Western Australian Biodiversity Conservation Act 2016* and the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. The landowner/applicant is advised to discuss the proposal with the Federal Department of Environment and Energy as there may be a requirement to refer the proposal under the EPBC Act.

A handwritten signature in black ink, appearing to read "Ms Sam Fagan".

Ms Sam Fagan
Secretary
Western Australian Planning Commission
17 April 2020

Enquiries : Arran Sutherland (Ph 6551 9730)

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ABN 35 482 341 493

Appendix C

Bore logs – Emerge Associates



PROJECT NUMBER: EP18-025

CLIENT: Schaffer Corporation

DATE INSTALLED: 23/03/2018

DRILLING CONTRACTOR: Strataprobe

DRILLING METHOD: Auger

LOGGED BY: NJC

PROJECT NAME: Schaffer, Lot 101, 104 & 105 Jandakot Road

PROJECT LOCATION: Lot 101, 104 & 105 Jandakot Road

SURVEY SOURCE:

EASTING: 6447064.0

NORTHING: 393474.0

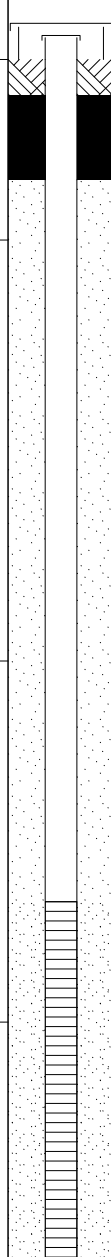
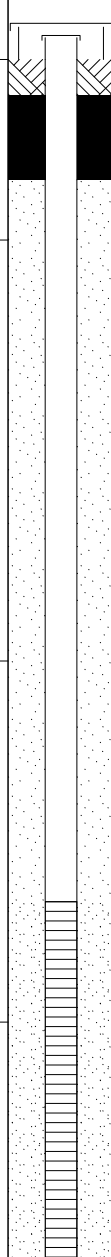
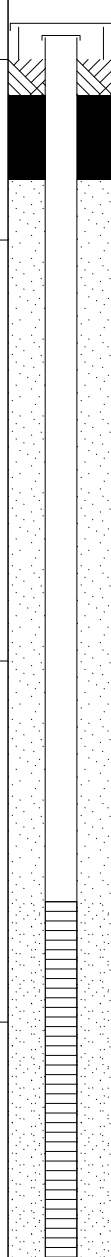
PROJECTION:

ELEVATION (GROUND):

ELEVATION (TOP OF CASING):

ELEVATION (GROUNDWATER):

CASING DIAMETER: 50 mm

DEPTH (mBGL)	DEPTH (mAHD)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT	WELL CONSTRUCTION
0			0.0m: Light brown, medium grain sand	Dry	 <p>Cement fill</p> <p>Bentonite</p> <p>Gravel pack</p> <p>Screen</p>
1					
1.5			1.5m: Light orange, medium grain sand	Dry	
2					
3					 <p>Cement fill</p> <p>Bentonite</p> <p>Gravel pack</p> <p>Screen</p>
4					
5			5.0m: Light orange, medium grain sand	Dry-moist	
6					
7					 <p>Cement fill</p> <p>Bentonite</p> <p>Gravel pack</p> <p>Screen</p>
8			8.0m: Light orange, medium grain sand	Wet	
9					
10					

Total drilled depth: 10 mBGL

COMMENTS:

PROJECT NUMBER: EP18-025

CLIENT: Schaffer Corporation

DATE INSTALLED: 23/03/2018

DRILLING CONTRACTOR: Strataprobe

DRILLING METHOD: Auger

LOGGED BY: NJC

PROJECT NAME: Schaffer, Lot 101, 104 & 105 Jandakot Road

PROJECT LOCATION: Lot 101, 104 & 105 Jandakot Road

SURVEY SOURCE:

EASTING: 6446669.0

NORTHING: 393189.0

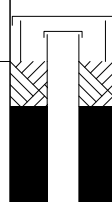

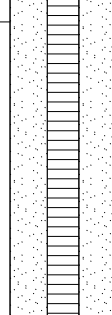
PROJECTION:

ELEVATION (GROUND):

ELEVATION (TOP OF CASING):

ELEVATION (GROUNDWATER):

CASING DIAMETER: 50 mm

DEPTH (mBGL)	DEPTH (mAHD)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT	WELL CONSTRUCTION
0			0.0m: Mid brown, medium grained sand, topsoil	Dry	 Cement cap Bentonite
1			1.0m: Light brown, medium grained sand	Dry	
2					
3					
4				4.0m: Orange browm, medium grained sand	Dry-moist
5					
6			6.0m: Orange browm, medium grained sand	Wet	 Screen
7					
8			Total drilled depth: 8 mBGL		

COMMENTS:

PROJECT NUMBER: EP18-025

CLIENT: Schaffer Corporation

DATE INSTALLED: 23/03/2018

DRILLING CONTRACTOR: Strataprobe

DRILLING METHOD: Auger

LOGGED BY: NJC

PROJECT NAME: Schaffer, Lot 101, 104 & 105 Jandakot Road

PROJECT LOCATION: Lot 101, 104 & 105 Jandakot Road

SURVEY SOURCE:

EASTING: 6447307.0

NORTHING: 393003.0

PROJECTION:

ELEVATION (GROUND):

ELEVATION (TOP OF CASING):

ELEVATION (GROUNDWATER):

CASING DIAMETER: 50 mm

DEPTH (mBGL)	DEPTH (mAHD)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT	WELL CONSTRUCTION
0			0.0m: White, medium grained sand	Dry	Cement cap
1					Bentonite
2					
3					
4			4.0m: White, medium grained sand	Wet	Gravel pack
5					Screen
6			Total drilled depth: 6 mBGL		

COMMENTS:

PROJECT NUMBER: EP18-025

CLIENT: Schaffer Corporation

DATE INSTALLED: 23/03/2018

DRILLING CONTRACTOR: Strataprobe

DRILLING METHOD: Auger

LOGGED BY: NJC

PROJECT NAME: Schaffer, Lot 101, 104 & 105 Jandakot Road

PROJECT LOCATION: Lot 101, 104 & 105 Jandakot Road

SURVEY SOURCE:

EASTING: 6447017.0

NORTHING: 392800.0

PROJECTION:

ELEVATION (GROUND):

ELEVATION (TOP OF CASING):

ELEVATION (GROUNDWATER):

CASING DIAMETER: 50 mm

DEPTH (mBGL)	DEPTH (mAHD)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT	WELL CONSTRUCTION
0			0.0m: Brown, medium grained sand, topsoil	Dry	Cement cap
1			1.0m: Light brown, medium grained sand	Dry	Bentonite
2					
3					
4			4.0m: Light brown, medium grained sand	Wet	Gravel pack
5					
6					Screen
7			Total drilled depth: 7 mBGL		

COMMENTS:


Appendix D

Infiltration testing locations





0 100 200 300 m

 Douglas Partners <small>Geotechnics Environment Groundwater</small>	Test Locations Proposed Industrial Development Lots 701 - 703 Jandakot Road, Jandakot, WA	PROJECT: 201648.00 Drawing No: 1 REV: 0
	CLIENT: Schaffer Corporation Limited	DATE: 8/3/2021

Appendix E

Amendment 112 to City of Cockburn Local Planning Scheme



PLANNING AND DEVELOPMENT ACT 2005
APPROVED LOCAL PLANNING SCHEME AMENDMENT
City of Cockburn

Local Planning Scheme No. 3—Amendment No. 112

Ref: TPS/1923

It is hereby notified for public information, in accordance with section 87 of the *Planning and Development Act 2005* that the Minister for Planning approved the City of Cockburn Local Planning Scheme amendment on 23 February 2018 for the purpose of—

1. Extending the Additional Use area AU1 covering Lots 701, 702 and portion of Lot 703, Jandakot Road, corner of Pilatus Street, Jandakot to include the whole of Lots 701, 702 and 703 excluding road widenings and Bush Forever Site 388C.
2. Amending the Scheme map accordingly.
3. Amending Table 6—Additional Uses of the Scheme Text by deleting the provisions relating to Additional Use AU1 and replacing them with the following—

No.	Description of Land	Additional Use	Conditions
AU1	Lots 701, 702 and 703 (excluding Bush Forever Area 388C) Jandakot Road, Jandakot. [Formerly Lots 101, 103 and 104 Jandakot Road, Jandakot]	<ul style="list-style-type: none"> • Nursery; • Masonry Production; • Warehouse, Showroom and Storage where the display, selling, hiring or storage of goods, equipment, plant or materials and the incidental site activities do not pose risk of pollution to the below ground public drinking water source. <p>The Use Class Definitions for 'Warehouse',</p>	<ol style="list-style-type: none"> 1. All development is to have due regard to a Local Development Plan prepared for the Additional Use No. 1 area. The Local Development Plan is to address the following— <ol style="list-style-type: none"> (a) The standards to be applied for physical development in order to ensure the protection of the below ground public drinking water source; (b) Building design, and vehicle access and egress arrangements to minimise the amenity impact to surrounding properties; (c) Noise mitigation measures pursuant to the details of an acoustic report where required;

698

GOVERNMENT GAZETTE, WA

2 March 2018

No.	Description of Land	Additional Use	Conditions
		<p>'Showroom' and 'Storage' are defined in Part 6 of the Scheme inclusive of the supplementary restrictions as mentioned above which limit the nature of the permissible goods, equipment, plant or materials to those which do not pose risk of pollution to the below ground public drinking water source.</p>	<ol style="list-style-type: none"> (d) Interface controls and/or measures with regard to Bush Forever Area 388, including, but not limited to; a hard road edge within the AU1 area abutting the Bush Forever area and/or bushland identified for protection; Bushfire mitigation measures being provided outside the Bush Forever area within the AU1 area; an appropriate wetland buffer, if considered relevant by the assessing authority, and; drainage to be contained within the AU1 area; (e) Identify revegetation areas to be used as a buffer between adjoining environmental and rural living land uses; and (f) Identify land on Lot 703 required for the upgrade of Jandakot Road, which may form part of Additional Use No. 1 area.

		<ol style="list-style-type: none"> 2. No bulk storage of green-waste, compost or Toxic or Hazardous Substances (THS) are permitted above 25 litres in total volume, excluding fuel within vehicle fuel tanks. THS includes pesticides, herbicides, fuel (storage), explosives, flammable liquids, cleaners, alcohol, fertilisers (other than on Lot 702 under current development approvals), medical or veterinary chemicals, pool chemicals and corrosive substances; inclusive of the substances listed in the <i>Poisons Act 1964</i> (Appendix B). These substances may only be stored in volumes above 25 litres if contained within domestic sized packages ready for end use in domestic situations. 3. Development of any Warehouse, Showroom, or Storage land use must be connected to reticulated sewer. 4. Any applications for the development of any Warehouse, Showroom or Storage land use is subject to the preparation, implementation and update the following documents to the satisfaction of the Local Government— <ol style="list-style-type: none"> (a) Site Chemical Risk Assessment report; (b) Dust Management Plan; and (c) Acoustic report. 5. No below ground storage is permitted. 6. As part of any future application for subdivision and/or development, land identified for the upgrade of Jandakot Road is to be ceded free of cost and
--	--	--

2 March 2018

GOVERNMENT GAZETTE, WA

699

No.	Description of Land	Additional Use	Conditions
			<p>constructed by the Applicant as follows—</p> <ol style="list-style-type: none"> (a) The amount of land to be ceded from the Additional Use No. 1 area is to form a single carriage way as depicted on an approved Local Development Plan; and (b) The Applicant is required to construct the ceded land as one additional carriage way to Jandakot Road. <ol style="list-style-type: none"> 7. As part of the first application for subdivision and/or development, the Applicant shall cede land within the Bush Forever Site free of cost to the Crown. 8. Notwithstanding any subdivision provisions in the Scheme, the minimum lot size for subdivision is 2 hectares.

