Part Two

Explanatory Section

1. Planning Background

1.1 Introduction And Purpose

This Structure Plan comprises an amendment to the existing approved Structure Plan (WAPC Ref: SPN 0468M-1) for Lots 1401 and 1402 Fifty Road, Baldivis, approved by the WAPC in September 2015, with a modified Structure Plan subsequently approved in July 2024.

The original Structure Plan was prepared by Allerding & Associates, with subsequent amendments completed by Rowe Group on behalf of the current landowners.

The purpose of this Structure Plan amendment is to reconfigure the residential layout in the eastern portion of the Structure Plan, east of Nairn Drive, to provide for a contemporary lot product mix within close proximity to the commercial centre. Given the strategic location of the site, an opportunity exists to create a fully integrated residential community that will build on the development currently underway in the Baldivis (North) District Structure Plan area, particularly within the adjoining Spires estate. This results in modifications to the movement network, reconfiguration of public open space, and reallocation of density.

The balance of the Structure Plan will remain generally as approved.

This Structure Plan provides a general planning framework to guide the future subdivision and development of the land in an integrated and cohesive manner.

This report provides an overall context to the Structure Plan (as amended), with specific detail and justification relating to the proposed modifications.

This Structure Plan will supersede the existing approved Structure Plan (SPN 0468M-1).

Refer **Attachment 1** – Existing Approved Local Structure Plan, and **Plan 1** – Proposed Structure Plan.

1.2 Project Team

The following multi-disciplinary project team has been engaged by the Proponent to progress the preparation of the Structure Plan:

Discipline	Consultant
Acoustic	Herring Storer
Civil Engineering	Cossill Webley
Environmental	PGV Environmental
Fire Management	Bushfire Prone Planning
Hydrological	Hyd2O
Landscape	Emerge
Transport	PTG
Town Planning and Design	Rowe Group

Table 4: Project Team

Rowe Group and Aigle Royal Group are the primary point of contact for all matters relating to this Structure Plan.

1.3 Land Description

1.3.1 Location

The subject site is located within the municipality of the City of Rockingham and within the locality of Baldivis (north). The subject site is located approximately 42 kilometres south of the Perth central area, and approximately 10 kilometres west of the Rockingham central area.

The subject site is bound by Fifty Road to the north, Everest Way to the east, and is dissected in a north south direction by the future extension of Nairn Drive. The land to the south and west of the Structure Plan comprises the existing Spires estate, progressively being developed in a staged approach.

Refer **Figure 1** – Regional Location.

Refer **Figure 2** – Local Location.

1.3.2 Area and Land Use

The subject site is currently vacant with existing remnant vegetation.

The nature of the surrounding locality is such that traditional rural pursuits are being replaced by the rapid development of residential and associated urban land uses, in accordance with the current zoning of the land.

There is existing urban residential development to the immediate north of the site, north of Fifty Road. The Baldivis Primary School is also located to the immediate north at the corner of Fifty Road and Nairn Drive, with the Baldivis Recreation Centre and Reserve also located in this general vicinity. Residential development to the west and south, comprising the Spires Estate, is also progressing toward the subject site boundaries.

The Structure Plan is dissected by the reservation for the future extension of Nairn Drive. Works associated with this road extension are yet to commence.

Refer **Figure 3** – Site Plan.

1.3.3 Legal Description and Ownership

The Structure Plan area comprises two lots, legally described as follows:

Lot Number	Deposited Plan	Volume/Folio	Proprietor/s	Approx. Area
1401	416355	2966 / 739	ARP No.22 Pty Ltd	4.47 ha
1402	416355	2966 / 740	ARD No. 1 Pty Ltd	9.05 ha

Table 5: Lot Details

The Structure Plan area comprises a total of approximately 13.52 hectares.

The two lots comprising the Structure Plan are dissected by an existing road reservation for the future extension of Nairn Drive.

Refer **Attachment 2** - Certificates of Title.



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FIGURE 1

REGIONAL LOCATION

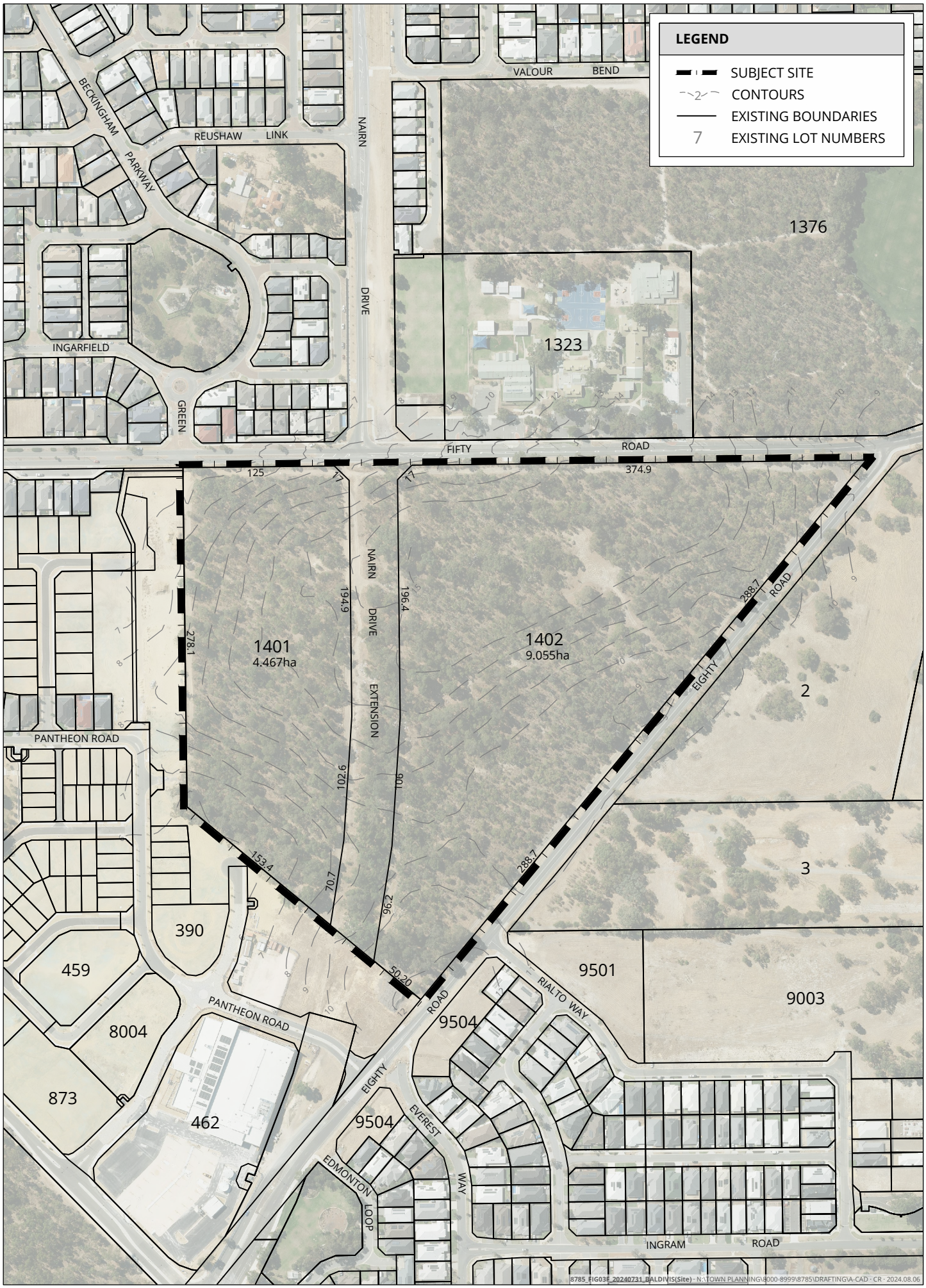


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FIGURE 2

LOCAL CONTEXT



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FIGURE 3

SITE PLAN

1.4 Planning Framework

1.4.1 Zoning and Reservations

The subject site is zoned 'Urban' under the provisions of the *Metropolitan Region Scheme* ('MRS') and 'Development' (Development Area 22) under the provisions of the *City of Rockingham Local Planning Scheme No. 2* ('LPS 2'). The subject site also comprises part of the City of Rockingham Development Contribution Area 2.

LPS 2 requires land within Development Area 22 be subject to the following:

> *An approved Structure Plan together with all approved amendments and detailed area plans, where applicable, shall apply to the land in order to guide subdivision and development.*

The Structure Plan therefore satisfies the above requirement.

The subject site is also dissected by an 'Other Regional Roads' reservation for the future extension of Nairn Drive. This reservation and future road alignment has been considered as part of the Structure Plan.

Refer **Figure 4** - Metropolitan Region Scheme Zoning.

Refer **Figure 5** – City of Rockingham Local Planning Scheme No. 2 Zoning.

1.4.2 Regional and Sub-Regional Structure Plans

1.4.2.1 Perth and Peel @ 3.5 Million and South Metropolitan Peel Sub-Regional Planning Framework

Perth and Peel @3.5 Million seeks to provide a framework for the development of the Perth and Peel regions as the population reaches an estimated 3.5 million by 2050. The document seeks to meet the targets identified under *Directions 2031* and the *State Planning Strategy 2050*. The suite of documents includes the over-arching *Perth and Peel @ 3.5 million* report and four planning frameworks for the Central, North-West, North-East and South Metropolitan Perth sub-regions. The subject site is situated within the South Metropolitan Peel sub-region.

Both *Perth and Peel @ 3.5 Million* and the *South Metropolitan Peel Sub-Regional Framework* identify the subject site as 'Urban', consistent with the zoning of the site under the MRS.

The South Metropolitan population is predicted to more than double by 2050, growing from 523,430 people in 2011 to over 1,264,450 by 2050. Therefore, it will be important to provide areas for urban growth to facilitate the growing population. The development of the subject site as proposed by the Structure Plan will therefore assist in accommodating this growth.

1.4.2.2 Baldivis (North) District Structure Plan

The subject site is located within Precincts 1 and 2 of the *Baldivis (North) District Structure Plan* ('District Structure Plan'), adopted by Council in July 2000. The District Structure Plan outlines the preferred broad land use and district framework for the area. The District Structure Plan allocates the subject site for residential development. Consistent with the proposed amended Local Structure Plan. The subject site is also identified as being part of a neighbourhood centre, comprising mixed use and core retail uses.

The District Structure Plan covers a large area identified primarily for future urban residential development. The purpose of the District Structure Plan is to ensure coordinated development occurs across the various landholdings by identifying key infrastructure such as main roads, commercial nodes and regional open space. A copy of the District Structure Plan is included as **Attachment 3**.

The District Structure Plan is used as a basis to assess the more detailed Local Structure Plans, which are required as a precursor to subdivision and development, in accordance with Clause 4.2.4(a) of LPS 2.

This Structure Plan is generally consistent with the District Structure Plan

Refer **Attachment 3** – Baldivis (North) District Structure Plan.

1.4.2.3 City of Rockingham LPP No.3.1.2: Local Commercial and Activity Centres Strategy (2022)

The City of Rockingham *Local Planning Policy No. 3.1.2 – Local Commercial and Activity Centres Strategy* ('LCACS') was endorsed in September 2022. The LCACS was prepared to replace the City's previous Local Planning Policy 3.1.2 as an interim measure to inform the preparation of the City's new Local Planning Strategy. This policy will remain in force to guide decision making until such time as the LCACS is formally endorsed as part of the Local Planning Strategy.

The overall objective of the LCACS is to guide the use and development of activity centres across the City.

The commercial centre comprising the western portion of this Structure Plan, in conjunction with the Spires estate, is identified in the LCACS as the *North Baldivis Neighbourhood Centre,* situated within Precinct 4. The North Baldivis Centre is one of 15 neighbourhood centres identified across the City of Rockingham.

As a guide, the LCACS identified an initial 5,200m^2 of floorspace for the North Baldivis Neighbourhood Centre, increasing to 8,655m^2 by 2036 and 9,941m^2 by 2041. Of the identified floorspace, approximately 5,500m^2 is contemplated under the adjoining Spires Local Structure Plan for the Baldivis North Centre. The previously approved Structure Plan amendment allows for 4,500m^2 of floor space within the subject land, equating to a total floorspace of approximately 10,000m^2 for the North Baldivis Neighbourhood Centre. This is generally consistent with the ultimate (year 2041) floorspace consideration for the centre under the LCACS.

No changes to the commercial zone or floorspace allocations, as previously approved, are proposed by this Structure Plan amendment.

1.4.3 State Planning Policies

Development of land must have due regard to any relevant WAPC State Planning Policies which are prepared and adopted by the WAPC under statutory procedures set out in Part 3 of the *Planning and Development Act 2005*. The WAPC and Local Government must have due regard to the provisions of State Planning Policies when preparing or amending planning schemes and when making decisions on planning matters.

The proposed amended Structure Plan responds to the following State Planning Policies:

- **State Planning Policy 3 – Urban Growth and Settlement**
  - Consideration of lot product mix and distribution/ location of density;
  - Provision and distribution of amenity throughout the Structure Plan;
  - Consideration of access, both locally and beyond;
  - Considerations for walkability and cycle opportunities; and
  - Consideration of 'neighbourhood character' in street block layout, open space provision and landscape design.
- **State Planning Policy 3.7 – Planning in Bushfire Prone Areas**
  - Preparation of a Bushfire Management Plan to support the Structure Plan; and

- Consideration of fire management in concept planning and allocation of public open space, as well as in the landscape master plan.

- **State Planning Policy 5.4 – Road and Rail Noise**

  - Preparation of an Acoustic Assessment to support the Structure Plan, responding to the noise impacts of the future extension of Nairn Drive, reserved under the MRS as an 'Other Regional Road'. The assessment includes noise mitigation requirements and the identification of lots subject to quiet house design and 'deemed-to-comply' noise insulation packages.

- **State Planning Policy 7 – Design of the Built Environment**

  - Preparation of a Precinct Plan (Concept Stage) to support the proposed Neighbourhood Centre. Further detailed planning and design will be required in accordance with SPP 7 at the development and/or subdivision application stage.

- **State Planning Policy 7.3 – Residential Design Codes**

  - Residential subdivision is to be in accordance with SPP 7.3, based on the R-Code allocations identified on the Structure Plan.

- **State Planning Policy 4.2 – Activity Centres**

  - Development of the North Baldivis Neighbourhood Centre at the subject site.

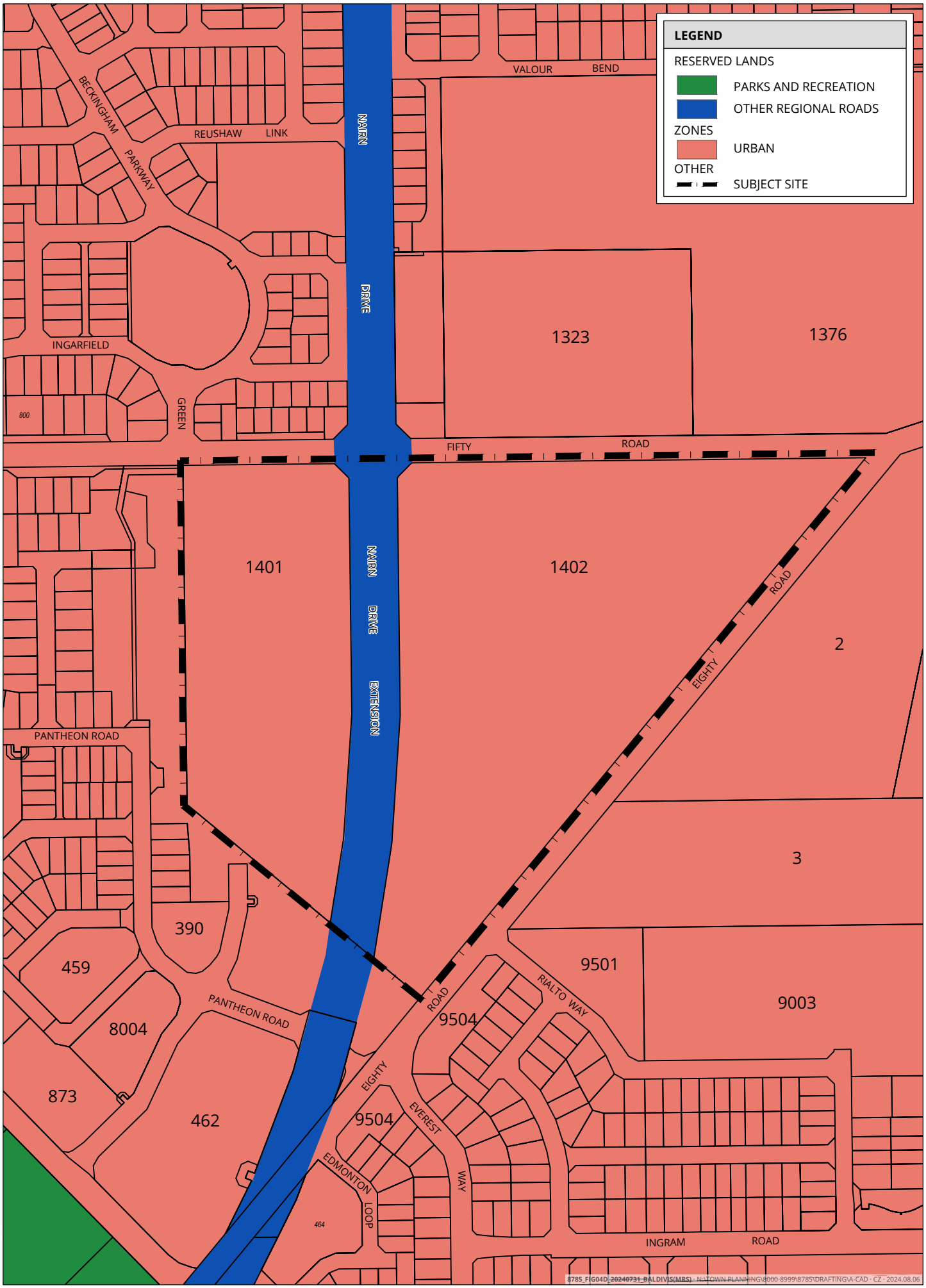
1.4.4 Local Planning Policies

The City of Rockingham Local Planning Policies (where relevant) are to be addressed and considered through the subdivision and detailed design stages.

1.4.5 Other Approvals and Decisions

The original Structure Plan for Lots 1401 and 1402 (formerly Lot 311) Fifty Road, Baldivis was prepared by Allerding and Associates in 2010, adopted by the City of Rockingham in October 2014 and approved by the WAPC in September 2015.

Following a change in ownership, Rowe Group was instructed to prepare an amendment to the Structure Plan, to increase the area of Commercial floorspace within the western portion of the Structure Plan area. That amendment was approved by the WAPC Statutory Planning Committee on 10 July 2024, subject to modifications (WAPC Ref: SPN 0468M-1).

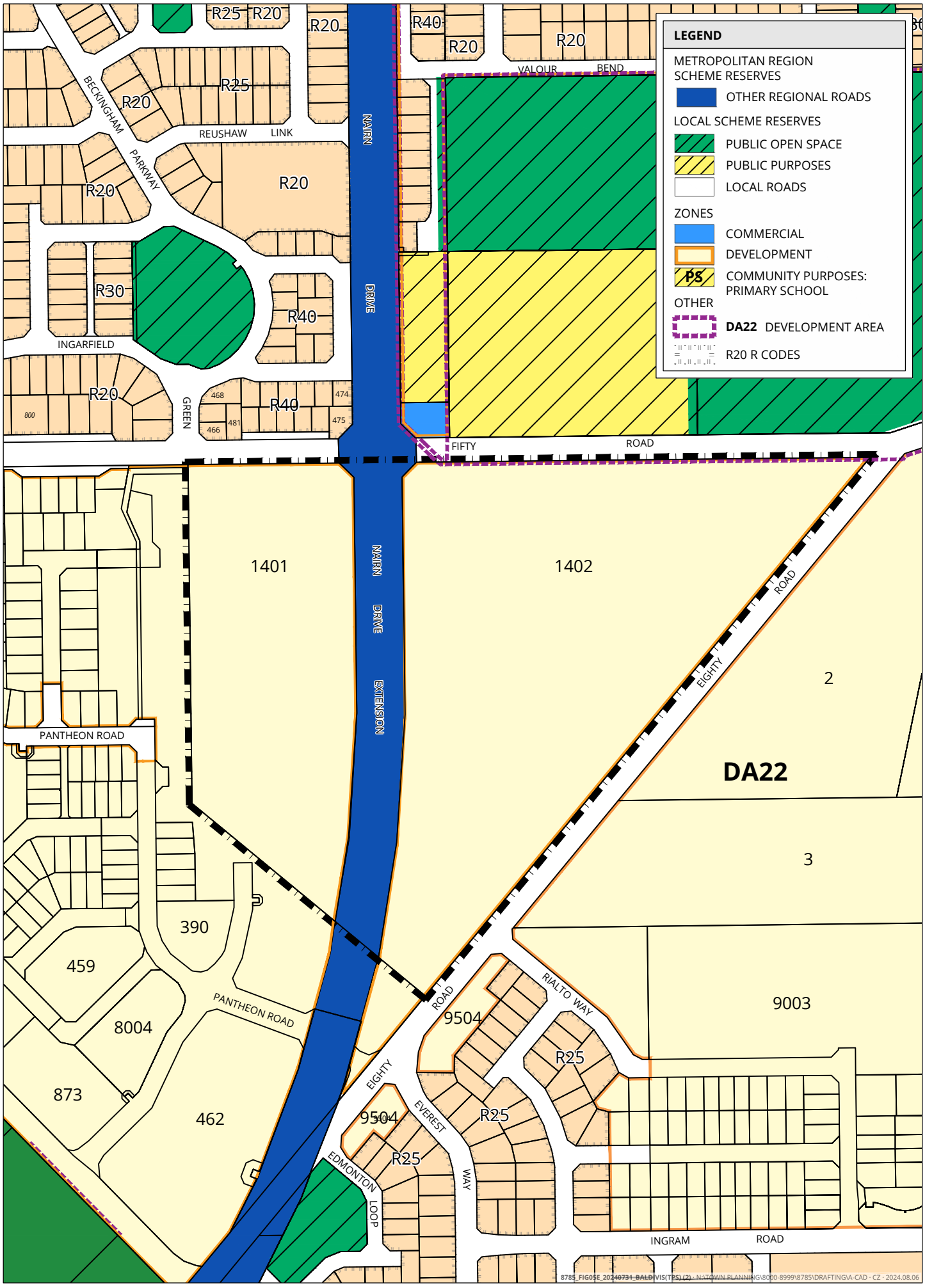


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FIGURE 4

METROPOLITAN REGION SCHEME



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FIGURE 5

CITY OF ROCKINGHAM LOCAL PLANNING SCHEME No.2 ZONING

2. Site Conditions and Constraints

2.1 Biodiversity and Natural Area Assets

2.1.1 Flora and Vegetation

The subject site is situated within the '*Cottesloe Complex – Central and South*' vegetation system. The Cottesloe Complex is described as a "Mosaic of woodland of *Eucalyptus gomphocephala* (Tuart) and open forest of *E. gomphocephala – E. marginate* (Jarrah) – *Corymbia calophylla* (Marri), closed heath on the limestone outcrops".

Notwithstanding the broad vegetation classification, a site specific flora and vegetation survey was undertaken across the subject site in September 2019. The key results of the survey are as follows:

- The site contains approximately 4.4 hectares of native vegetation, of which majority has been impacted by past clearing and frequent fire events;
- A total of 66 plant species were recorded during the flora survey, comprising 39 native species and 27 (41%) introduced species. The total recorded number of plant species is considered low for the vegetation types recorded over the site. This is likely due to past disturbance from clearing and fires;
- No Threatened (Declared Rare) or Priority flora species were recorded on the site. No other species of conservation significance were recorded;
- A small amount of Cotton Bush (*Gomphocarpus fruticous*), listed as 'Declared Pest' under the *Biosecurity and Agriculture Management Act 2007*, was recorded on the site;
- Four native woodland vegetation types were described and mapped on the site; these include:
    - *Eucalyptus marginate* (Jarrah) Low Woodland over *Jacksonia sternbergiana / Acacia pulcchella* Low Shrubland;
    - *Corymbia calophylla* (Marri) Low Woodland over *Jacksonia sternbergiana* Tall Open Shrubland over weeds;
    - *Corymbia calophylla* (Marri) Low Woodland over *Jacksonia furcellata* Open Shurbland over weeds; and
    - *Eucalyptus gomphocephala* (Tuart) Low Woodland over *Jacksonia sterbergiana/ J.furcellata* Shrubland over weeds.
- The vegetation across the site was mapped as being in a Degraded Condition in accordance with the Keighery assessment system. Whilst the upper tree and large shrub canopies were intact, the understorey has a high weed species component.
- The low species richness and high weed coverage across the site means the vegetation is not able to be accurately assigned a Floristic Community Type;
- The vegetation is not part of the Banksia Woodlands of the Swan Coastal Plain TEC. This is due to the absence of any of the four key Banksia tree species on site as dominant tree canopy; and
- The vegetation containing Tuart trees is not representative of the Tuart Woodlands and Forests of the Swan Coastal Plain TEC, due to the poor condition of the understorey and small size of the areas containing Tuart trees.

The land is proposed to be cleared to facilitate the development of the site for residential purposes. There are, however, opportunities to retain some vegetation within areas of public open space and potentially within road reserves, subject to detailed design. This will be further explored at the detailed design phase as part of the subdivision process.

A review of the Bush Forever site database has not identified any Bush Forever sites on the subject land or immediate surrounds.

Refer **Attachment 4** – Flora and Vegetation Survey.

2.1.2 Fauna

The subject land is not part of an interconnected area of bushland (surrounded predominantly by urban development), it contains no wetland areas and the overall site area (13.52 hectares) is of a relatively limited size. As such, although remnant bush remains within the site, the locality is not conducive to fauna habitat.

Notwithstanding, the subject site has been identified as containing habitat for Black Cockatoo species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* ('EPBC Act') The three listed species of Black Cockatoo are:

- Carnaby's Black Cockatoo (*Calytorhynchus latirostris*) (Endangered);
- Baudin's Black Cockatoo (*Calyptorhynchus baundinii*) (Vulnerable); and
- Forest Red-Tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable).

2.1.3 Black Cockatoo Assessment

A targeted Black Cockatoo Habitat Assessment has been undertaken by PGV Environmental in accordance with the EPBC Act Referral Guidelines for three threatened Black Cockatoo species, being the Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-Tailed Black Cockatoo The assessment reviews any Black Cockatoo habitat at the subject site, maps any significant vegetation for feeding and breeding of Black Cockatoos, and makes recommendations on mitigating any impact on Black Cockatoo species. Refer **Attachment 5** – Black Cockatoo Assessment.

A site visit was undertaken by PGV Environmental on 16 June 2016. The site was traversed on foot and information on Black Cockatoo foraging, roosting and breeding habitat was assessed. The extent, type and quality of the vegetation present, including the presence and extent of plants known to be used by Black Cockatoos, was investigated during the site inspection. The quality of the vegetation was determined in the context of foraging habitat for Black Cockatoos. During the site visit, a search for feeding signs or feeding debris such as 'chewed' Marri and Jarrah nuts was undertaken.

The assessment concludes the loss of the majority of the vegetation across the subject site to facilitate the proposed future development will not have a significant impact on the Black Cockatoo species. Notwithstanding, a referral to the Department of Environment and Sustainability under the EPBC Act will be lodged in due course.

2.2 Landform and Soils

2.2.1 Topography

The subject site is gently undulating with the elevation ranging from 10 to 14 metres AHD. The highest point occurs in the north near Fifty Road and the lowest point occurs in the south west corner of the site along Everest Way.

2.2.2 Soils

The subject site is mapped as part of the Spearwood System, which has the highest relief of the dune systems on the Swan Coastal Plan. The Spearwood Systems consists of slightly calcareous Aeolian sand remnants from leaching of the underlying Pleistocene Tamala limestone.

The two Spearwood soil units mapped across the site are described as follows:

- *Spearwood S2a Phase*, which are located on the lower slopes of dune ridges and are moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown sub-soils and minor limestone outcrop. This soil unit occurs over most of the site; and
- *Spearwood S4a Phase*, which are located on flat to gently undulating sand plains. These soils are deep, pale and sometimes bleached sands, with yellow-brown sub-soils. This soil unit is mapped over the south-western corner of the site.

2.2.3 Acid Sulphate Soils

The southern portion of the subject site is mapped as having moderate to low risk of Acid Sulphate Soils ('ASS') occurring within three metres of natural soil surface. The balance of the site is not mapped as having any known risk of ASS occurring. It is therefore anticipated that development of the site can be undertaken with minimal adverse future risk of ASS occurring.

Notwithstanding, any management measures required to address any potential risk from ASS will be further explored prior to subdivision, and will be subject to more detailed engineering and environmental advice at that time.

2.2.4 Contamination

A review of the Department of Water and Environmental Regulation Contaminated Sites Database does not identify the subject site as being a known or suspected contaminated site.

2.3 Groundwater and Surface Water

2.3.1 Groundwater

Preliminary advice from the Perth Groundwater Atlas indicates the nominal groundwater level is at RL 2 metres AHD, with a 0.5 to 3 metre fluctuation due to seasonal variation and flow westwards.

There are four DWER long-term monitoring bores around the site, with monitoring results indicating there is a declining pattern of groundwater levels.

Groundwater levels for the subject site, based on data from the *Lower Serpentine Hydrological Report* (2015), range from 3.9 metres AHD in the east and falling to 3.7 metres AHD in the west. The separation from natural surface ranges from 2.3 to 11.2 metres below the surface.

2.3.2 Surface Water

The subject site has a relatively simple surface water drainage regime, with a punctuated high point towards the northern middle of the site and couples with relatively high permeability soils. There is little evidence of surface flows across the site.

The subject site is not affected by regional flood levels.

There are no wetlands mapped over the subject site or immediate surrounds.

2.4 Bushfire Hazard

The subject site is identified on the Department of Fire and Emergency Services (DFES) mapping as being bushfire prone. A Bushfire Management Plan ('BMP') has therefore been prepared for the site in support of this Structure Plan, with a copy provided at **Attachment 6.**

The bushfire hazard impacting the subject site is primarily occurring from within the site boundary. Given this, the BMP has been prepared on the basis of a post-development vegetation classification, being either cleared or managed to a 'low threat' state. Given timing for the development of the surrounding land is unknown, the BMP also assumes the vegetation outside the site will remain in its current condition for the foreseeable future.

On the basis of the above, the Bushfire Attack Level ('BAL') Assessment indicates the majority of the site can achieve a rating of BAL-29 or less, with the site primarily capable of achieving BAL-Low (and BAL 12.5 within the easternmost portions of the site). There is a small portion of the site along the eastern boundary which is impacted by a BAL-40 rating. Residential lots in this location will therefore need to consider Asset Protection Zone setback requirements, with a restriction on habitable buildings in that part of the lot, to ensure a maximum rating of BAL-29 within the developable area. This can be appropriately managed through Restrictive Covenants, imposed through a condition of subdivision approval.

Part 1 of the Structure Plan includes specific requirements relating to notifications on Title, Local Development Plan requirements and other requirements in accordance with the Bushfire Management Plan.

Refer **Attachment 6** – Bushfire Management Plan.

2.5 Heritage

The *Aboriginal Heritage Act 1972* ('AHA') was introduced in Western Australia in 1972 to protect Aboriginal Heritage. Since the AHA, there has been associated legislation introduced, however in November 2023 the AHA was restored as the legislation that manages Aboriginal heritage in Western Australia, with simple and effective amendments drawn from feedback over years of consultation. The AHA guidelines are available to assist in determining whether an intended land poses a risk of committing an offence under the Act.

Original investigations of the Department of Indigenous Affairs Heritage Sites Database identified the database does not include any registered sites within the subject site. However, as part of formal advertising of the original Structure Plan, comment was provided by the Department of Indigenous Affairs in regard to the property containing *Aboriginal Heritage Site DIA 4323* (Gas Pipeline 2).

The investigation of the file at the time of writing the original Structure Plan revealed the following findings in *A report of an Aboriginal Heritage Assessment of a proposed clay borrow pit, Mundijong Road, Wellard* dated June 2001 states:

> *The site is located on Dog Hill immediately on the south-eastern corner of the junction of St Albans Road and Dog Hill Road…However the Aboriginal Affairs Department has determined that the location in the site file is insufficient to accurately or confidently determine the location of the site is described as being concentrated on a 9m high and 200m long crescent shaped sand slope immediately on the north-east side of a large swamp area and the WANG pipeline to Dongara runs 50m to 100m to the east of this slope. It is not entirely clear from the information contained in the site file, but it would appear that all of the artifactual material was collected from this site at the time of recording (February 1979) such that this site also probably no longer exists.*

It is considered most likely that Registered Site 4323 is located east of Baldivis Road (and possibly east of the Kwinana Freeway), between the swamp and the pipeline and therefore this does not impact upon the subject site.

Notwithstanding, the landowner is aware of their obligations under Section 15 of the AHA, and in the event that cultural material or a new site is discovered during construction work, the landowner will report this information to the *Registrar of Aboriginal Sites*.

2.6 Context and Other Land Use Constraints and Opportunities

2.6.1 Nairn Drive Extension

The subject site is dissected by the future Nairn Drive extension. The land required for the future road has already been reserved under the MRS as an 'Other Regional Road' and created within its own Title. Both the existing approved Structure plan and proposed amended Structure Plan provide for the future Nairn Drive extension, with the land use configuration and future road intersections having consideration for the requirements and restrictions of this road. Further consideration in this regard will be undertaken as part of the detailed engineering design at subdivision.

Given the anticipated traffic volumes along the future Nairn Drive, in accordance with *State Planning Policy 5.4 – Road and Rail Noise* ('SPP 5.4'), an acoustic assessment was undertaken for the subject site to determine any impacts on the future residential development as a result of vehicle traffic noise.

The noise modelling undertaken indicates residential lots adjoining Nairn Drive would be impacted by vehicle noise exceeding acceptable limits. In this regard, a 2.2 metre high noise attenuation barrier is recommended for those lots immediately abutting the Nairn Drive reserve, to provide for protected outdoor living areas. Where lot orientation and dwelling design provide for the protection of outdoor living areas (ie. lots fronting Nairn Drive where outdoor living areas would typically be located at the rear and therefore protected by the dwelling), the noise attenuation barrier may not be required along the Nairn Drive boundary.

Quiet house design packages will also be applicable to other lots within proximity to Nairn Drive. These lots will require Notifications on Title. It is recommended a further assessment be undertaken at subdivision stage to confirm noise mitigation and quiet house design requirements based on detailed design.

Refer **Attachment 7** – Acoustic Assessment.

3. Land Use and Subdivision Requirements

3.1 Land Use

The Structure Plan sets out land use, residential densities, public open space, public and private transport provision, environment considerations and servicing requirements.

The proposed Structure Plan comprises residential development with density codes ranging from R30 to R60, and associated areas of public open space. The western portion of the Structure Plan also includes an area of Commercial zoned land, approved under the existing Structure Plan (WAPC Ref: SPN 0468M-1), and forming part of the Baldivis North Neighbourhood Centre.

The following describes the design response underpinning the Structure Plan, primarily for that land comprising the proposed Structure Plan amendment, and addresses the relevant elements of *Liveable Neighbourhoods*. Please also refer to the Land Use Summary Table provided within the Executive Summary on Page IV of this report.

Refer **Plan 1** – Structure Plan (as amended)**.**

3.2 Public Open Space

Public Open Space is provided generally in accordance with the existing approved Structure Plan.

Public Open Space is dispersed across the Structure Plan area in four parcels, comprising two local parks west of Nairn Drive, and one local park and one neighbourhood park east of Nairn Drive. The public open space areas comprise a total of approximately 1.32 hectares, which equates to approximately 11.56% of the gross subdivisible area (comprising approximately 8.14% unrestricted open space, approximately 1.89% of restricted open space, and approximately 1.5% as dedicated drainage (non-credited)). The restricted open space comprises the drainage basins, to be incorporated as part of the landscaping design to provide for passive recreation.

Refer **Figure 6** – Public Open Space Plan

Refer **Figure 7** – Public Open Space Schedule.

Refer **Attachment 8** – Landscape Concept Plan.



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FIGURE 6

PUBLIC OPEN SPACE PLAN

Lot 1401 and Lot 1402 Fifty Road, Baldivis - Public Open Space Schedule

7/04/2024			
Site Area (Structure Plan Boundary)			135,216
Less			
nil			
Net Site Area			**135,216**
Deductions			
Commercial Zone	18,592		
Dedicated Drainage (first 15mm)	1,758		
Total		20,350	
Gross Subdivisible Area			**114,866**
POS @10%			11,487
Public Open Space Contribution			
May comprise:			
Min 80% unrestricted POS		9,189	
Min 20% restricted use POS		2,297	
Total Required POS			**11,487**

POS Reference Number	Total Area (m^2)	Dedicated Drainage (m^2)	Restricted POS (m^2)	Unrestricted POS (m^2)
1	850	243	260	347
2	1,057	200	312	545
3	888	192	68	628
4	10,482	1,123	1,531	7,828
Total	**13,277**	**1,758**	**2,171**	**9,348**
Percentage of gross subdivisible area	**11.6%**	**1.5%**	**1.89%**	**8.14%**

Notes:

1. This Public Open Space Schedule is based on the Local Structure Plan Concept prepared by Rowe Group (Plan ID: 8785-CON11E_20241120)
2. Restricted Open Space area calculated on basis of 5 yr ARI (20% AEP) area less the 1 yr ARI (first 15mm) drainage area
3. 1 yr ARI (first 15mm) drainage is considered dedicated drainage and is included as a deduction to site area and not credited towards Restricted Open Space
4. Site area based on Landgate Lot areas
5. Drainage areas based on HyD20 Plan Ref: H24018 dated 20241120

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3.3 Residential

The amended Structure Plan allocates a range of residential density codes across the site, ranging from R30 to R60, providing for a diversity in housing choices and levels of affordability. The higher densities are allocated in areas of high amenity and access, situated along the Nairn Drive extension, fronting the future neighbourhood centre, and within close proximity to public open space.

The western portion of the proposed Structure Plan remains consistent with the existing approved Structure Plan, with a proposed reallocation of density within the eastern precinct, modified to reflect the amended residential lot layout.

The amended Structure Plan proposes a base density code of R30, with densities in the eastern precinct, primarily along the Nairn Drive extension, increasing from R20-25 to R60. The increase in density has been proposed to allow for a greater flexibility in providing a diversity of housing product, consistent with current market requirements, as well as to deliver the densities required under the Planning Framework.

Based on the density codes allocated and indicative concept planning undertaken for the site, the Structure Plan has the potential total yield up to approximately 228 lots (subject to detailed design), delivering an approximate density of 34 dwellings per residential site hectare, and 16.8 dwellings per gross urban hectare. These densities are consistent with the targets set out under both Liveable Neighbourhoods and the Planning Frameworks. Notwithstanding the site being capable of achieving these densities, the actual densities delivered as part as part of the detailed design will be subject to number of design factors, including lot shape, access requirements, market demand and dwelling design requirements.