L. HOWLETT, Mayor.
S. CAIN, Chief Executive Officer.

Appendix F

Landscape plans – EPCAD 2021



JANDAKOT SCHAFFER LAND LANDSCAPE & IRRIGATION WORKS

(Contract No B0980/JSL/L)

for

SCHAFFER CORPORATION

MAY 2021

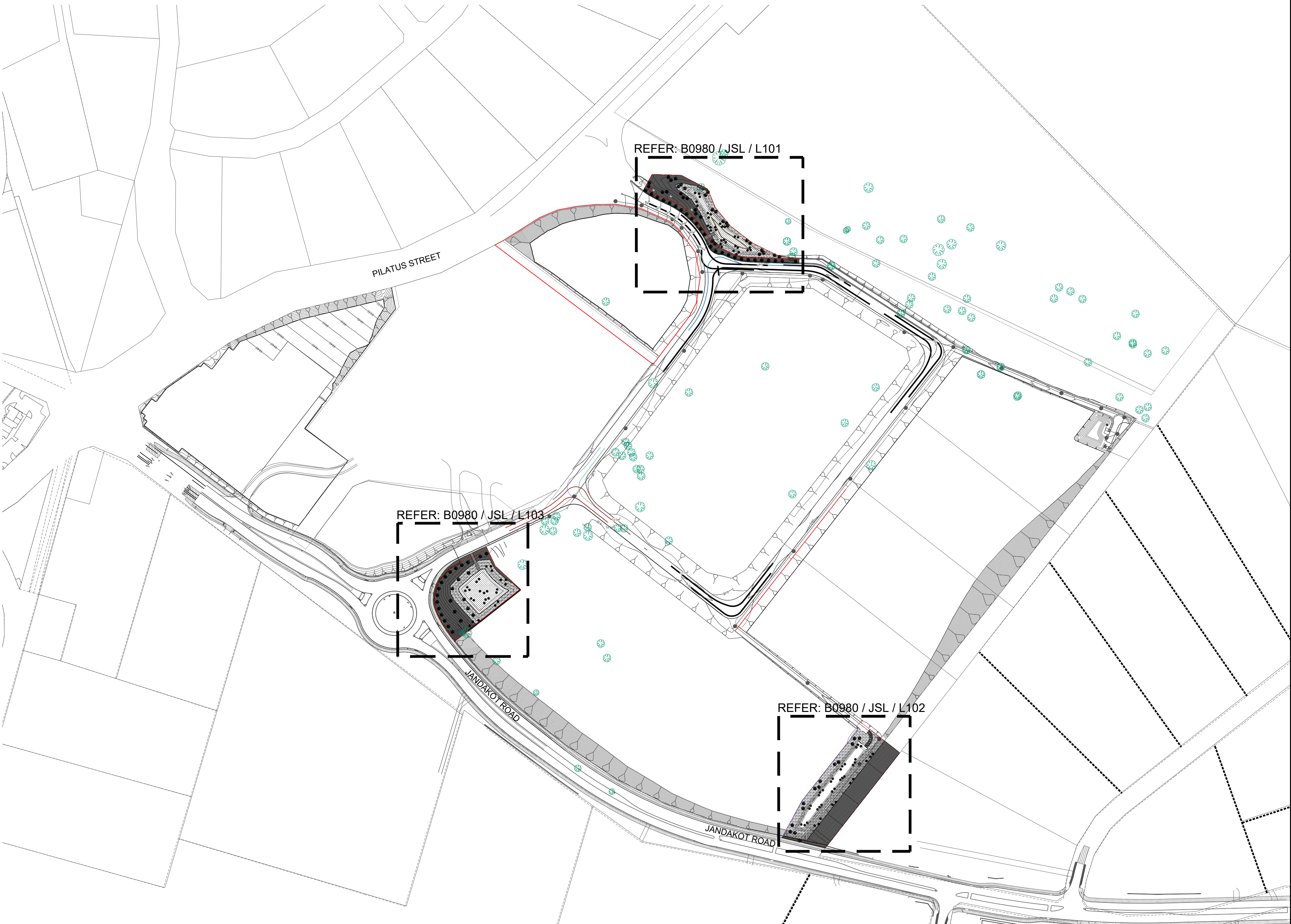
FOR APPROVAL



DRAWING SCHEDULE

EPCAD PTY LTD

Drawing No.	Title
B0980 / JSL / L100	COVER SHEET
B0980 / JSL / L101 REV A	PLANTING PLAN 1 OF 3
B0980 / JSL / L102 REV B	PLANTING PLAN 2 OF 3
B0980 / JSL / L103 REV C	PLANTING PLAN 3 OF 3



Document Set ID: 12418908
Version: 2. Version Date: 14/08/2025

Appendix G

Modelling assumptions report – Emerge Associates



Modelling assumptions report

Lots 701, 702 and 703 Jandakot Road

Project No: EP21-014(01)

**Prepared for Schaffer Corporation Ltd
April 2021**

Modelling assumptions report

Lots 701, 702 and 703 Jandakot Road



Document Control

Doc name:		Modelling assumptions report Lots 701, 702 and 703 Jandakot Road			
Doc no.:		EP21-014(01)--005			
Version	Date	Author		Reviewer	
1	April 2021	Johanna Boonzaaier	JB	David Coremans	DPC
	To be included in the UWMP				
A	August 2021	Johanna Boonzaaier	JB	David Coremans	
	To be included in the UWMP				

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Modelling assumptions report

Lots 701, 702 and 703 Jandakot Road



Table of Contents

1	Modelling Assumptions.....	1
2	Post-development Model	2
2.1	Post development catchments	2
2.2	Critical duration	2
2.3	Infiltration loss assumptions	3
3	References	4

List of Tables

Table 1 Jandakot Road post-development parameters	2
Table 2 Jandakot Road post-development catchment areas	2
Table 3: Critical duration (minutes)	3

Modelling assumptions report

Lots 701, 702 and 703 Jandakot Road



1 Modelling Assumptions

XPSWMM hydrologic and hydraulic modelling software (v18.1) was used to calculate the surface water runoff volumes within the road reserves of Lots 101, 103 and 104 of the Jandakot Road development

The hydrologic component of the software uses the Laurenson non-linear runoff-routing method to simulate runoff from design storm events. Key assumptions regarding the hydrologic model include:

- Runoff is proportional to slope, area, infiltration and percentage of imperviousness of a catchment.
- Sub-catchment areas and slopes are determined from surveyed topographical data and earthworks plans.
- Infiltration rates and percentage imperviousness have been selected based on experience with model preparation for similar soil conditions.

Runoff from each sub-catchment is routed through the catchment using the hydraulic component of XPSWMM. Generally, assumptions associated with the hydraulic component of the model include:

- Virtual links (i.e. purely for model construction, not equivalent to flow path onsite) between nodes within a sub-catchment are given the length of 10 m and slope of 0.05 to minimise the lag time of conveying the water from a sub-catchment node to a 'storage' node, a 'dummy intermediate' node or a conduit/link.
- Links between sub-catchment storages act as conveyance channels (e.g. sheet flow within roads in a 100 year average recurrence interval (ARI) event / 1% annual exceedance probability (AEP)). These links are given lengths and slopes that are representative of the site conditions and actual pathway lengths between catchments.
- All channels are designed with a width of 5 m, roughness of 0.014 (Manning's n) and are trapezoidal in shape. This allows for easy conveyance and represents concrete pipes and road surfaces within the model.
- Where relevant median swales, bio-retention areas (BRAs), and flood storage areas (FSAs) are modelled as nodal-reservoirs with infiltration depth-rating curves to account for differential infiltration rates with changing depth.

Modelling assumptions report

Lots 701, 702 and 703 Jandakot Road



2 Post-development Model

2.1 Post development catchments

The post-development model uses an "initial loss - continuing loss" infiltration model. The post-development catchment area and land types within the site were informed by the development earthworks option C plans (drawing number 6151-00-SK59 C) and **Table 1**, which gives the loss parameters used within the post-development model.

Table 1 Jandakot Road post-development parameters

Land type	Initial loss (mm)	Continuing loss (mm)	Roughness
Road Surface	1	0.1	0.02
Road Verge	9	1.5	0.05
Basin catchments	22.5	3	0.05
Sump	15	0.1	0.02

A summary of post-development catchment information is provided in **Table 2** with the catchment plan and basin locations shown in **Figure 8** of the *Urban Water Management Plan Lots 701, 702 and 703 Jandakot Road* (Emerge Associates 2021).

Table 2 Jandakot Road post-development catchment areas

Catchment	Slope (m/m)	Area (ha)				Basin land type
		Total area	Road reserve	Road pavement	Road verge	
Swale 1 road reserve	0.01	0.919	0.919	0.735	0.184	
Swale 1 basin catchment	0.01	1.140				Basin catchments
Swale 2 road reserve	0.01	1.969	1.969	1.575	0.394	
Swale 2 basin catchment	0.01	0.643				Basin catchments
Sump road reserve	0.01	0.652	0.652	0.522	0.130	
Sump basin area	0.01	0.031				Sump
Sewer sump road reserve	0.01	0.136	0.136	0.136	0	
Sewer sump basin catchment	0.01	0.081				Sump

2.2 Critical duration

A critical duration analysis was performed for the basins, for the 1% AEP, 10% AEP and 20% AEP events with durations ranging from 20 minute to 3 days. The results of the analysis are shown in **Table 3**.

Modelling assumptions report

Lots 701, 702 and 703 Jandakot Road



Table 3: Critical duration (minutes)

Location	1% AEP event	10% AEP event	20% AEP event
Swale 1	360	360	360
Swale 2	360	360	360
Swale 3 (sump)	180	720	20
Sewer sump	30	30	20

2.3 Infiltration loss assumptions

The infiltration rates used were predominantly based upon the following assumptions:

- Lot assumptions
 - All lots will fully retain the 1% annual exceedance probability (1% AEP) / 100 year average recurrence interval (ARI) event runoff on lot in soakwells, infiltration in pervious areas and other detention measures.
- Road reserve assumptions
 - There will be no infiltration on roads, pavements and driveways. There will however be some minor absorption storage loss which is accounted for in the initial and continuing loss values.
 - Road reserve contains 20% pervious verge and 80% impervious bitumen areas. This equates to a runoff co-efficient of 0.8 from road reserves for the design of downstream infrastructure (i.e. median swales, bio-retention areas (BRA) and flood storage areas (FSA)).
- Basin catchments assumptions
 - Basin catchment areas are assumed to be 100% pervious.
 - Basin catchment areas will likely contain landscaped or remnant vegetation.
 - A section of lot reserve to the north east of the site does not drain to a basin. It is assumed that rainfall in this area infiltrates and flows overland into the vegetated area north of the site as per the pre-development hydrology.
- Sump basin
 - The Sump catchment represents rainfall landing on the sump area itself. During rainfall events this area will quickly be filled with surface water, hence the lower values for initial and continual loss and manning's number.
- Storage assumptions
 - Basin side slopes, general configuration and invert levels are based on the earthworks plan option C (drawing number 6151-00-SK59 C).
 - Basins retain runoff from events up to the 1% AEP event.
- Storage infiltration assumptions
 - Storage basin 1 and storage basin 3 have been designed based on an infiltration rate of 8.6 m/day with no clogging factor and storage basin 2 has been designed based on an infiltration rate of 8.6 m/day with a clogging factor of 0.5 based on infiltration test results.
 - Infiltration through base area and side slopes of the basins are considered in the overall infiltration rating curve for these areas.
- Volumes leaving the system through evapotranspiration were assumed to be negligible when compared to the total runoff volume and since the duration of the model run was comparatively short. XPSWMM default evapotranspiration assumptions are therefore used.

Modelling assumptions report

Lots 701, 702 and 703 Jandakot Road



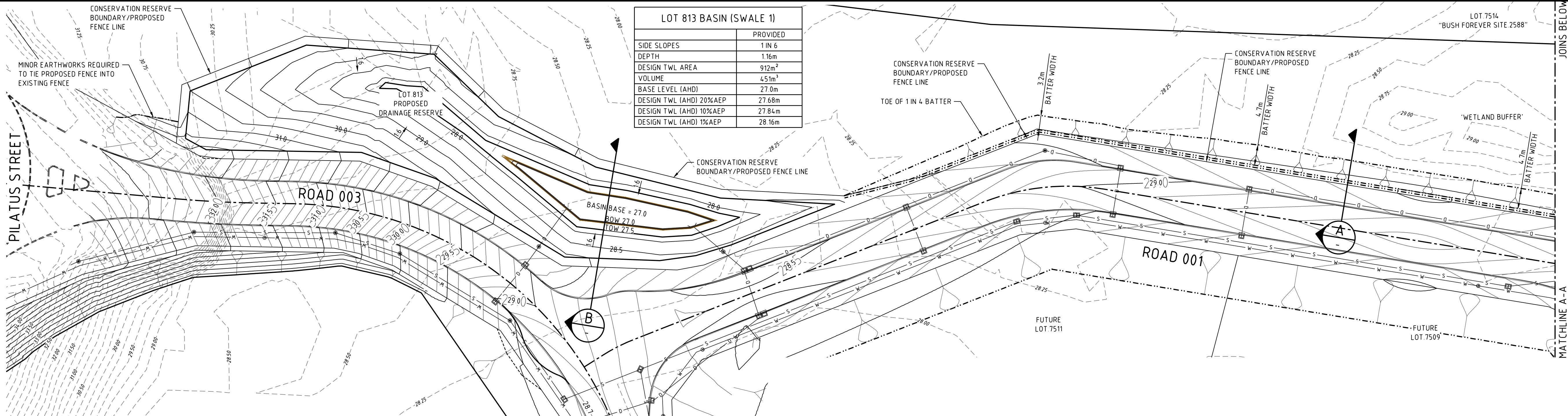
3 References

Emerge Associates 2021, *Urban Water Management Plan Lots 701, 702 and 703 Jandakot Road*, EP21-014(01).

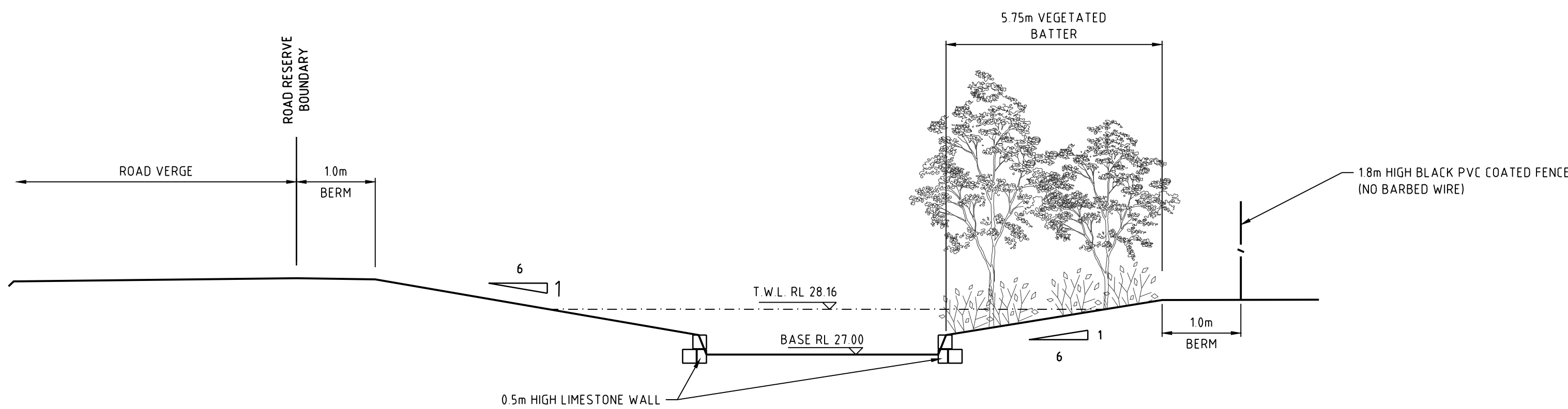
Appendix H

Civil designs

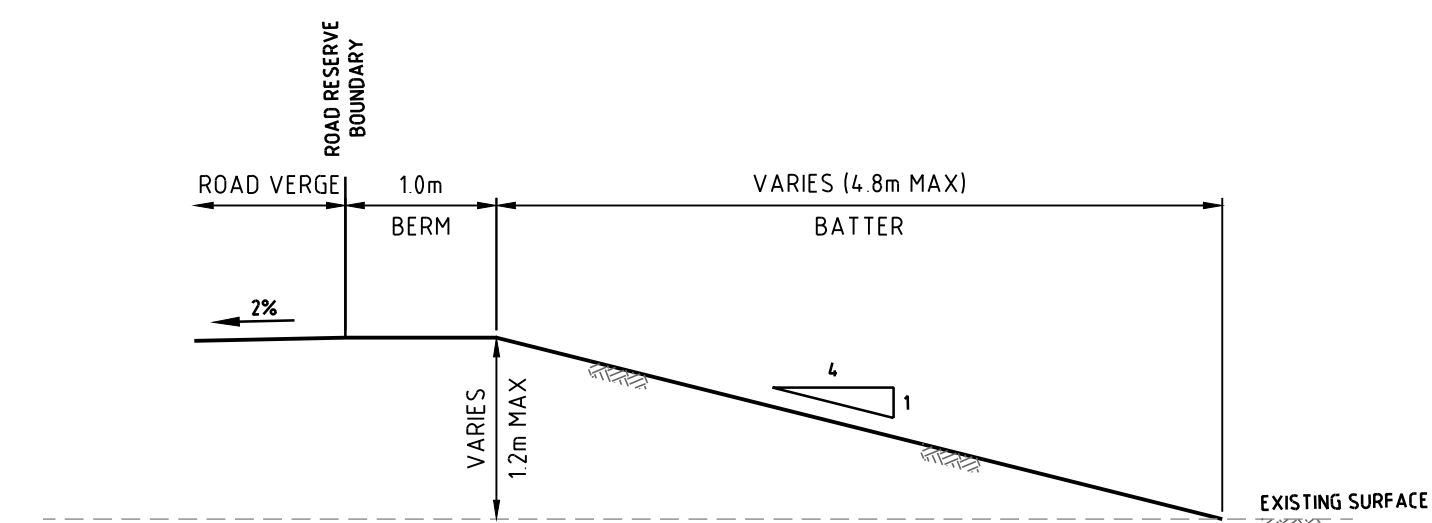




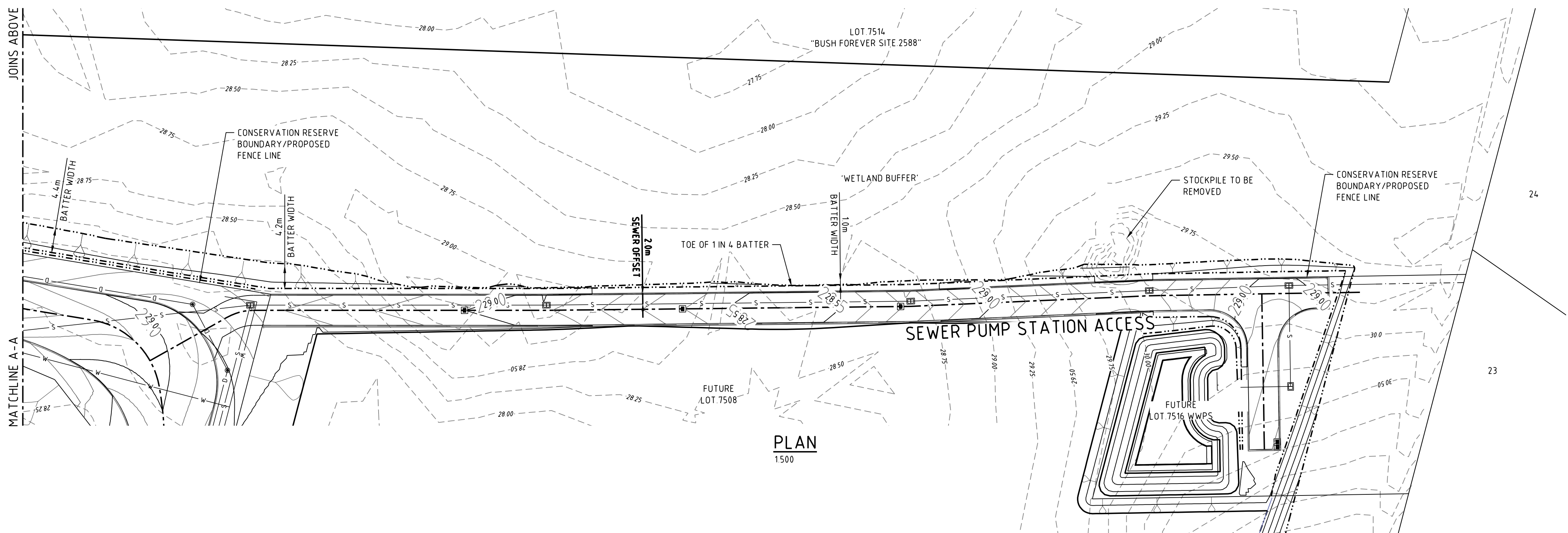
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SECTION B
SCALE 1200

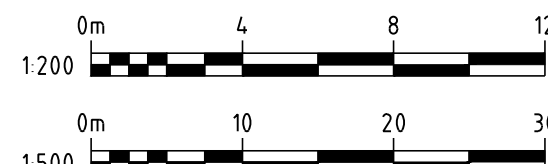
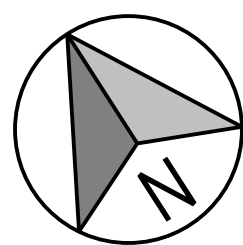


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PLAN
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G	06.10.21	AAD	RR1	R. TODD	TOP WATER LEVELS ADDED TO TABLE
F	18.05.21	DMC	RR1	R. TODD	CROSS SECTION B ADDED ISSUED FOR INFORMATION
E	12.04.21	DP	RR1	R. TODD	ISSUED FOR INFORMATION
D	06.04.21	DP	RR1	R. TODD	ISSUED FOR INFORMATION
REV	DATE	DRN	CKD	APP	AMENDMENT