Indicator	Calculation
Gross Urban Area	13.52 hectares
Gross Subdivisible Area (Residential)	11.49 hectares
Net Residential Area	6.69 hectares
Total estimated dwellings (excluding 'Neighbourhood Centre')	228 dwellings
Estimated Gross Residential Density (Dwellings per Gross Urban area)	16.8 du/ha
Estimated Net Residential Density (Dwellings per Net Residential area)	34 du/ha
Estimated population (at an average of 2.9 people per household).	661 people

Table 6: Residential Density Calculations

3.3.1 Local Development Plans

A Local Development Plan is required, as a condition of subdivision approval, in the following circumstances:

- Lots with an area of 260 square metre or less;
- Grouped Housing sites;
- Irregular shaped lots;
- Lots where specific vehicles access and egress control is required;
- Lots abutting and/or fronting public open space;
- Lots abutting and/or fronting commercial zoned land;
- Lots fronting Nairn Drive and Fifty Road;
- Lots with particular site constraints;
- Lot subject of a notification on Title;
- Lots with a BAL Rating of 12.5 or greater; and
- Lots that require quiet house design for noise attenuation through deemed-to-comply noise insulation packages, and/or lots requiring specialist acoustics.

For residential development, Local Development Plans are to address, as a minimum, the following:

- Dwelling orientation;
- Type of fencing;
- Location of carports/garages and vehicular access;
- Surveillance;
- Setback requirements;
- Solar orientation; and
- Requirements for dwelling construction compliant with an approved Bushfire Management Plan and Noise Management Plan.

In preparing Local Development Plans, the design responses and interface treatments between the subject site and the adjoining Spires estate will need to be considered to ensure an effortless transition between the two developments, however noting the different design objectives of two estate to create individual character and sense of place.

For Commercial development, Development Applications are to address, as a minimum, the following:

- Pedestrian connectivity and permeability;
- Vehicle access and egress;
- Weather protection;
- Façade treatments;
- Street activation;
- Car parking; and

- Landscaping

3.4 Movement Networks

3.4.1 Existing Road Network

Fifty Road

Fifty Road runs along the northern boundary of the subject site and provides an east/west connection between Mandurah Road and Baldivis Road.

Fifty Road is classified as a Local Distributor under the Main Roads WA Functional Road Hierarchy, and is currently constructed as a two-way, two-lane road with an 8.4 metre wide carriageway and a 20 metre wide reserve. Fifty Road has capacity to carry up to 7,000 vehicles per day in a residential context and up to 15,000 vehicles per day in a town centre context.

It is understood the current 20 metre reserve is to be widened to 24 metre to cater for a road of similar cross section to a Neighbourhood Connector A type road, but to also allow embayed parking in accordance with Liveable Neighbourhoods. The Structure Plan makes allowance for this widening.

Everest Way (formerly Eighty Road)

Everest Way runs north/south along the eastern boundary of the subject site and connects with Safety Bay Road in the south, providing access to the Kwinana Freeway. Everest Way connects with Fifty Road at a T-junction under Give way control.

Everest Way is classified as a Local Access Road under the Main Roads WA Functional Road Hierarchy, and has a 7 metre wide carriageway and a 20 metre wide reserve. Traffic volumes along Everest Way are estimated to be approximately 4,500 vehicles per day.

Nairn Drive (Future Extension)

The subject site is dissected by the future Nairn Drive extension, which will provide a sub-regional connection through the Baldivis locality between Mundijong Road in the north to Paganoni Road in the south. The land required for the future road has already been reserved under the MRS as an 'Other Regional Road' and created within its own Title.

Nairn Drive is to ultimately be a dual carriageway (four-lane) road, with a 40 metre wide road reserve. The cross-section is equivalent to an Integrator A under Liveable Neighbourhoods.

The intersection of Nairn Drive and Fifty Road at the northern boundary of the subject site is expected to be controlled by either a roundabout or traffic signals in the longer term. This will be determined at subdivision stage.

All proposed road intersections with Nairn Drive within the Structure Plan area are required to be left in/left out only, as required by the existing approved Structure Plan.

No direct access from residential lots is permitted on to Nairn Drive.

3.4.2 Proposed Movement Network

The road hierarchy for the Structure Plan provides for simple and efficient vehicle movements through the subject site. The street block lengths are consistent with the requirements of Liveable Neighbourhoods, providing for connectivity and permeability through the site for both pedestrians and vehicles.

The residential road network primarily comprises Access Street C roads with reserves of approximately 15 metres.

The western precinct of the Structure Plan area, subject to an existing approved Structure Plan amendment (WAPC Ref: SPN 0468M-1), services the proposed centre. The outcome proposes a reserve width of 22.4 metres (including embayment parking and a median) between the two commercial cells. This road is proposed to provide a direct connection to Nairn Drive through the neighbourhoods centre, with the introduction of a controlled 3-way intersection.

Consistent with the existing approved Structure Plan west of Nairn Drive, a 'main street' outcome with a reserve width of 22.4 metres (including embayed parking and a median) is provided between the two commercial cells, servicing the Neighbourhood Centre. This road provides a direct connection to Nairn Drive through the Centre, via a left in/ left out controlled intersection.

Immediately surrounding the Centre and connecting through to the Spires Centre (via Yellowstone Road), reserve widths range from 15 metres to 20 metres.

Modelling indicates traffic volumes generated by the Structure Plan are not expected to exceed the maximum acceptable daily flow rates on any existing or proposed roads within and adjacent to the proposed development. The total anticipated trip generation for the Structure Plan is 5380 trips per day.

3.4.3 Public Transport

There are existing bus services running along Fifty Road and Eighty Road/Everest Way, being bus route 568, servicing the Warnbro Train Station. No public transport services are anticipated as a result of the proposed development.

3.4.4 Pedestrian and Cycle Network

Footpaths are proposed on a least one side of all internal roads. Footpaths are to be provided at a width of 2 metres, in accordance with City of Rockingham requirements.

All cycling within the Structure Plan is proposed to be either on-road or on proposed footpaths. Internal traffic volumes are expected to be low enough such that on-road cycling will not pose a high risk to cyclists; with the exception being on the main street, where traffic volumes are expected to be higher around the centre. It is therefore recommended bicycle lanes or sealed shoulders be provided along Yellowstone Road and the Main Street to better provide for on-street cycling.

3.5 Water Management

A Local Water Management Strategy ('LWMS') has been prepared in support of the Structure Plan and is provided at **Attachment 10**.

The LWMS has been prepared in accordance with the design objectives outlined in Better Urban Water Management (2008) and seeks to:

- Maximise water conservation by minimising the amount of potable water used outside of homes and buildings to achieve efficient use of Scheme water;

- Provide water quality management by seeking to maintain post-development annual discharge volumes and peak flows to pre-development conditions, and seeking to maintain the surface water and groundwater quality to pre-development levels; and
- To ensure the development does not introduce a health risk from mosquitoes in stagnant water.

3.5.1 Stormwater Management Strategy

The design philosophy for stormwater drainage across the site is to ensure the following:

- Sufficient flood control freeboard to the proposed urban development is limited to pre-development conditions. Additional stormwater that will be generated on site due to the proposed urban development is to be retained and managed on the site using alternative measures to an end of pipe solution and;
- It meets the policy objectives of City of Rockingham Local Planning Policy *No. 4.3.3 – Urban Water Management*

To achieve this, and in unison with a stormwater drainage piped system, other stormwater management facilities such as rainwater tanks, soakwells, bio-retention infrastructures, swales and compensation basins will be provided to assist in the attenuation of stormwater runoff prior to discharge to downstream outlets where appropriate.

3.5.2 Groundwater Management Strategy

Surface water runoff from the proposed development will be infiltrated at source where possible. The infiltrated water will enter the underlying groundwater system and may ultimately emerge and/or discharge further downstream in surface waters. Whilst the soil profile may treat the infiltrated water and remove some nutrients through natural process, the use of amended soils and bio-retention pockets should be investigated and implemented at the UWMP stage.

To ensure there is no decline in water quality occurring from the likely nutrient sources (lot gardens, stormwater detention basin, and public open space areas), the following measures can be implemented to ensure the infiltrating water is treated to an acceptable water quality:

- Stormwater Detention Basins:

  Final treatment will occur in the downstream vegetated portion of the infiltration basins, since all surface water runoff ultimately reports to vegetated portions of the detention basins, resulting in a concentrated nutrient load, these locations should provide a greater degree of treatment. The vegetation species should be native, have a high nutrient uptake and should be able to survive in dry conditions. Vegetation should be trimmed and/or harvested routinely to encourage growth and continual nutrient uptake.

- Public Open Space:

  Public open space areas should enhance the local environment by utilising native vegetation consistent with the local setting and minimise the use of turf.

  The City of Rockingham require all native plants to be fertilised with a slow release fertiliser. Turf species to be used for public open space areas is the *Pennisetum Clandestinum* (kikuyu Grass). Other grass species are not supported by the City.

- Private Gardens:

Owing to the medium density development (ranging between R30 and R60), coupled with the latest trends in contemporary house designs, there is generally little land available for gardens which favour ground water quality, therefore minimising the leaching of nutrients. However, the use of native vegetation and nutrient retaining soils in gardens are to be encouraged.

- Lot Soakwells:

  Soakwells receive runoff from roofs. This water is of a high quality and can be stored in rainwater tanks for use in toilets, washing machines and gardens. Rainwater, if infiltrated, will not increase nutrient concentrations in groundwater, provided roof gutters are cleaned routinely to inhibit a build-up of nutrients that may potentially enter the soakwell.

3.5.3 Monitoring

The recommended post-development monitoring approach is to install monitoring bores upstream of the groundwater flows, within an area of public open space. Additional monitoring bores will also be installed downstream (of groundwater flow) of the proposed development, also within an area of public open space. The results from upstream and downstream groundwater flows will be measured to determine if the development has successfully implemented stormwater treatment systems, and enable any remediation measures if required. The upstream bores will help isolate ambient pollutant readings which may come from upstream catchments.

3.5.4 Implementation

The following table summarises the commitments, roles and responsibilities for the implementation of the LWMS:

Item	Description	Responsibility	Timing
Water Efficiency	Educational information to purchasers	Subdivider	During lot sales, house design and construction
	Front landscaping package	Subdivider	During lot sales, house design and construction
Stormwater Management	Stormwater infrastructure	Subdivider	Following approval of detailed engineering drawings
	Public Open Space and Drainage	Subdivider	Subdivider until Council takes care and control
Further Work	Urban Water Management Plan	Subdivider	As a condition of Subdivision

Table 7: Local Water Management Strategy Implementation

3.6 Education Facilities

In accordance with the approved District Structure Plan and existing approved Local Structure Plan, no primary or high school sites are proposed for the subject land. The anticipated lot yield for the Structure Plan area does not trigger the requirement for a new primary or high school in this location, in accordance with Liveable Neighbourhoods.

There is an existing public primary school (Baldivis Primary School) situated to the immediate north of the Structure Plan area, at the intersection of Fifty Road and Nairn Drive. It is anticipated the future population of the Structure Plan area will be included within the catchment of that school.

The closest public high school to the Structure Plan area is Baldivis Secondary College, located approximately 4 kilometres to the south.

3.7 Activity Centres and Employment

Generally in accordance with the District Structure Plan and the *City of Rockingham Local Commercial and Activity Centres Strategy* ('LCACS'), and in accordance with the existing approved Structure Plan, the proposed Structure Plan comprises part of the Baldivis North Neighbourhood Centre, shared with the adjoining landholding, being the Spire estate.

The existing approved Structure Plan allows for 4,500m^2 of floor space within the subject land, equating to a total floorspace of approximately 10,000m^2 for the North Baldivis Neighbourhood Centre. This is generally consistent with the ultimate (year 2041) floorspace consideration for the Centre under the LCACS.

Whilst subject to detailed design, the Centre is anticipated to include a combination of Shop/ Retail and Other (large format) Retail uses, such as a supermarket, child care centre, medical centre, food and beverage and other non-retail commercial uses.

No changes to the commercial zone or floorspace allocations, as previously approved, are proposed by this Structure Plan amendment.

Refer **Plan 2**: Commercial Centre Concept Plan.

3.8 Infrastructure Coordination, Servicing and Staging

3.8.1 Sewer

The subject site falls within the catchment of the Baldivis North pumping station, with an existing Water Corporation sewer line running along Fifty Road. The Water Corporation has advised a 375mm high pressure pipeline will be constructed through the subject site along the Nairn Drive alignment. This will connect between the Brownell Cresent Sewerage Pump Station and the Baldivis Sewerage Pump Station.

Provision has been made for wastewater from the locality to be treated at the Water Corporation's Thomas Road treatment facility. Detailed future investigations will be required at the time of subdivision to determine engineering and design requirements to accommodate the development of the subject site.

3.8.2 Water

Water Corporation plans indicate the Baldivis North Structure Plan area is serviced by mains water. A water main currently runs along Eighty Road/Everest Way, and it is proposed the subject site will be serviced from the Water Corporation's Tamworth Hill reservoir on Eighty Road/Everest Way.

3.8.3 Power

Power will be extended into the Structure Plan area from existing surrounding services at the time of subdivision.

3.8.4 Gas

There are no existing WA gas network underground assets / pipes present in the vicinity of the subject site.

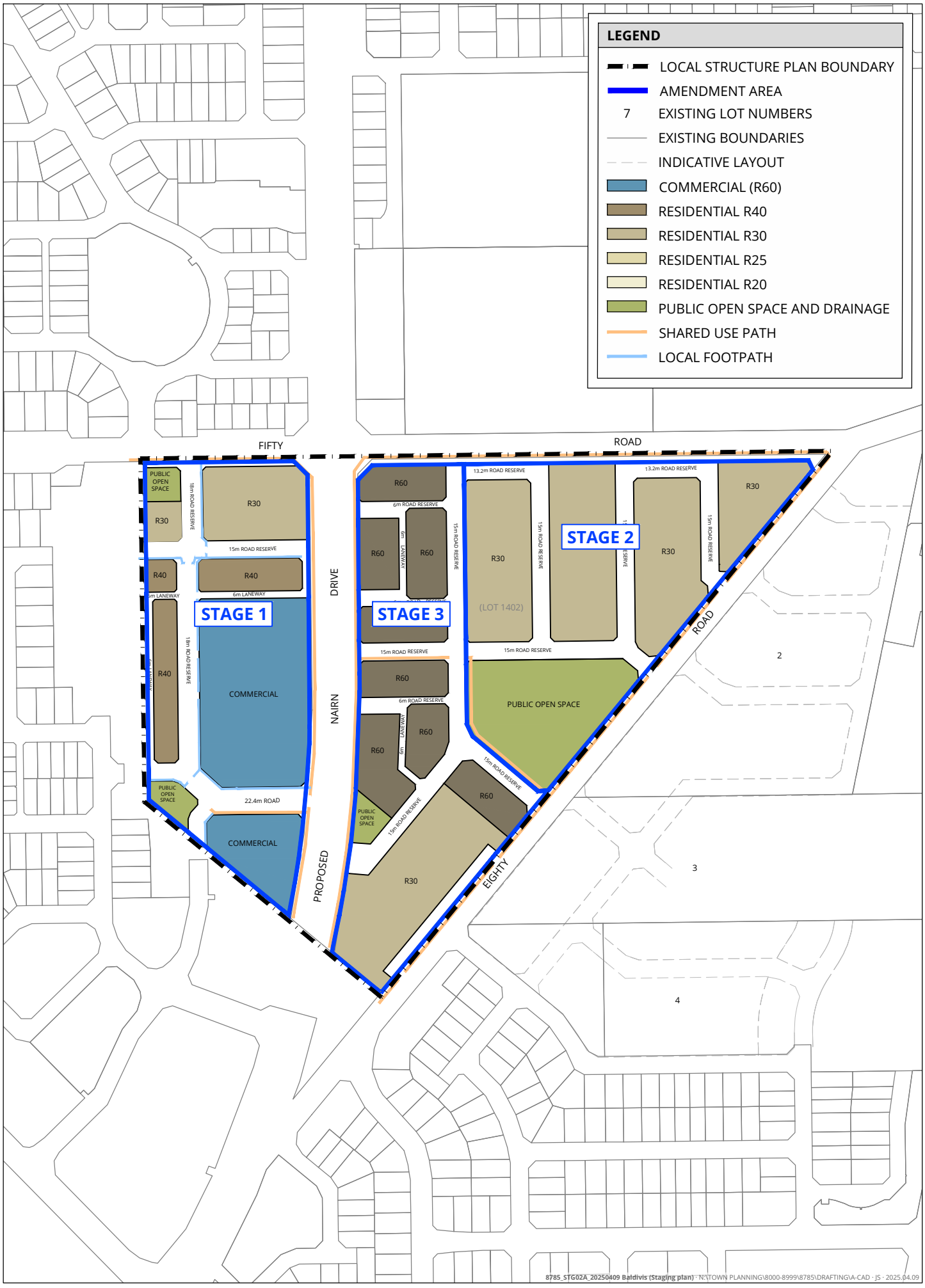
3.8.5 Staging

The development of the Structure Plan area is intended to be delivered in three (3) stages. Development is intended to be initially undertaken on the residential zoned land on the western side of Nairn Drive, moving east to subsequent stages.

Refer **Figure 8** – Indicative Staging Plan.

3.9 Developer Contribution Arrangements

The subject site is situated within the City of Rockingham Development Contribution Area No.2 ('DCA 2') in accordance with Schedule 10 of the City of Rockingham's TPS 2. Future residential development within the Structure Plan area will be required to pay contributions in accordance with DCA 2.



8785_STG02A_20250409 Baldivis (Staging plan) · N:\TOWN PLANNING\8000-8999\8785\DRAFTING\A-CAD · JS · 2025.04.09

0 100 m

SCALE @ A4: 1:4000

FIGURE 8

INDICATIVE STAGING PLAN

ATTACHMENT 1

Existing Approved Local Structure Plan



PLAN 1 - LOCAL STRUCTURE PLAN

LOTS 1401 AND 1402 FIFTY ROAD

BALDIVIS

N

0 50 m

SCALE @ A3: 1:2000

8785-STR-04-G

DRAWN: JS
DATE CREATED: 2024.11.14
PROJECTION: MGA50 GDA2020
CADASTRE: LANDGATE

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ROWE GROUP DESIGN

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ATTACHMENT 2

Certificates of Title

WESTERN AUSTRALIA

REGISTER NUMBER	
1401/DP416355	
DUPLICATE EDITION **2**	DATE DUPLICATE ISSUED **12/8/2019**

VOLUME **2966** FOLIO **739**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

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

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 1401 ON DEPOSITED PLAN 416355

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ARP NO. 22 PTY LTD OF LEVEL 8 225 ST GEORGES TERRACE PERTH WA 6000

(T O210704) REGISTERED 8/8/2019

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

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

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

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

SKETCH OF LAND:	DP416355
PREVIOUS TITLE:	1170-618
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	CITY OF ROCKINGHAM

LANDGATE COPY OF ORIGINAL NOT TO SCALE 08/04/2020 03:40 PM Request number: 60491347

Landgate
www.landgate.wa.gov.au

WESTERN AUSTRALIA

REGISTER NUMBER	
1402/DP416355	
DUPLICATE EDITION **1**	DATE DUPLICATE ISSUED **30/5/2019**

VOLUME **2966** FOLIO **740**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

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

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 1402 ON DEPOSITED PLAN 416355

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ARD NO.1 PTY LTD OF PO BOX 7987 CLOISTERS SQUARE PERTH

(AF O143794) REGISTERED 23/5/2019

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

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
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LANDGATE COPY OF ORIGINAL NOT TO SCALE 08/04/2020 03:40 PM Request number: 60491347

Landgate
www.landgate.wa.gov.au

ATTACHMENT 3

Baldivis North District Structure Plan

Precinct 2

400m walkable catchment

Proposed primary school and associated active public open space

Walkable Catchment Node

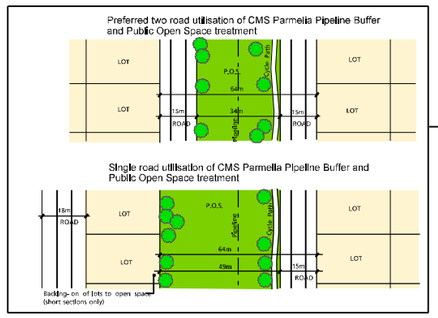
Dress Circle Lots - opportunity to design to capture long distance rural aspects

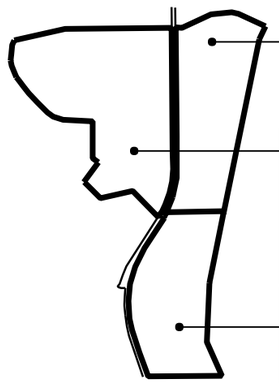
400m walkable catchment to Neighbourhood Centre

Neighbourhood Centre 5500m^2 nla max.

Significant Tuart trees to be protected, widen road reserve to accommodate in verge

Existing wetland to be modified to create permanent lake and drainage feature encompassed within Public Open Space





PRECINCT 1.

Total Area 123.21ha

Deductions

Baldivis Primary School	3.17ha
Walkable Catchment Nodes	0.25ha
Neighbourhood Centre	0.25ha
Drainage (2%)	2.46ha
TOTAL	6.13ha

Total Developable Area 117.08ha
Public Open Space Requirement (10%) 11.71ha
Public Open Space Provided 11.71ha(10%)

PRECINCT 2.

Total Area 184.75ha

Deductions

Primary School	3.50ha
Neighbourhood Centre &	2.50ha
Walkable Catchment Nodes	
CMS Buffer	3.62ha
Drainage	3.69ha
TOTAL	13.31ha

Total Developable Area 171.44ha
Public Open Space Requirement (10%) 17.14ha
Public Open Space Provided 17.14ha(10%)
Note : 50% credit only for areas within CMS 32m buffer subject to development. Refer section 8.3

PRECINCT 3.

Total Area 114.18ha

Deductions

Walkable Catchment Nodes	0.50ha
CMS Buffer	2.70ha
Drainage (2%)	2.28ha
TOTAL	5.48ha

Total Developable Area 108.79ha
Public Open Space Requirement (10%) 10.87ha
Public Open Space Provided 13.33ha(12.2%)
Note : 50% credit only for areas within CMS 32m buffer subject to development. Refer section 8.3

See Modified Plan on Page 2

LEGEND

- NC — NEIGHBOURHOOD CENTRE - RETAIL CORE
- MU — NEIGHBOURHOOD CENTRE - MIXED USE
- CF — COMMUNITY FACILITIES
- MD — MEDIUM DENSITY HOUSING
- N — WALKABLE CATCHMENT NODE
  Potentially includes a retail (corner store) max. 150m diam, medical centre, day care centre, community facility etc.

Precinct 1

Suggested location of Lunch Bar in proposed Light Industrial Area

Potential Rural Service Store site

Dress Circle Lots - opportunity to design to capture rural aspect to east

Design on south side of Kerosene Lane should recognise use of land north of Kerosene Lane for Light Industry

Landmark Public Open Space site. Public viewpoint on high point

400m walkable catchment to potential Rural Store

Community Facilities site

Public Open Space encompassing high point

Walkable Catchment Node

Approved subdivision area, western half affected by poultry farm buffer and pending reconsideration request

Existing Public Open Space containing District Level active and organised recreation

400m walkable catchment to local shopping

Pedestrian link between Tramway reserve and Tamworth Hill

400m walkable catchment

Public Open Space to preserve remnant bushland

Retain section of Fifty Road as services corridor

Precinct 3

Walkable Catchment Node
Proposed Coastal Christian Church community facilities site

400m walkable catchment

Former "Tramway" reserve

Walkable Catchment Node

Unconstructed road. Reserve to be closed

800m walkable catchment to Baldivis District Centre

Tamworth Hill Swamp Wetland is 'conservation' category wetland protected in public open space and utilised for drainage incorporating water sensitive design techniques

Public Open Space to preserve some remnant bushland and provide centrally located recreation opportunity for residential catchment

Walkable Catchment Node

Roads and road reserves and public open space within CMS buffer
(see detail diagram insert)

400m walkable catchment

BALDIVIS (NORTH) DISTRICT STRUCTURE PLAN

100 0 100 200 300 400 m

NORTH

Fig.No.16

Taylor Burrell
Town planning and design
187 Roberts Road Subiaco
PO Box03 West Perth
Western Australia 6872
Telephone (09) 382 2911
Facsimile (09) 382 4586

KEROSENE LANE

ROAD

MANDURAH

FORMER NORTH/SOUTH ROAD CONNECTION

P.O.S.

PRIMARY SCHOOL

MD

NC

MD

MD

P.O.S.

P.O.S.

P.O.S.

CF

P.O.S.

MD

P.O.S.

MU

NC

CF

BALDIVIS PRIMARY SCHOOL

NC

MD

NC

MU

CF

MD

P.O.S.

MCDONALD RD

CMS

FUTURE

9 8 7 6 5 1 700 701 10 2 12 11 1 10 9 3 4 5 6 52 305 53 299 306 55 16 101 54 100 51 14 15 30 31 53 55 56 18 308 309 311 2

0 50 100 150 200 250 300m

SCALE 1:6000
ORIGINAL PLAN SIZE: A3

NORTH

Australian Association of Planning Consultants

Allerding & Associates

DRAWING NUMBER: NLV ROC SP

DATE: 26.09.2006

310A Newcastle Street, Perth W.A. 6000
PH: (08) 9328 5555 FAX: (08) 9328 5559
www.planningwa.com

PROPOSED MODIFICATIONS TO BALDIVIS (North) DISTRICT STRUCTURE PLAN - Option 2

LOTS 1, 3, 700 & 703 MANDURAH ROAD
BALDIVIS
for National Lifestyle Villages

ATTACHMENT 4

Flora and Vegetation Survey

LOT 1401 FIFTY ROAD, BALDIVIS

FLORA AND VEGETATION SURVEY

Prepared for:	ARD No. 1 Pty Ltd
Report Date:	28 November 2019
Version:	1
Report No.	2019-479

pgv ENVIRONMENTAL

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Tables

Table 1: Statement of Botanical Survey Conditions

Table 2: Conservation Significant Flora Identified in Database Searches

Table 3: Likelihood of Identified Significant Flora Species Occurring on the Site

Table 4: Threatened and Priority Ecological Communities likely to occur within 5km of the Site

Table 5: Vegetation Types on the Site

Table 6: Vegetation Condition Rating Scale

Plates

Plate 1: Historical Aerial Photography from1953

Plate 2: Historical Aerial Photography from 2010

Figures

Figure 1: Site Location

Figure 2: Site Boundary

Figure 3: Vegetation Types

Appendices

Appendix 1: DBCA Database Search Reports

Appendix 2: Naturemap Report

Appendix 3: Protected Matters Search Tool Report

Appendix 4: Conservation Codes

Appendix 5: DBCA TEC/PEC Database Search

Appendix 6: Species List

Appendix 7: Quadrat Data

1 INTRODUCTION

1.1 Site Location

Lot 1401 Fifty Road, Baldivis (the site) is located in the City of Rockingham approximately 40km south of the Perth Central Business District (Figure 1). The site is close to the south-west corner of the Fifty Road and Everest Way intersection (Figure 2). The site is bounded to the north by Fifty Road, west by residential development, undeveloped land to the south and road reserve for the undeveloped Nairn Road to the east (Figure 2). The site is 4.4667ha in size.

1.2 Background

The site is proposed to be developed for urban residential purposes in accordance with the approved Local Structure Plan. The site is zoned as 'Urban' under the Perth Metropolitan Region Scheme (MRS" and 'Development' under the City of Rockingham Town Planning Scheme No. 2 (WAPC, 2004).

The site currently contain native vegetation over the whole lot.

1.3 Scope of Works

A Detailed Flora and Vegetation Survey of the site was undertaken in accordance with EPA Technical Guidance *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016). The survey included the following:

- Review of DBCA and EPBC databases for Threatened and Priority flora and vegetation;
- Examination of historic and recent aerial photography and contour and soil maps to provisionally identify vegetation types and condition;
- Field survey using quadrats to record native and introduced species as well as a thorough site walkover of any areas of native vegetation;
- Recording of any significant plant species using a hand-held GPS;
- Description and mapping of vegetation types and vegetation condition;
- Compilation of a flora list; and
- Identification of any flora and vegetation of conservation significance.

2 EXISTING ENVIRONMENT

2.1 Land Use

Historically the site was parkland cleared prior to 1953 (Plate 1). The native vegetation on the site has regrown since then but has been subjected to regular fires and is cleared in some areas. The vegetation was burnt in late 2009 or early 2010 as shown in aerial photography from February 2010 (Plate 2). The current condition of the site is similar to that shown in the 2010 aerial photograph.

Plate 1: Aerial Photography from 1953

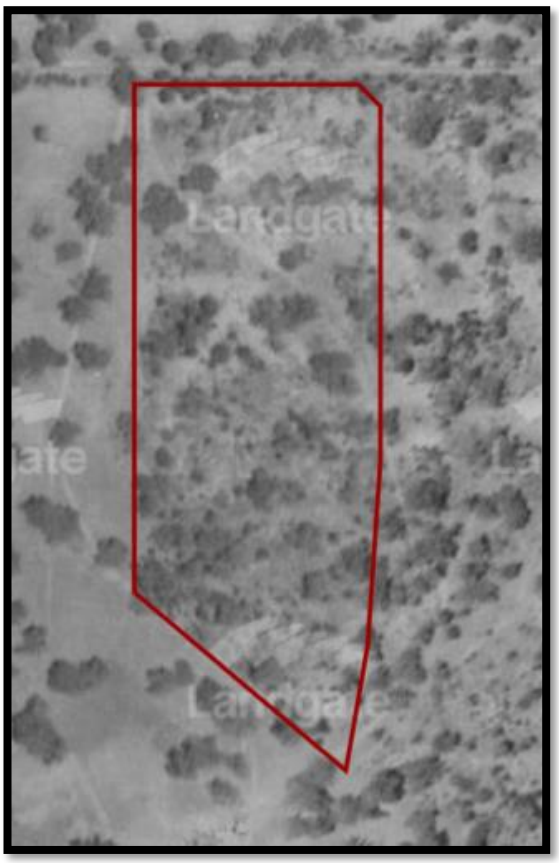


Plate 2: Aerial Photography from 2010



2.2 Topography

The site is gently undulating with elevations of between approximately 10m and 14m Australian Height Datum (AHD) (Figure 2).

2.3 Geology and Soils

2.3.1 Geology

The site is mapped as part of the Spearwood System which has the highest relief of the dune systems on the Swan Coastal Plain (Bolland, 1998). The Spearwood system consists of slightly calcareous Aeolian sand remnant from leaching of the underlying Pleistocene Tamala limestone (Davidson, 1995).

2.3.2 Soils

Two Spearwood soil units are mapped on the site and are described as follows:

- Spearwood S2a Phase (211Sp_S2a) which are located on the lower slopes of dune ridges and are moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils and minor limestone outcrop which is over most of the site; and
- Spearwood S4a Phase (211Sp_S4a) is located on a flat to gently undulating sandplain. These soils are deep, pale and sometimes bleached, sands with yellow-brown subsoils (DPIRD, 2019). This phase is mapped on the south-western corner of the site.

2.4 Hydrology

Groundwater under the site is at approximately 2mAHD (DWER, 2019), which is between 8m and 10m below ground level. Accordingly, there are no surface water features such as wetlands on the site.

3 METHODOLOGY

3.1 Database Searches

Searches of the following databases were undertaken for a 10km radius around the central point of the site prior to the site survey:

- Department of Biodiversity, Conservation and Attractions (DBCA) Declared Rare and Priority Flora database and Threatened Ecological Communities database (Appendix 1);
- DBCA Naturemap Database (DBCA, 2019) (Appendix 2); and
- The Commonwealth Government's Protected Matters Search Tool to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* (DoEE, 2019a). A radius of 5km was used for this database (Appendix 3).

Other available information was also researched to determine any additional studies that had been completed on or near the site.

3.2 Site Survey

A flora and vegetation survey of the site was conducted by Dr Paul van der Moezel of PGV Environmental on 20 September 2019.

The whole site was thoroughly walked to record all species in the survey area. In addition, the species composition, height and cover abundance were recorded in four 10m x 10m non-permanent quadrats.

Most plant species were identified in the field. Some specimens were photographed or taken for identification at the Perth Reference Herbarium or office using standard reference guides.

3.3 Survey Conditions

The conditions that the survey was undertaken in are presented in Table 1 in order to assess the adequacy of the survey. In summary, there were no constraints to the survey.

Table 1: Statement of Botanical Survey Conditions

Issue	Constraints (Y/N)*	Comment
Competency/experience of the consultant conducting the survey	No	Dr Paul van der Moezel has extensive botanical survey experience on the Swan Coastal Plain in the Perth Metropolitan Region.
Proportion of the flora identified^	No	The timing of the survey in late September was optimal to record most of the native species.
Sources of information (historic/recent or new data)	No	The flora in the Perth Metropolitan Region is well documented.
Proportion of the task achieved and further work that may need to be undertaken	No	No follow-up survey required as no Threatened Flora expected to occur in other seasons.

Issue	Constraints (Y/N)*	Comment
Timing/weather/season/cycle	No	The spring survey was optimal for most flora species. 2019 was an average year for ephemeral species, including orchids.
Disturbances (Fire)	No	The fire age of the vegetation was greater than 5 years.
Intensity of survey (e.g. In retrospect was the intensity adequate)	No	The small site and ease of access made for a full coverage.
Completeness (e.g. was relevant area fully surveyed)	No	
Resources (e.g. degree of expertise available for plant identification)	No	Experienced botanist undertook most plant identifications on site.
Remoteness and/or access problems	No	Easily accessible site in the Perth Metropolitan Region.
Availability of contextual (e.g. bioregional) information for the study area.	No	Gibson *et al*. (1994) Floristic Community Types

*Constraints have been rated as Significant, Moderate or No constraints

^Fungi and nonvascular flora (e.g. algae, mosses and liverworts) were not specifically surveyed for during the survey.

4 RESULTS

4.1 Flora Database Searches

A search of the DBCA Threatened Flora Databases: the WA Herbarium database (WAHerb), the Threatened (Declared Rare) and Priority Flora Species List (TFPL) (Appendix 1), Naturemap (Appendix 2) and the EPBC Act Protected Matters Search Tool (Appendix 3) indicates that a number of species that are listed as Endangered, Threatened or Priority have been located within a 5km radius of the site. The results from these database searches are shown in Table 2.

Table 3 lists the likelihood that any of these species could occur on the site based on the soil types and vegetation condition. In summary, one Threatened species (Grand Spider Orchid – *Caladenia huegelii*) and three Priority species have potential to occur on the site.

Table 2: Conservation Significant Flora Identified in Database Searches

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act
Caladenia huegelii	King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid	Schedule 1	Endangered
Drakaea elastica	Glossy-leafed Hammer Orchid	Schedule 1	Endangered
Synaphea sp. Fairbridge Farm (D Papenfus 696)	Selena's Synaphea	Schedule 1	Critically Endangered
Synaphea sp. Serpentine (G.R Brand 103)		Schedule 1	Critically Endangered
Diuris purdiei	Purdie's Donkey-orchid	Schedule 2	Endangered
Drakaea micrantha	Dwarf Hammer-orchid	Schedule 2	Vulnerable
Lepidosperma rostratum	Beaked Lepidosperma	Schedule 2	Endangered
Diuris drummondii	Tall Donkey Orchid	Schedule 3	Vulnerable
Diuris micrantha	Dwarf Bee-orchid	Schedule 3	Vulnerable
Acacia lasiocarpa var. *bracteolata* long peduncle variant (G.J. Keighery 5026)		Priority 1	
Acacia sp. Binningup (G. Cockerton et al. WB 37784)		Priority 1	
Boronia juncea subsp. *juncea*		Priority 1	
Acacia benthamii		Priority 2	
Tetraria sp. Chandala (G.J. Keighery 17055)		Priority 2	
Beyeria cinerea subsp. *cinerea*		Priority 3	
Carex tereticaulis		Priority 3	
Cyathochaeta teretifolia		Priority 3	

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act
Dillwynia dillwynioides		Priority 3	
Jacksonia gracillima		Priority 3	
Schoenus capillifolius		Priority 3	
Sphaerolobium calcicola		Priority 3	
Aponogeton hexatepalus	Stalked Water Ribbons	Priority 4	
Dodonaea hackettiana	Hackett's Hopbush	Priority 4	
Eucalyptus rudis subsp. *cratyantha*		Priority 4	
Jacksonia sericea	Waldjumi	Priority 4	
Parsonsia diaphanophleba		Priority 4	
Stylidium ireneae		Priority 4	
Stylidium longitubum	Jumping Jacks	Priority 4	
Stylidium striatum	Fan-leaved Triggerplant	Priority 4	

Conservation Codes are shown in Appendix 4

Table 3: Likelihood of Identified Significant Flora Species Occurring on the Site

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Caladenia huegelii	King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid	The Grand Spider-orchid prefers sand or clay loam. This species generally does not survive in disturbed areas.	Possible
Drakaea elastica	Glossy-leafed Hammer Orchid	The Glossy-leafed Hammer Orchid prefers low-lying situations adjoining winter-wet swamps. This species does not survive in disturbed areas.	Highly Unlikely – not wetland habitat
Synaphea sp. Fairbridge Farm (D Papenfus 696)	Selena's Synaphea	Selena's Synaphea occurs in sandy with lateritic pebbles near winter-wet flats, in low woodland with weedy grasses.	Highly Unlikely – not wetland habitat
Synaphea sp. Serpentine (G.R Brand 103)		*Synaphea* sp. Serpentine occurs in brown sandy clay.	Highly Unlikely – not clay habitat
Diuris purdiei	Purdie's Donkey-orchid	Purdie's Donkey Orchid occurs in grey-black sand in moist winter-wet swamps.	Highly Unlikely – not wetland habitat
Drakaea micrantha	Dwarf Hammer-orchid	Dwarf Hammer-orchid occurs in grey sands over dark, grey to blackish, sandy clay-loam substrates in winter wet depressions or swamps.	Highly Unlikely – not wetland habitat

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Lepidosperma rostratum	Beaked Lepidosperma	Beaked Lepidosperma is found in peaty sand, clay.	Highly Unlikely – not wetland habitat
Diuris drummondii	Tall Donkey Orchid	The Tall Donkey Orchid grows in low-lying depressions, swamps.	Highly Unlikely – not wetland habitat
Diuris micrantha	Dwarf Bee-orchid	The Dwarf Bee-orchid is usually found on cleared firebreaks or open sandy patches that have been disturbed within Jarrah Banksia woodland or thickets of Spearwood (*Kunzea ericifolia/ glabrescens*) (Williams *et al.,* 2001).	Unlikely as vegetation types not similar
Acacia lasiocarpa var. *bracteolata* long peduncle variant (G.J. Keighery 5026)		This variant of *Acacia lasiocarpa* occurs in grey or black sand over clay in swampy areas, winter wet lowlands.	Highly Unlikely – not wetland habitat
Acacia sp. Binningup (G. Cockerton et al. WB 37784)		*Acacia* sp. Binningup occurs in sand.	Possible
Boronia juncea subsp. *juncea*		*Boronia juncea* subsp. *juncea* occurs in sand in low scrub	Unlikely – low scrub vegetation not present
Acacia benthamii		*Acacia benthamii* grows on sand, typically on limestone breakaways	Highly Unlikely – no limestone habitat
Tetraria sp. Chandala (G.J. Keighery 17055)		*Tetraria* sp. Chandala is recorded from a mound spring in peaty sand (Western Australian Herbarium, 2005).	Highly Unlikely – not wetland habitat
Beyeria cinerea subsp. *cinerea*		*Beyeria cinerea* subsp. *cinerea* grows in sand over limestone on road verges, gullies	Unlikely – not suitable habitat
Carex tereticaulis		*Carex tereticaulis* prefers black peaty sand.	Highly Unlikely – not wetland habitat
Cyathochaeta teretifolia		*Cyathochaeta teretifolia* occurs in grey sand, sandy clay on swamps, creek edges.	Highly Unlikely – not wetland habitat
Dillwynia dillwynioides		*Dillwynia dillwynioides* occurs in sandy soils in winter-wet depressions.	Highly Unlikely – not wetland habitat

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Jacksonia gracillima		*Jacksonia gracillima* occurs in grey and brown well-drained sand.	Possible
Schoenus capillifolius		*Schoenus capillifolius* grows in brown mud on claypans.	Highly Unlikely – not wetland habitat
Sphaerolobium calcicola		*Sphaerolobium calcicola* grows in white-grey-brown sand, sandy clay over limestone, black peaty sandy clay on tall dunes, winter-wet flats, interdunal swamps, low-lying areas.	Highly Unlikely – not wetland habitat
Aponogeton hexatepalus	Stalked Water Ribbons	Stalked Water Ribbons grow in freshwater: ponds, rivers, claypans	Highly Unlikely – not wetland habitat
Dodonaea hackettiana	Hackett's Hopbush	Hackett's Hopbush occurs in sand with outcropping limestone.	Unlikely – no limestone habitat
Eucalyptus rudis subsp. *cratyantha*		*Eucalyptus rudis* subsp. *cratyantha* grows in loam on flats, hillsides.	Highly Unlikely – not suitable habitat
Jacksonia sericea	Waldjumi	Waldjumi grows in calcareous and sandy soils.	Possible
Parsonsia diaphanophleba		*Parsonsia diaphanophleba* occurs in alluvial soils along rivers.	Highly Unlikely – not alluvial habitat
Stylidium ireneae		*Stylidium ireneae* occurs in sandy loam in valleys near creek lines, woodland, often with *Agonis*.	Highly Unlikely – not suitable habitat
Stylidium longitubum	Jumping Jacks	Jumping Jacks prefer sandy clay, clay in seasonal wetlands.	Highly Unlikely – not wetland habitat
Stylidium striatum	Fan-leaved Triggerplant	The Fan-leaved Triggerplant grows in brown clay loam over laterite on hillslopes in Jarrah/Marri forest, Wandoo woodland.	Unlikely – not lateritic habitat

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

4.2 TEC and PEC Desktop Search

A search of DBCA's Threatened (TEC) and Priority Ecological Communities (PEC) database was conducted within a radius of 5km around the site (30-0919EC) (Appendix 5). One TEC and three Priority 3 PECs at State level were identified in the database search. The three State listed PECs are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as TECs. The communities identified in the database searches are outlined in Table 4. Two of the communities, the Tuart and Banksia communities have potential to occur on the site given the site soil conditions. The stromatolite and saltmarsh communities would not occur on the site.