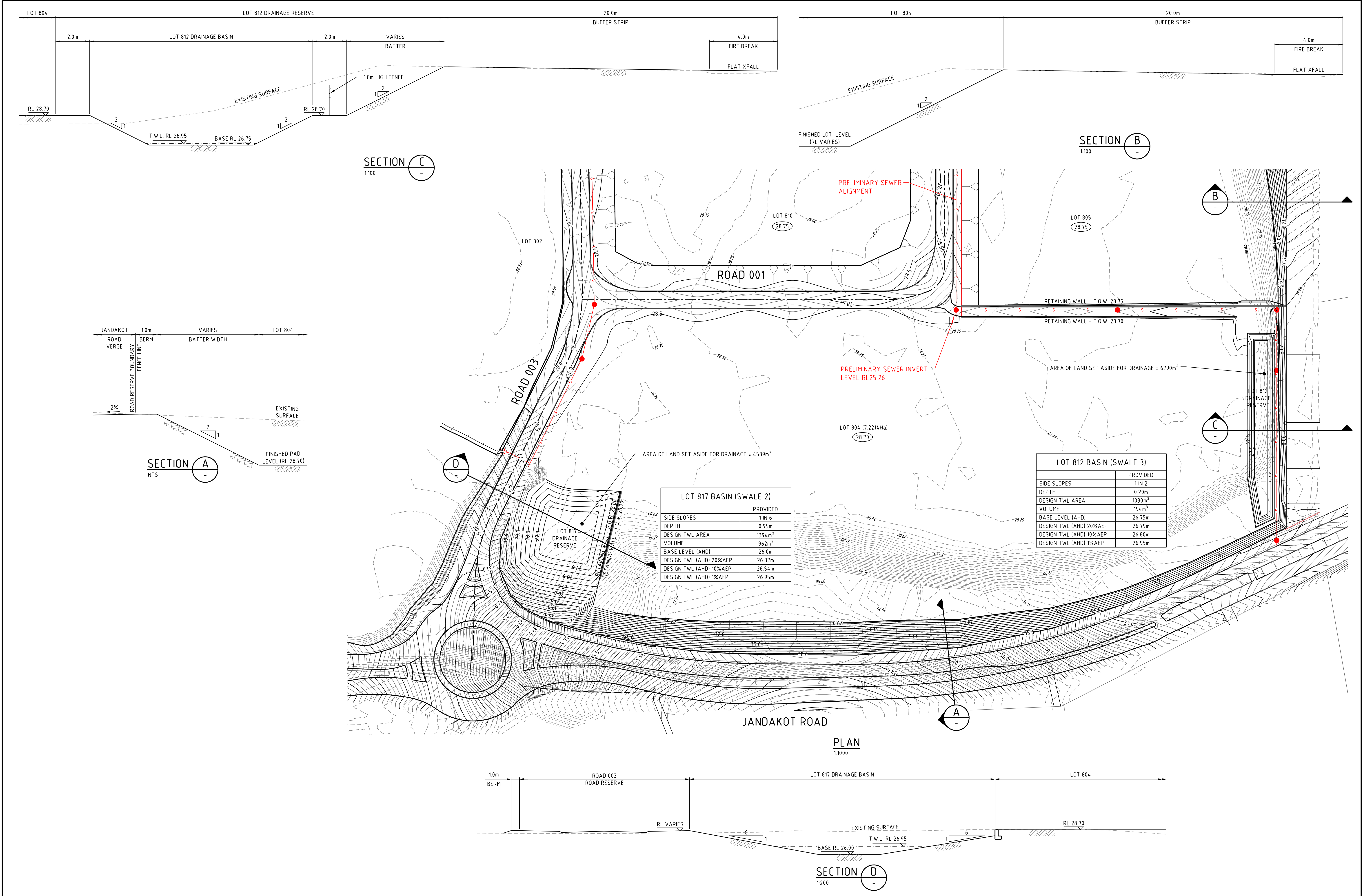
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SCALE
1:500 1:250 1:200

PROJECT
LOTS 101, 103 AND 104, JANDAKOT
TITLE
WETLAND BUFFER
EARTHWORKS INTERFACE
WAPC No.
DRAWING No.
6151-00-SK56
REVISION
H

ORIGINAL
SIZE
A1



H	07.10.21	AAD	1	1	1	BASIN DEPTH IN TABLE UPDATED
G	06.10.21	AAD	RRT	R	TODD	TOP WATER LEVELS ADDED TO TABLE
F	13.07.21	AAD	RRT	R	TODD	BASIN DETAILS AMENDED
E	12.04.21	DP	RRT	R	TODD	ISSUED FOR INFORMATION
D	06.04.21	DP	RRT	R	TODD	ISSUED FOR INFORMATION
REV	DATE	DRN	CKD	APP		AMENDMENT

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CLIENT
SCHAFFER CORPORATION LTD

APPROVED
K. Loda

7.10.21

DESIGNED
RJW

SCALE
1:1000 1:100 1:200

PROJECT
LOTS 101, 103 AND 104, JANDAKOT

TITLE
LOT 804 VERGE LAYOUT
ALTERNATIVE 1

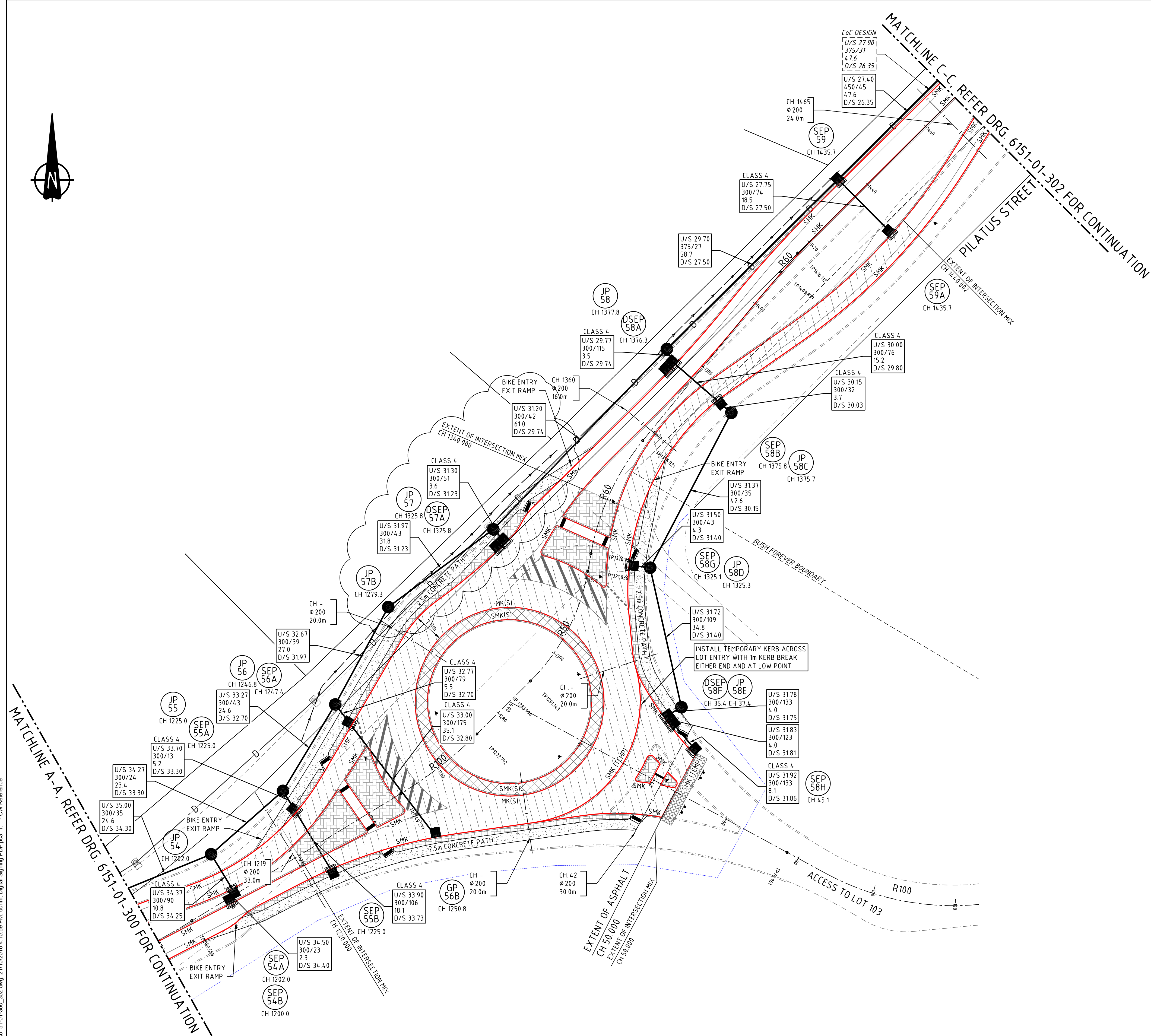
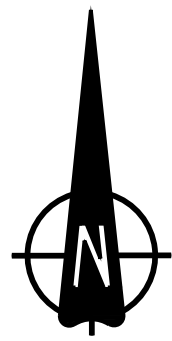
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DRAWING No.
6151-00-SK59

REVISION
H

ORIGINAL SIZE
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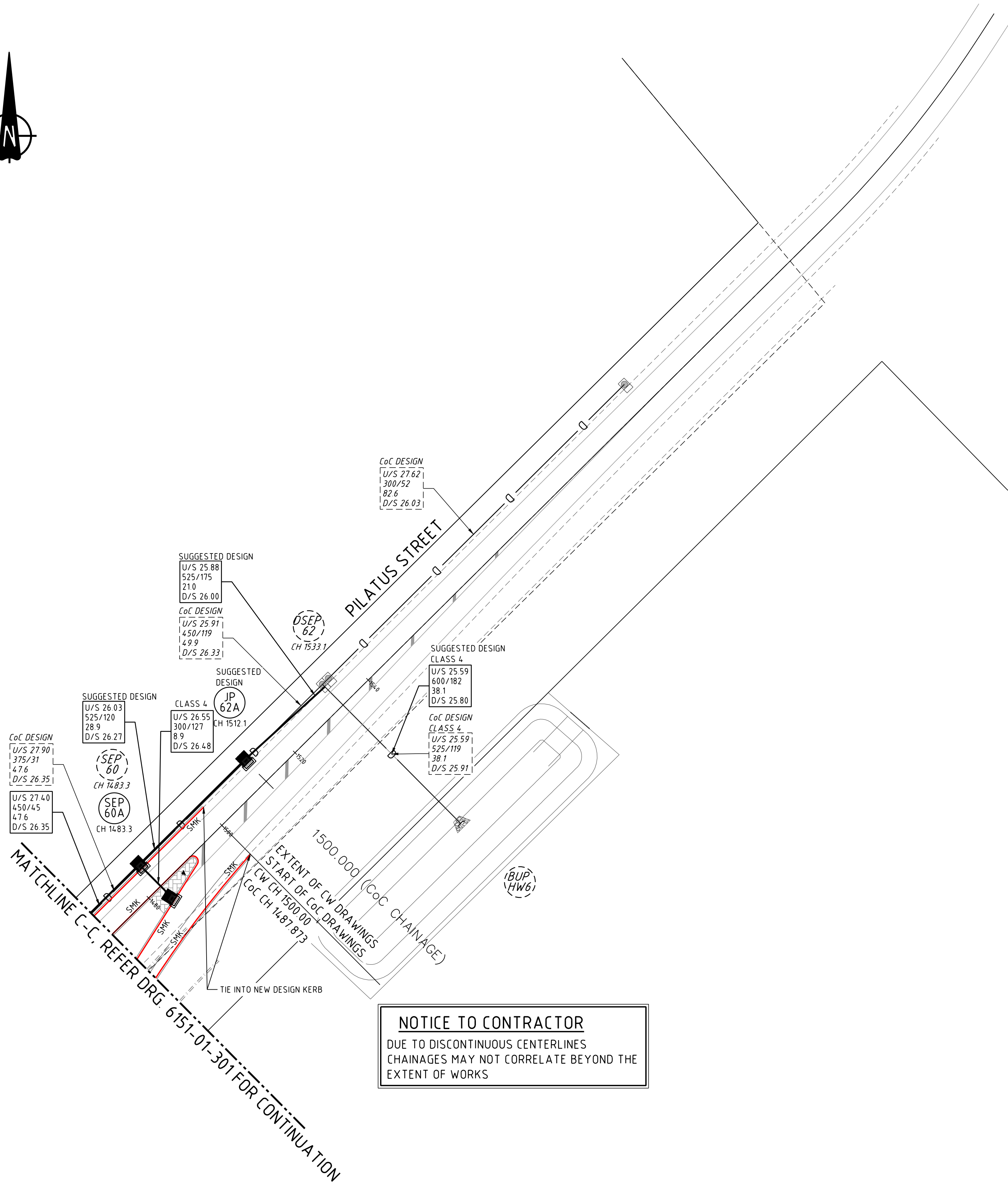
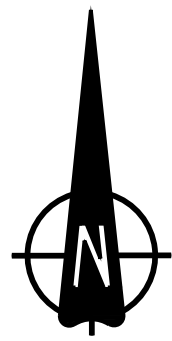
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REFER TO DRAWING 6151-01-300 FOR NOTES & LEGEND