Table 4: Threatened and Priority Ecological Communities likely to occur within 5km of the Site

Ecological Community	Description	Conservation Status WA	Status under the EPBC Act
SCP19a	Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in in Gibson et al. (1994))	Critically Endangered	Endangered
SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994)).	Critically Endangered	Endangered
Walyungup Microbial	Microbial community of a coastal saline lake (Lake Walyungup)	Priority 1	
SCP21c	Low lying Banksia attenuata woodlands or shrublands	Priority 3	Endangered as part of Banksia WL SCP
SCP24	Northern Spearwood shrublands and woodlands	Priority 3	
SCP25	Southern *Eucalyptus gomphocephala-Agonis flexuosa* woodlands	Priority 3	
Tuart WL SCP	Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community	Priority 3	Critically Endangered
Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered

4.3 Flora

A total of 66 plant species were recorded during the 2019 flora survey (Appendix 6). This total consisted of 39 native species and 27 (41%) introduced species. The high percentage of introduced species reflects the past disturbance on the site.

The plant Families with the highest representation of species were the Fabaceae (Pea and Wattle family – 9 species, 6 native and 3 introduced), Poaceae (Grass family - 7 species, all introduced) Asteraceae (Daisy family – 7 species, 1 native and 6 introduced) and Proteaceae (Banksia family – 6 species, all native).

Quadrat Data are provided in Appendix 7.

Species richness in the four quadrats ranged from 15-20 with an average of 17. The species richness is considered low for this type of vegetation which reflects the overall Degraded condition of the vegetation on the site.

There were no Threatened (Declared Rare) or Priority plant species recorded on the site.

One species, Cotton Bush (*Gomphocarpus fruticosus*), listed as a Declared Pest under Section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act) was recorded on the site.

4.4 Vegetation

4.4.1 Vegetation Complex

Vegetation Complexes are a broad level of vegetation description which is based on the underlying geomorphology and rainfall (Heddle *et al*., 1980). The vegetation is part of the Cottesloe Complex – Central and South which is described as a 'Mosaic of woodland of *Eucalyptus gomphocephala* (Tuart) and open forest of *E. gomphocephala* – *E. marginata* (Jarrah) – *Corymbia calophylla* (Marri), closed heath on the limestone outcrops' (Heddle *et al.,* 1980).

4.4.2 Vegetation Type

For small scale sites, such as the survey area, vegetation mapping is usually undertaken at the level of vegetation types which are based on the composition and structure of the dominant species.

A total of four native vegetation types were described and mapped on the site. The vegetation types are described in Table 5 and mapped in Figure 3.

Table 5: Vegetation Types on the Site

Vegetation Type		Description	Photograph
Em	*Eucalyptus marginata* (Jarrah) Low Woodland over *Jacksonia sternbergiana/ Acacia pulchella* Low Shrubland	This was the main vegetation type on the site. Jarrah (*Eucalyptus marginata*) was mostly re-growth young trees to 4m high with multiple thin stems. *Jacksonia sternbergiana* was a sparse tall shrub to 2.5m high over *Acacia pulchella* and *Macrozamia riedlei* to 1.5m over an open low understorey predominantly containing herbaceous native and introduced species. The soils were orange-brown sand. Quadrat FR1 is representative of this vegetation type.	
CcJs	*Corymbia calophylla* (Marri) Low Woodland over *Jacksonia sternbergiana* Tall Open Shrubland over weeds	This vegetation type occurred in a small area near the northwestern part of the site. Marri was up to 8m high over a sparse mid-canopy of *Jacksonia sternbergiana*. The understorey consisted mostly of grassy weeds including Annual Veldtgrass (*Ehrharta longiflora*) and Blowfly Grass (*Briza maxima*). The soils were orange-brown sand. Quadrat FR2 is representative of this vegetation type.	

Vegetation Type		Description	Photograph
CcJf	*Corymbia calophylla* (Marri) Low Woodland over *Jacksonia furcellata* Open Shrubland over weeds	This vegetation type occurred at the southern end of the site. Marri was up to 8m high over a sparse mid-canopy of *Jacksonia furcellata* and *Banksia grandis* to 2m. The understorey was low and consisted mostly of herbaceous native and annual species. The soils were orange-brown sand. Quadrat FR3 is representative of this vegetation type.	
Eg	*Eucalyptus gomphocephala* (Tuart) Low Woodland over *Jacksonia sternbergiana/J. furcellata* Shrubland over weeds	A small area containing Tuart trees up to 12m high was located at the east-central part of the site. A sparse cover of *Jacksonia sternbergiana* and *J. furcellata* shrubs to 2m occurred over a mostly weedy understorey. The soils were orange-brown sand. Quadrat FR4 is representative of this vegetation type.	

4.4.3 Vegetation Condition

The condition of the vegetation was assessed according to the system of Keighery as described in Bush Forever (Government of Western Australia, 2000) (Table 6).

Table 6: 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 disturbance. Retains basic vegetation structure or ability to regenerate to 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.
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.

The vegetation on the site was rated as being in Degraded Condition. While the upper tree and large shrub canopies were intact, the understorey had a high weed species component.

4.5 Conservation Significance of Flora and Vegetation

4.5.1 Flora

No Threatened or Priority flora species were recorded on the site. No other species of conservation significance were recorded.

4.5.2 Vegetation

Vegetation Complex

According to the Perth Biodiversity Project (WALGA, 2013) approximately 12,362ha (36%) of the original 34,429ha of the Cottesloe – Central and South Vegetation Complex on the Southern Swan Coastal Plain remains of which 6,085ha (18%) has some protection

The percentage protection of these complexes is above the 10% minimum criteria for vegetation complexes in the Perth and Peel Region Constrained Areas and the EPA's target for minimum 30% retention of vegetation complexes State-wide.

Floristic Community Type

Only vegetation in Very Good condition or better is considered to have floristic data that are suitable to be identified as a Floristic Community Type. The vegetation on the site in the four quadrats was representative of the vegetation on the site as a whole which was in Degraded condition. The vegetation on the site therefore is too degraded to accurately assign to one of the FCT of Gibson *et al.* (1994).

Banksia Woodland TEC

The Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia Woodland TEC) is listed as an Endangered TEC under the EPBC Act. The *Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community* (Conservation Advice) describes the Banksia Woodland TEC as follows:

> *The ecological community is a woodland associated with the Swan Coastal Plain of southwest Western Australia. A key diagnostic feature is a prominent tree layer of Banksia, with scattered eucalypts and other tree species often present among or emerging above the Banksia canopy. The understorey is a species rich mix of sclerophyllous shrubs, graminoids and forbs. The ecological community is characterised by a high endemism and considerable localised variation in species composition across its range*.

Banksia trees were very sparse to absent on the site. Only a few *Banksia attenuata* and *B. menziesii* were recorded. *Banksia grandis* was more common in some parts of the site. *Banksia grandis* is not one of the four key species of the Banksia Woodland TEC.

As a result of the absence or very sparse density of *Banksia attenuata* and *B. menziesii* trees the vegetation on the site is not considered representative of the Banksia Woodland TEC.

Tuart Woodland TEC

The Tuart Woodlands and Forests of the Swan Coastal Plain ecological community was listed as a Threatened Ecological Community (TEC) under the Commonwealth EPBC Act on 4 July 2019. A description of the Tuart Woodland TEC is contained in the *Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological*.

There are several criteria for vegetation containing Tuart trees to qualify as the Tuart Woodland TEC. One of the key criteria is the size and condition of the area of vegetation containing Tuarts, called the 'patch'. For a patch of Tuart vegetation to be the Tuart Woodland TEC it needs to be at least greater than 0.5ha in size. The vegetation on the site that contains Tuart trees is around 0.3ha in size. On that basis alone the Tuart vegetation on the site is not representative of the Tuart Woodlands and Forests of the Swan Coastal Plain TEC.

According to the condition category specifically used for Tuart Woodland TEC assessments in the Conservation Advice, the condition of the Tuart vegetation on the site is rated as Moderate as there are between 4 and 8 native species in the understorey. Tuart vegetation in Moderate condition needs to be at least 2ha in size to be part of the Tuart Woodland TEC.

On the basis of both patch size and condition, the Tuart (*Eucalyptus gomphocephala*) Low Woodland over *Jacksonia sternbergiana/J. furcellata* Shrubland over weeds vegetation type on the site is not part of the Tuart Woodlands and Forests of the Swan Coastal Plain TEC.

5 SUMMARY AND CONCLUSIONS

The 2019 Flora and Vegetation survey of Lot 1401 Fifty Road, Baldivis resulted in the following findings:

- The site contains around 4.4ha of native vegetation;
- The vegetation has been impacted by partial clearing in the past and frequent fire;
- A total of 66 plant species were recorded during the flora survey. This total consisted of 39 native species and 27 (41%) introduced species. The total is considered low for the vegetation types on the site. The low species richness is likely due to past disturbance from partial clearing and frequent fires;
- No Threatened (Declared Rare) or Priority flora species were recorded on the site;
- A small amount of Cotton Bush (*Gomphocarpus fruticosus*), listed as Declared Pests under S22 of the BAM Act, was recorded on the site;
- Four native woodland vegetation types were described and mapped on the site; the main woodland type contained Jarrah, two smaller types contained Marri and a small area contained Tuart as the dominant tree. *Jacksonia sternbergiana* and *J. furcellata* were common taller shrubs while the understorey mostly contained herbaceous native and introduced species;
- The condition of the vegetation was rated as Degraded due to past disturbance and the abundance of weeds;
- The native vegetation on the site is part of the Cottesloe – Central and South Vegetation Complex which has a percentage protection above the 10% minimum criteria for vegetation complexes in the Perth and Peel Region Constrained Areas and meets the EPA's target for minimum 30% retention of vegetation complexes State-wide;
- The low species richness and high weed coverage means the vegetation is not able to be accurately assigned a Floristic Community Type;
- The vegetation is not part of the Banksia Woodlands of the Swan Coastal Plain TEC due to the absence of any of the four key Banksia tree species on the site as a dominant tree canopy; and
- The vegetation containing Tuart trees is not representative of the Tuart Woodlands and Forests of the Swan Coastal Plain TEC due to the poor condition of the understorey and small size of the areas containing Tuart trees.

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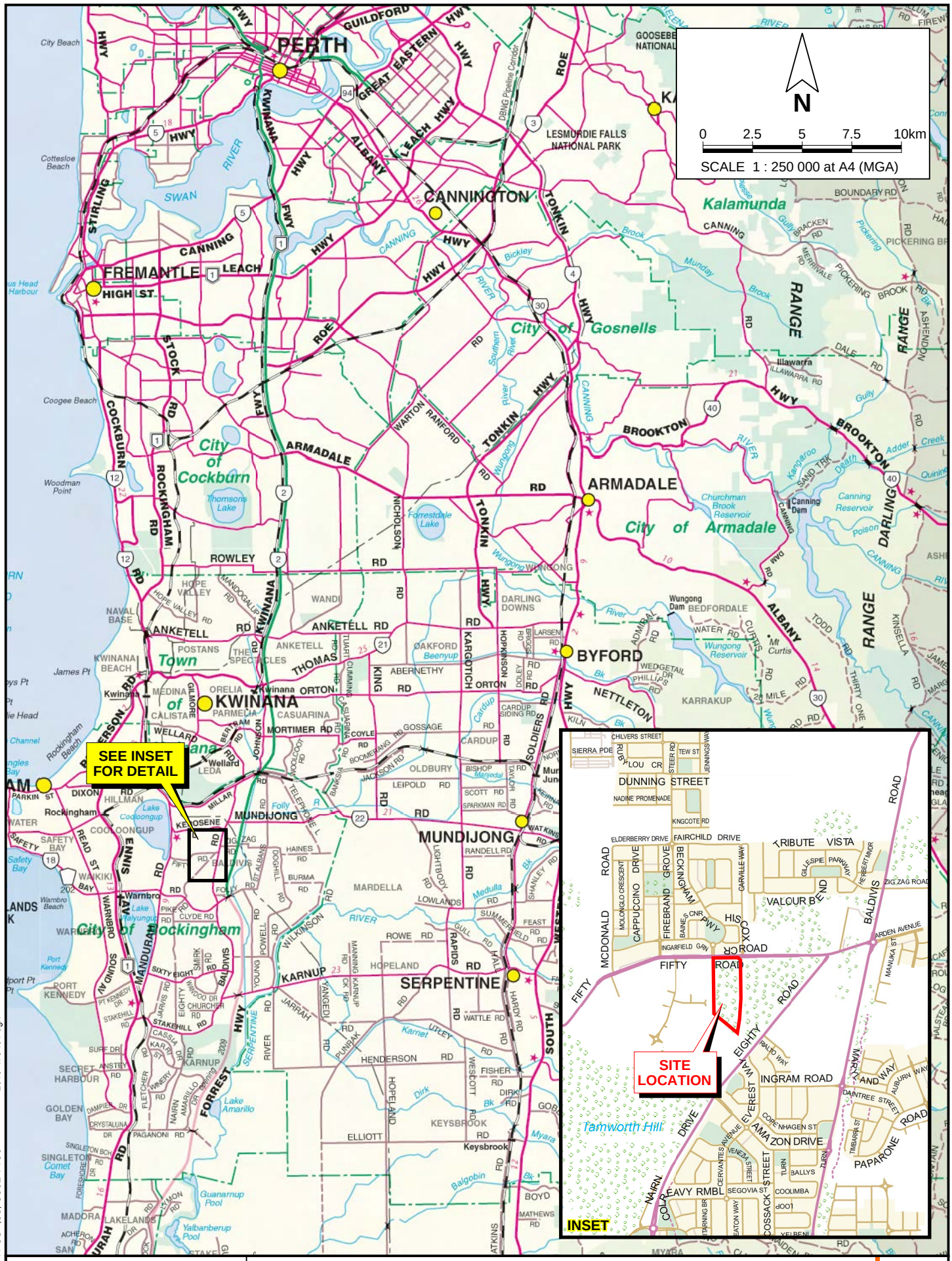
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FIGURES



PINPOINT CARTOGRAPHICS (08) 9562 7136 2019-479-f01.dgn

pgv ENVIRONMENTAL

ARD No. 1 Pty Ltd
FLORA AND VEGETATION SURVEY
LOT 1401 FIFTY ROAD, BALDIVIS

Drawn: J. Cabot	Date: 2 Feb 2020
Job: 10250 Rpt: 2019-479	Revision: A

SITE LOCATION

Figure 1

PINPOINT CARTOGRAPHICS (08) 9562 7136 2019-479-f02.dgn



CADASTRAL SOURCE: Landgate, January 2020.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown December 2019.

pgv ENVIRONMENTAL

Drawn: J. Cabot	Date: 2 Feb 2020
Job: 10250 Rpt: 2019-479	Revision: A

ARD No. 1 Pty Ltd
FLORA AND VEGETATION SURVEY
LOT 1401 FIFTY ROAD, BALDIVIS

SITE BOUNDARY

Figure 2

PINPOINT CARTOGRAPHICS (08) 9562 7136 2019-479-f03.dgn

N

0 10 20 30 40 50m

SCALE 1 : 1 250 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Quadrat Location
- Vegetation Type Boundary
- Em Vegetation Type

Vegetation Types

Em
Eucalyptus marginata (Jarrah) Low Woodland over *Jacksonia sternbergiana/Acacia pulchella* Low Shrubland

CcJs
Corymbia calophylla (Marri) Low Woodland over *Jacksonia sternbergiana* Tall Open Shrubland over weeds

CcJf
Corymbia calophylla (Marri) Low Woodland over *Jacksonia furcellata* Open Shrubland over weeds

Eg
Eucalyptus gomphocephala (Tuart) Low Woodland over *Jacksonia sternbergiana/J. furcellata* Shrubland over weeds

FIFTY ROAD

PANTHEON ROAD

EIGHTY ROAD

Lot 1401

106 107 109 108 467 466 481 480 479 478 477 476 475 317 364 9003 1402

FR1 FR2 FR3 FR4

Em CcJs Eg CcJf

6 424 800mN 6 424 600mN 6 424 400mN

388 400 mE 388 600 mE

CADASTRAL SOURCE: Landgate, January 2020.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown December 2019.

pgv ENVIRONMENTAL

ARD No. 1 Pty Ltd
FLORA AND VEGETATION SURVEY
LOT 1401 FIFTY ROAD, BALDIVIS

Drawn: J. Cabot | Date: 3 Feb 2020

Job: 10250 Rpt: 2019-479 | Revision: A

VEGETATION TYPES

Figure 3

APPENDIX 1

DBCA Database Search Reports

FID	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Geo_Method	Precision	Date
724	6960103	3237	Acacia benthamii	2		Low plain. Grey sand.	Open Jarrah & Tuart woodland. Allocasuarina fraseriana, Banksia attenuata, Kunzea glabrescens, Hibbertia hypericoides.	ca 20 plants.		Lot 203, Stock Road, Stake Hill	GPS	1	31/03/2005
2640	4080696	14932	Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)	1	Erect slender shrub to 1.5 m. Flowers yellow, in full flower.	Grey sand over clay.	Eucalyptus calophylla woodland.		Abundance: scattered in area.	Lowlands; Serpentine River	MAN	0	13/08/1992
3913	9047905	48762	Acacia sp. Binningup (G. Cockerton et al. WB 37784)	1	Suckering clumping shrubs to 1.5 m.	Sand.	Tuart woodland. Associated species: Acacia saligna, Xanthorrhoea preissii, Rhagodia baccata, Spyridium globosum, Acacnthocarpus preissii and annual grasses.	c. 200 in 20 m x 20 m.		Rockingham Golf Course eastern fenceline	GPS	1	24/10/2017
6993	4095251	141	Aponogeton hexatepalus	4	Aquatic bulbous herb 15 cm high.	Seasonal wetland on Pinjarra Plain. Red loam.	Open Melaleuca viminea scrub over Leptocarpus coangustatus dense low sedges.	common.		Bushland remnant W of junction of Mundijong and Duckpond roads (plot duck-3)	GPS	1	7/08/1992
10649	7132484	34236	Beyeria cinerea subsp. cinerea	3	Semi-erect shrub 0.2 m high x 0.2 m wide.	Limestone ridge. Brown-orange sand with outcropping limestone. Tamala limestone.	Mixed Low Heath C. Grevillea preissii, Rhagodia baccata.	uncommon.		Lot 4, Mandurah Road (Bushplan Site 395)	AUTO	1	30/06/1999
11135	7332025	16633	Boronia juncea subsp. juncea	1	Shrub to 1 m high x 0.5 m wide. Pink and purple flowers.	Gentle slope with a north aspect. Surface soil is dark brown sandy loam and sub surface soil is dark brown sandy loam. Drainage is poor and wet during winter and spring only with soil being waterlogged at present.	Melaleuca preissiana, M. rhaphiophylla low open woodland over Astartea scoparia closed heath over Centella asiatica herbland. Excellent to pristine vegetation condition with some weed species affecting the herb layer.	a couple.		Braddock Road, Wellard	GPS	1	2/12/2005

FID	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Geo_Method	Precision	Date
16020	7332149	16245	Cyathochaeta teretifolia	3	Tufty sedge with height of 1.5 m and width of 1 m.	Gentle slope with a north aspect. Surface soil is dark brown sandy loam and sub surface soil is dark brown sandy loam. Drainage is poor and wet during winter and spring only with soil being waterlogged at present.	Melaleuca preissiana, M. rhaphiophylla low open woodland over Astartea scoparia closed heath over Centella asiatica herbland. Excellent to pristine vegetation condition with some weed species affecting the herb layer.	locally common.	Outside quadrat.	Braddock Road, Wellard	GPS	1	2/12/2005
16032	7858736	16245	Cyathochaeta teretifolia	3		Black peat.	Melaleuca preissiana, Eucalyptus rudis subsp. rudis, Pteridium esculentum			Lot 100, Treeby Rd, Anketell	GPS	0	24/10/2007
18289	5943086	3863	Dillwynia dillwynioides	3		Seasonal dampland.	Melaleuca rhaphiophylla Low Forest B over M. rhaphiophylla Low Scrub B over Dense Low Grass and Dense Low Sedges.			Site 8, 1.4 km S of Stakehill Road and the N boundary of Baldivis Pine Plantation, Karnup,	MAN	2	4/11/1998
18290	5943523	3863	Dillwynia dillwynioides	3		Seasonal dampland.	Eucalyptus rudis Low Forest A over Melaleuca rhaphiophylla Open Low Woodland A over Kunzea ericifolia Open Scrub over Dense Low Scrub of mixed grasses, weeds and sedges.			Site 10, 100 m N of S boundary of Baldivis Pine Plantation and 1.8 km E of Karri Street, Karnup,	MAN	2	4/11/1998
18293	7536062	3863	Dillwynia dillwynioides	3		Moist grey loam.	Low Woodland A of Eucalyptus rudis, Melaleuca rhaphiophylla, Banksia littoralis, Lepidosperma longitudinale, Hibbertia stellaris, Kunzea glabrescens, Villarsia albiflora.	>20 plants.	Condition of population: moderate.	Baldivis Ordnance Reserve	GPS	1	15/09/2006
18450	4981588	12938	Diuris micrantha	T						Medina	AUTO	3	24/09/1984

FID	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Geo_Method	Precision	Date
18454	8649731	12938	Diuris micrantha	T	Orchid.	Swamp. Inundated black clay peat. Burnt in 2009.	Open scrub over dense low sedges. Lepidosperma longitudinale, Wurmbea sp., Burchardia sp., Romulea rosea, Trifolium sp., cape tulip.	7 plants.	Area occupied is c. 2.5 m x 1.5 m. Population 1a.	Lot 9206 Johnson Road, Bertram. Population occurs within swamp on W side of Johnson Road c. 630 m S of Holden and Johnson Roads intersection and c. 70 m W of E boundary fence	GPS	1	22/09/2009
18560	1157647	4763	Dodonaea hackettiana	4	Erect shrub, ca 1.5 m high.	Level, but disturbed sand.		rare.		The Spectacles, near Medina	MAN	4	22/04/1986
18566	7104588	4763	Dodonaea hackettiana	4	Perennial, erect shrub, 4 m high x 3 m wide. Orange flowers. Reproductive method: seeds.	Plain. Reserve. Lake upland. Beeliar Regional Park. Grey dry sand. Soil disturbed 20 years ago.	Tall trees with Eucalyptus rudis and paperbarks.	6-20 plants in 10 m x 10 m area.	Population structure: 50% in bud, 100% flowering. With many alien species.	About 40 m S of Osprey Drive and just E of the drain going under Osprey Drive (which is W of Parkes Road); Yangebup	GPS	1	16/10/2003
33066	9076557	20462	Jacksonia gracillima	3	Spreading low shrub, 50 cm high.	Very gentle lower slope of dune on edge of broad swale. Grey sand. > 7 years since fire.	Corymbia calophylla and Eucalyptus marginata subsp. marginata open forest, over Allocasuarina fraseriana, Banksia ilicifolia, B. menziesii and B. attenuata scattered low trees to low woodland, over Xanthorrhoea preissii high open shrubland, over Daviesia	6 plants.		Area bounded by Thomas Road in the N, Kwinana freeway in the W and Mortimer Road in the S, c. 30 km S of Perth CBD	GPS	1	25/10/2010
33206	5437784	4027	Jacksonia sericea	4	Prostrate shrub 10 cm high, 2 m wide; sterile, only a few spiny branchlets.	Limestone ridge, brown orange sand with outcropping limestone over Tamala limestone.	Mixed Low Heath C of Grevillea preissii, Rhagodia baccata and Melaleuca acerosa.	locally abundant.		Lot 4 Mandurah Road, Singleton (Bushplan Site 395)	GPS	1	30/06/1999

FID	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Geo_Method	Precision	Date
33207	5437768	4027	Jacksonia sericea	4	Prostrate shrub 10 cm high, 2 m wide; old fruit; reflexed peduncles, no spiny branchlets; could be considered J. sericea.	Limestone ridge, brown-orange sand with outcropping limestone over Tamala limestone.	Mixed Low Heath C of Grevillea preissii, Rhagodia baccata and Melaleuca acerosa.	locally abundant.		Lot 4 Mandurah Road, Singleton (Bushplan Site 395)	GPS	1	30/06/1999
33217	6511570	4027	Jacksonia sericea	4	Prostrate shrub, buds and orange flowers.					Bushland area in pasture N of Madora Road. c. 1 km E of Fremantle Road	TOPO	2	1/12/1995
39241	4190211	6573	Parsonsia diaphanophleba	4	Vine, to 10 m, rampant on trees. Flowers pale pink, in full flower.	Edges and banks of Serpentine River. Sand over clay.	Eucalyptus rudis forest.			Lowlands Property, Serpentine	MAN	0	20/04/1992
42871	7536070	980	Schoenus capillifolius	3	Reproductive state: vegetative.	Inundated grey clay.	Dense Low Forst of Melaleuca rhaphiophylla. With Baumea articulata, Triglochin linearis, Villarsia albiflora, Callitriche stagnalis, Lemna disperma, Cotula coronopifolia.	large numbers, 40% cover.	Condition of population: healthy.	Baldivis Ordnance Reserve	GPS	1	15/09/2006
44039	3464008	20348	Sphaerolobium calcicola	3	Erect multi-stemmed shrub 20-30 cm tall. In full flower. Flowers yellow-red.	Tall dunes, grey-white sand over white sand.	Low open heath of Jacksonia/Olearia axillaris and Acacia lasiocarpha.	rare in area.		Lake Walyunup, Rockingham	MAN	0	23/10/1993
45132	7746865	17850	Stylidium ireneae	4						Kwinana	UNK	3	2/12/2004
45285	4555708	7756	Stylidium longitubum	4	Delicate annual herb.	Soil: Brown sand. Topography/drainage: Seasonally wet poorly drained flat. Geomorphology: Swamp deposits - holocene.	Vegetation: Melalueca raphiophylla Low Forest B over exotic Very Open Low Grass over Lotus sauveolens, Stylidium longitubum Herbs over Lepidosperma longitudinale Tall Sedges.			Remnant bushland near Hymus Swamp in SW corner of Lowlands property (M105), 11 km WNW of Serpentine (plot hymus05).	GPS	1	6/11/1993
47071	4622316	28354	Synaphea sp. Serpentine (G.R. Brand 103)	T	Low shrub 20 cm high x 50 cm wide, flowers yellow.	Pinjarra Plain, sumpland. Red brown loam.	Marri Woodland with Eucalyptus calophylla, Phyllanthus calycinus, Mesomelaena tetragona.			Bushland at intersection Duckpond and Mundijong Roads	MAN	0	15/08/1991

FID	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Geo_Method	Precision	Date
47094	8057001	28354	Synaphea sp. Serpentine (G.R. Brand 103)	T	Perennial shrub 0.6 m high with yellow flowers.	Coastal plain wetland reserve, with brown clay soil. Burnt ca 3 years ago.	Low shrubland including Hakea ceratophylla, Anigozanthos manglesii, Eutaxia virgata, Pimelea sp., Calectasia sp., Shoenus curvifolius sedges and rushes.	Common.		Lambkin Reserve, Serpentine.	GPS	1	4/09/2008
47758	9076492	35581	Tetraria sp. Chandala (G.J. Keighery 17055)	2	Erect sedge, 70 cm high.	Dampland on edge of open water, wetland on plain. Black peat. > 10 years since fire.	Eucalyptus rudis subsp. rudis open forest, over Melaleuca preissiana and M. rhaphiophylla open woodland, over Taxandria linearifolia scattered tall shrubs, over Cyathochaeta teretifolia high closed sedgeland with Pteridium esculentum high fernland. Assoc		Excellent vegetation condition (low weed cover), though disturbance nearby (transmission lines).	Area bounded by Thomas Road in the N, Kwinana freeway in the W and Mortimer Road in the S, c. 30 km S of Perth CBD	GPS	1	2/11/2010

FID	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPopCode	Location	District	Vesting	Purpose1	Purpose2	CountDate	Method	MatureCoun	SeedlingCo	LiveTotal	PlantTypeC	AreaOccupi	inFlower	Population
909	92886	14932	Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)	1		4		Lowlands; Serpentine River.	PERTH HILLS	UNKNOWN			13/08/1992 0:00		0		0			Y	
2451	84412	141	Aponogeton hexatepalus	4		7		ca 250m WNW of Mundijong Rd & Duckpond Rd jnc.	SWAN COASTAL	UNKNOWN			10/08/1992 0:00	ESTMT	150		150			Y	
2489	84399	141	Aponogeton hexatepalus	4		22		ca 600m S of Orton Rd on Johnson Rd, W side. W side of swamp, almost adj drain on E side.	SWAN COASTAL	NON	UCL		16/09/1993 0:00	ESTMT	0		100			N	
2495	84405	141	Aponogeton hexatepalus	4		28		PRI Lot.200. Duckpond reserve, cnr Duckpond Rd & Mundaijong Rd, Peel Estate.	SWAN COASTAL	PRI			5/11/1997 0:00		0		0			N	
4593	84970	1596	Caladenia huegelii	T	CR	9		West of Johnson Road, 200m west and then 120m south of intersection (roundabout) of Holden Close (extension of Orton Road). Opposite Johnson Rd and Orton Rd intersection.	SWAN COASTAL	RDL	UCL		1/10/2004 0:00		0		0			N	
4608	84937	1596	Caladenia huegelii	T	CR	24		Lowlands farm. ca 1km SW of shed.	SWAN COASTAL	PRI			28/07/1991 0:00	ESTMT	7	5	7			N	
4612	97276	1596	Caladenia huegelii	T	CR	31	A	Lowlands farm. 1km W of T-jnc of Rowe & Hopelands Rd then 400m N of S bdy of farm. West of firebreak/fence.	SWAN COASTAL	PRI			16/09/2005 0:00		2		2			N	
6312	93210	16245	Cyathochaeta teretifolia	3		25		Private Property. No. 52 Braddock Rd, Wellard (in possible wetland ca.360m N-NNE of Braddock-Levington Rd intersection - EXTRAPOLATED). Kwinana	SWAN COASTAL	PRI			2/12/2005 0:00		0		0			N	
7077	86764	3863	Dillwynia dillwynioides	3		4		Seasonal wetland adjoining Hymus Swamp. Ca 2 km N of Karnup Rd, at approx 1 km W of the junction with Yangetti Rd.	SWAN COASTAL	PRI			15/06/1994 0:00		0		0			N	

FID	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPopCode	Location	District	Vesting	Purpose1	Purpose2	CountDate	Method	MatureCoun	SeedlingCo	LiveTotal	PlantTypeC	AreaOccupi	inFlower	Population
7082	86769	3863	Dillwynia dillwynioides	3		9		Baldivis Ordinace Reserve (ID: 37090).	SWAN COASTAL	EXD	OTH		15/09/2006 0:00	ESTMT	20		20			Y	
7094	98820	3863	Dillwynia dillwynioides	3		20	A	Baldivis Ordance Reserve (ID: 37090). Site 8, 1.4km S of Stakehill Rd and the N boundary of Baldivis Pine Plantation, Karnup.	SWAN COASTAL	EXD	TIM	OTH	4/11/1998 0:00		0		0			N	
7095	98821	3863	Dillwynia dillwynioides	3		20	B	Baldivis Ordance Reserve (ID: 37090). Site 10, 100m N of S boundary of Baldivis Pine Plantation & 1.8km E of Karri St, Karnup.	SWAN COASTAL	EXD	TIM	OTH	4/11/1998 0:00		0		0			N	
7186	101444	12938	Diuris micrantha	T	VU	1	A	UCL, Lot 9206. Johnson Road, Bertram. Population occurs within swamp on western side of Johnson Road approximately 630m south of Holden and Johnson intersection, and approximately 70m west of eastern boundary fence	SWAN COASTAL	NON	UCL		20/09/2010 0:00	ACT_IND	6		0	PLANTS	3.75	Y	HEALTHY
7187	101445	12938	Diuris micrantha	T	VU	1	B	UCL. Ca 600m S of Orton Rd on Johnson Rd, W side. On W side of drain (previously known as Lot 1201, State Housing Commission).	SWAN COASTAL	NON	UCL		24/09/2002 0:00		0		0			N	
7273	87263	4763	Dodonaea hackettiana	4		22		NON Lot.459. About 40m S of Ospery Drv & just E of the drain going under Osprey Drv (which is W of Parkes Rd); Yangebup. Beeliar Regional Park.	SWAN COASTAL	NON	UCL		16/10/2003 0:00	UNKNOWN	12		12			Y	
7368	97396	1639	Drakaea elastica	T	CR	23	B	Private Property, Loc 16, part 2 (Lowlands Farm). 1km W of T-junction of Hopelands Rd & Rowe Rd, then ca 400m N of S boundary of Farm. Ca 40m W of fence. Shire of Serpentine-Jarrahdale.	SWAN COASTAL	PRI			9/08/2010 0:00		0		0			N	

FID	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPopCode	Location	District	Vesting	Purpose1	Purpose2	CountDate	Method	MatureCoun	SeedlingCo	LiveTotal	PlantTypeC	AreaOccupi	inFlower	Population
7375	85073	1639	Drakaea elastica	T	CR	30		Private property, Lot 2 Lowlands Rd, Mardella (Lowlands Farm). S from Wilkinson Road/Serpentine River junction. Within `Hymus Swamp` along the `Dampier to Bunbury Natural Gas Pipeline Corridor`. Both sides of gas pipeline.	SWAN COASTAL	PRI			29/09/2005 0:00	ACT_IND	54		54			N	
15175	84515	980	Schoenus capillifolius	3		12		Baldevis Ordenance Reserve (No.37090), Rockingham	SWAN COASTAL	EXD			15/09/2006 0:00		0		0			N	
15669	89296	7756	Stylidium longitubum	4		14		PRI Lot.2. Remnant bushland near Hymus Swamp in SW cnr of lowlands property (M105), 11km WNW of Serpentine (plot hymus05).	SWAN COASTAL	PRI			6/11/1993 0:00		0		0			N	
15678	89306	7756	Stylidium longitubum	4		23		PRI Lot.305. Braddock Rd, Wellard.	SWAN COASTAL	PRI			17/11/1995 0:00		0		0			N	

APPENDIX 2

Naturemap Report

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 31/10/2019

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115° 49' 00" E,32° 18' 33" S
Buffer	10km
Group By	Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	1305	13927
Other specially protected fauna	3	12
Priority 1	3	4
Priority 2	3	4
Priority 3	11	51
Priority 4	15	256
Protected under international agreement	23	240
Rare or likely to become extinct	20	413
TOTAL	**1383**	**14907**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	24506	*Anous tenuirostris subsp. melanops (Australian Lesser Noddy)*		T	
2.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
3.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
4.	24790	*Calidris tenuirostris (Great Knot)*		T	
5.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
6.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)*		T	
7.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
8.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
9.	34031	*Carcharodon carcharias (Great White Shark)*		T	
10.	25335	*Caretta caretta (Loggerhead Turtle)*		T	
11.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		T	
12.	25336	*Chelonia mydas (Green Turtle)*		T	
13.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
14.	25346	*Dermochelys coriacea (Leatherback Turtle)*		T	
15.	12938	*Diuris micrantha*		T	
16.	1639	*Drakaea elastica (Glossy-leaved Hammer Orchid)*		T	
17.	25344	*Natator depressus (Flatback Turtle)*		T	
18.	24798	*Numenius madagascariensis (Eastern Curlew)*		T	
19.	28354	*Synaphea sp. Serpentine (G.R. Brand 103)*		T	
20.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Protected under international agreement					
21.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
22.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
23.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
24.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
25.	24780	*Calidris alba (Sanderling)*		IA	
26.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
27.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
28.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
29.	41332	*Chlidonias leucopterus (White-winged Black Tern, white-winged tern)*		IA	
30.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	
31.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
32.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
33.	24690	*Macronectes giganteus (Southern Giant Petrel)*		IA	
34.	24691	*Macronectes halli (Northern Giant Petrel)*		IA	
35.	41347	*Onychoprion anaethetus (Bridled Tern)*		IA	
36.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
37.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
38.	24517	*Stercorarius parasiticus (Arctic jaeger, Arctic Skua)*		IA	
39.	25640	*Sterna dougallii (Roseate Tern)*		IA	
40.	48597	*Thalasseus bergii (Crested Tern)*		IA	
41.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
42.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
43.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
Other specially protected fauna					
44.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
45.	25508	*Phascogale tapoatafa (Brush-tailed Phascogale)*		S	
46.	48070	*Phascogale tapoatafa subsp. wambenger (South-western Brush-tailed Phascogale, Wambenger)*		S	
Priority 1					
47.	14932	*Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)*		P1	
48.	48762	*Acacia sp. Binningup (G. Cockerton et al. WB 37784)*		P1	
49.	16633	*Boronia juncea subsp. juncea*		P1	
Priority 2					
50.	3237	*Acacia benthamii*		P2	
51.	19272	*Johnsonia pubescens subsp. cygnorum*		P2	
52.	35581	*Tetraria sp. Chandala (G.J. Keighery 17055)*		P2	
Priority 3					
53.	34236	*Beyeria cinerea subsp. cinerea*		P3	
54.	759	*Carex tereticaulis*		P3	
55.	16245	*Cyathochaeta teretifolia*		P3	
56.	3863	*Dillwynia dillwynioides*		P3	
57.	48935	*Idiosoma sigillatum (Swan Coastal Plain shield-backed trapdoor spider)*		P3	
58.	20462	*Jacksonia gracillima*		P3	
59.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
60.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	
61.	25006	*Pletholax gracilis subsp. edelensis (Keeled Legless Lizard (Shark Bay))*		P3	
62.	980	*Schoenus capillifolius*		P3	
63.	20348	*Sphaerolobium calcicola*		P3	
Priority 4					
64.	141	*Aponogeton hexatepalus (Stalked Water Ribbons)*		P4	
65.	4763	*Dodonaea hackettiana (Hackett's Hopbush)*		P4	
66.	13512	*Eucalyptus rudis subsp. cratyantha*		P4	
67.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
68.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
69.	4027	*Jacksonia sericea (Waldjumi)*		P4	
70.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
71.	25196	*Notoscincus butleri (lined soil-crevice skink (Dampier))*		P4	
72.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
73.	6573	*Parsonsia diaphanophleba*		P4	
74.	17850	*Stylidium ireneae*		P4	
75.	7756	*Stylidium longitubum (Jumping Jacks)*		P4	
76.	7803	*Stylidium striatum (Fan-leaved Triggerplant)*		P4	
77.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
78.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
Non-conservation taxon					
79.		*?Lepidosperma squamatum s.l.*			
80.		*?Lomandra caespitosa*			
81.		*?Microlaena stipoides*			
82.		*Ablennes hians*			
83.	15466	*Acacia applanata*			
84.	3282	*Acacia cyclops (Coastal Wattle)*			
85.	3294	*Acacia dentifera*			
86.	3374	*Acacia huegelii*			
87.	3409	*Acacia lasiocarpa (Panjang)*			
88.	11611	*Acacia lasiocarpa var. lasiocarpa*			
89.	3502	*Acacia pulchella (Prickly Moses)*			
90.	15482	*Acacia pulchella var. goadbyi*			
91.	3525	*Acacia rostellifera (Summer-scented Wattle)*			
92.	3527	*Acacia saligna (Orange Wattle, Kudjong)*			
93.	30032	*Acacia saligna subsp. saligna*			
94.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
95.	3602	*Acacia willdenowiana (Grass Wattle)*			
96.		*Acanthaluteres brownii*			

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97.		*Acanthaluteres spilomelanurus*			
98.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
99.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
100.	24262	*Acanthiza inornata (Western Thornbill)*			
101.	1208	*Acanthocarpus preissii*			
102.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
103.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
104.	24281	*Accipiter cirrocephalus subsp. cirrocephalus (Collared Sparrowhawk)*			
105.	25536	*Accipiter fasciatus (Brown Goshawk)*			
106.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
107.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
108.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
109.	6203	*Actinotus glomeratus*			
110.	1775	*Adenanthos cygnorum (Common Woollybush)*			
111.	1791	*Adenanthos obovatus (Basket Flower)*			
112.	25	*Adiantum aethiopicum (Common Maidenhair)*			
113.	4582	*Adriana quadripartita (Bitter Bush)*			
114.		*Aetapcus maculatus*			
115.		*Afraflacilla huntorum*			Y
116.		*Afurcagobius suppositus*			
117.	1505	*Agave americana (Century Plant)*	Y		
118.	1261	*Agrostocrinum scabrum (Blue Grass Lily)*			
119.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
120.		*Aira caryophyllea/cupaniana group*			
121.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
122.		*Aleurina ferruginea*			
123.		*Allenichthys glauerti*			
124.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
125.		*Allotrochosina karri*			
126.	2652	*Alternanthera nodiflora (Common Joyweed)*			
127.	6565	*Alyxia buxifolia (Dysentery Bush)*			
128.	7821	*Ambrosia psilostachya (Perennial Ragweed)*	Y		
129.	46276	*Ambrosia tenuifolia (Lacy Ragweed)*	Y		
130.	4585	*Amperea ericoides*			
131.	13380	*Amphibromus nervosus*			
132.	198	*Amphipogon laguroides*			
133.	20184	*Amphipogon laguroides subsp. laguroides*			
134.	200	*Amphipogon turbinatus*			
135.		*Aname mainae*			
136.		*Aname tepperi*			
137.	24310	*Anas castanea (Chestnut Teal)*			
138.	24312	*Anas gracilis (Grey Teal)*			
139.	24313	*Anas platyrhynchos (Mallard)*			
140.		*Anas platyrhynchos subsp. domesticus*			
141.	24315	*Anas rhynchotis (Australasian Shoveler)*			
142.	24316	*Anas superciliosa (Pacific Black Duck)*			
143.		*Ancylidae sp.*			
144.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
145.	11434	*Anigozanthos humilis subsp. humilis*			
146.	1411	*Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)*			
147.	11261	*Anigozanthos manglesii subsp. manglesii*			
148.	1416	*Anigozanthos viridis (Green Kangaroo Paw, Kurulbardang)*			
149.	44629	*Anilios australis*			
150.		*Anoplocapros amygdaloides?*			
151.		*Anoplocapros robustus*			
152.		*Anoplocapros sp.*			
153.	26466	*Anotrichium elongatum*			
154.		*Anser anser*			
155.	6949	*Anthocercis littorea (Yellow Tailflower)*			
156.	24561	*Anthochaera carunculata (Red Wattlebird)*			
157.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
158.	202	*Anthoxanthum odoratum (Sweet Vernal Grass)*	Y		
159.	26475	*Antithamnion hanovioides*			
160.	3686	*Aotus cordifolia*			
161.	3688	*Aotus gracillima*			
162.	3692	*Aotus procumbens*			
163.	1117	*Aphelia cyperoides*			
164.	6210	*Apium annuum*			
165.	6211	*Apium prostratum (Sea Celery)*			
166.	12040	*Apium prostratum subsp. prostratum var. prostratum (Sea Celery)*			

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167.		*Aploactisoma milesii subsp. milesii*			Y
168.		*Aplodactylus westralis*			
169.		*Apogon rueppellii*			
170.		*Apogon victoriae*			
171.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
172.		*Aptychotrema sp.*			
173.		*Aptychotrema vincentiana*			
174.	24285	*Aquila audax (Wedge-tailed Eagle)*			
175.		*Aracana aurita*			
176.		*Araneus cyphoxis*			
177.		*Araneus senicaudatus*			
178.	46393	*Arctotheca calendula x populifolia*	Y		
179.	24337	*Ardea garzetta subsp. nigripes (Little Egret)*			
180.	25558	*Ardea ibis (Cattle Egret)*			
181.	41324	*Ardea modesta (great egret, white egret)*			
182.	24340	*Ardea novaehollandiae (White-faced Heron)*			
183.	24341	*Ardea pacifica (White-necked Heron)*			
184.	26484	*Areschougia ligulata*			
185.		*Argiope protensa*			
186.		*Argiope trifasciata*			
187.	222	*Aristida ramosa (Purple Wiregrass)*	Y		
188.	1264	*Arnocrinum preissii*			
189.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
190.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
191.		*Artoria flavimana*			
192.		*Artoria linnaei*			
193.		*Artoriopsis expolita*			
194.	226	*Arundo donax (Giant Reed)*	Y		
195.	8779	*Asparagus asparagoides (Bridal Creeper)*	Y		
196.	1364	*Asphodelus fistulosus (Onion Weed)*	Y		
197.	20350	*Astartea affinis (West-coast Astartea)*			
198.	20249	*Astartea leptophylla (River-bank Astartea)*			
199.	20283	*Astartea scoparia (Common Astartea)*			
200.		*Asterella drummondii*			
201.	7851	*Asteridea pulverulenta (Common Bristle Daisy)*			
202.	6323	*Astroloma ciliatum (Candle Cranberry)*			
203.		*Asymbolus sp.*			Y
204.		*Atherina sp.*			
205.		*Atherinosoma presbyteroides*			
206.		*Atherinosoma wallacei*			
207.	2480	*Atriplex suberecta*			
208.		*Austracantha minax*			
209.	47713	*Austronomus australis (White-striped Free-tailed Bat)*			
210.	17233	*Austrostipa campylachne*			
211.	17234	*Austrostipa compressa*			
212.	17240	*Austrostipa flavescens*			
213.	37421	*Austrostipa sp. Marchagee (B.R. Maslin 1407)*			
214.	17257	*Austrostipa variabilis*			
215.	231	*Avellinia michelii*	Y		
216.	233	*Avena barbata (Bearded Oat)*	Y		
217.	234	*Avena fatua (Wild Oat)*	Y		
218.	235	*Avena sativa (Common Oat)*	Y		
219.	24318	*Aythya australis (Hardhead)*			
220.	36441	*Babingtonia camphorosmae (Camphor Myrtle)*			
221.		*Backobourkia brounii*			
222.	38979	*Badhamia utricularis*			
223.	24044	*Balaenoptera acutorostrata (Dwarf Minke Whale)*			
224.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
225.	1819	*Banksia grandis (Bull Banksia, Pulgarla)*			
226.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
227.	1830	*Banksia littoralis (Swamp Banksia, Pungura)*			
228.	1834	*Banksia menziesii (Firewood Banksia)*			
229.	32077	*Banksia sessilis var. cygnorum*			
230.	32080	*Banksia sessilis var. sessilis*			
231.		*Barnardius zonarius*			
232.		*Batrachomoeus rubricephalus*			
233.	739	*Baumea acuta (Pale Twig-rush)*			
234.	740	*Baumea arthrophylla*			
235.	741	*Baumea articulata (Jointed Rush)*			
236.	743	*Baumea juncea (Bare Twigrush)*			

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237.	744	*Baumea laxa*			
238.	748	*Baumea vaginalis (Sheath Twigrush)*			
239.	5382	*Beaufortia elegans (Elegant Beaufortia)*			
240.	7046	*Bellardia trixago (Bellardia)*	Y		
241.	48868	*Bellardia viscosa*	Y		
242.		*Bianor maculatus*			
243.	24319	*Biziura lobata (Musk Duck)*			
244.	749	*Bolboschoenus caldwellii (Marsh Club-rush)*			
245.	26511	*Bornetia binderiana*			
246.	4413	*Boronia crenulata (Aniseed Boronia)*			
247.	16636	*Boronia crenulata subsp. viminea*			
248.	4417	*Boronia dichotoma*			
249.	11381	*Boronia ramosa subsp. anethifolia*			
250.	1272	*Borya scirpoidea*			
251.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
252.		*Brachaluteres jacksonianus*			
253.	6341	*Brachyloma preissii (Globe Heath)*			
254.	7878	*Brachyscome iberidifolia*			
255.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
256.	2999	*Brassica rapa*	Y		
257.	3000	*Brassica tournefortii (Mediterranean Turnip)*	Y		
258.	2995	*Brassica x napus*	Y		
259.	244	*Briza maxima (Blowfly Grass)*	Y		
260.	245	*Briza minor (Shivery Grass)*	Y		
261.	249	*Bromus diandrus (Great Brome)*	Y		
262.	250	*Bromus hordeaceus (Soft Brome)*	Y		
263.	26520	*Brongniartella australis*			
264.	26521	*Bryopsis australis*			
265.	26522	*Bryopsis foliosa*			
266.		*Bryopsis gemellipara*			
267.	1366	*Bulbine semibarbata (Leek Lily)*			
268.	1383	*Burchardia bairdiae*			
269.	12770	*Burchardia congesta*			
270.	1385	*Burchardia multiflora (Dwarf Burchardia)*			
271.	24359	*Burhinus grallarius (Bush Stone-curlew)*			
272.		*Byssomerulius corium*			
273.	25713	*Cacatua galerita (Sulphur-crested Cockatoo)*			
274.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
275.	25715	*Cacatua roseicapilla (Galah)*			
276.	25716	*Cacatua sanguinea (Little Corella)*			
277.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*	Y		
278.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
279.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
280.		*Caenidae sp.*			
281.	1276	*Caesia micrantha (Pale Grass Lily)*			
282.	1277	*Caesia occidentalis*			
283.	3002	*Cakile maritima (Sea Rocket)*	Y		
284.		*Caladenia ?flava*			
285.	15330	*Caladenia arenicola*			
286.	11136	*Caladenia denticulata*			
287.	1586	*Caladenia discoidea (Dancing Orchid)*			
288.	1592	*Caladenia flava (Cowslip Orchid)*			
289.	15348	*Caladenia flava subsp. flava*			
290.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
291.	15361	*Caladenia longicauda subsp. calcigena*			
292.	17760	*Caladenia nobilis*			
293.	1613	*Caladenia reptans (Little Pink Fairy Orchid)*			
294.	2846	*Calandrinia calyptrata (Pink Purslane)*			
295.	2854	*Calandrinia granulifera (Pygmy Purslane)*			
296.	2856	*Calandrinia liniflora (Parakeelya)*			
297.	26527	*Calliblepharis planicaulis*			Y
298.	96	*Callitris preissii (Rottnest Island Pine, Maro)*			
299.	26533	*Callophycus costatus*			
300.	26535	*Callophycus harveyanus*			
301.	26536	*Callophycus oppositifolius*			
302.		*Calocera guepinioides*			
303.	5415	*Calothamnus lateralis*			
304.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
305.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
306.	5439	*Calytrix angulata (Yellow Starflower)*			

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307.	5458	*Calytrix flavescens (Summer Starflower)*			
308.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
309.		*Candelariella sp.*			
310.	48920	*Canis familiaris (Dog, Dingo)*	Y		
311.		*Carassius auratus*			
312.	3005	*Cardamine hirsuta (Common Bittercress)*	Y		
313.	2795	*Carpobrotus edulis (Hottentot Fig)*	Y		
314.	26546	*Carpopeltis elata*			
315.	1162	*Cartonema philydroides*			
316.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
317.	2957	*Cassytha racemosa (Dodder Laurel)*			
318.	11242	*Cassytha racemosa forma pilosa*			
319.	11799	*Cassytha racemosa forma racemosa*			
320.	18321	*Casuarina glauca*	Y		
321.	1742	*Casuarina obesa (Swamp Sheoak, Kuli)*			
322.	44539	*Caulerpa cylindracea*			
323.	26586	*Caulocystis uvifera*			
324.	41568	*Cenchrus setaceus (Fountain Grass)*	Y		
325.	6539	*Centaurium erythraea (Common Centaury)*	Y		
326.	6542	*Centaurium tenuiflorum*	Y		
327.	6214	*Centella asiatica*			
328.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
329.	1125	*Centrolepis drummondiana*			
330.	1129	*Centrolepis glabra (Smooth Centrolepis)*			
331.	1131	*Centrolepis inconspicua*			
332.	1132	*Centrolepis mutica*			
333.	2889	*Cerastium glomeratum (Mouse Ear Chickweed)*	Y		
334.		*Ceratopogonidae sp.*			
335.		*Cercophonius sulcatus*			
336.	17685	*Chaetanthus aristatus*			
337.		*Chaetodermis penicilligera*			
338.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
339.	1280	*Chamaescilla corymbosa (Blue Squill)*			
340.	11299	*Chamaescilla corymbosa var. corymbosa*			
341.	26616	*Champia affinis*			
342.	26621	*Champia zostericola*			
343.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
344.	31	*Cheilanthes austrotenuifolia*			
345.		*Cheilodactylus rubrolabiatus*			
346.		*Chelidonichthys kumu*			
347.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
348.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
349.	2483	*Chenopodium album (Fat Hen)*	Y		
350.	2490	*Chenopodium glaucum (Glaucous Goosefoot)*	Y		
351.	2494	*Chenopodium murale (Nettle-leaf Goosefoot)*	Y		
352.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
353.	33939	*Cherax cainii (Marron)*			
354.		*Cherax destructor*			
355.		*Cherax quinquecarinatus*			
356.		*Chironominae sp.*			
357.	26638	*Chondria lanceolata*			
358.	763	*Chorizandra enodis (Black Bristlerush)*			
359.	24980	*Christinus marmoratus (Marbled Gecko)*			
360.		*Chroicocephalus novaehollandiae*			
361.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
362.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
363.	41264	*Chrysothrix xanthina*			
364.	6543	*Cicendia filiformis (Slender Cicendia)*	Y		
365.	24288	*Circus approximans (Swamp Harrier)*			
366.		*Cirrhimuraena calamus*			
367.	7937	*Cirsium vulgare (Spear Thistle, Scotch Thistle)*	Y		
368.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
369.	26661	*Cladosiphon filum*			
370.		*Cleidopus gloriamaris*			
371.	10804	*Clematis linearifolia*			
372.		*Clynotis albobarbatus*			
373.		*Clynotis severus*			
374.	26671	*Codium duthieae*			
375.	26672	*Codium galeatum*			
376.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			

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377.	24399	*Columba livia (Domestic Pigeon)*	Y		
378.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
379.	4552	*Comesperma confertum*			
380.	4555	*Comesperma integerrimum*			
381.	4564	*Comesperma virgatum (Milkwort)*			
382.	6217	*Conium maculatum (Hemlock)*	Y		
383.	1863	*Conospermum capitatum*			
384.	1885	*Conospermum triplinervium (Tree Smokebush)*			
385.	6347	*Conostephium minus (Pink-tipped Pearl flower)*			
386.	6348	*Conostephium pendulum (Pearl Flower)*			
387.	6349	*Conostephium preissii*			
388.	1418	*Conostylis aculeata (Prickly Conostylis)*			
389.	11826	*Conostylis aculeata subsp. aculeata*			
390.	12109	*Conostylis aculeata subsp. preissii*			
391.	1427	*Conostylis candicans (Grey Cottonhead)*			
392.	11438	*Conostylis candicans subsp. candicans*			
393.	1436	*Conostylis juncea*			
394.	1454	*Conostylis setigera (Bristly Cottonhead)*			
395.	1455	*Conostylis setosa (White Cottonhead)*			
396.		*Conyza ?bonariensis*			
397.	7939	*Conyza bonariensis (Flaxleaf Fleabane)*	Y		
398.		*Conyza sp.*			
399.	20074	*Conyza sumatrensis*	Y		
400.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
401.		*Corixidae sp.*			
402.		*Cormocephalus aurantiipes*			
403.		*Cormocephalus novaehollandiae*			
404.	2891	*Corrigiola litoralis (Strapwort)*	Y		
405.	48259	*Cortaderia selloana subsp. selloana*	Y		
406.	25592	*Corvus coronoides (Australian Raven)*			
407.	24419	*Corvus splendens (House Crow)*			
408.	17104	*Corymbia calophylla (Marri)*			
409.	1285	*Corynotheca micrantha (Sand Lily)*			
410.	11283	*Corynotheca micrantha var. micrantha*			
411.		*Coryphaena hippurus*			
412.	7943	*Cotula australis (Common Cotula)*			
413.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
414.	24671	*Coturnix pectoralis (Stubble Quail)*			
415.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
416.	25595	*Cracticus tibicen (Australian Magpie)*			
417.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
418.	25596	*Cracticus torquatus (Grey Butcherbird)*			
419.	26702	*Craspedocarpus ramentaceus*			
420.	26704	*Craspedocarpus venosus*			
421.	3137	*Crassula colorata (Dense Stonecrop)*			
422.	3140	*Crassula glomerata*	Y		
423.	3142	*Crassula natans*	Y		
424.	15706	*Crassula natans var. minus*	Y		
425.	11345	*Crassula thunbergiana subsp. thunbergiana*	Y		
426.	25398	*Crinia georgiana (Quacking Frog)*			
427.	25399	*Crinia glauerti (Clicking Frog)*			
428.	25400	*Crinia insignifera (Squelching Froglet)*			
429.		*Cristiceps aurantiacus*			
430.		*Cristiceps australis*			
431.	4802	*Cryptandra mutila*			
432.	30893	*Cryptoblepharus buchananii*			
433.	25020	*Cryptoblepharus plagiocephalus*			
434.	1627	*Cryptostylis ovata (Slipper Orchid)*			
435.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
436.	25027	*Ctenotus australis*			
437.	25039	*Ctenotus fallens*			
438.	25040	*Ctenotus gemmula (Jewelled South-west Ctenotus (Swan Coastal Plain subpop P3), skink)*			
439.		*Culicidae sp.*			
440.	26712	*Curdiea obesa*			
441.	6663	*Cuscuta epithymum (Lesser Dodder, Greater Dodder)*	Y		
442.	768	*Cyathochaeta avenacea*			
443.		*Cyclosa trilobata*			
444.	40660	*Cycnogeton huegelii*			
445.	40661	*Cycnogeton lineare*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
446.	24322	*Cygnus atratus (Black Swan)*			
447.	283	*Cynodon dactylon (Couch)*	Y		
448.	285	*Cynosurus echinatus (Rough Dogstail)*	Y		
449.	783	*Cyperus congestus (Dense Flat-sedge)*	Y		
450.	815	*Cyperus tenellus (Tiny Flatsedge)*	Y		
451.	816	*Cyperus tenuiflorus (Scaly Sedge)*	Y		
452.	10964	*Cyrtostylis robusta*			
453.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
454.	30902	*Dacelo novaeguineae subsp. novaeguineae (Laughing Kookaburra)*	Y		
455.		*Dactylophora nigricans*			
456.		*Dactylopus dactylopus*			
457.	7420	*Dampiera alata (Winged-stem Dampiera)*			
458.	7454	*Dampiera linearis (Common Dampiera)*			
459.	7484	*Dampiera trigona (Angled-stem Dampiera)*			
460.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
461.	24687	*Daption capense (Cape Petrel)*			
462.	5508	*Darwinia citriodora (Lemon-scented Darwinia)*			
463.	26739	*Dasya extensa*			
464.	26751	*Dasyclonium flaccidum*			
465.	26752	*Dasyclonium incisum*			
466.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
467.	6218	*Daucus glochidiatus (Australian Carrot)*			
468.	3793	*Daviesia angulata*			
469.	3807	*Daviesia divaricata (Marno)*			
470.	18560	*Daviesia divaricata subsp. divaricata*			
471.	3832	*Daviesia physodes*			
472.	3845	*Daviesia triflora*			
473.		*Decapterus muroadsi*			
474.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
475.	24999	*Delma grayii*			
476.	17663	*Desmocladus asper*			
477.	17691	*Desmocladus fasciculatus*			
478.	16595	*Desmocladus flexuosus*			
479.	299	*Deyeuxia quadriseta (Reed Bentgrass)*			
480.	1259	*Dianella revoluta (Blueberry Lily)*			
481.	11636	*Dianella revoluta var. divaricata*			
482.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
483.	306	*Dichelachne crinita (Longhair Plumegrass)*			
484.	1287	*Dichopogon capillipes*			
485.	26766	*Dictyopteris muelleri*			
486.	29537	*Dictyota fastigiata*			
487.	35223	*Dictyota polyclada*			
488.	17838	*Dielsia stenostachya*			
489.	314	*Digitaria didactyla (Queensland Blue Couch)*	Y		
490.		*Dingosa serrata*			
491.		*Diodon nicthemerus*			
492.	4454	*Diplolaena dampieri (Southern Diplolaena)*			
493.	18541	*Diplopeltis huegelii subsp. huegelii*			
494.	3011	*Diplotaxis muralis (Wall Rocket)*	Y		
495.	7054	*Dischisma arenarium*	Y		
496.	7055	*Dischisma capitatum (Woolly-headed Dischisma)*	Y		
497.	7961	*Dittrichia graveolens (Stinkwort)*	Y		
498.	12943	*Diuris brumalis*			
499.	1634	*Diuris laxiflora (Bee Orchid)*			
500.	1635	*Diuris longifolia (Common Donkey Orchid)*			
501.	12939	*Diuris magnifica*			
502.	11156	*Drakaea livida*			
503.	3092	*Drosera bulbosa (Red-leaved Sundew)*			
504.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
505.	48747	*Drosera geniculata*			
506.	3097	*Drosera gigantea (Giant Sundew)*			
507.	3098	*Drosera glanduligera (Pimpernel Sundew)*			
508.	3101	*Drosera heterophylla (Swamp Rainbow)*			
509.	3105	*Drosera leucoblasta (Wheel Sundew)*			
510.	3106	*Drosera macrantha (Bridal Rainbow)*			
511.	3109	*Drosera menziesii (Pink Rainbow)*			
512.	3114	*Drosera nitidula (Shining Sundew)*			
513.	13189	*Drosera oreopodion*			
514.	3118	*Drosera pallida (Pale Rainbow)*			
515.	29178	*Drosera porrecta*			

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516.	3124	*Drosera pulchella (Pretty Sundew)*			
517.	49090	*Drosera sp. Branched styles (S.C. Coffey 193)*			
518.	3131	*Drosera stolonifera (Leafy Sundew)*			
519.	33500	*Dysphania ambrosioides (Mexican Tea)*	Y		
520.	33480	*Dysphania pumilio (Clammy Goosefoot)*			
521.		*Dytiscidae sp.*			
522.		*Echeneis naucrates*			
523.	26803	*Echinothamnion hystrix*			
524.		*Ecnomidae sp.*			
525.	25100	*Egernia napoleonis*			
526.		*Egretta garzetta*			
527.		*Egretta novaehollandiae*			
528.	11485	*Ehrharta brevifolia var. cuspidata*	Y		
529.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
530.	349	*Ehrharta longiflora (Annual Veldt Grass)*	Y		
531.		*Elanus axillaris*			
532.	25250	*Elapognathus coronatus (Crowned Snake)*			
533.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
534.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
535.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
536.		*Enoplosus armatus*			
537.		*Eolophus roseicapillus*			
538.	6131	*Epilobium billardiereanum (Glabrous Willow Herb)*			
539.	11570	*Epilobium billardiereanum subsp. billardiereanum (Smooth Willow Herb)*			
540.	11992	*Epilobium billardiereanum subsp. intermedium*			
541.	6133	*Epilobium hirtigerum (Hairy Willow Herb)*			
542.	24567	*Epthianura albifrons (White-fronted Chat)*			
543.	374	*Eragrostis cilianensis (Stinkgrass)*	Y		
544.	376	*Eragrostis curvula (African Lovegrass)*	Y		
545.	379	*Eragrostis elongata (Clustered Lovegrass)*			
546.		*Eragrostis sp. indet.*			
547.	13950	*Eremaea asterocarpa subsp. asterocarpa*			
548.	17175	*Eremophila glabra subsp. albicans*			
549.		*Eriophora biapicata*			
550.	4333	*Erodium cicutarium (Common Storksbill)*	Y		
551.	15446	*Eryngium pinnatifidum subsp. pinnatifidum*			
552.	26821	*Erythroclonium muelleri*			
553.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
554.		*Eubalichthys caeruleoguttatus*			
555.		*Eubalichthys cyanoura*			
556.		*Eubalichthys mosaicus*			
557.	5615	*Eucalyptus decipiens (Limestone Marlock, Moit)*			
558.	5649	*Eucalyptus foecunda (Narrow-leaved Red Mallee)*			
559.	5659	*Eucalyptus gomphocephala (Tuart, Duart)*			
560.	5708	*Eucalyptus marginata (Jarrah, Djara)*			
561.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
562.	20808	*Eucalyptus petiolaris*	Y		
563.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
564.	3872	*Euchilopsis linearis (Swamp Pea)*			
565.	25746	*Eudyptula minor (Little Penguin)*			
566.		*Euleptorhamphus viridis*			
567.	4627	*Euphorbia helioscopia (Sun Spurge)*	Y		
568.	29940	*Euphorbia maculata*	Y		
569.	4648	*Euphorbia terracina (Geraldton Carnation Weed)*	Y		
570.	3880	*Eutaxia virgata*			
571.	835	*Evandra pauciflora*			
572.	10765	*Exocarpos sparteus (Broom Ballart, Djuk)*			
573.	25621	*Falco berigora (Brown Falcon)*			
574.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
575.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)*			
576.	25623	*Falco longipennis (Australian Hobby)*			
577.	24041	*Felis catus (Cat)*	Y		
578.	20216	*Ficinia nodosa (Knotted Club Rush)*			
579.	1747	*Ficus carica (Common Fig)*	Y		
580.	894	*Fimbristylis velata*			
581.		*Fomitopsis lilacinogilva*			
582.	25727	*Fulica atra (Eurasian Coot)*			
583.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
584.	8365	*Fumaria bastardii*	Y		
585.	2969	*Fumaria capreolata (Whiteflower Fumitory)*	Y		

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586.	31532	*Fumaria muralis subsp. muralis*	Y		
587.		*Furgaleus macki*			
588.	907	*Gahnia trifida (Coast Saw-sedge)*			
589.	34028	*Galaxias occidentalis (Western Minnow)*			
590.	7323	*Galium murale (Small Goosegrass)*	Y		
591.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
592.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
593.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
594.	20247	*Gamochaeta calviceps*	Y		
595.	20346	*Gamochaeta coarctata*	Y		
596.	20475	*Gastrolobium capitatum*			
597.	20473	*Gastrolobium ebracteolatum*			
598.	20482	*Gastrolobium nervosum*			
599.	4339	*Geranium molle (Dove's Foot Cranesbill)*	Y		
600.	4341	*Geranium solanderi (Native Geranium)*			
601.	25530	*Gerygone fusca (Western Gerygone)*			
602.		*Girella zebra*			
603.	1518	*Gladiolus angustus (Long Tubed Painted Lady)*	Y		
604.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
605.	26860	*Gloiocladia halymenioides*			
606.	17043	*Glyceria declinata*	Y		
607.		*Gnathanacanthus goetzeei*			
608.		*Gnathophis longicaudatus*			
609.	12624	*Gnephosis angianthoides*			
610.		*Gomphidae sp.*			
611.	6587	*Gomphocarpus fruticosus (Narrowleaf Cottonbush)*	Y		
612.	10909	*Gompholobium confertum*			
613.	3951	*Gompholobium marginatum*			
614.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
615.	6161	*Gonocarpus pithyoides*			
616.		*Gonorynchus greyi*			
617.	7538	*Goodenia pulchella*			
618.	24443	*Grallina cyanoleuca (Magpie-lark)*			
619.	37500	*Grammatotheca bergiana var. bergiana*	Y		
620.	14282	*Gratiola pubescens*			
621.	1982	*Grevillea crithmifolia*			
622.	2066	*Grevillea pilulifera (Woolly-flowered Grevillea)*			
623.	15839	*Grevillea preissii subsp. preissii*			
624.	2119	*Grevillea vestita*			
625.	12824	*Grevillea vestita subsp. vestita*			
626.		*Gripopterygidae sp.*			
627.		*Gymnapistes marmoratus*			
628.		*Gymnopilus allantopus*			
629.		*Gymnopilus eucalyptorum*			Y
630.		*Gymnothorax sp.*			
631.		*Gymnothorax woodwardi*			
632.		*Gyrinidae sp.*			
633.	2788	*Gyrostemon subnudus*			
634.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
635.	1468	*Haemodorum laxum*			
636.	1472	*Haemodorum simplex*			
637.		*Haemodorum sp.*			
638.	1474	*Haemodorum sparsiflorum*			
639.	1475	*Haemodorum spicatum (Mardja)*			
640.	2175	*Hakea lissocarpha (Honey Bush)*			
641.	2179	*Hakea marginata*			
642.	2197	*Hakea prostrata (Harsh Hakea)*			
643.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
644.	2216	*Hakea varia (Variable-leaved Hakea)*			
645.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
646.	25541	*Haliastur indus (Brahminy Kite)*			
647.	24295	*Haliastur sphenurus (Whistling Kite)*			
648.		*Halichoeres brownfieldi*			
649.	24689	*Halobaena caerulea (Blue Petrel)*			
650.	26900	*Haloplegma preissii*			
651.	24296	*Hamirostra isura (Square-tailed Kite)*			
652.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
653.	25410	*Heleioporus eyrei (Moaning Frog)*			
654.	3016	*Heliophila pusilla*	Y		
655.	6710	*Heliotropium europaeum (Common Heliotrope)*	Y		

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656.	11451	*Hemarthria uncinata var. uncinata*			
657.	6839	*Hemiandra pungens (Snakebush)*			
658.		*Hemicorduliidae sp.*			
659.	25119	*Hemiergis quadrilineata*			
660.	26915	*Hennedya crispa*			
661.	26919	*Herposiphonia rostrata*			
662.		*Heteroclinus sp.*			
663.		*Heterodontus portusjacksoni*			
664.	26929	*Heterosiphonia callithamnium*			
665.	26938	*Heterosiphonia wrangelioides*			
666.		*Hexanchus nakamurai*			Y
667.	5108	*Hibbertia acerosa (Needle Leaved Guinea Flower)*			
668.	5114	*Hibbertia commutata*			
669.	5117	*Hibbertia cuneiformis (Cutleaf Hibbertia)*			
670.	5134	*Hibbertia huegelii*			
671.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
672.	45534	*Hibbertia hypericoides subsp. hypericoides*			
673.	5154	*Hibbertia perfoliata*			
674.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
675.	5172	*Hibbertia stellaris (Orange Stars)*			
676.	5173	*Hibbertia subvaginata*			
677.	5176	*Hibbertia vaginata*			
678.	47965	*Hieraaetus morphnoides (Little Eagle)*			
679.	25734	*Himantopus himantopus (Black-winged Stilt)*			
680.		*Hippocampus elongatus*			
681.	26942	*Hirsutithallia laricina*			
682.	24491	*Hirundo neoxena (Welcome Swallow)*			
683.	13758	*Histiopteris incisa*			
684.		*Histrio histrio*			
685.		*Hogna crispipes*			
686.		*Holconia westralia*			
687.	445	*Holcus setiger (Annual Fog)*	Y		
688.		*Holoplatys dejongi*			
689.	6222	*Homalosciadium homalocarpum*			
690.	5816	*Homalospermum firmum*			
691.	448	*Hordeum glaucum (Northern Barley Grass)*	Y		
692.	449	*Hordeum leporinum (Barley Grass)*	Y		
693.	3968	*Hovea trisperma (Common Hovea)*			
694.	12859	*Hovea trisperma var. trisperma*			
695.	12741	*Hyalosperma cotula*			
696.	5216	*Hybanthus calycinus (Wild Violet)*			
697.	5218	*Hybanthus debilissimus*			
698.	26949	*Hydroclathrus clathratus*			
699.	6223	*Hydrocotyle alata*			
700.	6224	*Hydrocotyle blepharocarpa*			
701.	6229	*Hydrocotyle diantha*			
702.	6232	*Hydrocotyle hispidula*			
703.	6240	*Hydrocotyle scutellifera*			
704.		*Hydrophilidae sp.*			
705.	25366	*Hydrophis elegans (Elegant Seasnake, Bar-bellied Seasnake)*			
706.	43384	*Hydrophis platurus (Yellow-bellied Seasnake)*			
707.		*Hydropsychidae sp.*			
708.		*Hydroptilidae sp.*			
709.	452	*Hyparrhenia hirta (Tambookie Grass)*	Y		
710.	5180	*Hypericum gramineum (Small St John's Wort)*			
711.		*Hypnos monopterygium*			
712.	5817	*Hypocalymma angustifolium (White Myrtle, Kudjid)*			
713.	35070	*Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)*			
714.	5825	*Hypocalymma robustum (Swan River Myrtle)*			
715.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
716.	9352	*Hypochaeris radicata (Flat Weed, Cats-ear)*	Y		
717.	26981	*Hypoglossum revolutum*			
718.	1070	*Hypolaena exsulca*			
719.	17841	*Hypolaena pubescens*			
720.		*Hyriidae sp.*			
721.		*Idiommata blackwalli*			
722.	910	*Isolepis cernua (Nodding Club-rush)*			
723.	20199	*Isolepis cernua var. cernua*			
724.	20200	*Isolepis cernua var. setiformis*			
725.	912	*Isolepis cyperoides*			

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726.	917	*Isolepis marginata (Coarse Club-rush)*			
727.	919	*Isolepis oldfieldiana*			
728.	921	*Isolepis producta*			
729.		*Isometroides vescus*			
730.		*Isopeda leishmanni*			
731.	7396	*Isotoma hypocrateriformis (Woodbridge Poison)*			
732.	3992	*Isotropis cuneifolia (Granny Bonnets)*			
733.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
734.	8092	*Ixiolaena viscosa (Sticky Ixiolaena)*			
735.	4012	*Jacksonia furcellata (Grey Stinkwood)*			
736.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
737.	20454	*Juncus acutus subsp. acutus*	Y		
738.	1178	*Juncus bufonius (Toad Rush)*	Y		
739.	1180	*Juncus capitatus (Capitate Rush)*	Y		
740.	1185	*Juncus kraussii (Sea Rush)*			
741.	11922	*Juncus kraussii subsp. australiensis*			
742.	1188	*Juncus pallidus (Pale Rush)*			
743.	1189	*Juncus pauciflorus (Loose Flower Rush)*			
744.	1191	*Juncus polyanthemus*	Y		
745.	4037	*Kennedia coccinea (Coral Vine)*			
746.	4044	*Kennedia prostrata (Scarlet Runner)*			
747.	4045	*Kennedia stirlingii (Bushy Kennedia)*			
748.	24070	*Kogia breviceps (Pygmy Sperm Whale)*			
749.	5832	*Kunzea ericifolia (Spearwood, Pondil)*			
750.	15498	*Kunzea glabrescens (Spearwood)*			
751.	13562	*Lachenalia aloides*	Y		
752.	1370	*Lachenalia reflexa*	Y		
753.	20019	*Lachnagrostis filiformis*			
754.	19955	*Lachnagrostis plebeia*			
755.	19956	*Lachnagrostis preissii*			
756.	18585	*Lagenophora huegelii*			
757.		*Lagocephalus sceleratus*			
758.	467	*Lagurus ovatus (Hare's Tail Grass)*	Y		
759.		*Lampona cylindrata*			
760.	28342	*Landoltia punctata (Thin Duckweed)*			
761.	30920	*Larus crassirostris (Black-tailed Gull)*			Y
762.	25637	*Larus novaehollandiae (Silver Gull)*			
763.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
764.	25638	*Larus pacificus (Pacific Gull)*			
765.	45082	*Lasiopetalum glutinosum subsp. latifolium*			
766.	4052	*Latrobea tenella*			
767.		*Latrodectus hasseltii*			
768.	27002	*Laurencia forsteri*			
769.	27008	*Laurencia shepherdii*			
770.	38323	*Lavandula stoechas subsp. stoechas*	Y		
771.	1307	*Laxmannia ramosa (Branching Lily)*			
772.	1309	*Laxmannia squarrosa*			
773.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
774.	7572	*Lechenaultia expansa*			
775.	7574	*Lechenaultia floribunda (Free-flowering Leschenaultia)*			
776.	925	*Lepidosperma angustatum*			
777.	42742	*Lepidosperma calcicola*			
778.	932	*Lepidosperma effusum (Spreading Sword-sedge)*			
779.	933	*Lepidosperma gladiatum (Coast Sword-sedge, Kerbin)*			
780.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
781.	938	*Lepidosperma persecans*			
782.	940	*Lepidosperma pubisquameum*			
783.	944	*Lepidosperma scabrum*			
784.		*Lepidosperma sp.*			
785.		*Lepidosperma sp. Brixton Street broad inflorescence*			
786.	945	*Lepidosperma squamatum*			
787.		*Lepidosperma squamatum s.l.*			
788.	948	*Lepidosperma tetraquetrum*			
789.	1653	*Leporella fimbriata (Hare Orchid)*			
790.	1077	*Leptocarpus canus (Hoary Twine-rush)*			
791.	1078	*Leptocarpus coangustatus*			
792.	46375	*Leptocarpus decipiens*			
793.	19833	*Leptocarpus laxus*			
794.	46382	*Leptocarpus roycei*			
795.	1080	*Leptocarpus scariosus*			