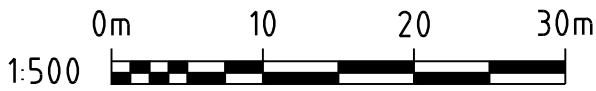


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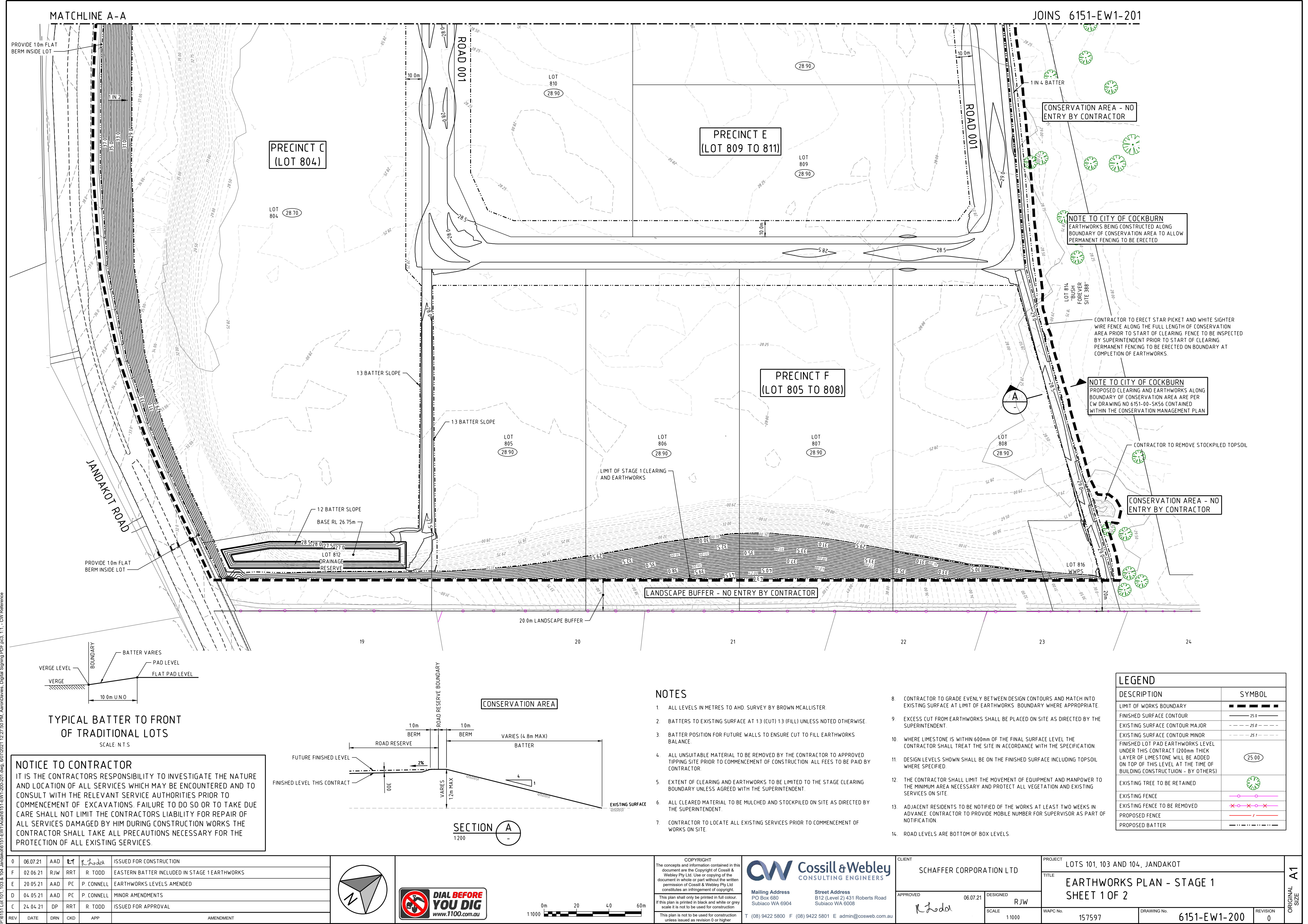


NOTICE TO CONTRACTOR
DUE TO DISCONTINUOUS CENTERLINES
CHAINAGES MAY NOT CORRELATE BEYOND THE
EXTENT OF WORKS

REFER TO DRAWING 6151-01-300 FOR NOTES & LEGEND



<table><tr><td>0</td><td>21.10.16</td><td>DPM</td><td>PS</td><td><i>NB</i></td><td>ISSUED FOR CONSTRUCTION</td><td></td><td></td><td></td><td></td></tr><tr><td>C</td><td>21.09.16</td><td>ARH</td><td>PS</td><td>N BUTSON</td><td>RE-ISSUED FOR COUNCIL APPROVAL</td><td></td><td></td><td></td><td></td></tr><tr><td>B</td><td>14.09.16</td><td>DPM</td><td>NB</td><td>N BUTSON</td><td>GEOMETRY AND DRAINAGE AMENDMENTS</td><td></td><td></td><td></td><td></td></tr><tr><td>A</td><td>13.08.16</td><td>DPM</td><td>PS</td><td>N BUTSON</td><td>ISSUED FOR INFORMATION</td><td></td><td></td><td></td><td></td></tr><tr><td>REV</td><td>DATE</td><td>DRN</td><td>CKD</td><td>APP</td><td>AMENDMENT</td><td>REV</td><td>DATE</td><td>DRN</td><td>CKD</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>AMENDMENT</td><td></td><td></td><td></td><td>APP</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>AMENDMENT</td><td></td><td></td><td></td><td></td></tr></table>										0	21.10.16	DPM	PS	<i>NB</i>	ISSUED FOR CONSTRUCTION					C	21.09.16	ARH	PS	N BUTSON	RE-ISSUED FOR COUNCIL APPROVAL					B	14.09.16	DPM	NB	N BUTSON	GEOMETRY AND DRAINAGE AMENDMENTS					A	13.08.16	DPM	PS	N BUTSON	ISSUED FOR INFORMATION					REV	DATE	DRN	CKD	APP	AMENDMENT	REV	DATE	DRN	CKD						AMENDMENT				APP						AMENDMENT					<p>COPYRIGHT The concepts and information contained in this document are the Copyright of Cossill & Webley Pty Ltd. Use or copying of the document in whole or part without the written permission of Cossill & Webley Pty Ltd constitutes an infringement of copyright.</p> <p>This plan is not to be used for construction unless issued as revision 0 or higher</p>		<p>CW Cossill & Webley CONSULTING ENGINEERS</p> <p>Mailing Address PO Box 690 Subiaco WA 6904</p> <p>Street Address B12 (Level 2) 431 Roberts Road Subiaco WA 6008</p> <p>T (08) 9422 5800 F (08) 9422 5801 E admin@cosweb.com.au</p>		<p>CLIENT SCHAFFER CORPORATION LTD</p> <p>APPROVED <i>NB</i> 24.10.16</p> <p>DESIGNED DPM</p> <p>SCALE 1:500</p>		<p>PROJECT LOTS 101, 103 AND 104, JANDAKOT</p> <p>TITLE ROADWORKS, DRAINAGE & FOOTPATHS LAYOUT PLAN - SHEET 3</p> <p>WAPC No.</p> <p>DRAWING No. 6151-01-302</p> <p>REVISION 0</p>				ORIGINAL SIZE A1
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MATCHLINE A-A

JOINS 6151-EW1-201

PROVIDE 10m FLAT BERM INSIDE LOT

PRECINCT C
(LOT 804)

PRECINCT E
(LOT 809 TO 811)

PRECINCT F
(LOT 805 TO 808)

CONSERVATION AREA - NO ENTRY BY CONTRACTOR

NOTE TO CITY OF COCKBURN
EARTHWORKS BEING CONSTRUCTED ALONG BOUNDARY OF CONSERVATION AREA TO ALLOW PERMANENT FENCING TO BE ERECTED

CONTRACTOR TO ERECT STAR PICKET AND WHITE SIGHTER WIRE FENCE ALONG THE FULL LENGTH OF CONSERVATION AREA PRIOR TO START OF CLEARING. FENCE TO BE INSPECTED BY SUPERINTENDENT PRIOR TO START OF CLEARING. PERMANENT FENCING TO BE ERECTED ON BOUNDARY AT COMPLETION OF EARTHWORKS.

NOTE TO CITY OF COCKBURN
PROPOSED CLEARING AND EARTHWORKS ALONG BOUNDARY OF CONSERVATION AREA ARE PER CW DRAWING NO 6151-00-SK56 CONTAINED WITHIN THE CONSERVATION MANAGEMENT PLAN

CONSERVATION AREA - NO ENTRY BY CONTRACTOR

CONTRACTOR TO REMOVE STOCKPILED TOPSOIL

JANDAKOT ROAD

PROVIDE 10m FLAT BERM INSIDE LOT

1:3 BATTER SLOPE

1:3 BATTER SLOPE

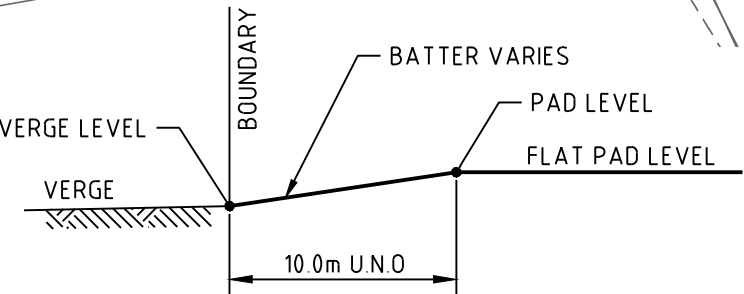
1:2 BATTER SLOPE
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LOT 812
DRAINAGE RESERVE