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796.	15418	*Leptoceras menziesii*			
797.		*Leptoceridae sp.*			
798.	2352	*Leptomeria preissiana*			
799.		*Leptophlebiidae sp.*			
800.	27015	*Leptosomia rosea*			
801.	1085	*Lepyrodia glauca*			
802.	1090	*Lepyrodia muirii*			
803.	25131	*Lerista distinguenda*			
804.	25133	*Lerista elegans*			
805.	25148	*Lerista lineopunctulata*			
806.	25165	*Lerista praepedita*			
807.	6374	*Leucopogon conostephioides*			
808.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
809.	6436	*Leucopogon propinquus*			
810.	7676	*Levenhookia pusilla (Midget Stylewort)*			
811.		*Levenhookia pusilla/stipitata*			
812.	7677	*Levenhookia stipitata (Common Stylewort)*			
813.		*Leviprora inops*			
814.	25005	*Lialis burtonis*			
815.		*Libellulidae sp.*			
816.	25661	*Lichmera indistincta (Brown Honeyeater)*			
817.	24582	*Lichmera indistincta subsp. indistincta (Brown Honeyeater)*			
818.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
819.	4362	*Linum marginale (Wild Flax)*			
820.	36160	*Liparophyllum capitatum*			
821.	36179	*Liparophyllum violifolium*			
822.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
823.	25388	*Litoria moorei (Motorbike Frog)*			
824.	9289	*Lobelia anceps (Angled Lobelia)*			
825.	7407	*Lobelia rhytidosperma (Wrinkled-seeded Lobelia)*			
826.	7408	*Lobelia tenuior (Slender Lobelia)*			
827.	27044	*Lobospira bicuspidata*			
828.	6515	*Logania vaginalis (White Spray)*			
829.	475	*Lolium multiflorum (Italian Ryegrass)*	Y		
830.	476	*Lolium perenne (Perennial Ryegrass)*	Y		
831.	478	*Lolium rigidum (Wimmera Ryegrass)*	Y		
832.		*Lolium sp.*			
833.		*Lolium sp. (annual)*			
834.	11073	*Lolium x hybridum*	Y		
835.		*Lomandra ?caespitosa*			
836.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
837.	1228	*Lomandra hermaphrodita*			
838.	1231	*Lomandra maritima*			
839.	1232	*Lomandra micrantha (Small-flower Mat-rush)*			
840.	14542	*Lomandra micrantha subsp. micrantha*			
841.	1234	*Lomandra nigricans*			
842.	1236	*Lomandra odora (Tiered Matrush)*			
843.	1239	*Lomandra preissii*			
844.	1243	*Lomandra sericea (Silky Mat Rush)*			
845.	1246	*Lomandra suaveolens*			
846.		*Lotella rhacinus*			
847.	4059	*Lotus angustissimus (Narrowleaf Trefoil)*	Y		
848.	8564	*Lotus subbiflorus*	Y		
849.	1198	*Luzula meridionalis (Field Woodrush)*			
850.		*Lycosa godeffroyi*			
851.	1097	*Lyginia barbata*			
852.	2839	*Macarthuria australis*			
853.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
854.	85	*Macrozamia riedlei (Zamia, Djiridji)*			
855.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
856.	25654	*Malurus splendens (Splendid Fairy-wren)*			
857.	24552	*Malurus splendens subsp. splendens (Splendid Fairy-wren)*			
858.	36480	*Malva arborea (Tree Mallow)*	Y		
859.	4961	*Malva parviflora (Marshmallow)*	Y		
860.	31351	*Malva preissiana*			
861.	24583	*Manorina flavigula (Yellow-throated Miner)*			
862.		*Maratus pavonis*			
863.		*Maxillicosta scabriceps*			
864.	25758	*Megalurus gramineus (Little Grassbird)*			
865.	34676	*Meionectes brownii (Swamp Raspwort)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
866.	37580	*Melaleuca acutifolia*			
867.	13271	*Melaleuca huegelii subsp. huegelii*			
868.	13273	*Melaleuca incana subsp. incana*			
869.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
870.	5952	*Melaleuca preissiana (Moonah)*			
871.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
872.	5978	*Melaleuca teretifolia (Banbar)*			
873.	5980	*Melaleuca thymoides*			
874.	5987	*Melaleuca viminea (Mohan)*			
875.	13280	*Melaleuca viminea subsp. viminea*			
876.	4516	*Melia azedarach (White Cedar)*			
877.	4084	*Melilotus albus*	Y		
878.	4085	*Melilotus indicus*	Y		
879.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
880.	25184	*Menetia greyii*			
881.	25185	*Menetia maini*			
882.	25186	*Menetia surda subsp. cresswelli*			
883.	25187	*Menetia surda subsp. surda*			
884.	6883	*Mentha pulegium (Pennyroyal)*	Y		
885.	6886	*Mentha x piperita*	Y		Y
886.	24598	*Merops ornatus (Rainbow Bee-eater)*			
887.	955	*Mesomelaena pseudostygia*			
888.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
889.		*Meuschenia freycineti*			
890.		*Microcarbo melanoleucos*			
891.	25693	*Microeca fascinans (Jacky Winter)*			
892.	485	*Microlaena stipoides (Weeping Grass)*			
893.	10954	*Microtis media (Tall Mignonette Orchid)*			
894.	15419	*Microtis media subsp. media*			
895.	1660	*Microtis orbicularis (Dark Mignonette Orchid)*			
896.	7085	*Misopates orontium (Lesser Snapdragon)*	Y		
897.		*Missulena granulosa*			
898.		*Missulena hoggi*			
899.		*Missulena occatoria*			
900.	2894	*Moenchia erecta (Erect Chickweed)*	Y		
901.		*Monacanthus chinensis*			
902.	7410	*Monopsis debilis*	Y		
903.	37440	*Monopsis debilis var. depressa*	Y		
904.	4662	*Monotaxis grandiflora (Diamond of the Desert)*			
905.	4666	*Monotaxis occidentalis*			
906.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
907.	25188	*Morethia adelaidensis*			
908.	25189	*Morethia boulengeri*			
909.	25191	*Morethia lineoocellata*			
910.	25192	*Morethia obscura*			
911.	25193	*Morethia ruficauda subsp. exquisita*			
912.	25194	*Morethia ruficauda subsp. ruficauda*			
913.	25195	*Morethia storri*			
914.	48008	*Morus serrator (Australasian Gannet)*			
915.	2412	*Muehlenbeckia adpressa (Climbing Lignum)*			
916.	24223	*Mus musculus (House Mouse)*	Y		
917.		*Mustelus antarcticus*			
918.		*Myandra bicincta*			
919.		*Myliobatis sp.*			
920.	25420	*Myobatrachus gouldii (Turtle Frog)*			
921.	7289	*Myoporum caprarioides (Slender Myoporum)*			
922.	7291	*Myoporum insulare (Blueberry Tree, boobialla)*			
923.	6192	*Myriophyllum drummondii*			
924.		*Nannoperca vittata*			
925.	24738	*Neophema elegans (Elegant Parrot)*			
926.		*Neosebastes pandus*			
927.		*Nephila edulis*			
928.	18356	*Nerium oleander*	Y		
929.	492	*Neurachne alopecuroidea (Foxtail Mulga Grass)*			
930.		*Nicodamus mainae*			
931.	27103	*Nizymenia conferta*			
932.	25252	*Notechis scutatus (Tiger Snake)*			
933.		*Notonectidae sp.*			
934.	25197	*Notoscincus ornatus subsp. ornatus*			
935.	2401	*Nuytsia floribunda (Christmas Tree, Mudja)*			

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936.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
937.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
938.		*Ocrisiona parmeliae*			
939.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
940.	6140	*Oenothera mollissima*	Y		
941.	14292	*Oenothera stricta subsp. stricta*	Y		
942.	8127	*Olearia axillaris (Coastal Daisybush)*			
943.	8149	*Olearia rudis (Rough Daisybush)*			
944.		*Oligochaeta sp.*			
945.		*Omegophora armilla*			
946.		*Ommatoiulus moreletii*			
947.		*Oniscidae sp.*			
948.	7348	*Opercularia hispidula (Hispid Stinkweed)*			
949.	18255	*Opercularia vaginata (Dog Weed)*			
950.		*Ophichthus melanochir*			
951.	12782	*Ophioglossum gramineum*			
952.		*Ophisurus serpens*			
953.	36177	*Ornduffia albiflora*			
954.	1372	*Ornithogalum arabicum (Lesser Cape Lily)*	Y		
955.	4113	*Ornithopus compressus (Yellow Serradella)*	Y		
956.	4114	*Ornithopus pinnatus (Slender Serradella)*	Y		
957.	7122	*Orobanche minor (Lesser Broomrape)*	Y		
958.		*Orthocladiinae sp.*			
959.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
960.	30375	*Oxalis exilis*			
961.	4352	*Oxalis glabra*	Y		
962.	4356	*Oxalis pes-caprae (Soursob)*	Y		
963.	4358	*Oxalis purpurea (Largeflower Wood Sorrel)*	Y		
964.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
965.	24692	*Pachyptila belcheri (Slender-billed Prion)*			
966.	24693	*Pachyptila desolata (Antarctic Prion)*			
967.	25707	*Pachyptila salvini (Salvin's Prion)*			
968.		*Palaemonidae sp.*			
969.	2965	*Papaver rhoeas (Field Poppy)*	Y		
970.	27119	*Papenfussiella extensa*			
971.		*Parablennius postoculomaculatus*			
972.	1667	*Paracaleana nigrita (Flying Duck Orchid)*			
973.	516	*Parapholis incurva (Coast Barbgrass)*	Y		
974.		*Paraplotosus albilabris*			
975.	3618	*Paraserianthes lophantha (Albizia)*			
976.		*Parastacidae sp.*			
977.	25253	*Parasuta gouldii*			
978.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
979.	25682	*Pardalotus striatus (Striated Pardalote)*			
980.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
981.	1762	*Parietaria debilis (Pellitory)*			
982.		*Paristiopterus gallipavo*			
983.	527	*Paspalum dilatatum*	Y		
984.	528	*Paspalum distichum (Water Couch)*	Y		
985.	533	*Paspalum vaginatum (Salt Water Couch)*			
986.	24642	*Passer montanus (Eurasian Tree Sparrow)*	Y		
987.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
988.	30471	*Patersonia occidentalis var. angustifolia*			
989.	30472	*Patersonia occidentalis var. occidentalis*			
990.	24674	*Pavo cristatus (Common Peafowl, Indian Peafowl)*	Y		
991.		*Pegasus sp.*			Y
992.		*Pegasus volitans*			
993.	4343	*Pelargonium capitatum (Rose Pelargonium)*	Y		
994.	4346	*Pelargonium littorale*			
995.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
996.	27121	*Penicillus nodulosus*			
997.		*Pentaceropsis recurvirostris*			
998.	40423	*Pentameris airoides (False Hairgrass)*	Y		
999.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
1000.	16477	*Pericalymma ellipticum var. ellipticum*			
1001.	16984	*Persicaria lapathifolia*	Y		
1002.	2273	*Persoonia saccata (Snottygobble)*			
1003.		*Perthiidae sp.*			
1004.	27126	*Petalonia fascia*			
1005.	48060	*Petrochelidon ariel (Fairy Martin)*			

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1006.	48061	*Petrochelidon nigricans (Tree Martin)*			
1007.	48066	*Petroica boodang (Scarlet Robin)*			
1008.	24659	*Petroica goodenovii (Red-capped Robin)*			
1009.	2299	*Petrophile linearis (Pixie Mops)*			
1010.	25697	*Phalacrocorax carbo (Great Cormorant)*			
1011.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
1012.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
1013.	25699	*Phalacrocorax varius (Pied Cormorant)*			
1014.	24668	*Phalacrocorax varius subsp. hypoleucos (Pied Cormorant)*			
1015.	547	*Phalaris angusta*	Y		
1016.	551	*Phalaris minor (Lesser Canary Grass)*	Y		
1017.	552	*Phalaris paradoxa (Paradoxa Grass)*	Y		
1018.	24409	*Phaps chalcoptera (Common Bronzewing)*			
1019.	25587	*Phaps elegans (Brush Bronzewing)*			
1020.	18529	*Philotheca spicata (Pepper and Salt)*			
1021.	1173	*Philydrella pygmaea (Butterfly Flowers)*			
1022.		*Phlebia rufa*			
1023.		*Phlebia subceracea*			
1024.	1478	*Phlebocarya ciliata*			
1025.		*Phryganoporus candidus*			
1026.	6734	*Phyla nodiflora var. nodiflora*	Y		
1027.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
1028.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
1029.	16177	*Phyllangium paradoxum*			
1030.	4675	*Phyllanthus calycinus (False Boronia)*			
1031.		*Phyllophryne scortea*			
1032.		*Phyllopteryx taeniolatus*			
1033.	20652	*Physalis angulata*	Y		
1034.	6983	*Physalis peruviana (Cape Gooseberry)*	Y		
1035.		*Physidae sp.*			
1036.	2793	*Phytolacca octandra (Red Ink Plant)*	Y		
1037.		*Phytophthora cinnamomi*			
1038.	78	*Pilularia novae-hollandiae (Austral Pillwort)*			
1039.	11404	*Pimelea imbricata var. major*			
1040.	5252	*Pimelea lanata*			
1041.	5254	*Pimelea leucantha*			
1042.	18117	*Pimelea rosea subsp. rosea*			
1043.	42281	*Pithocarpa cordata*			
1044.	7303	*Plantago lanceolata (Ribwort Plantain)*	Y		
1045.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
1046.	24842	*Platalea regia (Royal Spoonbill)*			
1047.	25720	*Platycercus icterotis (Western Rosella)*			
1048.	24747	*Platycercus spurius (Red-capped Parrot)*			
1049.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
1050.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
1051.	27149	*Platysiphonia mutabilis*			
1052.	25007	*Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)*			
1053.	38824	*Pleurotus australis*			
1054.		*Pluteus atromarginatus*			
1055.	571	*Poa annua (Winter Grass)*	Y		
1056.	573	*Poa drummondiana (Knotted Poa)*			
1057.	577	*Poa poiformis (Coastal Poa)*			
1058.	578	*Poa porphyroclados*			
1059.	25703	*Podargus strigoides (Tawny Frogmouth)*			
1060.	24679	*Podargus strigoides subsp. brachypterus (Tawny Frogmouth)*			
1061.	25704	*Podiceps cristatus (Great Crested Grebe)*			
1062.	8175	*Podolepis gracilis (Slender Podolepis)*			
1063.	8182	*Podotheca angustifolia (Sticky Longheads)*			
1064.	8183	*Podotheca chrysantha (Yellow Podotheca)*			
1065.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
1066.		*Podotheca sp.*			
1067.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
1068.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
1069.	24908	*Pogona minor subsp. mitchelli (Dwarf Bearded Dragon)*			
1070.	24909	*Pogona nullarbor (Nullabor Bearded Dragon)*			
1071.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
1072.	27162	*Pollexfenia pedicellata*			
1073.	582	*Polypogon monspeliensis (Annual Beardgrass)*	Y		
1074.	583	*Polypogon tenellus*			
1075.	25722	*Polytelis anthopeplus (Regent Parrot)*			

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1076.		*Pomatomus saltatrix*			
1077.	4691	*Poranthera microphylla (Small Poranthera)*			
1078.		*Poranthera microphylla/moorokatta*			
1079.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
1080.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
1081.	24769	*Porzana fluminea (Australian Spotted Crake)*			
1082.	25732	*Porzana pusilla (Baillon's Crake)*			
1083.	24771	*Porzana tabuensis (Spotless Crake)*			
1084.	110	*Potamogeton drummondii*			
1085.	111	*Potamogeton ochreatus (Blunt Pondweed)*			
1086.	1670	*Prasophyllum drummondii (Swamp Leek Orchid)*			
1087.	1676	*Prasophyllum hians (Yawning Leek Orchid)*			
1088.	10853	*Prasophyllum plumiforme*			
1089.		*Prionosternum nitidiceps*			
1090.		*Prionosternum scutatum*			
1091.	25199	*Proablepharus reginae*			
1092.	25200	*Proablepharus tenuis*			
1093.	25201	*Pseudemoia baudini*			
1094.	8189	*Pseudognaphalium luteoalbum (Jersey Cudweed)*			
1095.	25511	*Pseudonaja affinis (Dugite)*			
1096.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
1097.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
1098.	25264	*Pseudonaja nuchalis (Gwardar, Northern Brown Snake)*			
1099.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
1100.	57	*Pteridium esculentum (Bracken)*			
1101.	13255	*Pterochaeta paniculata*			
1102.	27195	*Pterocladia lucida*			
1103.	27196	*Pterocladia rectangularis*			
1104.	24702	*Pterodroma brevirostris (Kerguelen Petrel)*			
1105.	24703	*Pterodroma lessonii (White-headed Petrel)*			
1106.		*Pterostylis aff. nana*			
1107.	15426	*Pterostylis aspera*			
1108.	10875	*Pterostylis concava*			
1109.	1693	*Pterostylis recurva (Jug Orchid)*			
1110.		*Pterostylis sp.*			
1111.	18655	*Pterostylis sp. crinkled leaf (G.J. Keighery 13426)*			
1112.	1698	*Pterostylis vittata (Banded Greenhood)*			
1113.		*Pterygotrigla polyommata*			
1114.	2718	*Ptilotus drummondii (Narrowleaf Mulla Mulla)*			
1115.	11260	*Ptilotus drummondii var. drummondii (Pussytail)*			
1116.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
1117.	4181	*Pultenaea reticulata*			
1118.		*Purpureicephalus spurius*			
1119.	30867	*Pycnonotus jocosus subsp. jocosus (Red-whiskered Bulbul)*	Y		Y
1120.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
1121.	25009	*Pygopus nigriceps*			
1122.	8195	*Quinetia urvillei*			
1123.		*Rachycentron canadum*			
1124.	2933	*Ranunculus muricatus (Sharp Buttercup)*	Y		
1125.	2938	*Ranunculus trilobus (Buttercup)*	Y		
1126.	24245	*Rattus rattus (Black Rat)*	Y		
1127.		*Raveniella peckorum*			
1128.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
1129.	38832	*Resupinatus cinerascens*			
1130.	48434	*Reticularia lobata*			Y
1131.	11341	*Rhagodia baccata subsp. baccata*			
1132.	11930	*Rhagodia baccata subsp. dioica (Sea Berry Saltbush)*			
1133.	4822	*Rhamnus alaternus (Buckthorn)*	Y		
1134.	48096	*Rhipidura albiscapa (Grey Fantail)*			
1135.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
1136.	24454	*Rhipidura leucophrys subsp. leucophrys (Willie Wagtail)*			
1137.		*Rhynchobatus djiddensis*			
1138.		*Richardsonianidae sp.*			
1139.		*Rickenella fibula*			
1140.	1556	*Romulea rosea (Guildford Grass)*	Y		
1141.	3066	*Rorippa nasturtium-aquaticum (Watercress)*	Y		
1142.	10970	*Rostraria cristata*	Y		
1143.	2429	*Rumex acetosella (Sorrel)*	Y		
1144.	2430	*Rumex brownii (Swamp Dock)*	Y		
1145.	2432	*Rumex conglomeratus (Clustered Dock)*	Y		

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1146.	2433	*Rumex crispus (Curled Dock)*	Y		
1147.	2440	*Rumex pulcher (Fiddle Dock)*	Y		
1148.	116	*Ruppia polycarpa*			
1149.	40431	*Rytidosperma acerosum*			
1150.	30434	*Salsola australis*			
1151.	6483	*Samolus junceus*			
1152.	6484	*Samolus repens (Creeping Brookweed)*			
1153.	14107	*Samolus repens var. paucifolius*			
1154.	27239	*Sargassum fallax*			
1155.	27253	*Sargassum peronii*			
1156.		*Saurida tumbil*			
1157.		*Saurida undosquamis*			
1158.	7595	*Scaevola anchusifolia*			
1159.	7603	*Scaevola canescens (Grey Scaevola)*			
1160.	7606	*Scaevola crassifolia (Thick-leaved Fan-flower)*			
1161.	7626	*Scaevola nitida (Shining Fanflower)*			
1162.	7634	*Scaevola phlebopetala (Velvet Fanflower)*			
1163.	7635	*Scaevola pilosa (Hairy Fan-flower)*			
1164.	13182	*Scaevola repens var. repens*			
1165.	48834	*Schinus terebinthifolia*	Y		
1166.	6263	*Schoenolaena juncea*			
1167.	973	*Schoenus asperocarpus (Poison Sedge)*			
1168.	978	*Schoenus brevisetis*			
1169.	982	*Schoenus clandestinus*			
1170.	984	*Schoenus curvifolius*			
1171.	986	*Schoenus efoliatus*			
1172.	994	*Schoenus humilis*			
1173.	1004	*Schoenus nitens (Shiny Bog-rush)*			
1174.	1007	*Schoenus pedicellatus*			
1175.	1017	*Schoenus subbulbosus*			
1176.	1018	*Schoenus subfascicularis*			
1177.	1023	*Schoenus tenellus*			
1178.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
1179.		*Scirtidae sp.*			
1180.		*Scorpaena sumptuosa*			
1181.		*Scorpis georgianus*			
1182.	603	*Secale cereale (Rye)*	Y		
1183.	6	*Selaginella gracillima (Tiny Clubmoss)*			
1184.	32433	*Sematophyllum homomallum*			
1185.	25878	*Senecio condylus*			
1186.	20161	*Senecio pinnatifolius*			
1187.	8220	*Senecio vulgaris (Common Groundsel)*	Y		
1188.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
1189.		*Seriola hippos*			
1190.		*Servaea melaina*			
1191.		*Servaea spinibarbis*			
1192.	4980	*Sida hookeriana*			
1193.	2909	*Silene gallica (French Catchfly)*	Y		
1194.		*Sillago sp.*			
1195.	8224	*Siloxerus filifolius*			
1196.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
1197.		*Simaetha tenuior*			
1198.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
1199.	25267	*Simoselaps littoralis (West Coast Banded Snake)*			
1200.		*Simuliidae sp.*			
1201.		*Siphonognathus argyrophanes*			
1202.		*Siphonognathus radiatus*			
1203.	42785	*Sirophysalis trinodis*			
1204.	3072	*Sisymbrium orientale (Indian Hedge Mustard)*	Y		
1205.	30948	*Smicrornis brevirostris (Weebill)*			
1206.	6988	*Solanum americanum (Glossy Nightshade)*	Y		
1207.	7020	*Solanum linnaeanum (Apple of Sodom)*	Y		
1208.	7022	*Solanum nigrum (Black Berry Nightshade)*	Y		
1209.	7037	*Solanum symonii*			
1210.	8230	*Sonchus asper (Rough Sowthistle)*	Y		
1211.	9367	*Sonchus hydrophilus (Native Sowthistle)*			
1212.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
1213.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
1214.	2912	*Spergula arvensis (Corn Spurry)*	Y		
1215.	635	*Sporobolus virginicus (Marine Couch)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1216.	4828	*Spyridium globulosum (Basket Bush)*			
1217.		*Squatina australis*			
1218.	6930	*Stachys arvensis (Staggerweed)*	Y		
1219.	4733	*Stackhousia monogyna*			
1220.		*Steatoda grossa*			
1221.	2918	*Stellaria media (Chickweed)*	Y		
1222.	20397	*Stellaria pallida*	Y		
1223.	39083	*Stemonitis fusca*			
1224.	39086	*Stemonitis smithii*			Y
1225.	19403	*Stenopetalum gracile*			
1226.	3080	*Stenopetalum robustum*			
1227.	636	*Stenotaphrum secundatum (Buffalo Grass)*	Y		
1228.	24522	*Sterna bergii (Crested Tern)*			
1229.	25643	*Sterna hybrida (Whiskered Tern)*			
1230.	48594	*Sternula nereis (Fairy Tern)*			
1231.	24329	*Stictonetta naevosa (Freckled Duck)*			
1232.		*Stigmatopora argus*			
1233.	24554	*Stipiturus malachurus subsp. westernensis (Southern Emu-wren)*			
1234.	2316	*Stirlingia latifolia (Blueboy)*			
1235.	25597	*Strepera versicolor (Grey Currawong)*			
1236.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
1237.	30951	*Streptopelia chinensis subsp. tigrina (Spotted Turtle-Dove)*	Y		
1238.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
1239.		*Strongylura leiura*			
1240.	25518	*Strophurus spinigerus*			
1241.	24942	*Strophurus spinigerus subsp. spinigerus*			
1242.	44492	*Stuckenia pectinata*			
1243.	7684	*Stylidium amoenum (Lovely Triggerplant)*			
1244.	25831	*Stylidium araeophyllum (Stilt Walker)*			
1245.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
1246.	7696	*Stylidium calcaratum (Book Triggerplant)*			
1247.	7699	*Stylidium carnosum (Fleshy-leaved Triggerplant)*			
1248.	7712	*Stylidium despectum (Dwarf Triggerplant)*			
1249.	7717	*Stylidium divaricatum (Daddy-long-legs)*			
1250.	25829	*Stylidium neurophyllum (Coastal Plain Triggerplant)*			
1251.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
1252.	33106	*Stylidium recurvum*			
1253.	7785	*Stylidium repens (Matted Triggerplant)*			
1254.	7790	*Stylidium roseoalatum (Pink-wing Triggerplant)*			
1255.	7798	*Stylidium schoenoides (Cow Kicks)*			
1256.	7806	*Stylidium utricularioides (Pink Fan Triggerplant)*			
1257.	1260	*Stypandra glauca (Blind Grass)*			
1258.	6476	*Styphelia tenuiflora (Common Pinheath)*			
1259.		*Sutorectus tentaculatus*			
1260.	2326	*Synaphea polymorpha (Albany Synaphea, Pinda)*			
1261.	2329	*Synaphea spinulosa*			
1262.	15532	*Synaphea spinulosa subsp. spinulosa*			
1263.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
1264.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
1265.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
1266.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
1267.	15741	*Tamarix aphylla (Athel Tree)*	Y		
1268.		*Tamopsis distinguenda*			
1269.		*Tamopsis perthensis*			
1270.		*Tanypodinae sp.*			
1271.	20135	*Taxandria linearifolia*			
1272.	4256	*Templetonia retusa (Cockies Tongues)*			
1273.	2791	*Tersonia cyathiflora (Button Creeper)*			
1274.		*Tetragnatha demissa*			
1275.		*Tetragnatha nitens*			
1276.		*Tetragnatha valida*			
1277.	2820	*Tetragonia decumbens (Sea Spinach)*	Y		
1278.		*Tetralycosa oraria*			
1279.		*Tetrapturus angustirostris*			
1280.	1036	*Tetraria octandra*			
1281.		*Thelymitra aff. pauciflora*			
1282.	1701	*Thelymitra antennifera (Vanilla Orchid)*			
1283.	10856	*Thelymitra benthamiana (Leopard Orchid)*			
1284.	1707	*Thelymitra flexuosa (Twisted Sun Orchid)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1285.	1708	*Thelymitra fuscolutea (Chestnut Sun Orchid)*			
1286.	11053	*Thelymitra macrophylla*			
1287.	1710	*Thelymitra mucida (Plum Orchid)*			
1288.		*Thelymitra sp.*			
1289.	20731	*Thelymitra vulgaris*			
1290.	20728	*Thelymitra xanthotricha*			
1291.	5077	*Thomasia cognata*			
1292.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
1293.		*Thyrsites atun*			
1294.		*Thysanophrys cirronasus*			
1295.	1318	*Thysanotus arbuscula*			
1296.	1319	*Thysanotus arenarius*			
1297.	1338	*Thysanotus manglesianus (Fringed Lily)*			
1298.		*Thysanotus manglesianus/patersonii complex*			
1299.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
1300.	1343	*Thysanotus patersonii*			
1301.	1351	*Thysanotus sparteus*			
1302.	1354	*Thysanotus tenellus*			
1303.	1357	*Thysanotus thyrsoideus*			
1304.	25202	*Tiliqua multifasciata (Central Blue-tongue)*			
1305.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
1306.	25519	*Tiliqua rugosa*			
1307.	25204	*Tiliqua rugosa subsp. aspera*			
1308.	25207	*Tiliqua rugosa subsp. rugosa*			
1309.		*Tipulidae sp.*			
1310.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
1311.		*Torquigener pleurogramma*			
1312.	32445	*Tortula muralis*			
1313.		*Trachinocephalus myops*			
1314.	1368	*Trachyandra divaricata*	Y		
1315.	6266	*Trachymene coerulea (Blue Lace Flower)*			
1316.	19041	*Trachymene coerulea subsp. coerulea*			
1317.	6280	*Trachymene pilosa (Native Parsnip)*			
1318.	1481	*Tribonanthes australis (Southern Tiurndin)*			
1319.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
1320.	4383	*Tribulus terrestris (Caltrop)*	Y		
1321.	39097	*Trichia decipiens*			
1322.	8251	*Trichocline spathulata (Native Gerbera)*			
1323.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
1324.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
1325.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
1326.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
1327.	1363	*Tricoryne tenella*			
1328.	4292	*Trifolium campestre (Hop Clover)*	Y		
1329.	4295	*Trifolium dubium (Suckling Clover)*	Y		
1330.	4297	*Trifolium glomeratum (Cluster Clover)*	Y		
1331.	17758	*Trifolium hybridum var. hybridum*	Y		
1332.	4313	*Trifolium subterraneum (Subterranean Clover)*	Y		
1333.	147	*Triglochin mucronata*			
1334.	151	*Triglochin striata*			
1335.	708	*Triticum aestivum (Wheat)*	Y		
1336.		*Trygonorrhina fasciata*			
1337.	11665	*Trymalium ledifolium var. ledifolium*			
1338.		*Tuoba pallida*			
1339.	27345	*Turbinaria gracilis*			
1340.	48147	*Turnix varius (Painted Button-quail)*			
1341.	30954	*Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)*			
1342.	24069	*Tursiops truncatus (Bottlenose Dolphin)*			
1343.	27347	*Tylotus obtusatus*			
1344.	99	*Typha orientalis (Bulrush, Cumbungi)*			
1345.	25762	*Tyto alba (Barn Owl)*			
1346.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
1347.		*Urodacus novaehollandiae*			
1348.	8255	*Ursinia anthemoides (Ursinia)*	Y		
1349.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
1350.	24386	*Vanellus tricolor (Banded Lapwing)*			
1351.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
1352.	25526	*Varanus tristis (Racehorse Monitor)*			
1353.	25227	*Varanus tristis subsp. tristis (Racehorse Monitor)*			
1354.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1355.		*Venator immansueta*			
1356.		*Venatrix pullastra*			
1357.	7111	*Veronica persica (Creeping Speedwell)*	Y		
1358.	24206	*Vespadelus regulus (Southern Forest Bat)*			
1359.	12070	*Vicia sativa subsp. sativa*	Y		
1360.	6575	*Vinca major (Blue Periwinkle)*	Y		
1361.	24040	*Vulpes vulpes (Red Fox)*	Y		
1362.	722	*Vulpia bromoides (Squirrel Tail Fescue)*	Y		
1363.	724	*Vulpia myuros (Rat's Tail Fescue)*	Y		
1364.	12052	*Vulpia myuros forma megalura*	Y		
1365.	33101	*Vulpia myuros forma myuros*	Y		
1366.		*Vulpia sp.*			
1367.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
1368.	7389	*Wahlenbergia preissii*			
1369.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
1370.	18108	*Watsonia meriana var. bulbillifera*	Y		
1371.	6658	*Wilsonia backhousei (Narrow-leaf Wilsonia)*			
1372.	27369	*Wrangelia velutina*			
1373.	1394	*Wurmbea dioica (Early Nancy)*			
1374.	12072	*Wurmbea dioica subsp. alba*			
1375.	1398	*Wurmbea monantha*			
1376.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			
1377.	6289	*Xanthosia huegelii*			
1378.	2331	*Xylomelum occidentale (Woody Pear, Djandin)*			
1379.		*Zanclistius elevatus*			
1380.	1049	*Zantedeschia aethiopica (Arum Lily)*	Y		
1381.		*Zebraplatys fractivittata*			
1382.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
1383.	36218	*Zygodon menziesii*			

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 wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

APPENDIX 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.

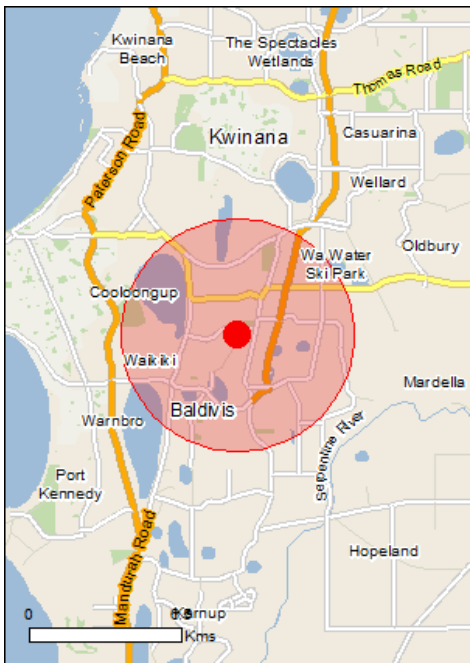
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 31/10/19 16:41:09

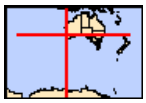
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



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

Coordinates
Buffer: 5.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	25
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:	27
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	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:	36
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Becher point wetlands	Within 10km of Ramsar
Peel-yalgorup system	20 - 30km upstream

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community known to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may 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 known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe	Endangered	Species or species

Name	Status	Type of Presence
[77037]		habitat likely to occur within area
Sternula nereis nereis		
Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Bettongia penicillata ogilbyi		
Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Other		
Westralunio carteri		
Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known 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 Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Diuris drummondii		
Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat may occur within area
Diuris micrantha		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei		
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica		
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus x balanites		
Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat likely to occur within area
Lepidosperma rostratum		
Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696)		
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Synaphea sp. Serpentine (G.R. Brand 103)		
[86879]	Critically 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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may 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
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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
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

Name	Threatened	Type of Presence
		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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat 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 may 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

Name	Threatened	Type of Presence 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 Pied Stilt, 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa 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
Leda	WA
Unnamed WA51658	WA

Invasive Species [Resource Information]

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

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

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		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur 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

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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

-32.30977 115.81564

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
-Department of Land and Resource Management, Northern Territory
-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, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-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

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 5

DBCA TEC/PEC Database Search

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
591	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	5	IP14-07	MYIP14-13	2000	No	334	219
596	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	IP14-08		2000	No	335	220
598	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	IP14-03		2000	No	340	225
1908	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	IP14-04		2000	No	341	226
889	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	5	IP14-09CENTRE	IP14-PLOT3	2000	No	342	227
888	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	2	IP14-10NORTH	IP14-10SOUTH	2000	No	343	228
594	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	IP14-02		2000	No	344	229

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
593	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	3	IP14 PLOT1	IP14-06	2000	No	346	231
605	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	COOL15		2000	No	348	233
603	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	COOL14		2000	No	349	234
606	SCP19a	Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in in Gibson et al. (1994))	Critically Endangered	Endangered	1	MYCOOL01		2000	No	360	245
640	SCP19a	Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in in Gibson et al. (1994))	Critically Endangered	Endangered	1	Walyungup01		2000	No	361	246
919	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	Walyungup02		2000	No	362	247
26	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	COOL09		2000	No	363	248

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
920	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	Walyungup03		2000	No	364	249
922	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	2	Walyungup04	Walyungup05	2000	No	365	250
1949	SCP19a	Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in in Gibson et al. (1994))	Critically Endangered	Endangered	1	Walyungup06		2000	No	608	471
1950	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	Walyungup07		2000	No	609	472
1951	SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	Critically Endangered	Endangered	1	Walyungup08		2000	No	610	473
2641	SCP24	Northern Spearwood shrublands and woodlands	Priority 3		2	KERO01	KERO02	500	No	1487	1197
2652	SCP24	Northern Spearwood shrublands and woodlands	Priority 3		1	COOL08		500	No	1490	1199
2653	SCP24	Northern Spearwood shrublands and woodlands	Priority 3		2	COOL02	COOL03	500	No	1491	1200
4332	Walyungup Microbial	Microbial community of a coastal saline lake (Lake Walyungup)	Priority 1		6	Walynugup05	WalyungupSite03	2000	No	2611	2199
3159	SCP21c	Low lying Banksia attenuata woodlands or shrublands	Priority 3	Endangered	1	HYMUS03		1000	No	14907	14483

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
109031	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld03313		200	No	106030	18313
109032	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld03314		200	No	106031	18314
109036	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld03318		200	No	106035	18318
109130	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld03412		200	No	106129	18412
109131	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld03413		200	No	106130	18413
110844	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld05126		200	No	107843	20125
110845	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld05127		200	No	107844	20126
110871	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld05153		200	No	107870	20152
110872	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld05154		200	No	107871	20153
112435	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld06717		200	No	109434	21716
112436	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld06718		200	No	109435	21717
112915	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld07197		200	No	109914	22196
113008	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld07290		200	No	110007	22289
116386	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10668		200	No	113385	25663
116387	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10669		200	No	113386	25664
116388	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10670		200	No	113387	25665
116465	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10747		200	No	113464	25742

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
116469	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10751		200	No	113468	25746
116470	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10752		200	No	113469	25747
116471	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10753		200	No	113470	25748
116645	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10927		200	No	113644	25922
116678	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10960		200	No	113677	25955
116680	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10962		200	No	113679	25957
116681	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10963		200	No	113680	25958
116682	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10964		200	No	113681	25959
116683	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10965		200	No	113682	25960
116684	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10966		200	No	113683	25961
116685	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10967		200	No	113684	25962
116686	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10968		200	No	113685	25963
116687	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10969		200	No	113686	25964
116691	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10973		200	No	113690	25968
116694	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld10976		200	No	113693	25971
116725	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11007		200	No	113724	26002
116726	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11008		200	No	113725	26003

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
116727	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11009		200	No	113726	26004
116729	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11011		200	No	113728	26006
116730	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11012		200	No	113729	26007
116731	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11013		200	No	113730	26008
116732	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11014		200	No	113731	26009
116733	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11015		200	No	113732	26010
116734	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11016		200	No	113733	26011
116735	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11017		200	No	113734	26012
116736	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11018		200	No	113735	26013
116744	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11026		200	No	113743	26021
116745	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11027		200	No	113744	26022
116746	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11028		200	No	113745	26023
116747	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11029		200	No	113746	26024
116748	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11030		200	No	113747	26025
116749	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11031		200	No	113748	26026
116750	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11032		200	No	113749	26027
116751	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11033		200	No	113750	26028

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
116763	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11045		200	No	113762	26040
116764	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11046		200	No	113763	26041
116765	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11047		200	No	113764	26042
116766	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11048		200	No	113765	26043
116767	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11049		200	No	113766	26044
116948	Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	Priority 3	Endangered	1	BanksiaWld11230		200	No	113947	26223
125351	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0250		500	No	122420	120759
125352	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0251		500	No	122421	120760
125355	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0254		500	No	122424	120763
125356	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0255		500	No	122425	120764
125359	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0258		500	No	122428	120767
125360	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0259		500	No	122429	120768
125361	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0260		500	No	122430	120769

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
125362	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0261		500	No	122431	120770
125363	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0262		500	No	122432	120771
125364	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0263		500	No	122433	120772
125365	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0264		500	No	122434	120773
125366	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0265		500	No	122435	120774
125367	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0266		500	No	122436	120775
125368	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0267		500	No	122437	120776
125369	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0268		500	No	122438	120777
125370	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0269		500	No	122439	120778
125371	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0270		500	No	122440	120779
125506	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0405		500	No	122575	120914

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
125507	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0406		500	No	122576	120915
125508	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0407		500	No	122577	120916
125509	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0408		500	No	122578	120917
125510	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0409		500	No	122579	120918
125511	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0410		500	No	122580	120919
125512	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0411		500	No	122581	120920
125513	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0412		500	No	122582	120921
125514	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0413		500	No	122583	120922
125716	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0615		500	No	122785	121124
125717	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0616		500	No	122786	121125
125719	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0618		500	No	122788	121127

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
125927	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0826		500	No	122996	121335
125928	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0827		500	No	122997	121336
125929	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0828		500	No	122998	121337
125930	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0829		500	No	122999	121338
125931	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0830		500	No	123000	121339
125932	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0831		500	No	123001	121340
125933	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0832		500	No	123002	121341
125934	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0833		500	No	123003	121342
125935	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0834		500	No	123004	121343
125936	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld0835		500	No	123005	121344
126183	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1082		500	No	123252	121591

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
126184	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1083		500	No	123253	121592
126185	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1084		500	No	123254	121593
126186	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1085		500	No	123255	121594
126187	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1086		500	No	123256	121595
126188	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1087		500	No	123257	121596
126189	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1088		500	No	123258	121597
126190	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1089		500	No	123259	121598
126191	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1090		500	No	123260	121599
126192	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1091		500	No	123261	121600
126193	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1092		500	No	123262	121601
126194	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1093		500	No	123263	121602

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
126195	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1094		500	No	123264	121603
126196	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1095		500	No	123265	121604
126197	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1096		500	No	123266	121605
126198	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1097		500	No	123267	121606
126199	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1098		500	No	123268	121607
126200	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1099		500	No	123269	121608
126202	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1101		500	No	123271	121610
126245	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1144		500	No	123314	121653
126246	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1145		500	No	123315	121654
126247	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1146		500	No	123316	121655
126626	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1525		500	No	123695	122034

OCC_UNIQUE	COM_ID	COM_NAME	STATE_CATG	COMM_CATG	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	ORIG_FID
126647	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1546		500	No	123716	122055
126648	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1547		500	No	123717	122056
126649	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1548		500	No	123718	122057
126663	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1562		500	No	123732	122071
126672	Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endangered	1	TuartWld1571		500	No	123741	122080
3119	SCP25	Southern Eucalyptus gomphocephala-Agonis flexuosa woodlands	Priority 3		1	SEW5		200	No	0	898
4424	SCP25	Southern Eucalyptus gomphocephala-Agonis flexuosa woodlands	Priority 3		1	leda01		500	No	0	991

APPENDIX 6

Species List

SPECIES LIST – Lot 1401 Fifty Road

GYMNOSPERMS

ZAMIACEAE
Macrozamia riedlei

MONOCOTYLEDONS

ARACEAE
**Zantedeschia aethiopica*

ASPARAGACEAE
Dichopogon capillipes
Lomandra preissii
Lomandra hermaphrodita
Sowerbaea laxiflora
Thysanotus thyrsoideus

COLCHICACEAE
Burchardia congesta

CYPERACEAE
Lepidosperma pubisquameum
Tetraria octandra

HAEMODORACEAE
Conostylis aculeata

HEMEROCALLIDACEAE
Caesia micrantha
Tricoryne elatior

IRIDACEAE
**Romulea rosea*

ORCHIDACEAE
Caladenia flava
Caladenia latifolia
Pterostylis sp.

POACEAE
**Avena fatua*
**Briza maxima*
**Briza minor*
**Ehrharta calycina*
**Ehrharta longiflora*
**Eragrostis curvula*
**Lolium perenne*

RESTIONACEAE
Desmocladus flexuosus

XANTHORRHOEACEAE
Xanthorrhoea preissii

DICOTYLEDONS

AIZOACEAE
**Carpobrotus edulis*

APOCYNACEAE
**Gomphocarpus fruticosus*

ASTERACEAE
**Arctotheca calendula*
**Conyza bonariensis*
**Hypochaeris glabra*
Senecio pinnatifolius
**Sonchus oleraceus*
**Taraxacum officinale*
**Ursinia anthemoides*

CARYOPHYLLACEAE
**Petrorhagia dubia*
**Silene gallica* var. *quinquevulnera*
**Stellaria media*

CASUARINACEAE
Allocasuarina fraseriana

DILLENIACEAE
Hibbertia hypericoides

DROSERACEAE
Drosera erythrorhiza
Drosera stolonifera

EUPHORBIACEAE
**Euphorbia peplus*
**Euphorbia terracina*

FABACEAE
Acacia pulchella
Gompholobium tomentosum
Hardenbergia comptoniana
Jacksonia furcellata
Jacksonia sternbergiana
Kennedia prostrata
**Lupinus cosentinii*
**Trifolium campestre*
**Vicia sativa*

MYRTACEAE
Corymbia calophylla
Eucalyptus gomphocephala
Eucalyptus marginata

OXALIDACEAE
**Oxalis pes-caprae*

PRIMULACEAE
**Lysimachia arvensis*

PROTEACEAE
Banksia attenuata
Banksia grandis
Banksia menziesii
Banksia sessilis
Hakea lissocarpha
Hakea prostrata

RANUNCULACEAE
Clematis linearifolia

THYMELEACEAE
Pimelea rosea

APPENDIX 7

Quadrat Data

QUADRAT FR1

50 388423 E 6424678 N

Vegetation: *Eucalyptus marginata* Low Woodland over *Jacksonia sternbergiana/Acacia pulchella* Low Shrubland
Condition: Degraded
Soil Type: Orange-brown sand
Landform: Gently sloping



QUADRAT (10 x 10m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus marginata	4	20
Jacksonia sternbergiana	2.5	2
Acacia pulchella	1.2	10
Macrozamia riedlei	0.8	2
**Ursinia anthemoides*	0.4	10
**Ehrharta calycina*	0.4	2
Sowerbaea laxiflora	0.4	<1
Tetraria octandra	0.4	<1
Desmocladus flexuosus	0.3	2
Lomandra hermaphrodita	0.3	1
Dichopogon capillipes	0.3	1
Caladenia flava	0.3	<1
Burchardia congesta	0.3	<1
Conostylis aculeata	0.2	<1
**Briza minor*	0.2	<1
**Romulea rosea*	0.2	<1
Drosera stolonifera	0.2	<1
**Lysimachia arvensis*	0.1	4
Pterostylis sp	0.1	<1
**Hypochaeris glabra*	Flat	5

* introduced species

QUADRAT FR2

50 388382 E 6424674 N

Vegetation: *Corymbia calophylla* Low Woodland over *Jacksonia sternbergiana* Tall Open Shrubland over weeds
Condition: Degraded
Soil Type: Orange-brown sand
Landform: Gentle slope



QUADRAT (10 x 10m)

SPECIES	HEIGHT (m)	COVER (%)
Corymbia calophylla	8	25
Jacksonia sternbergiana	2.1	5
Macrozamia riedlei	0.7	1
**Ehrharta calycina*	0.6	1
**Ehrharta longiflora*	0.5	20
Dichopogon capillipes	0.4	1
**Lupinus cosentinii*	0.4	1
**Briza maxima*	0.3	10
Conostylis aculeata	0.2	<1
**Stellaria media*	0.1	2
**Trifolium campestre*	0.1	1
Kennedia prostrata	0.1	<1
**Sonchus oleraceus*	0.1	<1
**Euphorbia terracina*	0.1	<1
**Hypochaeris glabra*	Flat	5

* introduced species

QUADRAT FR3

50 388413 E 6424546 N

Vegetation: *Corymbia calophylla* Low Woodland over *Jacksonia furcellata* Open Shrubland over weeds
Condition: Degraded
Soil Type: Orange-brown sand
Landform: Gentle slope



Quadrat (10 x 10m)

SPECIES	HEIGHT (m)	COVER (%)
Corymbia calophylla	8	25
Banksia grandis	2	1
Jacksonia furcellata	1.9	1
Allocasuarina fraseriana	1	1
Thysanotus thyrsoideus	0.7	<1
Macrozamia riedlei	0.6	2
**Ehrharta longiflora*	0.4	5
Lomandra preissii	0.4	<1
Lepidosperma pubisquameum	0.4	<1
**Briza maxima*	0.3	10
Dichopogon capillipes	0.3	2
Caladenia latifolia	0.3	<1
Sowerbaea laxiflora	0.3	<1
Conostylis aculeata	0.2	2
Desmocladus flexuosus	0.2	1
**Euphorbia peplus*	0.1	<1
**Lysimachia arvensis*	0.1	<1
**Hypochaeris glabra*	Flat	<1
Hardenbergia comptoniana	Climber	<1

* introduced species

QUADRAT FR4

50 388472 E 6424646 N

Vegetation: *Eucalyptus gomphocephala* Low Woodland over *Jacksonia sternbergiana* Shrubland over weeds
Condition: Degraded
Soil Type: Orange-brown sand
Landform: Gentle slope



QUADRAT (10 x 10m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus gomphocephala	10	10
Jacksonia sternbergiana	1.5	1
Banksia sessilis	1.2	1
Macrozamia riedlei	0.9	1
**Ehrharta longiflora*	0.4	10
**Briza maxima*	0.3	50
Burchardia congesta	0.3	<1
Dichopogon capillipes	0.3	<1
Desmocladus flexuosus	0.2	<1
Caladenia flava	0.2	<1
Drosera stolonifera	0.2	<1
**Lysimachia arvensis*	0.1	<1
**Briza minor*	0.1	<1
**Hypochaeris glabra*	Flat	1

* introduced species

ATTACHMENT 5

Black Cockatoo Assessment

LOT 311 FIFTY ROAD, BALDIVIS

BLACK COCKATOO HABITAT ASSESSMENT

Prepared for:	Aigle Royal
Report Date:	26 August 2016
Version:	2
Report No.	2016-271

pgv ENVIRONMENTAL

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1 INTRODUCTION

1.1 Site Location

Lot 311 Fifty Road (the site) is located in the City of Rockingham approximately 40km south of the Perth Central Business District (Figure 1). The site is at the south-west corner of the Fifty Road and Eighty Road intersection (Figure 2). The site is bounded to the north and partly to the south by residential development, to the west and east by rural grazing land and a chicken hatchery to the east. A part of Nairn Road that has not been constructed runs through the site (Figure 2). The site is 15.1ha in size.

1.2 Background

The site has been identified as containing habitat for Black Cockatoo species that are listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The three listed species of Black Cockatoo are:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) (Endangered);
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) (Vulnerable); and
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable).

PGV Environmental was commissioned by Aigle Royal to undertake a Black Cockatoo Habitat Assessment of the site.

1.3 Scope of Works

The Black Cockatoo Habitat Assessment has been prepared by PGV Environmental to:

- Describe the Black Cockatoo habitat on the site;
- Accurately map foraging habitat, potential breeding and potential roosting habitat;
- Assess the impact of proposed development on the Black Cockatoos;
- Ascertain whether referral of the proposed development is required under the EPBC Act; and
- Make recommendations on mitigating any impact on Black Cockatoo species.

2 BLACK COCKATOOS

2.1 Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)

Forest Red-tailed Black Cockatoos are endemic to the humid to sub-humid south-west of Western Australia (SEWPaC, 2012). The range of Forest Red-tailed Black Cockatoos is bound by Gingin in the north to Mt Helena, Christmas Tree Well, West Dale, North Bannister, Mt Saddleback, Kojonup, Rocky Gully, upper King River and Green Range (east of Albany) (SEWPaC, 2012; DoE, 2016). It nests in tree hollows with a depth of 1-5m, that are predominately Marri, Jarrah and Karri (*E. diversicolor*) and it feeds primarily on the seeds of Marri and Jarrah (Johnstone and Kirkby, 2011).

The site is within the modelled distribution for this species (SEWPaC, 2012) and Forest Red-tailed Black Cockatoos have been observed on the site in January and June by PGV Environmental (Plate 1).

Plate 1: Forest Red-Tailed Black Cockatoo on the site, 2016



2.2 Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*)

Carnaby's Black 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 of 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell). Eggs are laid from July to October, with incubation lasting 29 days (DoE, 2014).

The site is within the modelled distribution and breeding range for this species (SEWPaC, 2012) but this species has not been observed by PGV Environmental on the site.

2.3 Baudin's Black Cockatoo (*Calyptorhynchus baudinii*)

Baudin's Black Cockatoo is most common in the far south-west of Western Australia. It is known to breed from the southern forests north to Collie and east to near Kojonup. Baudin's Black Cockatoo is typically found in vagrant flocks and utilises the taller, more open Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) woodlands where it feeds mainly on Marri seeds and various Proteaceous species (Johnstone and Kirkby, 2011).

The site is outside the modelled distribution for Baudin's Black Cockatoos (SEWPaC, 2012). Therefore, habitat specific to this species has not been investigated further in this assessment.

3 METHODOLOGY

PGV Environmental undertook the Black Cockatoo Habitat Assessment in accordance with the *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* (SEWPaC, 2012) (Black Cockatoo Referral Guidelines) and the methodology that is outlined in the SPRAT Database for each of the Black Cockatoo species for Black Cockatoo Habitat Assessments.

A site visit was undertaken by PGV Environmental on 16 June 2016. The site was traversed on foot and information on Black Cockatoo foraging, roosting and breeding habitat was assessed.

The extent, type and quality of the vegetation present, including the presence and extent of plants known to be used by Black Cockatoos, was investigated during the site inspection. The quality of the vegetation was determined in the context of foraging habitat for Black Cockatoos. During the site visit a search for feeding signs or feeding debris such as 'chewed' Marri and Jarrah nuts was undertaken.

The site was also searched for evidence of roosting including areas of droppings, moulted feathers, feather down or clippings from branches under trees.

Breeding habitat is defined in the Black Cockatoo Referral Guidelines as trees of species known to support breeding within the range of the Black Cockatoo species which either have a suitable nest hollow OR are of a suitable diameter at breast height (DBH) to develop a nest hollow. For most tree species the suitable DBH is 500mm. A Significant Tree Survey assessment was undertaken to identify trees within the site that have a DBH of 500mm or greater. The location, species, tree trunk DBH and any other important descriptive information about each suitable tree located within the site was recorded. The presence of hollows or spouts was also recorded. Any hollows or spouts found were assessed from the ground and therefore those deemed suitable for breeding by Black Cockatoos may not be suitable upon closer inspection. The relevant species on the site were Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and Tuart (*Eucalyptus gomphocephala*).

4 BLACK COCKATOO HABITAT

4.1 Site Condition

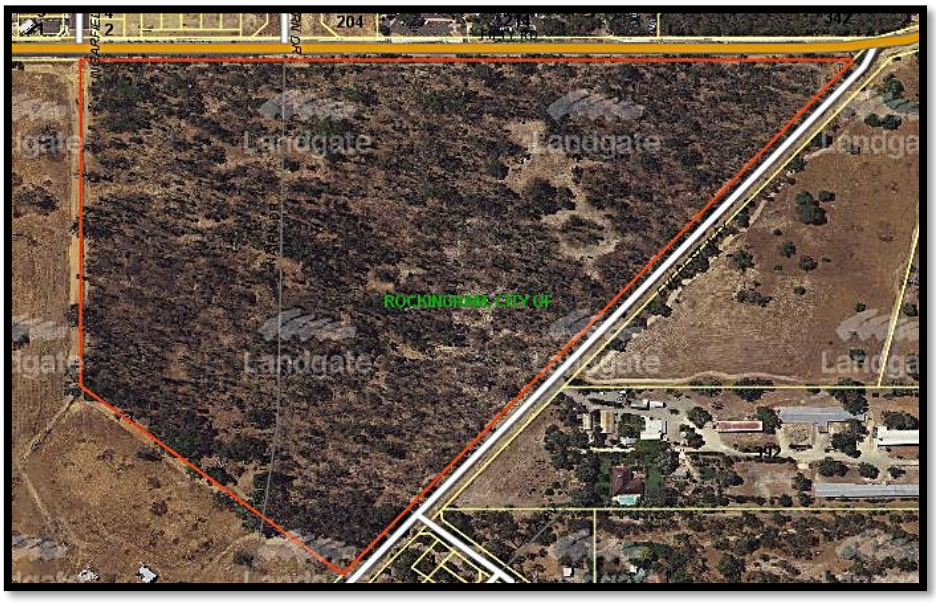
Historically the site was parkland cleared prior to 1953 (Plate 2). The native vegetation on the site has been substantially modified by fire and is cleared in some areas.

Plate 2: Aerial Photography from 22 February 2010 (Landgate, 2016)



The vegetation was impacted by fire in late 2009 or early 2010 as shown in aerial photography from 2010 (Plate 3).

Plate 3: Aerial Photography from 22 February 2010 (Landgate, 2016)



The impact of the previous clearing and fire are evident on the site by the charred trunks on the trees and abundance of Prickly Moses (*Acacia pulchella*) in the understorey (Plate 4).

Plate 4: Trees impacted by Fire with *Acacia pulchella* understorey



There are also frequent spot fires as evidence in a photograph taken January 2016 (Plate 5).

Plate 5: Evidence of spot fire, January 2016



The condition of the vegetation on the site was assessed by PGV Environmental on 16 June 2016 according to the Bush Forever rating scale shown in Table 2.

Table 2: 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 disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
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.

According to the Bush Forever Scale the vegetation is rated as Good due to the significant cover of weeds, the effects of past clearing and fire.

4.2 Foraging

The flora and vegetation present on the site was inspected by Dr Paul van der Moezel from PGV Environmental on 16 June 2016. There are nine native species recorded on the site that are recognised as foraging habitat for Black Cockatoos (Valentine and Stock, 2008; Groom, 2011). These are listed in Table 3.

Table 3: Foraging Species for Black Cockatoos Recorded on the Site

Species	Common Name
Eucalyptus marginata	Jarrah
Eucalyptus gomphocephala	Tuart
Corymbia calophylla	Marri
Allocasuarina fraseriana	Sheoak
Banksia attenuata	Candlestick Banksia
Banksia menziesii	Firewood Banksia
Banksia grandis	Bull Banksia
Banksia sessilis	Parrot Bush
Xanthorrhoea preissii	Grass Tree

These species are generally distributed throughout the site, although often in clumps rather than an even distribution (Figure 3). The remainder of the site is dominated by *Acacia pulchella*, *Jacksonia furcellata* and some open cleared patches. The presence of the *Acacia* and *Jacksonia* are typical to areas of high disturbance and frequent fires and are not considered to be habitat for Black Cockatoos.

There was fresh and old evidence of Black Cockatoos foraging on Marri nuts, Jarrah nuts and Banksia cones (Plates 5, 6, 7 and 8) on the site (Figure 3).

Plate 6: Chewed Fresh Marri Nuts



Plate 7: Chewed Older Marri Nuts



Plate 8: Chewed Jarrah Nuts



Plate 9: Chewed Banksia Cone



Forest Red-tailed Black Cockatoos forage predominantly on the Marri and Jarrah nuts, and most of the evidence of foraging was typical to this species. Carnaby's Black Cockatoos are likely to forage on all of the foraging items listed in Table 1, however evidence of foraging typical to this species was limited to one Banksia cone with chew marks typical to the shorter bill.

The extent of foraging habitat on the site was calculated as 11.86ha and is shown in Figure 3.

The Black Cockatoo Referral Guidelines refer to the quality of the foraging habitat as an important characteristic in determining the significance of the impact. However, there is no guidance as to how the quality is determined in the Black Cockatoo Referral Guidelines other than specifying that 'quality' foraging habitat refers to the use of the habitat by Black Cockatoos rather than the overall quality of the vegetation which would normally be described using understorey as well as tree canopy.

The quality of the foraging habitat on the site for the Forest Red-Tailed Black cockatoos is evident by the presence of this species present on the site during the site visit by PGV Environmental and the high level of foraging evidence. In the case of Carnaby's Black Cockatoos the evidence of foraging on the site was very limited to some *Banksia* cones. *Banksia* trees are sparsely scattered over the site with a high proportion and young individuals that are producing minimal cones (Plate 10).

Plate 10: Scattered Young *Banksia grandis*



4.3 Roosting

The site does not contain a known roosting site for Carnaby's Black Cockatoos, and the nearest site recorded is approximately 6.6km to the south of the site (DoP, 2011). No evidence of the site being utilised as roosting habitat by Black Cockatoos was observed during the site visit.

4.4 Breeding

Black Cockatoos are known to breed in hollows of large eucalypts. The survey recorded nine trees with either hollows or spouts (Table 4). Three Standing Dead Trees (SDTs) with hollows (Tree Numbers 34, 53 and 83) and one SDT contained potential spout (Tree Number 2). One Marri tree was recorded with small hollows (Tree Number 110) and three marri trees had potential hollows (Tree Numbers 4, 31 and 41). Two of the Tuarts (Tree Numbers 4 and 41) had spouts. The site is not known as a breeding site for Carnaby's Black Cockatoos (DoP, 2011) and the nearest recorded breeding site is approximately 13km to the south. No evidence of breeding by Black Cockatoos was observed on the site by PGV Environmental during the site visit.

The Black Cockatoo Referral Guidelines define trees of certain species with a DBH of 500mm or greater as breeding habitat regardless of the presence or not of hollows. The theory behind this definition is

the concept that while the trees may not currently contain hollows they are mature enough that in the next 50 years or so a hollow might form and be of use to Black Cockatoos for the purposes of breeding.

The survey recorded 123 trees that had a DBH greater than 500mm. Three trees, while meeting the definition, were large burnt out trunks with some sprouting and are highly unlikely to form hollows for breeding in the future (Tree Numbers 10, 107 and 117) (Plate 11).

Plate 11: Re-sprouting trunk of burnt tree



A total of 120 trees are classified as potential breeding habitat. These trees consisted of 53 Marri, 47 Tuart, 11 Jarrah and 9 Standing Dead Trees (SDTs) (Table 4).

Table 4: Significant Trees Recorded on the site

Species	Marri	Tuart	Jarrah	SDT	Total
Hollows/spouts	4	2	0	4	10
No Hollows/Spouts	49	45	11	5	110
Total	**53**	**47**	**11**	**9**	**120**

The trees are mapped on Figure 4 and details of the significant trees are in Appendix 1.

5 REGIONAL CONTEXT

To assist in determining the significance of any impact on Black Cockatoo habitat on the site an assessment of Black Cockatoo habitat within the vicinity of the site was undertaken.

Bush Forever sites occur within 5km of the site with a total area of greater than 1,000ha of vegetation that is typical Black Cockatoo Habitat. The sites are described below in Table 5.

Table 5: Sites within 5km that contain Black Cockatoo Habitat

Bush Forever Site	Area (ha)	Proximity to the Site	Significant Vegetation Complexes within Bush Forever Sites	Potential Foraging and/or Breeding Habitat
Lake Cooloongup, Lake Walyungup and Adjacent Bushland, Hillman to Port Kennedy 356	Upland 120ha	Approximately 300m to the south-east of the site	*Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus gomphocephala*, *E. marginata* and *Banksia attenuata* Open Forest; *Grevillea ves*tita Closed Heath; *Hibbertia hypericoides* Open Low Heath	Foraging and Breeding
Leda and Adjacent Bushland, Leda 349	850ha of Upland vegetation	2.5km north of the site	*Eucalyptus marginata, E. gomphocephala* and *Allocasuarina fraseriana* Woodland; *Banksia menziesii*, *Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata* and *B. grandis* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus gomphocephala*; *Eucalyptus gomphocephala* Open Forest; *Acacia saligna* Low Open Forest; *Eucalyptus calophylla* Open Forest	Foraging and Breeding
Doghill Road Bushland, Baldivis 369	58.8ha	3.3km South-east of the site	*Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* Low Woodland; Scattered *Eucalyptus marginata* and/or *E. gomphocephala* over *Banksia* species Low Woodland	Foraging and Breeding

6 SIGNIFICANCE OF IMPACT

According to the EPBC Act Significant Impact Guidelines 1.1 (DoE, 2013), the significance of the impact on Black Cockatoos depends on the sensitivity, value and quality of the environment and the intensity, duration, magnitude and geographic extent of the impacts. The category of listing (for example; Endangered, Vulnerable or Migratory) determines the significant impact criteria for listed flora and fauna species and ecological communities.

This Black Cockatoo Habitat Assessment assumes all of the foraging and potential breeding trees on the site would be cleared during the construction of the road. Using this assumption, the clearing would result in approximately 11.86ha of foraging habitat and 120 potential breeding trees being cleared.

The following assessments are for Forest Red-tailed Black Cockatoos which are listed as Vulnerable and the Carnaby's Black Cockatoos which are listed as Endangered.

Forest Red-tailed Black Cockatoo

The impact on Forest Red-tailed Black Cockatoos from clearing the Black Cockatoo habitat on the site has been assessed against the criteria set out in the Significant Impact Guidelines 1.1 for the impact on a Vulnerable species and is shown below:

• *Lead to a long-term decrease in the size of an important population of a species*

In the Significant Impact Guidelines 1.1 an important population is defined as "a population that is necessary for a species' long-term survival and recovery" and may be "key source populations either for breeding or dispersal, populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species' range".

There was no evidence of breeding occurring on the site and the surrounding area contains a number of Bush Forever sites providing large areas of foraging and breeding habitat for Cockatoos that utilise the site. Development of the site would therefore not result in this outcome.

• *Reduce the area of occupancy of an important population*

There was no evidence found of Forest Red-tailed Black Cockatoos breeding or roosting on the site. Clearing of the site will reduce the area of foraging available by approximately 11.86ha, however there is greater than 1,000ha of foraging habitat within 5km of the site in Bush Forever sites therefore clearing of the site would not result in this outcome.

• *Fragment an existing important population into two or more populations*

There are large areas of Bush Forever sites within 5km of the site that provide foraging and potential breeding habitat. Forest Red-tailed Black Cockatoos can fly large distances between foraging areas. Therefore, clearing of the site would not result in this outcome.

• *Adversely affect habitat critical to the survival of a species*

There was no evidence that Forest Red-tailed Black Cockatoos breed on the site and there are large areas of foraging habitat within 5km of the site, as Bush Forever sites, therefore the site is not considered critical to the survival of the species.

• *Disrupt the breeding cycle of an important population*

There was no evidence that Forest Red-tailed Black Cockatoos breed on the site and there were only ten trees on the site that contained potentially suitable hollows/spouts therefore clearing of the site would not result in this outcome.

• *Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

The large areas of foraging and breeding habitat located in the Bush Forever sites within 5km of the site would prevent the population from declining as a result of clearing of the site.

• *Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

Clearing the site will not result in invasive species being introduced, therefore would not result in this outcome.

• *Introduce disease that may cause the species to decline*

Clearing the site will not result in disease being introduced, therefore would not result in this outcome.

• *Interfere substantially with the recovery of the species*

The Forest Red-tailed Black Cockatoos that would utilise the site have access to greater than 1,000ha of Black Cockatoo habitat within 5km reserved in Bush Forever sites. Therefore, the clearing of approximately 11.86ha of foraging habitat on the site would not interfere substantially with the recovery of the species.

In accordance with the criteria set out in the Significant Impact Guidelines 1.1 the conclusion of this assessment is that development of Lot 311 Fifty Road would not have a significant impact on Forest Red-tailed Black Cockatoos.

Carnaby's Black Cockatoo

The impact on Carnaby's Black Cockatoos from clearing the Black Cockatoo habitat on the site has been assessed against the criteria set out in the Significant Impact Guidelines 1.1 for the impact on an Endangered species and is shown below:

• *Lead to a long-term decrease in the size of a population*

There was no evidence that the site supports breeding or roosting of Carnaby's Black Cockatoos. There are large areas of Bush Forever sites within 5km consisting of larger areas of foraging and potential breeding habitat. Therefore, clearing of the site will not result in this outcome.

• *Reduce the area of occupancy of the species*

Clearing of the site will not result in a reduction of any known breeding and roosting habitat although it will result in a reduction of approximately 11.86ha of foraging habitat. Within 5km of the site, however, there is greater than 1,000ha of foraging habitat located in Bush Forever sites and therefore clearing of the site will not result in this outcome.

• *Fragment an existing population into two or more populations*

Clearing of the site is unlikely to fragment the population of Carnaby's Black Cockatoos in the area into sub-populations due to the Bush Forever sites in the area providing linkages consisting of large areas of Black Cockatoo habitat. Carnaby's Black Cockatoos can fly large distances between foraging areas. Clearing of the site will therefore not result in this outcome.

• *Adversely affect habitat critical to the survival of a species*

There was no evidence of breeding or roosting by Carnaby's Black Cockatoos on the site. The ten trees that contained potentially suitable hollows/spouts and the approximate 11.86ha of foraging habitat is not considered to be critical to the survival of the species due to the large amount of foraging and potential breeding habitat within 5km of the site, therefore clearing of the site would not result in this outcome.

• *Disrupt the breeding cycle of a population*

The site contained no evidence of breeding and there were only three trees that contained potentially suitable hollows/spouts (two of which contained bee hives) therefore clearing of the site would not result in this outcome.

• *Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

Clearing of the site will not result in this outcome due to the large extent of Black Cockatoo habitat reserved in Bush Forever sites within 5km of the site.

• *Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

Clearing of the site will not result in the establishment of an invasive species harmful to Carnaby's Black Cockatoos.

• *Introduce disease that may cause the species to decline*

Clearing of the site will not cause disease to be introduced therefore will not result in this outcome.

• *Interfere with the recovery of the species*

The Carnaby's Black Cockatoos that would utilise the site have access to greater than 1,000ha of Black Cockatoo habitat within 5km reserved in Bush Forever sites. Therefore, any clearing of habitat on the site would not interfere substantially with the recovery of the species.

The conclusion of this assessment in accordance with the criteria set out in the Significant Impact Guidelines 1.1 is that of Lot 311 Fifty Road would not have a significant impact on Carnaby's Black Cockatoos.

7 BLACK COCKATOO REFERRAL GUIDELINES

The *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* (SEWPaC, 2012) (Black Cockatoo Referral Guidelines) contain several steps to determine whether or not a referral is required. These steps are:

1. The definition of habitat (breeding, roosting and foraging – Table 1 in the Black Cockatoo Referral Guidelines);
2. A description of the type of action that may have a high or low risk of being a significant impact and therefore require referral (Table 3 in the Black Cockatoo Referral Guidelines);
3. Formulation of a mitigation strategy to reduce the scale of impact; and
4. A flowchart to assist in decision making on whether or not an action should be referred.

Step 1 Black Cockatoo Habitat

As outlined previously there is approximately 11.86ha of foraging habitat on the site with evidence of foraging on Marri nuts throughout site and limited foraging on Jarrah and Banksia Cones. The site also contains 120 trees that are considered to be potential breeding trees under the definition provided by the Department of the Environment. There is no evidence of breeding or roosting on the site.

Step 2 Level of Impact

Foraging

According to Table 3 in the Black Cockatoo Referral Guidelines the clearing of more than 1ha of quality foraging habitat has a high risk of causing a significant impact. Degradation of more than 1ha of quality habitat by things such as altered hydrology or fire regimes has an uncertain risk. The significance of degradation depends on the type of degradation and the quality of the habitat.

The site contained approximately 11.86ha of foraging habitat for Black Cockatoos. The amount of foraging evidence observed indicates that the Marri trees provide quality foraging for Forest Red-tailed Black Cockatoos. Clearing of the site will still lead to the loss of more than 1ha of quality foraging habitat and result in a high risk of a significant impact.

Roosting

The Black Cockatoo Referral Guidelines consider the clearing of a known roosting site as a high risk of being a significant impact. The site is not mapped as having a known roosting site by the Department of Planning mapping of January 2011. There were no roosting sites recorded during the Black Cockatoo Habitat Assessment and the risk of a significant impact on a known roosting site is considered to be low.

Breeding

According to Table 3 in the Black Cockatoo Referral Guidelines the clearing of any known nesting tree has a high risk of being a significant impact. A known nesting tree is defined in the Black Cockatoo

Referral Guidelines as any existing tree in which breeding has been recorded or suspected. There are no known nesting trees that occur on the site and therefore there is no risk of a significant impact on known breeding habitat of Black Cockatoos.

The Black Cockatoo Referral Guidelines also consider that the clearing or degradation of any part of a vegetation community known to contain breeding habitat is likely to have a high risk of a significant impact. In Table 1 of the Black Cockatoo Referral Guidelines breeding habitat is defined as woodlands, forests or isolated trees that contain or consist of live or dead trees of certain species with either a DBH of or greater than 500mm or the presence of suitable nest hollows. The site contains 120 trees (live and dead) with a DBH of or greater than 500mm (53 Marri, 47 Tuarts, 11 Jarrah and 9 SDTs), nine of which contained hollows/spouts potentially suitable for Black Cockatoos. According to Table 1 of the Black Cockatoo Referral Guidelines Carnaby's Black Cockatoos may breed in the live or dead Jarrah, Tuart or Marri trees on the site while Forest Red-tailed Black Cockatoos may breed in the live or dead Marri or Jarrah trees on the site.

According to the Black Cockatoo Referral Guidelines the risk of a significant impact on breeding habitat of Carnaby's and Forest Red-tailed Black Cockatoos is considered to be high.

Surrounding Habitat

According to the Black Cockatoo Referral Guidelines clearing of vegetation that results in a gap of greater than 4km between patches of Black Cockatoo habitat (foraging, roosting or breeding) has a high risk of having a significant impact. As listed in Table 6 there are eight Bush Forever sites within 5km of the site that provide Black Cockatoo habitat as well as other sites in the vicinity. The Bush Forever sites are less than 4km from each other therefore the risk of creating a gap of greater than 4km between areas of Black Cockatoo habitat is considered to be low.

Step 3 Mitigation

The consideration of a mitigation strategy during the determination of the level of impact and requirement to refer is allowed by the Black Cockatoo Referral Guidelines and setting in place the best practice mitigation strategy may reduce the level of impact and in turn the risk of a significant impact. Mitigation strategies include avoiding impact, managing impact so that there is no net decline in habitat and monitoring the effectiveness of mitigation.

This assessment is based on the entire 11.86ha of foraging habitat and all 120 potential breeding trees being cleared. Putting a mitigation strategy in place during the planning stage may reduce the level of impact on Black Cockatoos from clearing of the site. Retaining trees in Public Open Space (POS) would reduce the level of impact, however the extent impact is likely to be high according to the criteria above.

Step 4 Referral Advice

The Decision Making flowchart in Figure 1 of the Black Cockatoo Referral Guidelines was applied to the site without consideration of mitigation strategies and is shown in sequence below:

1 Could the impacts of your action occur within the modelled distribution of the black cockatoos? – YES

2 Could the impacts of your action affect any black cockatoo habitat or individuals? - YES
3 Have you surveyed for black cockatoo habitat using the recommended methods? – YES
4 Could your action have an impact on black cockatoos or their habitat? – YES
5 Is your impact mitigation best practice so that it may reduce the significance of your impacts on black cockatoos? Prioritise impact avoidance over impact minimisation - NO

RESULT – Referral Recommended: High risk of resulting in significant impact.

8 SUMMARY AND CONCLUSION

The proposed development on Lot 311 Fifty Road, Baldivis will result in the clearing of native vegetation on the site. The site contains a number of species identified as potentially suitable foraging, roosting or breeding habitat for Black Cockatoos. These include Marri, Jarrah, Tuart and Banksia trees.

PGV Environmental conducted a Black Cockatoo Habitat Assessment for Forest Red-tailed Black Cockatoos, a species recorded on the site and Carnaby's Black Cockatoos which are considered likely to utilise the site.

The Black Cockatoo Habitat Assessment identified approximately 11.86ha of foraging habitat on the site consisting of vegetation types containing Marri, Jarrah and Banksia as dominant species. Evidence of foraging by Black Cockatoos on Marri nuts, Jarrah nuts and Banksia cones was found over the site. Foraging was mostly by Forest Red-tailed Black Cockatoos on the Marri and Jarrah nuts and Sheoak cones. There was limited evidence of Carnaby's Black Cockatoos foraging on Banksia cones observed. The evidence of foraging was predominately typical to Forest Red-tailed Black Cockatoos.

The site does not contain known breeding sites and no evidence of breeding was recorded on the site. Potential breeding habitat for Carnaby's Black Cockatoos and Forest Red-tailed Black Cockatoos was recorded on the site and consisted of 120 trees made up of 53 Marri, 47 Tuarts, 11 Jarrah and 9 Standing Dead Trees with a diameter at breast height (DBH) of 500mm or greater. Ten of these trees were recorded to contain hollows or spouts.

The site does not contain a known roosting site and no evidence was observed that the site has been used as roosting habitat.

The habitat on the site is subject to threatening processes such as fire and weeds. The potential for dieback to be spread on the site from unauthorised access is also a threat to the future viability of the habitat on the site.

Clearing of the site may result in the loss of all of the Black Cockatoo habitat on the site. According to the EPBC Act Significant Impact Guidelines the impact on Forest Red-tailed Black Cockatoos and Carnaby's Black Cockatoos is not likely to be significant. The surrounding Bush Forever sites provide a large amount of foraging and potential breeding habitat in close vicinity of the site and are likely to lower the impact that clearing of the site would have on Black Cockatoos. Implementing mitigation strategies may reduce the level of impact clearing of the site will have on Black Cockatoos.

In accordance with the Black Cockatoo Referral Guidelines the clearing of Black Cockatoo habitat is likely to have the impact has a high risk of being a significant impact due to the loss of more than 1ha of quality foraging habitat and the loss of potential breeding trees. The impact is more likely to be on Forest Red-tailed Black Cockatoo habitat rather than Carnaby's Black Cockatoo habitat given the evidence of site usage recorded. Referral to the Department of the Environment under the EPBC Act is recommended. Reducing the level of impact through implementing mitigation strategies could increase the likelihood of the referral being approved and reduce the size of the off-site offsets that may be required.