LIMIT OF STAGE 1 CLEARING AND EARTHWORKS

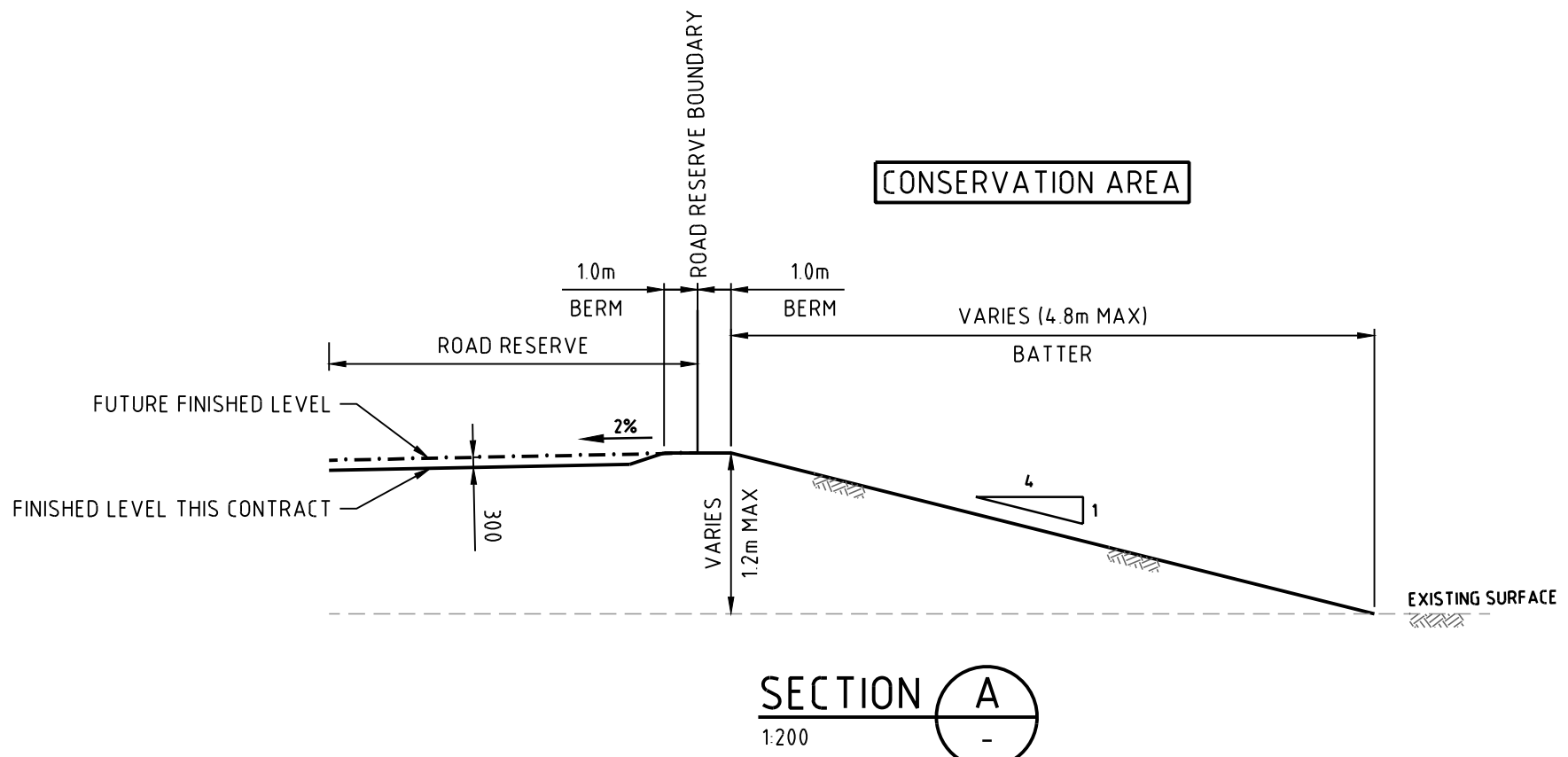
LANDSCAPE BUFFER - NO ENTRY BY CONTRACTOR

20.0m LANDSCAPE BUFFER



TYPICAL BATTER TO FRONT OF TRADITIONAL LOTS
SCALE: N.T.S

NOTICE TO CONTRACTOR
IT IS THE CONTRACTORS RESPONSIBILITY TO INVESTIGATE THE NATURE AND LOCATION OF ALL SERVICES WHICH MAY BE ENCOUNTERED AND TO CONSULT WITH THE RELEVANT SERVICE AUTHORITIES PRIOR TO COMMENCEMENT OF EXCAVATIONS. FAILURE TO DO SO OR TO TAKE DUE CARE SHALL NOT LIMIT THE CONTRACTORS LIABILITY FOR REPAIR OF ALL SERVICES DAMAGED BY HIM DURING CONSTRUCTION WORKS. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY FOR THE PROTECTION OF ALL EXISTING SERVICES.



NOTES

- ALL LEVELS IN METRES TO AHD. SURVEY BY BROWN MCALLISTER.
- BATTERS TO EXISTING SURFACE AT 1:3 (CUT) 1:3 (FILL) UNLESS NOTED OTHERWISE.
- BATTER POSITION FOR FUTURE WALLS TO ENSURE CUT TO FILL EARTHWORKS BALANCE.
- ALL UNSUITABLE MATERIAL TO BE REMOVED BY THE CONTRACTOR TO APPROVED TIPPING SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION. ALL FEES TO BE PAID BY CONTRACTOR.
- EXTENT OF CLEARING AND EARTHWORKS TO BE LIMITED TO THE STAGE CLEARING BOUNDARY UNLESS AGREED WITH THE SUPERINTENDENT.
- ALL CLEARED MATERIAL TO BE MULCHED AND STOCKPILED ON SITE AS DIRECTED BY THE SUPERINTENDENT.
- CONTRACTOR TO LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS ON SITE.
- CONTRACTOR TO GRADE EVENLY BETWEEN DESIGN CONTOURS AND MATCH INTO EXISTING SURFACE AT LIMIT OF EARTHWORKS BOUNDARY WHERE APPROPRIATE.
- EXCESS CUT FROM EARTHWORKS SHALL BE PLACED ON SITE AS DIRECTED BY THE SUPERINTENDENT.
- WHERE LIMESTONE IS WITHIN 600mm OF THE FINAL SURFACE LEVEL THE CONTRACTOR SHALL TREAT THE SITE IN ACCORDANCE WITH THE SPECIFICATION.
- DESIGN LEVELS SHOWN SHALL BE ON THE FINISHED SURFACE INCLUDING TOPSOIL WHERE SPECIFIED.
- THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND MANPOWER TO THE MINIMUM AREA NECESSARY AND PROTECT ALL VEGETATION AND EXISTING SERVICES ON SITE.
- ADJACENT RESIDENTS TO BE NOTIFIED OF THE WORKS AT LEAST TWO WEEKS IN ADVANCE. CONTRACTOR TO PROVIDE MOBILE NUMBER FOR SUPERVISOR AS PART OF NOTIFICATION.
- ROAD LEVELS ARE BOTTOM OF BOX LEVELS.

LEGEND	
DESCRIPTION	SYMBOL
LIMIT OF WORKS BOUNDARY	---
FINISHED SURFACE CONTOUR	— 25.0 —
EXISTING SURFACE CONTOUR MAJOR	- - - 25.0 - - -
EXISTING SURFACE CONTOUR MINOR	- - - 25.1 - - -
FINISHED LOT PAD EARTHWORKS LEVEL UNDER THIS CONTRACT (200mm THICK LAYER OF LIMESTONE WILL BE ADDED ON TOP OF THIS LEVEL AT THE TIME OF BUILDING CONSTRUCTION - BY OTHERS)	(25.00)
EXISTING TREE TO BE RETAINED	(Tree Symbol)
EXISTING FENCE	—o—o—o—
EXISTING FENCE TO BE REMOVED	-x-x-x-
PROPOSED FENCE	—/—/—/—
PROPOSED BATTER	---

0	06.07.21	AAD	RT	R TODD	ISSUED FOR CONSTRUCTION
F	02.06.21	RJW	RR	R TODD	EASTERN BATTER INCLUDED IN STAGE 1 EARTHWORKS
E	20.05.21	AAD	PC	P. CONNELL	EARTHWORKS LEVELS AMENDED
D	04.05.21	AAD	PC	P. CONNELL	MINOR AMENDMENTS
C	24.04.21	DP	RR	R TODD	ISSUED FOR APPROVAL
REV	DATE	DRN	CKD	APP	AMENDMENT

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CLIENT
SCHAFFER CORPORATION LTD

APPROVED

DESIGNED
RJW

SCALE
1:1000

PROJECT
LOTS 101, 103 AND 104, JANDAKOT

TITLE
EARTHWORKS PLAN - STAGE 1
SHEET 1 OF 2

WAPC No.
157597

DRAWING No.
6151-EW1-200

REVISION
0

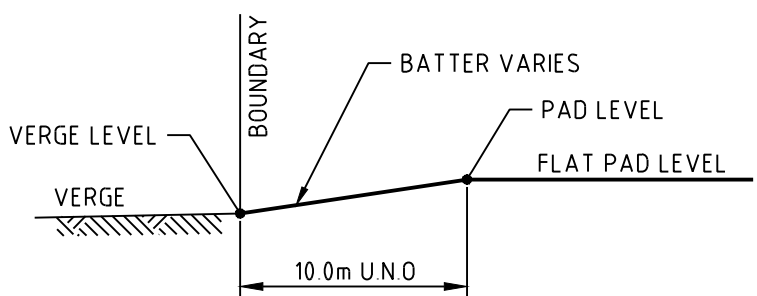
ORIGINAL SIZE
A1

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TYPICAL BATTER TO FRONT OF TRADITIONAL LOTS

SCALE: N.T.S.

LEGEND

DESCRIPTION	SYMBOL
LIMIT OF WORKS BOUNDARY	--- 25.0 ---
FINISHED SURFACE CONTOUR	--- 25.0 ---
EXISTING SURFACE CONTOUR MAJOR	--- 25.0 ---
EXISTING SURFACE CONTOUR MINOR	--- 25.25 ---
FINISHED LOT PAD EARTHWORKS LEVEL UNDER THIS CONTRACT (200mm THICK LAYER OF LIMESTONE WILL BE ADDED ON TOP OF THIS LEVEL AT THE TIME OF BUILDING CONSTRUCTION - BY OTHERS)	(25.00)
EXISTING TREE TO BE RETAINED	(Tree symbol)
EXISTING FENCE	--- 25.0 ---
EXISTING FENCE TO BE REMOVED	--- 25.0 ---
PROPOSED FENCE	--- 25.0 ---
PROPOSED BATTER	--- 25.0 ---

NOTE TO CITY OF COCKBURN
EARTHWORKS BEING CONSTRUCTED ALONG BOUNDARY OF CONSERVATION AREA TO ALLOW PERMANENT FENCING TO BE ERECTED

NOTE TO CITY OF COCKBURN
PROPOSED CLEARING AND EARTHWORKS ALONG BOUNDARY OF CONSERVATION AREA ARE PER CW DRAWING NO 6151-00-SK56 CONTAINED WITHIN THE CONSERVATION MANAGEMENT PLAN

CONTRACTOR TO ERECT STAR PICKET AND WHITE SIGHTER WIRE FENCE ALONG THE FULL LENGTH OF CONSERVATION AREA PRIOR TO START OF CLEARING. FENCE TO BE INSPECTED BY SUPERINTENDENT PRIOR TO START OF CLEARING. PERMANENT FENCING TO BE ERECTED ON BOUNDARY AT COMPLETION OF EARTHWORKS

CONSERVATION AREA - NO ENTRY BY CONTRACTOR

EXISTING GREENWASTE STOCKPILE TO BE REMOVED FROM SITE BY CONTRACTOR TO APPROVED FACILITY. FEES TO BE PAID BY CONTRACTOR

OPPORTUNITY FOR HAUL ROUTE THROUGH URBANSTONE FOR REMOVAL OF SURPLUS SAND

PILATUS STREET

PRECINCT A

PRECINCT B

PRECINCT G

PRECINCT C

PRECINCT D
(ALL ROAD BOXOUT AND SWALES)

URBANSTONE FACILITY - NO ENTRY BY CONTRACTOR

EARTHWORKS TO FINISH NO CLOSER THAN 2m FROM FENCE

CONTRACTOR TO ERECT NEW FENCE BETWEEN APPROX POINTS A, B, C AND D TO MAINTAIN SECURITY OF URBANSTONE FACILITY. ALIGNMENT TO FOLLOW PROPOSED BOUNDARIES