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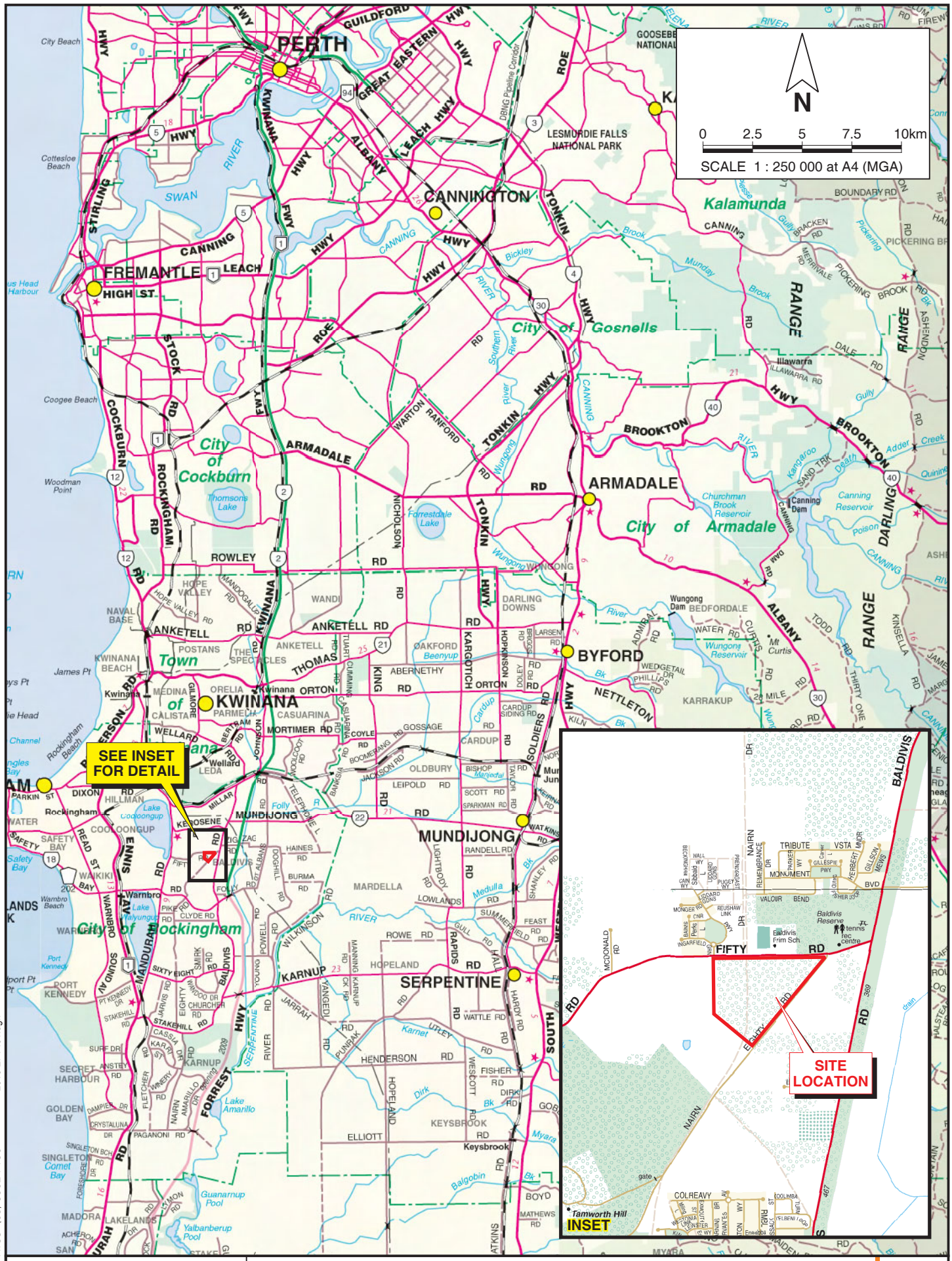
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FIGURES



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Aigle Royal Developments
BLACK COCKATOO HABITAT ASSESSMENT
LOT 311 FIFTY ROAD, BALDIVIS

Drawn: J. Cabot	Date: 26 Aug 2016
Job: 10250 Rpt: 2016-271	Revision: A

SITE LOCATION

Figure 1

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476
475
466
388 500mE
268
1323
R 35107
388 750mE
1376
R 23952
FIFTY
ROAD
6 424 750mN
Lot 311
ROAD
EIGHTY
6 424 500mN
312
1
2
3
9502
9501
573
543
544
545
546
9504
538
N
0 20 40 60 80 100m
SCALE 1 : 2 000 at A3 (MGA)
Legend
Site Boundary
Cadastral Boundary
CADASTRAL SOURCE: Landgate, August 2016.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown January 2016.
2016-271-I02.dgn
PINPOINT CARTOGRAPHICS (08) 9562 7136

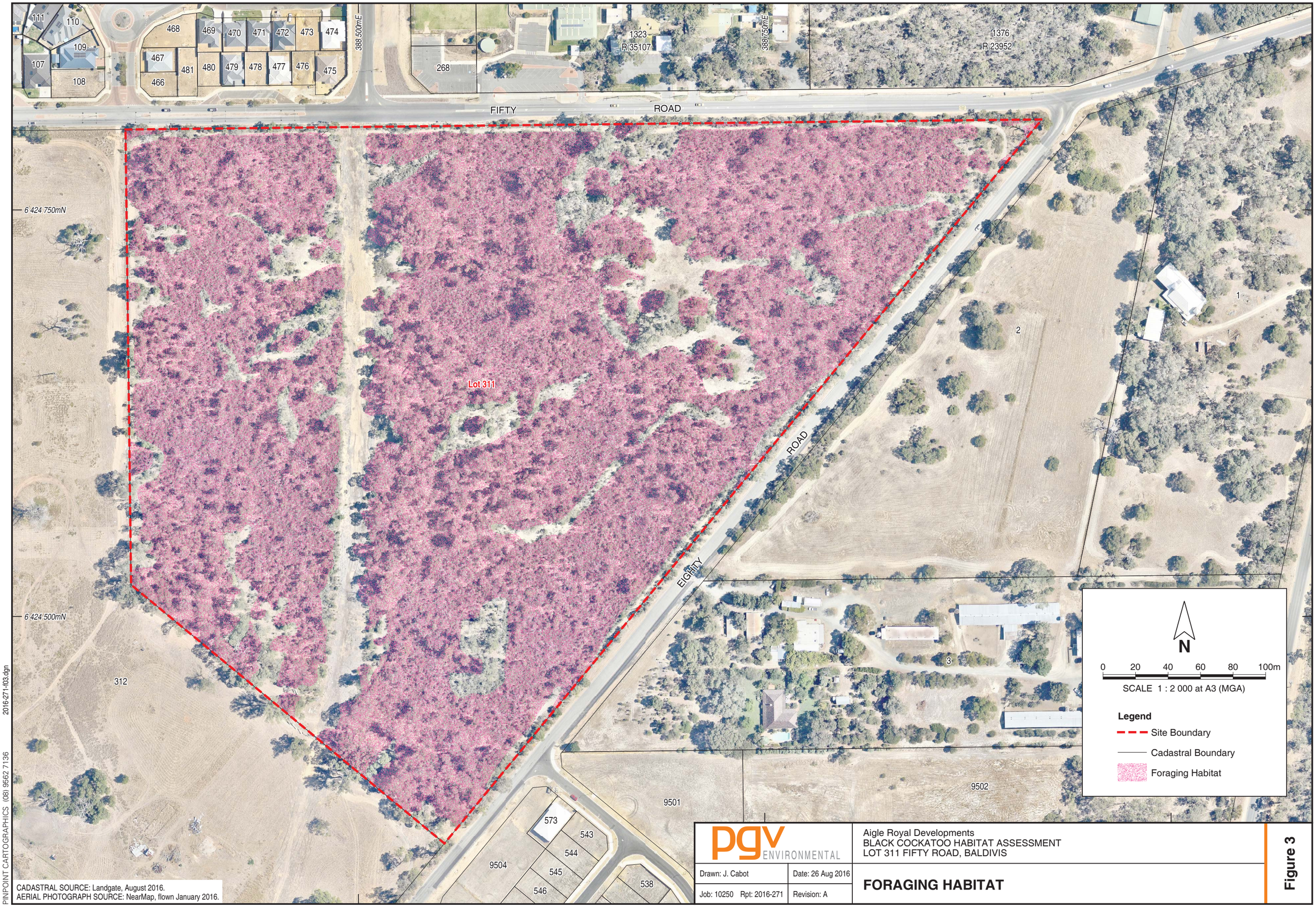
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BLACK COCKATOO HABITAT ASSESSMENT
LOT 311 FIFTY ROAD, BALDIVIS

Drawn: J. Cabot | Date: 26 Aug 2016
Job: 10250 Rpt: 2016-271 | Revision: A

SITE BOUNDARY

Figure 2



CADASTRAL SOURCE: Landgate, August 2016.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown January 2016.

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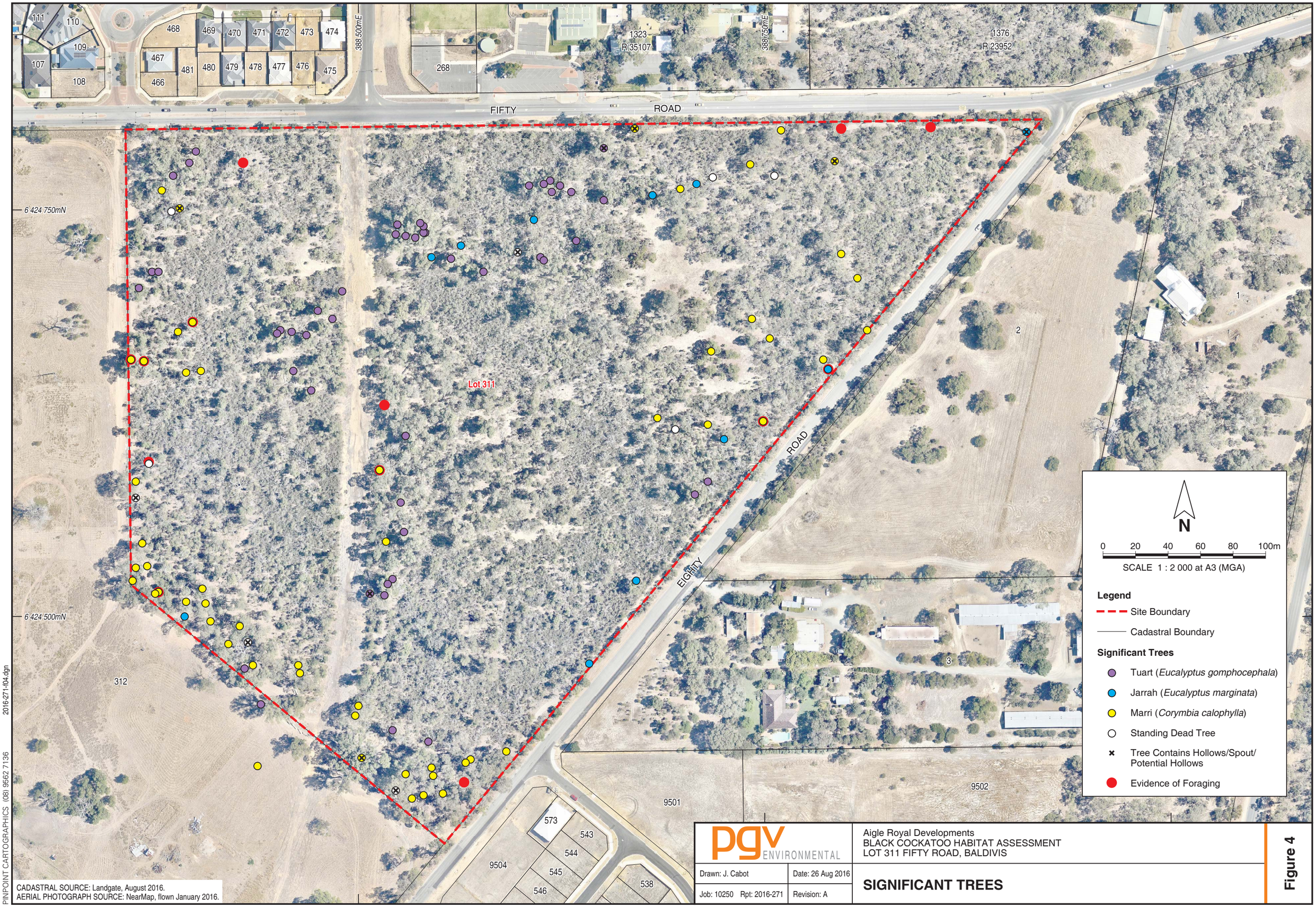
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FORAGING HABITAT

Figure 3



CADASTRAL SOURCE: Landgate, August 2016.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown January 2016.

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SIGNIFICANT TREES

Figure 4

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APPENDIX 1

Significant Tree Survey Results

Tree Number	Species	Easting MGA zn50	Northing MGA zn50	Photo Number	Height (m)	Diameter (mm)	Second ary Branches (mm)	Notes (hollows, bees etc.)
1	Marri (*Corymbia calophylla*)	540	390	1146	12	50		Burnt at base, fair condition, no hollows
2	Standing Dead Tree	523	393	1147	8	90		Potential spout
3	Marri (*Corymbia calophylla*)	529	403	1148	12	90		Good condition, no hollows
4	Marri (Corymbia calophylla)	502	413	1149	12	150		Very Good condition, potential hollows and spout
5	Tuart (Eucalyptus gomphocephala)	521	430	1150	11	75	55	Leaning, no hollows
6	Tuart (Eucalyptus gomphocephala)	543	423	1151	12	70		Good condition, no hollows
7	Marri (Corymbia calophylla)	545	407	1152L	12	65		Fire impacted, trunk sprouts, poor condition, no hollows
8	Marri (Corymbia calophylla)	546	402	1152R	12	60		Fire impacted, trunk sprouts, poor condition, no hollows
9	Marri (Corymbia calophylla)	552	391	1153	12	60		Fire impacted, trunk sprouts, poor condition, no hollows
10	Marri (Corymbia calophylla)	533	388	1156	11	75	many small	Large trunk only, not suitable habitat
11	Marri (Corymbia calophylla)	569	412	1158L	11	55		Good condition, no hollows
12	Marri (Corymbia calophylla)	566	410	1158R	11	70		Burnt at base, fair condition, no hollows
13	Marri (Corymbia calophylla)	591	417	1159	12	85	small	Fire impacted, trunk sprouts, fair condition, no hollows
14	Jarrah (Eucalyptus marginata)	642	471	1161	9	50	30	Poor condition, no hollows
15	Jarrah (Eucalyptus marginata)	671	522	1162	10	65		Fair condition, no hollows
16	Tuart (Eucalyptus gomphocephala)	707	575	1164	12	75		Good condition, no hollows
17	Tuart (Eucalyptus gomphocephala)	715	583	1165	9	80	30	Mostly dead, no hollows
18	Jarrah (Eucalyptus marginata)	725	609	1168	11	65		Poor condition, no hollows
19	Marri (Corymbia calophylla)	715	618	1169R	11	65		Very poor condition, no hollows
20	Standing Dead Tree	695	615	1169L	10	95		Trunk only
21	Marri (Corymbia calophylla)	684	622	1171	10	60		Very poor condition, no hollows
22	Marri (Corymbia calophylla)	717	663	1173	8	55		Fair condition, sprouting, no hollows
23	Marri (Corymbia calophylla)	742	683	1174	10	55		Good condition, no hollows
24	Marri (Corymbia calophylla)	753	671	1175	11	55		Very poor condition, no hollows
25	Marri (Corymbia calophylla)	749	620	1176	10	60		Very poor condition, no hollows
26	Jarrah (Eucalyptus marginata)	789	652	1177	10	60		Very poor condition, no hollows
27	Marri (Corymbia calophylla)	786	658	1177	112	65		Good condition, no hollows
28	Marri (Corymbia calophylla)	813	676	1178	11	70		fair condition, no hollows
29	Marri (Corymbia calophylla)	807	708	1179	9	55	50	Very poor condition, no hollows
30	Marri (Corymbia calophylla)	797	723	1180	12	130		Good condition, no hollows
31	Marri (Corymbia calophylla)	793	780	1183	10	50		Good condition, potential hollows
32	Jarrah (Eucalyptus marginata)	911	798	1186	9	95	75	One trunk dead, potential hollows and other side good condition, no hollows

Tree Number	Species	Easting MGA zn50	Northing MGA zn50	Photo Number	Height (m)	Diameter (mm)	Second ary Branches (mm)	Notes (hollows, bees etc.)
33	Marri (Corymbia calophylla)	760	799	1187	11	65		Damaged by fire, no hollows
34	Standing Dead Tree	756	771	1188	9	60		Potential spout, no hollows
35	Marri (Corymbia calophylla)	741	778	1191	10	50		Good condition, no hollows
36	Standing Dead Tree	718	770	1191	10	75		No hollows
37	Marri (Corymbia calophylla)	698	763	1192	12	110		Fair condition, no hollows
38	Jarrah (Eucalyptus marginata)	708	766	1193	9	55		Poor condition, no hollows
39	Jarrah (Eucalyptus marginata)	681	759	1195	8	50	25/5/5	Fair condition, no hollows
40	Tuart (Eucalyptus gomphocephala)	651	756	1196	11	65		Fair condition, no hollows
41	Marri (Corymbia calophylla)	670	800	1197	12	125		Good condition, potential hollows and spout
42	Tuart (Eucalyptus gomphocephala)	651	788	1198	14	90		Fair condition, potential hollows
43	Tuart (Eucalyptus gomphocephala)	631	761	1199	12	225		burnt out, fair condition, very large
44	Tuart (Eucalyptus gomphocephala)	634	731	1202	12	65		Good condition, no hollows
45	Tuart (Eucalyptus gomphocephala)	624	765	1202	11	75		Good condition, no hollows
46	Tuart (Eucalyptus gomphocephala)	618	768	1202	11	50		Good condition, no hollows
47	Tuart (Eucalyptus gomphocephala)	619	761	1202	11	55		Good condition, no hollows
48	Tuart (Eucalyptus gomphocephala)	614	766	1204	9	50		Fair condition, some sprouting, no hollows
49	Tuart (Eucalyptus gomphocephala)	605	765	1204	12	95		Good condition, no hollows
50	Jarrah (Eucalyptus marginata)	608	744	1205	12	55	30	Good condition, no hollows
51	Tuart (Eucalyptus gomphocephala)	612	721	1206	12	55		Fair condition, some sprouting, no hollows
52	Tuart (Eucalyptus gomphocephala)	614	719	1206	11	65		Fair condition, some sprouting, no hollows
53	Standing Dead Tree	598	724	1208	10	130		Potential hollows and spouts
54	Tuart (Eucalyptus gomphocephala)	577	712	1209	11	80	45/45	Impacted by fire, some sprouting, no hollows
55	Tuart (Eucalyptus gomphocephala)	557	720	1210	12	55		Fair condition, some sprouting, no hollows
56	Jarrah (Eucalyptus marginata)	563	728	1211	11	80		Impacted by fire, some sprouting, no hollows
57	Jarrah (Eucalyptus marginata)	545	721	1212	10	70		Fair condition, no hollows
58	Tuart (Eucalyptus gomphocephala)	541	736	1213	11	70		Fair condition, no hollows
59	Tuart (Eucalyptus gomphocephala)	540	736	1213	11	50	50	Fair condition, no hollows
60	Tuart (Eucalyptus gomphocephala)	540	740	1213	9	65		Fair condition, no hollows
61	Tuart (Eucalyptus gomphocephala)	538	742	1213	9	65	45/25/5	Fair condition, no hollows
62	Tuart (Eucalyptus gomphocephala)	535	733	1213	12	60	35	Fair condition, no hollows
63	Tuart (Eucalyptus gomphocephala)	529	734	1213	12	65	60	Fair condition, no hollows
64	Tuart (Eucalyptus gomphocephala)	523	735	1213	12	65	35	Fair condition, no hollows
65	Tuart (Eucalyptus gomphocephala)	524	741	1213	8	50	30	Fair condition, no hollows
66	Tuart (Eucalyptus gomphocephala)	529	611	1214	12	50		Good condition, no hollows
67	Marri (Corymbia calophylla)	513	590	1215	10	50		Damaged by fire, no hollows
68	Tuart (Eucalyptus gomphocephala)	526	570	1216	12	55		Damaged by fire, white ants present, no hollows
69	Tuart (Eucalyptus gomphocephala)	528	552	1217	12	80		Fair condition, some sprouting, no hollows
70	Marri (Corymbia calophylla)	517	546	1218	11	50		Fire damage, no hollows

Tree Number	Species	Easting MGA zn50	Northing MGA zn50	Photo Number	Height (m)	Diameter (mm)	Second ary Branches (mm)	Notes (hollows, bees etc.)
71	Tuart (Eucalyptus gomphocephala)	507	514	1219	11	55		Mostly dead, potential spout, white ants present
72	Tuart (Eucalyptus gomphocephala)	521	523	1219	11	70		Good condition, no hollows
73	Tuart (Eucalyptus gomphocephala)	518	520	1219	12	65		Good condition, no hollows
74	Tuart (Eucalyptus gomphocephala)	516	513	1222	11	50		Mostly dead, no hollows
75	Marri (Corymbia calophylla)	500	445	1223	11	90		Good condition, no hollows
76	Marri (Corymbia calophylla)	498	439	1223	10	50		Good condition, no hollows
77	Tuart (Eucalyptus gomphocephala)	430	468	1223	11	60		Good condition, no hollows
78	Tuart (Eucalyptus gomphocephala)	440	446	1226	11	100		Good condition, no hollows
79	Marri (Corymbia calophylla)	464	465	1227	12	55		Impacted by fire, no hollows
80	Marri (Corymbia calophylla)	463	470	1227	11	75		Impacted by fire, no hollows
81	Marri (Corymbia calophylla)	438	408	1228	112	55		Impacted by fire, no hollows
82	Marri (Corymbia calophylla)	435	470	1228	12	55		Impacted by fire, no hollows
83	Standing Dead Tree	432	484	1229	10	90		Potential hollows and spouts
84	Marri (Corymbia calophylla)	427	494	1230	12	70		Good condition, no hollows
85	Marri (Corymbia calophylla)	420	483	1231	11	65		Fair condition, no hollows
86	Marri (Corymbia calophylla)	409	497	1232	10	55		Impacted by fire, no hollows
87	Jarrah (Eucalyptus marginata)	393	500	1232	8	70		Impacted by fire, no hollows
88	Marri (Corymbia calophylla)	406	508	1232	10	75		Impacted by fire, no hollows
89	Marri (Corymbia calophylla)	394	509	1232	12	85		Impacted by fire, no hollows
90	Marri (Corymbia calophylla)	404	517	1233	12	55		Impacted by fire, no hollows
91	Marri (Corymbia calophylla)	377	515	1234	12	80		Impacted by fire, no hollows
92	Marri (Corymbia calophylla)	375	514	1234	11	75		Impacted by fire, no hollows
93	Marri (Corymbia calophylla)	361	522	1236	12	75		Impacted by fire, no hollows
94	Marri (Corymbia calophylla)	363	530	1236	11	70	25/20/+++	Main trunk dead, sprouting, no hollows
95	Marri (Corymbia calophylla)	370	531	1236	6	95		Impacted by fire, no hollows
96	Marri (Corymbia calophylla)	367	545	1237	10	55		Good condition, no hollows
97	Standing Dead Tree	363	573	1238	12	70		No observable hollows
98	Marri (Corymbia calophylla)	363	583	1238	12	90		Good condition, no hollows
99	Standing Dead Tree	371	594	1239	12	65		No observable hollows
100	Marri (Corymbia calophylla)	360	658	1245	12	70		Good condition, no hollows
101	Marri (Corymbia calophylla)	368	657	1246	11	55		Impacted by fire, no hollows
102	Marri (Corymbia calophylla)	394	650	1247	10	50		Impacted by fire, no hollows
103	Marri (Corymbia calophylla)	403	651	1248	8	60		Mostly dead, no hollows
104	Marri (Corymbia calophylla)	389	675	1250	10	55		Mostly dead, no hollows
105	Marri (Corymbia calophylla)	398	681	1251	10	75	many small ones	Mostly dead, no hollows
106	Tuart (Eucalyptus gomphocephala)	365	702	1252	11	55	many small ones	Fair condition, some sprouting, no hollows
107	Tuart (Eucalyptus gomphocephala)	373	712	1253	9	55	10/5/5	Large dead trunk with sprouting - not potential habitat
108	Tuart (Eucalyptus gomphocephala)	377	712	1253	11	75		Fair condition, no hollows

Tree Number	Species	Easting MGA zn50	Northing MGA zn50	Photo Number	Height (m)	Diameter (mm)	Second ary Branches (mm)	Notes (hollows, bees etc.)
109	Standing Dead Tree	385	749	1254	12	60		No hollows
110	Marri (Corymbia calophylla)	390	751	1255	10	105		Fair condition, small hollows and sprouting
111	Tuart (Eucalyptus gomphocephala)	386	771	1256	12	180		Good condition, no hollows
112	Marri (Corymbia calophylla)	379	762	1257	10	70		Impacted by fire, no hollows
113	Tuart (Eucalyptus gomphocephala)	396	779	1258	12	55	50/25	Good condition, no hollows
114	Tuart (Eucalyptus gomphocephala)	4000	786	1259	11	55		Good condition, no hollows
115	Tuart (Eucalyptus gomphocephala)	490	700	1263	9	55	50	Good condition, no hollows
116	Tuart (Eucalyptus gomphocephala)	475	688	1264	10	70		Fair condition, no hollows
117	Tuart (Eucalyptus gomphocephala)	484	683	1265	8	95		Hollow trunk - not potential habitat
118	Tuart (Eucalyptus gomphocephala)	468	673	1266	11	65		Good condition, no hollows
119	Tuart (Eucalyptus gomphocephala)	459	675	1267	10	50		Fair condition, sprouting, no hollows
120	Tuart (Eucalyptus gomphocephala)	452	676	1268	11	60		Fair condition, sprouting, no hollows
121	Tuart (Eucalyptus gomphocephala)	450	674	1268	8	50		Fair condition, sprouting, no hollows
122	Tuart (Eucalyptus gomphocephala)	460	651	1269	10	60		Fair condition, sprouting, no hollows
123	Tuart (Eucalyptus gomphocephala)	471	639	1270	6	120		Main trunk dead, no hollows

Lot 311 Fifty Road

Tree 1



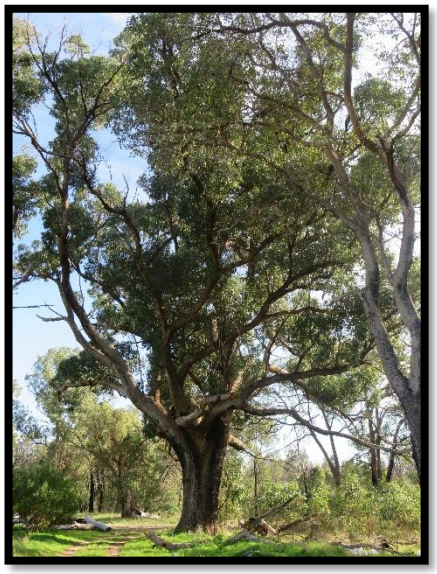
Tree 2



Tree 3



Tree 4



Tree 5



Tree 6



Tree 7L Tree 8R



Tree 9

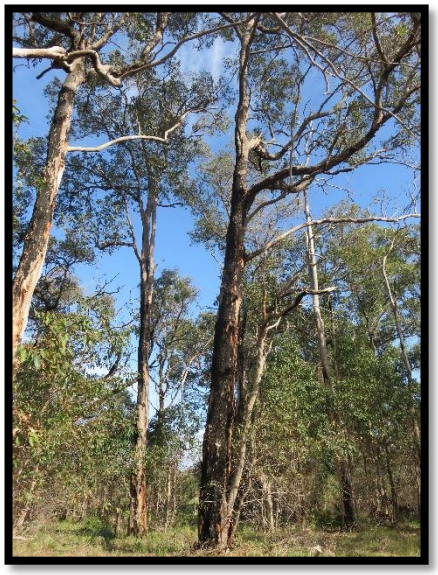


Tree 10



Lot 311 Fifty Road

Tree 11L Tree 12 R



Tree 13



Tree 14



Tree 15



Tree 16



Tree 17



Tree 18



Tree 19L Tree 20R

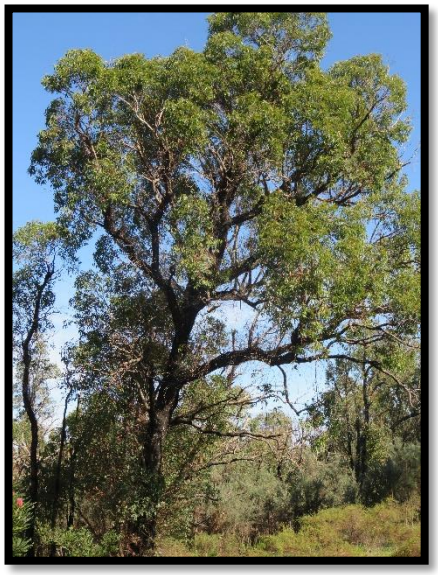


Tree 21



Lot 311 Fifty Road

Tree 22



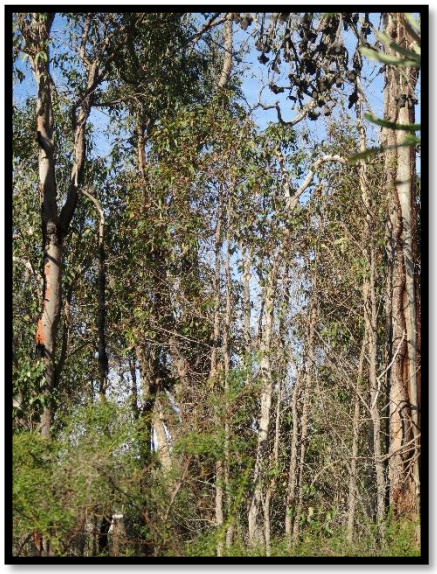
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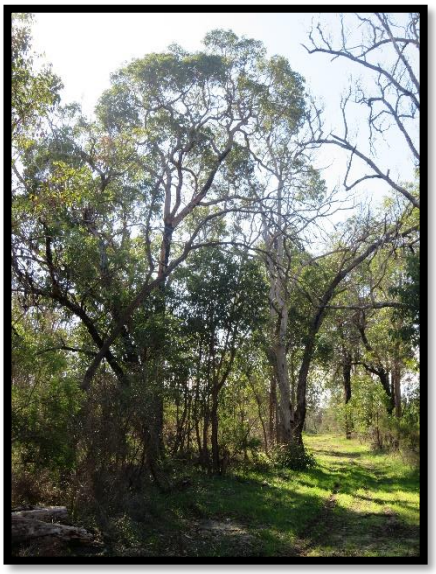
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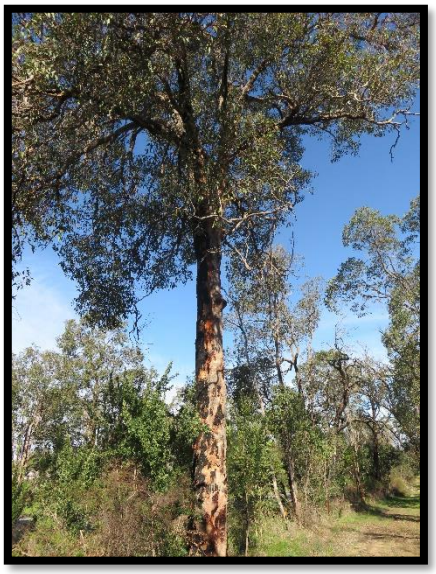
Tree 25



Tree 26R Tree 27L



Tree 28



Tree 29



Tree 30



Tree 31

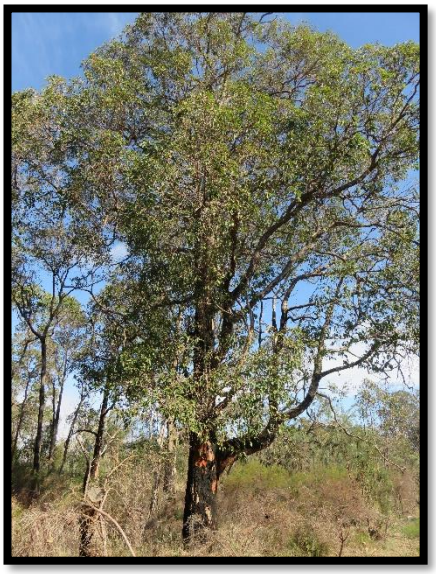


Lot 311 Fifty Road

Tree 32



Tree 33



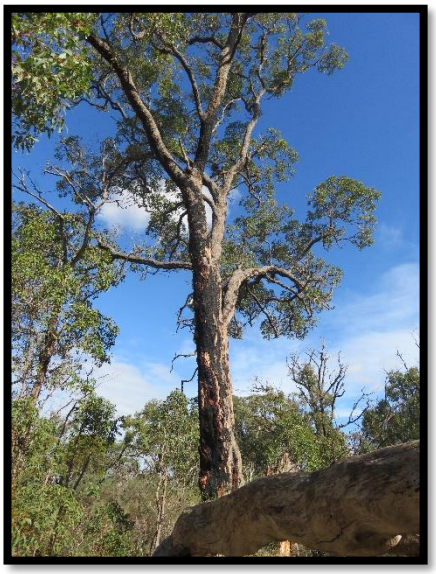
Tree 34



Tree 35



Tree 37



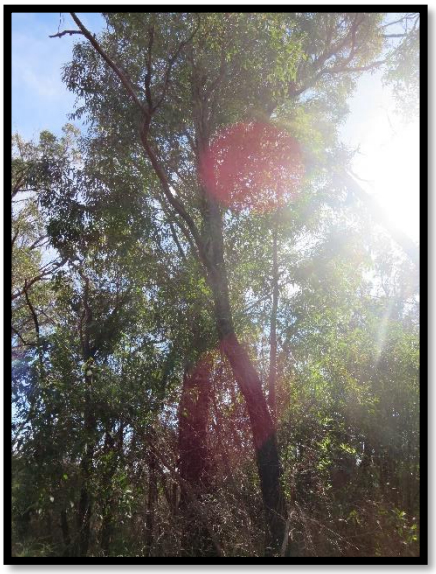
Tree 38



Tree 39



Tree 40



Tree 41

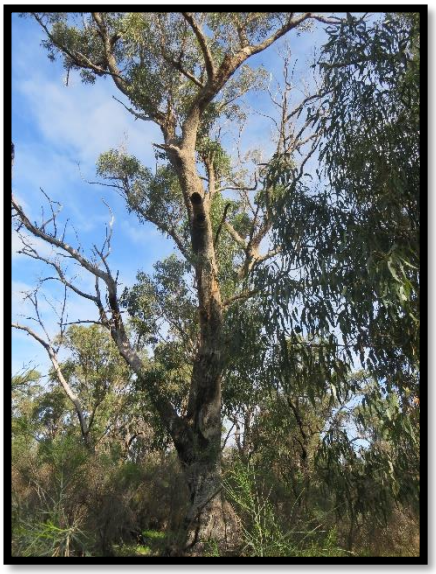


Lot 311 Fifty Road

Tree 42



Tree 43



Tree 44, 45, 46 and 47



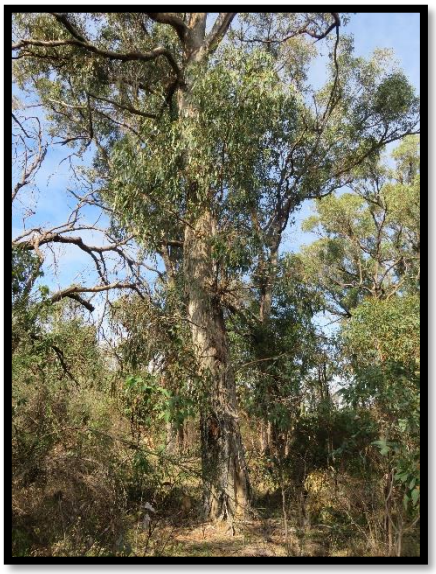
Tree 48R Tree49L



Tree 50



Tree 51L and 52R



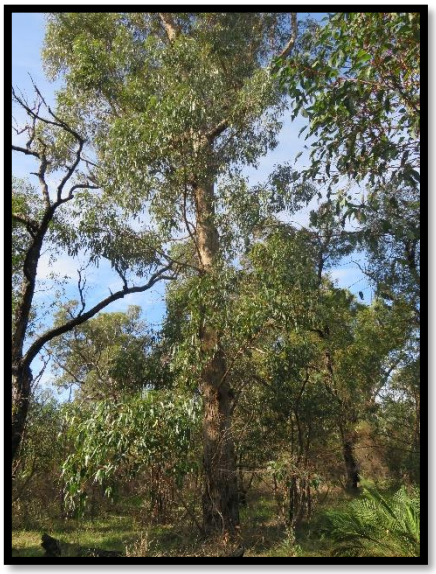
Tree 53



Tree 54

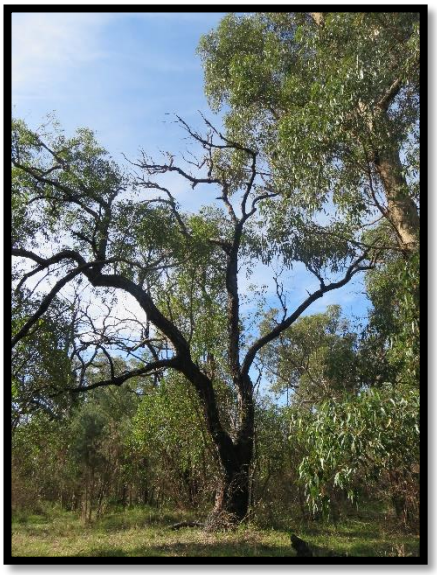


Tree 55



Lot 311 Fifty Road

Tree 56



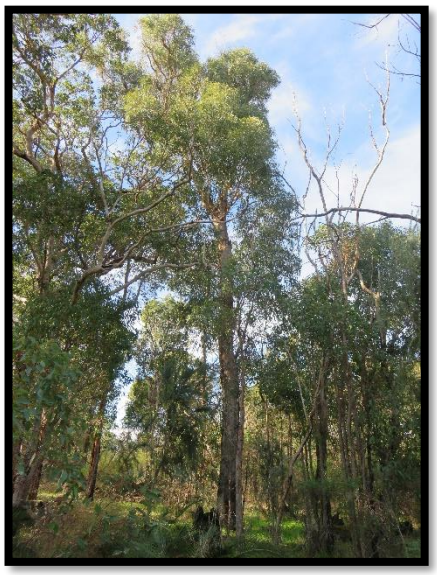
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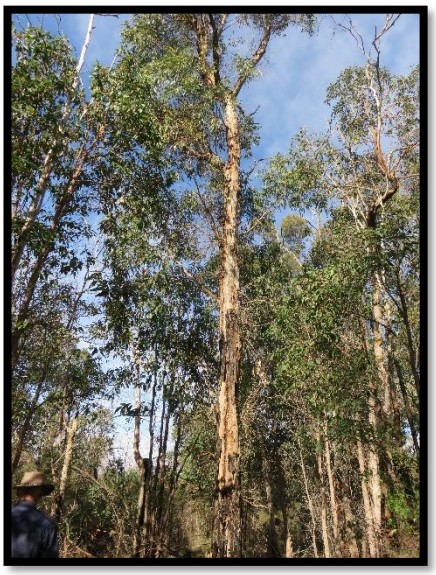
Tree 58, 59, 60, 61, 62, 63, 64 and 65