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REMOVE AND REINSTATE FENCING

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EXISTING LOT 701
FUTURE LOT 802

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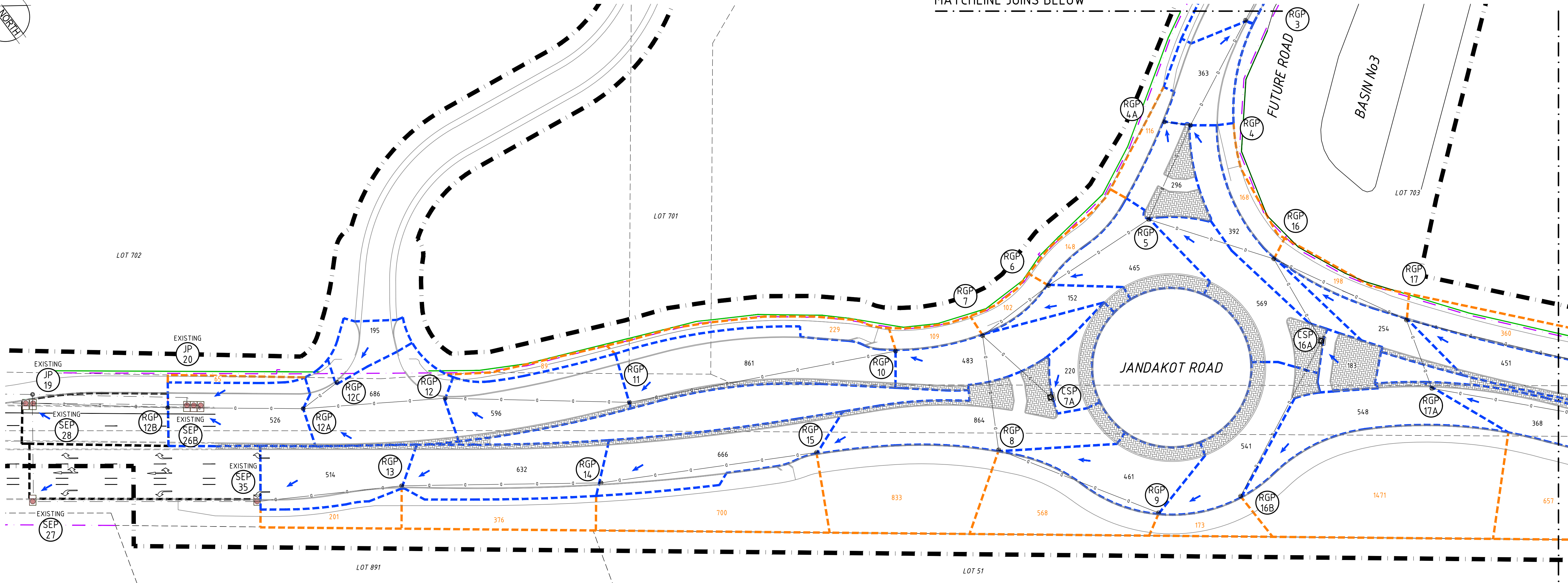
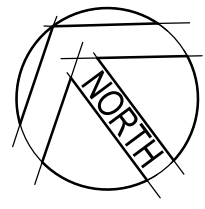
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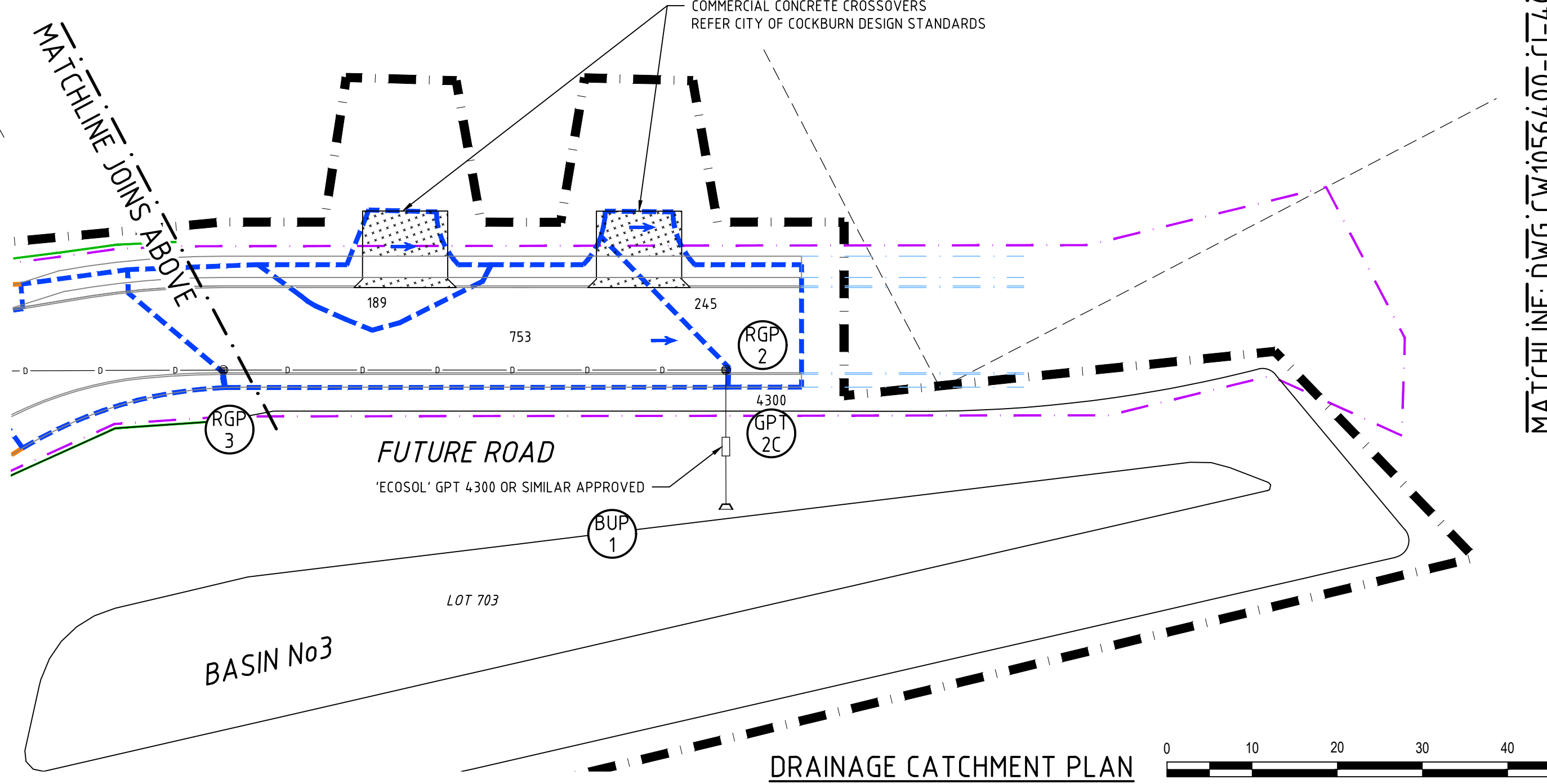
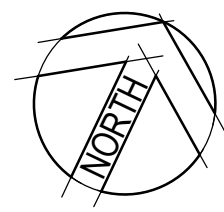


LEGEND:

- WORKS BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- PROPOSED CADASTRAL BOUNDARY
- PROPOSED PRAM RAMP
- PROPOSED KERB
- FUTURE ROAD DESIGN
- EXISTING KERB
- CATCHMENT BOUNDARY
- CATCHMENT VERGE INFILTRATION AT SOURCE
- EXISTING CATCHMENT BOUNDARY
- CATCHMENT GROSS AREA (m²)
- PROPOSED DRAINAGE LINE
- EXISTING DRAINAGE LINE
- FUTURE DRAINAGE LINE
- SHEET FLOW DIRECTION TO TABLEDRAIN / PIT
- TABLE DRAIN AND FLOW DIRECTION
- MEDIAN ISLAND BRICK PAVING
- PIT SIZE (Ø1050 U.N.O.)
- DRAINAGE PIT TYPE (SEE BELOW FOR DETAILS)
- PIT NUMBER
- RECTANGULAR GULLY PIT
- SIDE ENTRY PIT
- COMBINATION SIDE ENTRY PIT
- JUNCTION PIT
- DOUBLE RECTANGULAR GULLY PIT
- DOUBLE SIDE ENTRY PIT
- BUBBLE-UP PIT
- HEADWALL
- EXISTING PIT

DRAINAGE CATCHMENT PLAN

SCALE 1:500



NOTES:

REFER TO DWG CW1056400-CI-406 FOR NOTES



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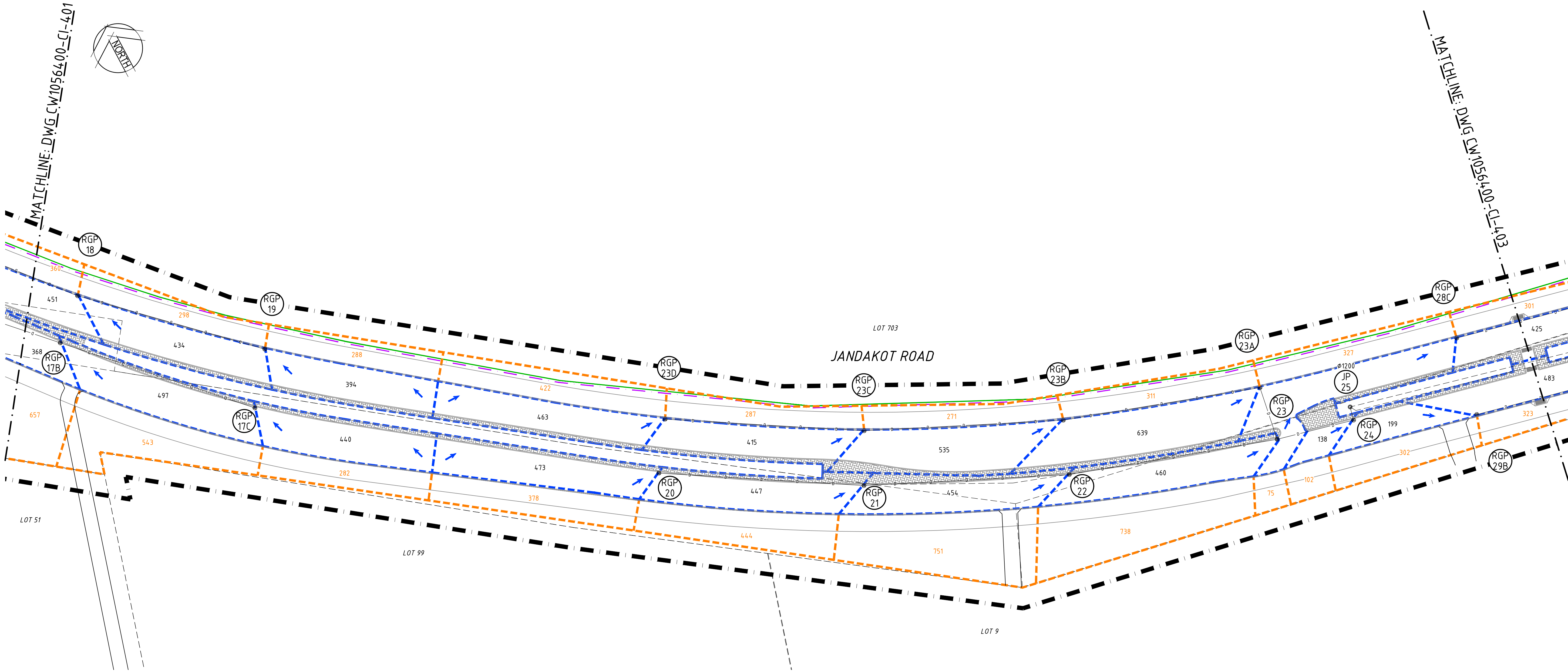


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Checked	C.BENFIELD	Date	18.03.2019
Designed	M.REDWAY	Date	18.03.2019
Verified	M.WRIGHT	Date	18.03.2019
Approved	P.WISEMAN	Date	18.03.2019

Client CITY OF COCKBURN
Project JANDAKOT ROAD DUPLICATION
Title DRAINAGE CATCHMENT PLAN SHEET 1 OF 5

Status	FOR TENDER ONLY			
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Datum	Date	Scale	Size	
A.H.D	14.11.2019	1:250	A1	
Drawing Number				Revision
CW1056400-CI-401				D

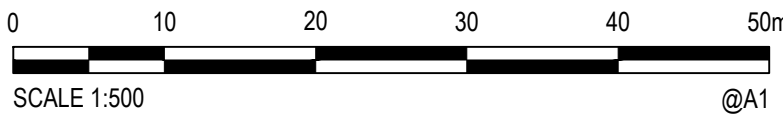


DRAINAGE CATCHMENT PLAN
SCALE 1:500



NOTES:

1. REFER TO DWG CW1056400-CI-406 FOR NOTES
2. REFER TO DWG CW1056400-CI-401 FOR LEGEND



Rev.	Date	Description	Des.	Verif.	Appd.
D	10.03.2020	ISSUED FOR TENDER		PR	MLW PW
C	14.11.2019	MEDIAN BRICKS ADDED		MR	MLW PW
B	08.04.2019	RE-ISSUED FOR APPROVAL		MR	MLW PW
A	18.03.2019	ISSUED FOR APPROVAL		MR	MLW PW



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Verified M.WRIGHT	Date 18.03.2019
Approved P.WISEMAN	Date 18.03.2019

Client CITY OF COCKBURN
Project JANDAKOT ROAD DUPLICATION
Title DRAINAGE DRAINAGE CATCHMENT PLAN SHEET 2 OF 5

Status			
FOR TENDER ONLY			
NOT TO BE USED FOR CONSTRUCTION PURPOSES			
Datum	Date	Scale	Size
A.H.D	14.11.2019	1:500	A1
Drawing Number			Revision
CW1056400-CI-402			D

JANDAKOT ROAD AND BERRIGAN DRIVE NETWORK															
Storm	Upstream Node Name	Downstream Node Name	Length m	Diameter (Height) m	Upstream Invert Elevation m	Downstream Invert Elevation m	Upstream Ground Elevation (Spill Crest) m	Downstream Ground Elevation (Spill Crest) m	Roughness	Entrance Loss	Exit Loss	Max Velocity m/s	Max Flow cms	Conduit Slope	Time to Peak hr
10y30m	RGP12B	EX 28A	33.200	0.300	26.29	26.22	27.00	27.17	0.013	0.5	0.000	0.760	0.077	0.210	0.267
10y30m	RGP12	RGP12A	34.900	0.300	26.45	26.40	27.47	27.17	0.010	1.3	0.000	0.780	0.042	0.140	0.267
10y30m	RGP11	RGP12	45.100	0.300	26.68	26.47	27.96	27.47	0.010	2.1	0.000	0.830	0.030	0.470	0.261
10y30m	RGP10	RGP11	66.400	0.300	27.04	26.70	29.09	27.96	0.010	5.0	0.000	0.750	0.011	0.510	0.261
10y30m	RGP13	EX SEP25	35.500	0.300	26.62	26.56	27.52	27.10	0.010	1.3	0.000	0.800	0.048	0.170	0.267
10y30m	RGP14	RGP13	48.800	0.300	26.86	26.62	27.95	27.52	0.010	2.1	0.000	0.850	0.034	0.490	0.261
10y30m	RGP15	RGP14	53.300	0.300	27.18	26.88	28.47	27.95	0.010	5.0	0.000	0.770	0.019	0.560	0.261
10y30m	RGP12A	RGP12B	33.200	0.300	26.38	26.31	27.17	27.00	0.013	1.3	0.000	0.670	0.066	0.210	0.267
10y30m	RGP12C	RGP12A	20.800	0.225	26.47	26.40	27.29	27.17	0.013	2.1	0.000	0.440	0.009	0.340	0.261

Name	Storm	Area ha	Impervious Percentage %	Volume of Inflow from Runoff Layer m^3	Ground Elevation (Spill Crest) m	Max Water Elevation m	Freeboard m
RGP12B	10y30m	0.053	100.000	11.41	27.00	26.46	0.54
RGP12	10y30m	0.060	100.000	12.94	27.47	26.68	0.79
RGP11	10y30m	0.086	100.000	18.51	27.96	26.83	1.13
RGP10	10y30m	0.048	100.000	10.35	29.09	26.83	2.26
EX SEP25	10y30m	0.051	100.000	11.02	27.10	26.75	0.35
RGP13	10y30m	0.063	100.000	13.54	27.52	26.86	0.66
RGP14	10y30m	0.067	100.000	14.41	27.95	27.02	0.94
RGP15	10y30m	0.086	100.000	18.51	28.47	27.29	1.18
EX 28A	10y30m	0.044	100.000	9.47	27.17	26.37	0.80
RGP12A	10y30m	0.069	100.000	14.85	27.17	26.55	0.62
RGP12C	10y30m	0.041	100.000	8.86	27.29	26.57	0.73

URBAN STONE NETWORK															
Storm	Upstream Node Name	Downstream Node Name	Length m	Diameter (Height) m	Upstream Invert Elevation m	Downstream Invert Elevation m	Upstream Ground Elevation (Spill Crest) m	Downstream Ground Elevation (Spill Crest) m	Roughness	Entrance Loss	Exit Loss	Max Velocity m/s	Max Flow cms	Conduit Slope	Time to Peak hr
10y30m	RGP4A	RGP4	6.4	0.300	29.86	29.82	0.010	5.0	0.000	0.410	0.005	30.160	30.120	29.932	29.871
10y30m	RGP4	RGP3	29.1	0.375	28.37	28.28	0.010	0.5	0.000	1.210	0.112	28.745	28.655	28.668	28.542
10y30m	RGP19	RGP18	47.6	0.300	36.84	35.69	0.010	5.0	0.000	1.150	0.007	37.140	35.990	36.882	35.728
10y30m	RGP18	RGP17	50.0	0.300	35.67	33.59	0.010	2.1	0.000	1.810	0.014	35.970	33.890	35.719	33.652
10y30m	RGP17	RGP16	35.7	0.300	33.57	31.58	0.010	0.5	0.000	2.850	0.044	33.870	31.880	33.652	31.658
10y30m	RGP16	RGP5	32.4	0.300	30.35	30.20	0.010	2.0	0.000	1.630	0.061	30.650	30.500	30.594	30.386
10y30m	RGP5	RGP4	24.8	0.375	28.46	28.39	0.010	1.8	0.000	0.960	0.100	28.835	28.765	28.807	28.668
10y30m	RGP6	RGP5	29.7	0.300	28.61	28.46	0.010	0.5	0.000	0.720	0.031	28.910	28.760	28.825	28.807
10y30m	RGP7	RGP6	20.1	0.300	28.73	28.63	0.010	1.1	0.000	0.820	0.023	29.030	28.930	28.869	28.825
10y30m	RGP7A	RGP7	26.6	0.300	28.93	28.81	0.010	5.0	0.000	0.480	0.004	29.230	29.110	28.981	28.869
10y30m	RGP17C	RGP17B	50.2	0.300	37.16	36.00	0.010	5.0	0.000	1.120	0.008	37.460	36.300	37.206	36.040
10y30m	RGP17B	RGP17A	4.07	0.300	35.98	34.44	0.010	2.1	0.000	1.740	0.016	36.280	34.740	36.037	34.492
10y30m	RGP17A	RGP17	17.8	0.300	34.42	33.59	0.010	1.3	0.000	1.990	0.022	34.720	33.890	34.485	33.652
10y30m	CSP16A	RGP16	23.6	0.300	30.49	30.37	0.010	2.1	0.000	0.500	0.012	30.790	30.670	30.614	30.594
10y30m	RGP16B	CSP16A	43.1	0.300	30.73	30.51	0.010	5.0	0.000	0.630	0.009	31.030	30.810	30.807	30.614
10y30m	RGP8	RGP7	28.8	0.300	28.90	28.75	0.010	2.1	0.000	0.780	0.017	29.200	29.050	29.004	28.869
10y30m	RGP9	RGP8	42.1	0.300	29.14	28.92	0.010	5.0	0.000	0.640	0.009	29.440	29.220	29.216	29.004
10y30m	RGP3	RGP2	59.0	0.375	27.31	27.13	0.010	2.0	0.000	1.050	0.117	27.685	27.505	28.542	28.278
10y30m	RGP2	BUP1	25.8	0.450	26.83	26.70	0.010	1.5	1.000	2.730	0.113	27.280	27.150	28.278	26.762

Name	Storm	Area ha	Impervious Percentage %	Volume of Inflow from Runoff Layer m^3	Ground Elevation (Spill Crest) m	Max Water Elevation m	Freeboard m
RGP4A	10y30m	0.030	100.000	6.45	30.853	29.932	0.921
RGP4	10y30m	0.039	100.000	8.39	30.821	28.663	2.158
RGP19	10y30m	0.039	100.000	8.39	37.843	36.882	0.961
RGP18	10y30m	0.043	100.000	9.24	36.669	35.718	0.951
RGP17	10y30m	0.045	100.000	9.67	34.574	33.651	0.923
RGP16	10y30m	0.025	100.000	5.39	32.588	30.592	1.996
RGP5	10y30m	0.057	100.000	12.25	31.274	28.803	2.471
RGP6	10y30m	0.047	100.000	10.11	30.580	28.822	1.758
RGP7	10y30m	0.015	100.000	3.25	29.809	28.867	0.942
RGP7A	10y30m	0.022	100.000	4.75	30.594	28.981	1.613
RGP17C	10y30m	0.044	100.000	9.45	38.162	37.205	0.957
RGP17B	10y30m	0.050	100.000	10.74	36.983	36.036	0.947
RGP17A	10y30m	0.037	100.000	7.95	35.420	34.485	0.935
CSP16A	10y30m	0.018	100.000	3.90	33.868	30.613	3.255
RGP16B	10y30m	0.055	100.000	11.82	31.730	30.807	0.923
RGP8	10y30m	0.046	100.000	9.89	29.823	29.003	0.820
RGP9	10y30m	0.054	100.000	11.60	31.032	29.216	1.816
RGP3	10y30m	0.036	100.000	7.74	29.890	28.444	1.446
RGP2	10y30m	0.075	100.000	16.09	28.278	27.468	0.810

D	10.03.2020	ISSUED FOR TENDER	PR	MLW	PW	
C	14.11.2019	ISSUED FOR APPROVAL	MR	MLW	PW	
B	08.04.2019	RE-ISSUED FOR APPROVAL	MR	MLW	PW	
A	18.03.2019	ISSUED FOR APPROVAL	MR	MLW	PW	
Rev.	Date	Description	Des.	Verif.	Appd.	



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Designed M.REDWAY	Date 18.03.2019	
Verified M.WRIGHT	Date 18.03.2019	
Approved P.WISEMAN	Date 18.03.2019	
Title DRAINAGE DRAINAGE CALCULATION SHEET 1 OF 3		
Status FOR TENDER ONLY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
Datum A.H.D	Date 14.11.2019	Scale AS SHOWN
Drawing Number CW1056400-CI-413	Size A1	Revision D