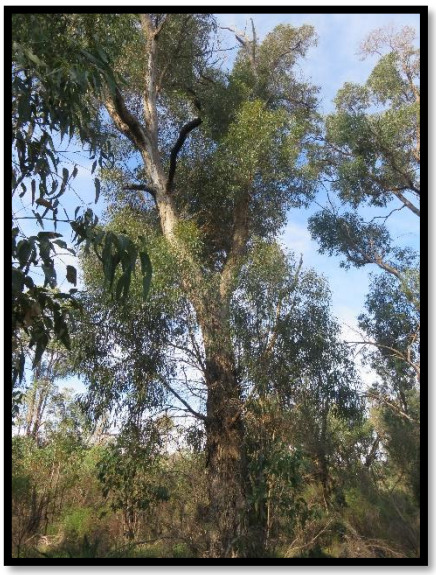
Tree 66



Tree 67

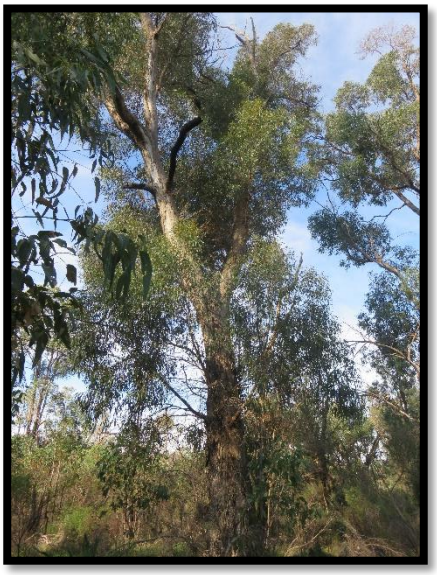


Tree 68



Lot 311 Fifty Road

Tree 69



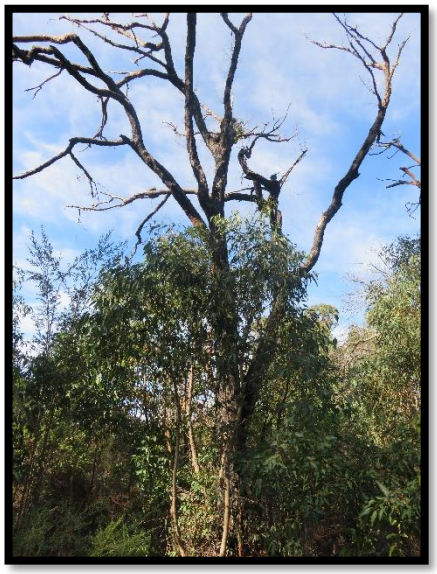
Tree 70



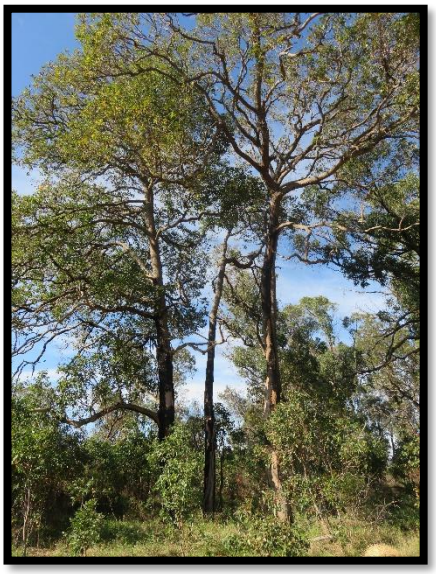
Tree 71, 72 and 73



Tree 74



Tree 75, 76 and 77



Tree 78



Tree 79R and 80L

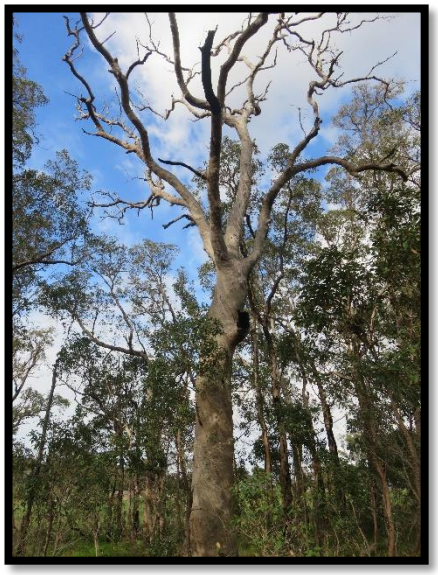


Tree 81L and 82R



Lot 311 Fifty Road

Tree 83



Tree 84



Tree 85



Tree 86L, 87R, 88C and 89CB



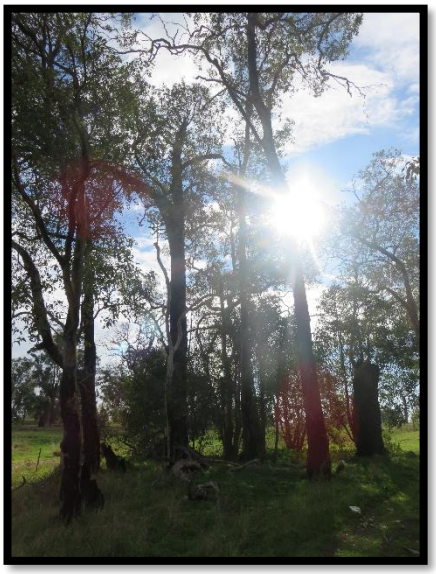
Tree 90



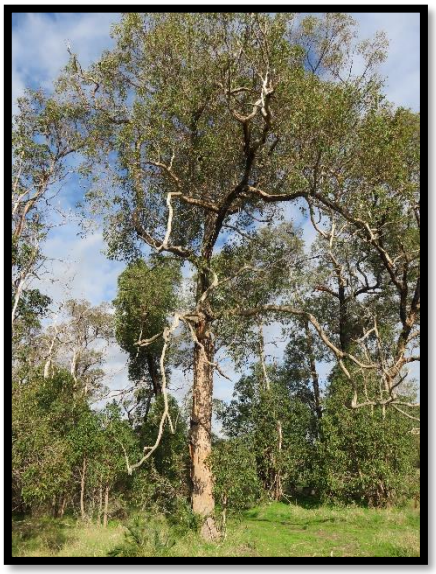
Tree 91R and 92L



Tree 93L, 94C and 95R



Tree 96



Lot 311 Fifty Road

Tree 97L and 98R



Tree 99



Tree 100



Tree 101



Tree 102



Tree 103



Tree 104



Tree 105



Tree 106



Lot 311 Fifty Road

Tree 107L and 108R



Tree 109



Tree 110



Tree 111



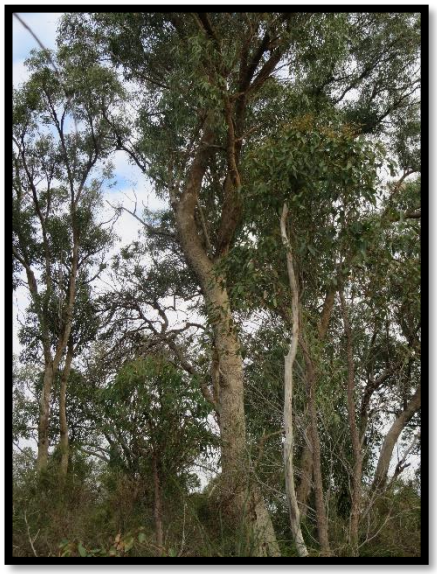
Tree 112



Tree 113



Tree 114



Tree 115



Tree 116



Lot 311 Fifty Road

Tree 117



Tree 118



Tree 119



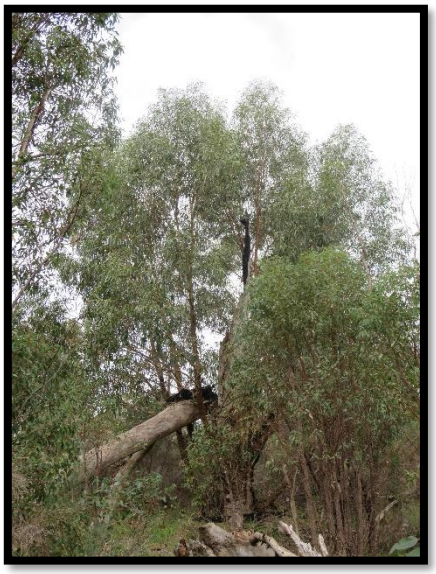
Tree 120R 121L



Tree 122



Tree 123



ATTACHMENT 6

Bushfire Management Plan

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address: Lot 1402 (319) Fifty Road, Baldivis

Site visit: Yes ☑ No ☐

Date of site visit (if applicable): Day 23 Month July Year 2024

Report author or reviewer: Sarina Gorman

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: 42204 Accreditation expiry: Month January Year 2025

Bushfire management plan version number: 1.0

Bushfire management plan date: Day 15 Month August Year 2024

Client/business name: Aigle Royal Developments

	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)?		✔
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)?		✔

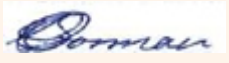
Is the proposal any of the following (see SPP 3.7 for definitions)?	Yes	No
Unavoidable development (in BAL-40 or BAL-FZ)		✔
Strategic planning proposal (including rezoning applications)	✔	
High risk land-use		✔
Vulnerable land-use		✔

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.)?

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

Signature of report author or reviewer 

Date 15 August 2024

BUSHFIRE PRONE PLANNING

BALDIVIS

Bushfire Management Plan

(PREPARED FOR PLANNING APPLICATION ASSESSMENT PURPOSES)



Assessing all relevant requirements established by State Planning Policy 3.7

Address / Location: Lot 1402 (319) Fifty Road, Baldivis

City of Rockingham

Structure Plan (lot layout known)

15 August 2024

Job Reference No: 168650

BPP GROUP PTY LTD T/A BUSHFIRE PRONE PLANNING

ACN: 39 166 551 784 | ABN: 39 166 551 784

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-	-	

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Person	Email				
Kris Kennedy – Aigle Royal Developments	kkennedy@aigleroyal.com.au	1.0	1	☐	☒
		-		☐	☐

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.*

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.

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.

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.

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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?		Possible (check)
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?		Possible (check)
Required Bushfire Protection Measures The Acceptable Solutions of the Bushfire Protection Criteria (Guidelines)		**Assessment Outcome**
Element	The Acceptable Solutions	
1: Location	A1 Location	Fully Compliant
	A1.1 Development location	Fully Compliant
2: Siting and Design of Development	A2 Siting and Design of Development	Fully Compliant
	A2.1 Asset Protection Zone (APZ)	Fully Compliant
3: Vehicular Access	A3 Vehicular Access	Fully Compliant
	A3.1 Public roads	Fully Compliant
	A3.2a Multiple access routes	Fully Compliant
	A3.2b Emergency access way	N/A
	A3.3 Through-roads	Fully Compliant
	A3.4a Perimeter roads	Fully Compliant
	A3.4b Fire service access route	N/A
	A3.5 Battle-axe legs	N/A
	A3.6 Private driveways	N/A
4: Water	A4 Water	Fully Compliant
	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
Bushfire Management Plan Guidance for the Dampier Peninsula (DPLH 2021 Rev B)		N/A
Other 'Bushfire Planning' Documents to Be Produced This necessity for additional documents is determined by the proposed development/use type and the requirements established by SPP 3.7 and the associated Guidelines (as amended). They may be produced concurrently or subsequent to the BMP. Relevant actions will be identified within Section 6 'Responsibilities for Implementation of Bushfire Protection Measures.		**Required**

Subsequent Bushfire Management Plans – For future development proposals	Yes
Summary Statement: Site-Specific Bushfire Management Plans for future development proposals on the subject land that considers land use at that time such as staged subdivision and/or development applications.	

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.		Structure Plan (lot layout known)	
The Subject Land/Site		Lot 1402 (319) Fifty Road, Baldivis – City of Rockingham	
Total Area of Subject Lot/Site		13.52 hectares	
Number of Additional Lots Created		Existing lot(s) = 2 / Proposed lot(s) = 219	
Primary Proposed Construction	**Type(s)**	New Building(s)	New Building(s)
	NCC Classification	Class 1a (house)	Class 5 (office building - professionals)
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			
Structure Plan to facilitate the development of the subject land into a combination of land uses including Residential Areas, Commercial Areas and Public Open Space Areas.			
Description of Planned Staged Development and the Management of Potential Bushfire Planning Issues			
Strategic assessment to address the bushfire risk that considers the future potential development proposal.			

STRUCTURE PLAN CONCEPT - INTEGRATED

LOT 1402 FIFTY ROAD

BALDIVIS

LAND USE SUMMARY		
ORIGINAL AREAS:	2	
LOT 1401	4.47ha	
LOT 1402	9.05ha	
TOTAL SITE AREA (EXCLUDES NAIRN DRIVE)	13.52ha	
LANDUSE		
RESIDENTIAL	6.51ha	46%
COMMERCIAL	1.86ha	14%
ROAD RESERVE	3.60ha	28%
POS AND DRAINAGE		
REQUIRED	1.40ha @12%	
PROVIDED	1.55ha	13%
LOT YIELD		
R30 400sqm AVERAGE	103	
R40 250sqm AVERAGE	21	
R60 180sqm AVERAGE	95	
TOTAL LOTS	219	

LEGEND

- LOCAL STRUCTURE PLAN BOUNDARY
- 7 EXISTING LOT NUMBERS
- EXISTING BOUNDARIES
- INDICATIVE LAYOUT
- COMMERCIAL
- RESIDENTIAL R60
- RESIDENTIAL R40
- RESIDENTIAL R30
- PUBLIC OPEN SPACE AND DRAINAGE
- SHARED USE PATH
- LOCAL FOOTPATH

N:\TOWN PLANNING\8000-8999\8785\DRAFTING\A-CAD : FC - 2024.06.13

N

0 50m

SCALE @ A3: 1:2000

8785-CON-11-B

DRAWN: JS
DATE CREATED: 2024.06.13
PROJECTION: MGA50 GDA94
CADASTRE: LANDGATE

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ROWE GROUP DESIGN

Figure 1.2

Proposed Structure Plan Map

Lot 1402 on Plan / Diagram: P416355
Area: 13.52ha
319 Fifty Road
Baldivis
City of Rockingham

------ LEGEND ------

- Hydrants
- Potential Hydrant
- Subject Site
- Cadastral
- Road Length (m)
- Structure Plan Linework

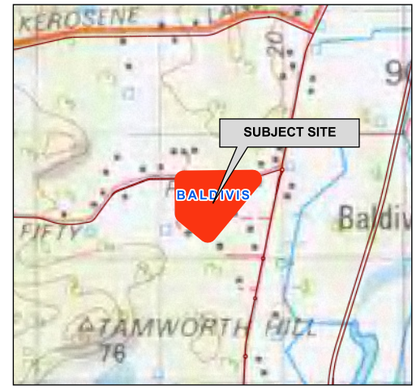
Land Use Zones

- Commercial
- Residential
- Public Open Space & Drainage

0 25 50 75 100 125

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 15-08-2024
SCALE (A3): 1 : 3000

BUSHFIRE PRONE PLANNING

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Figure 1.3

Location Plan

Lot 1402 on Plan / Diagram: P416355
Area: 13.52ha
319 Fifty Road
Baldivis
City of Rockingham

------ LEGEND ------

- Subject Site
- Local Government Authority
- Localities/Suburb
- Bush Forever Sites
- Reserves

DFES Stations (DFES-023)

- Career Fire Rescue Service
- Volunteer Fire & Emergency Service
- Volunteer Fire & Rescue Service

DBCA Legislated Lands & Waters (DBCA-011)

- Crown Freehold - Dept Managed
- Nature Reserve

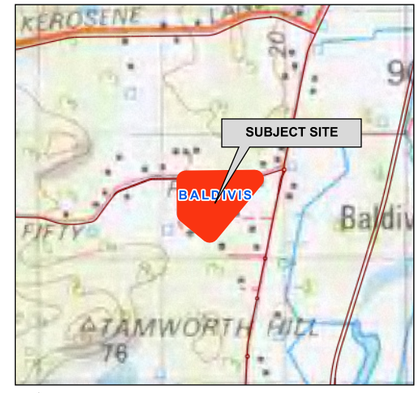
DBCA Lands of Interest (DBCA-012)

- Crown Freehold
- Crown Reserve
- Unallocated Crown Land

0 500 1,000 1,500 2,000

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 14-08-2024
SCALE (A3): 1 : 35000

BUSHFIRE PRONE PLANNING

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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

Bushfire Prone Area

Lot 1402 on Plan / Diagram: P416355
Area: 13.52ha
319 Fifty Road
Baldivis
City of Rockingham

------ LEGEND ------

- Bushfire Prone Areas 2021
- Local Government Authority
- Localities/Suburb
- Hydrants
- Potential Hydrant
- Subject Site
- Cadastral
- Road Length (m)
- Structure Plan Linework

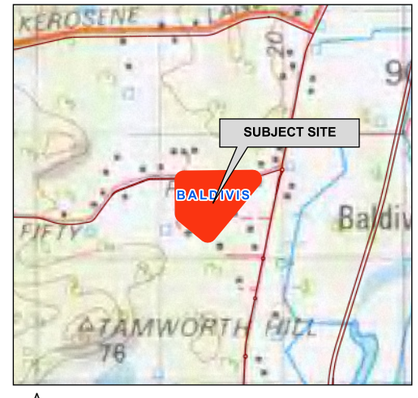
Land Use Zones

- Commercial
- Residential
- Public Open Space & Drainage

0 25 50 75 100 125

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 15-08-2024
SCALE (A3): 1 : 3000

BUSHFIRE PRONE PLANNING

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1.2 The Bushfire Management Plan (BMP)

1.2.1 Commissioning and Purpose

Landowner / proponent:	Aigle Royal Developments
Bushfire Prone Planning commissioned to produce the BMP by:	Aigle Royal Developments
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 strategic planning proposal.
BMP to be submitted to:	WA Planning Commission (WAPC) and City of Rockingham

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.

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	Yes	Yes	N/A	N/A	-
Bushfire Management Plan	Yes	Yes	Yes	Yes	Bushfire Management Plan – Lot 1401 and 1402 Fifty Road, Baldivis – Prepared by Emerge Associates (March 2020)
Implications for this BMP: Revised Bushfire Management Plan required to account for changes in Standards, State Planning Policies and associated Guidelines.					
Preliminary bushfire advice (may include a BAL contour map)	No	N/A	N/A	N/A	-
Bushfire Emergency Plan or Information	No	N/A	N/A	N/A	-
Bushfire Risk Report	No	N/A	N/A	N/A	-
Environmental Asset or Vegetation Survey	No	N/A	N/A	N/A	-
Landscaping and Revegetation Plan	No	N/A	Yes	N/A	-

Land Management Agreement	No	N/A	N/A	N/A	-

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

2.1.1 Vegetation of Significance to be Retained 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 and Waters Tenure categories include national and conservation parks, nature and crown reserves, state forest.	No	N/A	DBCA-011	☒	☐	☐	None
Designated Public Open Space	No	N/A	-	☒	☐	☐	None

2.1.2 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	
Heritage Areas (World and National)	No	N/A	Relevant register or mapping	☒	☐	☐	None
Wetlands and their 50m Buffer These are wetlands of international importance (Ramsar List), conservation category and nationally important.	No	N/A	DBCA-010 and 011, 019, 040, 043, 044	☒	☐	☐	None
Threatened and Priority Flora and their continuous 50m buffer	Unknown	Possible	DBCA-036	Restricted Scale of Data Available (security)	☐	☐	Confirm with relevant agency
Threatened Ecological Community	Unknown	Possible	DBCA-038		☐	☐	Confirm with relevant agency
Bush Forever	No	N/A	DPLH-022, SPP 2.8	☐	☐	☐	None

Figure 2.1

Environmental Considerations

Lot 1402 on Plan / Diagram: P416355
Area: 13.52ha
319 Fifty Road
Baldivis
City of Rockingham

------ LEGEND ------

- Subject Site
- Bush Forever Sites
- Reserves
- Clearing Regulations

Environmentally Sensitive Areas

- Declared Rare Fauna
- Threatened Ecological Community
- Declared Rare Flora

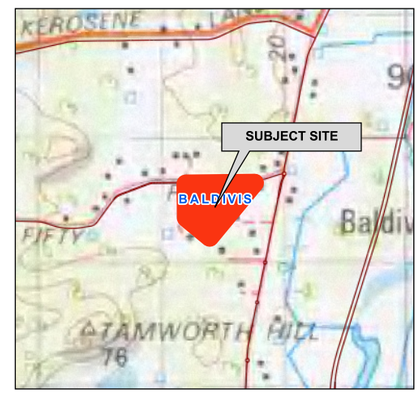
Geomorphic Wetlands Swan Coastal Plain

- Dampland
- Lake
- No Longer a Wetland
- Not Assessed
- Palusplain
- Sumpland

0 500 1,000 1,500 2,000

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 14-08-2024
SCALE (A3): 1 : 35000

BUSHFIRE PRONE PLANNING

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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.	No
Application of Design and/or Construction Responses to Limit Vegetation Modification or Removal	
Modify the development location to reduce exposure by increasing separation distance.	N/A
Redesign development, structure plan or subdivision.	N/A
Reduction of lot yield where this can increase available separation distances.	N/A
Cluster development to limit modification or removal of vegetation.	N/A
Construct building(s) to the requirements corresponding to higher BAL ratings to reduce required separation distances.	N/A

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:	Likely
General Comment - A Landscaping Plan for the proposed Public Open Space is likely to be required as a condition of eventual subdivision. Where any Landscaping or Revegetation areas are scheduled to occur as a result of ongoing development within the site, consideration must be given as to not increase the bushfire risk and their associated BAL Ratings indicated in this plan.	

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	
Wetland Buffers	No	
Legislated Lands	No	
Public Open Space	Possible	Should approval be granted, a Landscape Management Plan should be provided to demonstrate that the landowner/proponent responsible for the on-going management has an obligation to undertake mitigation works and the approving decision maker (i.e. local government) support the vegetation classification and management treatments assigned to the subject area.
Road Verges	Possible	
Other	Possible	

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 **onsite** native vegetation to establish the required bushfire protection measures on the subject site?	Yes
Refer to Figure 3.1b 'Classified Vegetation & Topography Map (Post Development) – Variations Applied' and Refer to Appendix A1.2 for justification details supporting the change.	
Is approval, from relevant state government agencies and/or the local government, to modify or remove **onsite** native vegetation required? (Note: if 'Yes' evidence of its existence should be provided in this BMP).	Yes

Refer to Figure 3.1b 'Classified Vegetation & Topography Map (Post Development) – Variations Applied' and Refer to Appendix A1.2 for justification details supporting the change.	
Has a requirement been identified to manage, modify or remove **offsite** 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 **offsite** 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 **offsite** bushfire prone vegetation, in perpetuity, to ensure the conditions of no fire fuels and/or low threat vegetation (refer to Appendix B) 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 Classification Variations to Existing Areas of Vegetation

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 than that which currently exists. (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).	No
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
Refer to Figure 3.1b 'Classified Vegetation & Topography Map (Post Development) – Variations Applied' and Refer to Appendix A1.2 for justification details supporting the change.	
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.	Yes
Refer to Figure 3.1b 'Classified Vegetation & Topography Map (Post Development) – Variations Applied' and Refer to Appendix A1.2 for justification details supporting the change.	

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/m^2. 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 3.1a & 3.1b	Table 3.2	Appendix A1	Table 3.1 Table 3.3 / BAL Contour Map
Method 2 (Detailed)	No	N/A	N/A	N/A	

3.1.2 BAL Ratings Derived from the Contour Map

Table 3.1: Indicative and determined BAL(s) for future buildings/structures on the proposed lots.

DETAILS OF BUSHFIRE EXPOSURE TO PROPOSED ALLOTMENTS/LAND USE ZONES						
Derived from the Application of Method 1 BAL Determination Methodology (AS 3959:2018 Section 2, Table 2.5)[1]						
Land Use Zones	BAL-FZ[2&3] Exposure	BAL-40 Exposure	BAL-29 Exposure	BAL-19 Exposure	BAL-12.5 Exposure	BAL-LOW Exposure
Residential	2		2		1	13
Commercial						2

[1] The assessment data used to derive the BAL ratings is sourced from Table 3.1 and Figure 3.2 'BAL Contour Map'.

[2] Land Use Zones currently subject to radiant heat levels corresponding to BAL-40 and/or BAL-FZ ratings that require consideration for development design and location of eventual allotments and associated structures.

[3] Future lot sizes will need to provide sufficient area to accommodate a building and the establishment of an APZ to ensure a maximum BAL rating of BAL-29 will apply to that building at the subdivision stage so as to ensure compliance with the Acceptable Solutions Established by the Guidelines for Planning in Bushfire Prone Areas can be achieved.

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 will be all areas of classified vegetation that exist at the time of the site assessment – both within the subject site (onsite) and external to the subject site (offsite).	Figure 3.1a
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 3.2
The relevant vegetation is the classified vegetation external to the subdivision boundaries. All identified classified vegetation areas, or portions of areas, within the proposed subdivision are excluded. This approach is applied to indicate the achievable bushfire attack levels within the subdivision and the resultant area of developable land on all lots where buildings will be subject to BAL-29 or less. It is based on the following assumptions: 1. Any classified vegetation within the subdivision can potentially be managed or removed by the developer and/or landowner to meet asset protection zone standards; and 2. Future development and consequent removal/management of vegetation that may take place on any adjoining land cannot be part of considerations for the subdivision.	Figures 3.1b and 3.2
Supporting Assessment Details: None Required.	

Table 3.2: Calculation inputs applied to deriving the vegetation separation distances corresponding to different levels of potential radiant heat transfer.

DATA APPLIED TO CALCULATE THE SITE SPECIFIC VEGETATION SEPARATION DISTANCES CORRESPONDING TO POTENTIAL RADIANT HEAT TRANSFER LEVELS [1]												
Applied BAL Determination Method		METHOD 1 - SIMPLIFIED PROCEDURE (AS 3959:2018 CLAUSE 2.2)										
The Calculation Input Variables - Corresponding to the Applied BAL Determination Method [2]												
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	metres	% Reduction
1	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A								
2	(A) Forest	80	Downslope >0-5	d/slope 1.4								
3	(B) Woodland	80	Upslope or flat 0	flat 0								
4	(A) Forest	80	Upslope or flat 0	flat 0								
5	(G) Grassland	80	Upslope or flat 0	flat 0								
6	(A) Forest	80	Upslope or flat 0	flat 0								
7	(A) Forest	80	Downslope >0-5	d/slope 4								

Note 1: The values used to indicate levels of potential radiant heat transfer (from fire in bushfire prone vegetation to exposed elements at risk), will be stated in subsequent tables as either as a bushfire attack level (BAL) and/or as kilowatts per square metre (kW/m2), as relevant to the application of the value and the type and use of the element at risk.

Note 2: All data and information supporting the determination of the classifications and values stated in this table 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 stated levels of potential radiant heat transfer.

THE CALCULATED (SITE SPECIFIC) VEGETATION SEPARATION DISTANCES CORRESPONDING TO THE STATED LEVEL OF POTENTIAL RADIANT HEAT TRANSFER (METRES) [1]									
Vegetation Classification		Maximum Radiant Heat Transfer (Flux)							
		>40 kW/m²	40 kW/m²	29 kW/m²	19 kW/m²	12.5 kW/m²	N/A [2]	10 kW/m²	2 kW/m²
		Bushfire Attack Levels							
Area	Class	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW		
1	Excluded cl 2.2.3.2(e & f)	N/A	N/A	N/A	N/A	N/A	N/A		
2	(A) Forest	<20	20-<27	27-<37	37-<50	50-<100	>100		
3	(B) Woodland	<10	10-<14	14-<20	20-<29	29-<100	>100		
4	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100		
5	(G) Grassland	<6	6-<8	8-<12	12-<17	17-<50	>50		
6	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100		
7	(A) Forest	<20	20-<27	27-<37	37-<50	50-<100	>100		

Note 1: The calculated results are illustrated in Figure 3.2 as a BAL Contour Map and/ or additional defining lines as necessary. All applied calculation input variables are presented in Table 3.2. A copy of the radiant heat calculator output for each area of classified vegetation is presented in Appendix A3.

Note 2: The BAL-LOW rating does not represent a maximum level of radiant heat transfer. The rating is applied when the separation distance is at least 100m from all classified vegetation except Grassland, for which 50m applies.

Figure 3.1a

Classified Vegetation & Topography Map - (Existing)

Lot 1402 on Plan / Diagram: P416355
Area: 13.52ha
319 Fifty Road
Baldivis
City of Rockingham

Area Number	Classified Vegetation	Effective Slope	Exclusion Clause (If Applicable)
1	Excluded	N/A	s2.2.3.2 (e & f)
2	Class A - Forest	>0-5	N/A
3	Class B - Woodland	Flat/Upslope (0 Degrees)	N/A
4	Class A - Forest	Flat/Upslope (0 Degrees)	N/A
5	Class G - Grassland	Flat/Upslope (0 Degrees)	N/A
6	Class A Forest	Flat/Upslope (0 Degrees)	N/A
7	Class A - Forest	>0-5	N/A

------ LEGEND ------

- Photo and Direction
- Elevation (m)
- Hydrants
- Potential Hydrant
- Subject Site
- Cadastral
- Road Length (m)
- Structure Plan Linework

Land Use Zones
- Commercial
- Residential
- Public Open Space & Drainage

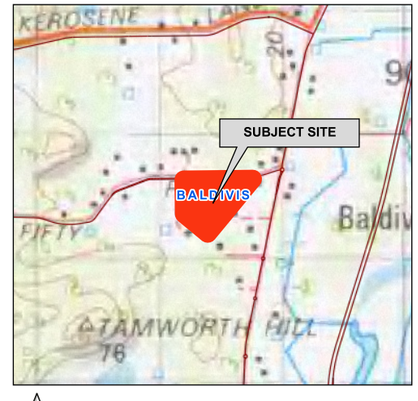
Assessment Area
- 150m Assessment Area

Classified Vegetation
- Class A - Forest
- Class B - Woodland
- Class G - Grassland
- Exclusion 2.2.3.2

0 25 50 75 100 125

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 15-08-2024
SCALE (A3): 1 : 3000

BUSHFIRE PRONE PLANNING

Disclaimer and Limitation: This map has been prepared for bushfire management planning purposes only. All depicted areas, contours and any dimensions shown are subject to survey. Bushfire Prone Planning does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence which may arise from relying on any information depicted.

Figure 3.1b

Classified Vegetation & Topography Map - (Post Development)

Lot 1402 on Plan / Diagram: P416355
Area: 13.52ha
319 Fifty Road
Baldivis
City of Rockingham

Area Number	Classified Vegetation	Effective Slope	Exclusion Clause (If Applicable)
1	Excluded	N/A	s2.2.3.2 (e & f)
2	Class A - Forest	>0-5	N/A
3	Class B - Woodland	Flat/Upslope (0 Degrees)	N/A
4	Class A - Forest	Flat/Upslope (0 Degrees)	N/A
5	Class G - Grassland	Flat/Upslope (0 Degrees)	N/A
6	Excluded	N/A	s2.2.3.2 (f)
7	Excluded	N/A	s2.2.3.2 (f)

------ LEGEND ------

- Photo and Direction
- Elevation (m)
- Hydrants
- Potential Hydrant
- Subject Site
- Cadastral
- Road Length (m)
- Structure Plan Linework

Land Use Zones
- Commercial
- Residential
- Public Open Space & Drainage

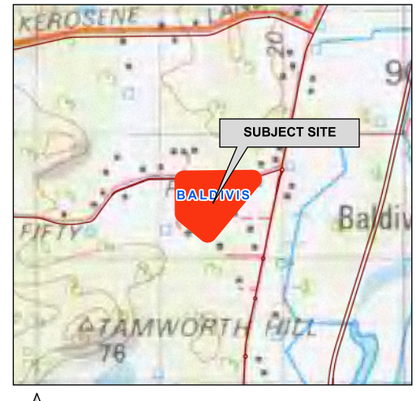
Assessment Area
- 150m Assessment Area

Classified Vegetation
- Class A - Forest
- Class B - Woodland
- Class G - Grassland
- Exclusion 2.2.3.2

0 25 50 75 100 125

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 15-08-2024
SCALE (A3): 1 : 3000

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Figure 3.2

BAL Contour Map - (Post Development)

Lot 1402 on Plan / Diagram: P416355
Area: 13.52ha
319 Fifty Road
Baldivis
City of Rockingham

Area Number	Classified Vegetation	Effective Slope	Exclusion Clause (If Applicable)
1	Excluded	N/A	s2.2.3.2 (e & f)
2	Class A - Forest	>0-5	N/A
3	Class B - Woodland	Flat/Upslope (0 Degrees)	N/A
4	Class A - Forest	Flat/Upslope (0 Degrees)	N/A
5	Class G - Grassland	Flat/Upslope (0 Degrees)	N/A
6	Excluded	N/A	s2.2.3.2 (f)
7	Excluded	N/A	s2.2.3.2 (f)

------ LEGEND ------

- Hydrants
- Potential Hydrant
- Subject Site
- Cadastral
- Road Length (m)
- Structure Plan Linework

Land Use Zones
- Commercial
- Residential
- Public Open Space & Drainage

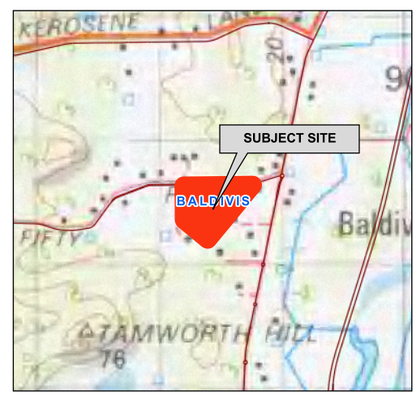
Assessment Area
- 100m Assessment Area
- 150m Assessment Area

Bushfire Attack Levels
- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

0 25 50 75 100 125

Metres

------ LOCALITY ------



AERIAL IMAGERY: Landgate/SLIP

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Merctaor Units: Metre
Map by: 15-08-2024
SCALE (A3): 1 : 3000

BUSHFIRE PRONE PLANNING

Disclaimer and Limitation: This map has been prepared for bushfire management planning purposes only. All depicted areas, contours and any dimensions shown are subject to survey. Bushfire Prone Planning does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence which may arise from relying on any information depicted.

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?	Yes

STRATEGIC PLANNING PROPOSALS - IDENTIFICATION OF RISK AND PLANNING ISSUES	
The Broader Landscape/Environment – The Potential for Bushfire Intensification and Extreme Events	
The type of bushfire prone vegetation surrounding the proposed development. Referencing the potential levels of each bushfire threat mechanism (direct and indirect).	Areas of bushfire prone vegetation external to the subject site are located to the north and east. These areas exist as retained vegetation (consisting of a combination of Forest, Woodland and Grassland with the Grassland being the predominant vegetation type across the broad landscape). The topography in the area surrounding the proposed development has an overall flat land or upslope appearance. Given the predominant grassland vegetation to the east, bushfire behaviour will be predominantly wind driven. Post Development - Due to the nature of the landscape, the bushfire threat will predominantly be from a flanking fire (indirect bushfire attack) as opposed to a fire front (direct bushfire attack). Particularly as the area is developed and becomes more fragmented.
The extent of bushfire prone vegetation surrounding the proposed development – both in area and continuity (fragmentation). Identification of conserved vegetation.	Refer to Figures 1.2 and 3.1a – It is evident that extents of bushfire prone vegetation exist across the broader landscape as retained vegetation (consisting of a combination of predominantly Forest, Woodland and Grassland. Most of the vegetation appears to be on private land and likely subject to various levels of fuel load management.
The potential for the surrounding topography to support known dynamic fire behaviours that can lead to an extreme fire event and intensification through atmospheric interaction (pyroconvective events).	Bushfire prone vegetation exists across the broader landscape as retained native vegetation (a combination of predominantly forest, woodland and grassland. Most of the vegetation appears to be on private land and subject to various levels of fuel load management as mentioned above. The forest and woodland vegetation will produce significant embers and firebrands in a bushfire event primarily due to the type foliage and type of bark. Pyroconvective Events - Possible but quite limited likelihood due to the fragmentation of areas of bushfire prone vegetation due to cleared areas, pastured areas, fuel load management by landowners and the availability of emergency services (including being a part of the greater Perth metropolitan area).
The Broader Landscape/Environment – The Potential for Increased Vulnerability of Persons in a Bushfire Event	
The wider (regional) road network and any access constraints.	At a local level, access options won't be limited to a single road in two directions to at least two suitable destinations once construction of the internal road network and surrounding road network connections to arterial roads have been completed. There is no access constraint for the subject site with regard to what is considered acceptable from a planning perspective, however, where development opportunities can increase local access options within the surrounding area, this would have merit that should be considered as benefiting a greater number of residents/occupants.
The proximity of settlements and availability of emergency services	The subject site is part of a large area of urban settlement (Baldivis). Firefighting emergency services are located in Baldivis and in Rockingham.
Environmental Considerations	

Constraints to implementing required and/or additional bushfire protection measures	The environmental considerations have not identified any existing constraints (i.e. Conservation Category of Resource Enhancement Wetlands) within the subject site. General Note - Any retained native vegetation and/or proposed gardens, requires implementation of a landscape management plan to ensure ongoing mitigation treatments lessen the on-site bushfire threat and minimise ignition sources from direct (deliberate) or indirect (accidental) origin.
Provision of Access Within the Subject Site	
Potential constraints	Staging of future development will consider constraints to ensure establishing the required access to meet bushfire planning requirements.
Issues to be Considered at Subsequent Planning Stages (additional assessments/documents)	
Specific land uses to be addressed	Land Use can be considered at the future development stage.
Additional assessments	N/A
Additional documents	Site specific Bushfire Management Plan for future subdivision proposals/development applications on the subject land that considers land use at that time.
Discretionary Decision Making and the Precautionary Principle (SPP 3.7 and Guidelines)	
Does the bushfire consultant consider there are issues that need to be addressed in this space?	Consideration for future staging of the land into various land uses through implementation of subsequent bushfire management plans to enable the creation of new lots at the localised level, to address bushfire risk.

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	(Sb) Structure plan where the lot layout is known and subdivision application				
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				
Acceptable Solutions - Assessment Statements *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.*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
E1 Location				**Compliant:**	Yes
A1.1 Development location		**Applicable:**	Yes	**Compliant:**	Yes
ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES					
☑ ☐ ☐ The structure plan 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.					
Supporting Assessment Details: The proposed structure plan 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. In addition, the vegetation surrounding the proposed development can be classed as a moderate bushfire hazard level. It is recognised however, that two of the Residential Land Use Cells (along the south-east boundary of the Subject Site) will potentially be subject to radiant heat levels corresponding to BAL-40 or BAL-FZ ratings. To comply with the Guidelines for Planning in Bushfire Prone Areas, the subsequent subdivision design of future lots in these cells will need to accommodate a building and the establishment of an APZ to ensure a maximum BAL rating of BAL-29.					
ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)					
"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." **Strategic Planning Proposals:** Consider the threat levels from any vegetation adjoining and within 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.					

Structure Plans (lot layout known) and Subdivision Applications: As for strategic planning proposals but within the subject site the relevant threat levels to consider are the radiant heat levels represented by BAL-FZ and BAL-40 ratings.

The Hazard Within the Subject Site

The existing lots are entirely vegetated with native vegetation classified as Class A Forest. The impact of the slopes under the vegetation will be dependent on a bushfire's direction of travel, but slopes in the range of zero to five degrees do exist and bushfire travelling upslope will have increased intensity and rate of spread.

Intense bushfire behaviour is possible, particularly if vegetation within the lot is ignited by bushfire in the adjoining hazard and they are involved together.

However, the ability to establish a BAL-29 dimensioned APZ within each of the proposed allotment boundaries removes the threat of greater levels of radiant heat or flame contact upon a future building.

The primary bushfire threat from bushfire prone vegetation will be embers from land to the north and east once development has taken place. This threat will be mitigated by the application of appropriate building design, bushfire construction requirements and the ongoing maintenance of the APZ to ensure the buildings will not be impacted by consequential fire within combustible materials used, stored or accumulated within the APZ.

The Hazard Adjoining the Subject Site

Bushfire prone vegetation within the locality exists as vegetation classified as Class A Forest, Class B Woodland and Class G Grassland, located to the north and east of the Subject Site. These hazards however are likely to become more fragmented as development in the area continues, thus diminishing to overall bushfire risk.

The impact of the slope under the vegetation will be dependent on a bushfire's direction of travel. The topography adjoining the Subject site has a predominant overall flat land appearance or is upslope in relation to the proposed development. It is noted that a slope in the range of zero (0) to five (5) degrees is present to the north. The adjoining land cannot be considered as rugged (which would present greater potential for dynamic fire behaviours to develop leading to increasing fire intensity extreme bushfire events).

Bushfire prone vegetation adjoining the existing lots exists as vegetation classified as a combination of Class A Forest Class B Woodland and Class G Grassland as mentioned above. The extent of these hazards is shown in Figures 1.2, 3.1a and 3.1b. These areas of vegetation are occurring under the following scenarios:

1. Vegetation that has been retained on adjoining land in the area.

The potential bushfire impact on persons and property within the proposed lots will be ember attack in the event of a bushfire.

This ember threat will be mitigated by the application of appropriate building design, bushfire construction requirements and the ongoing maintenance of the BAL-29 dimensioned APZ, to ensure the buildings will not be impacted by consequential fire within combustible materials used, stored or accumulated within the APZ.

The Potential of the Proposed Development to Reduce Bushfire Risk to the Existing Land Use

When considered in the broader context of existing land use within the surrounding area, the proposed subdivision can potentially contribute to reducing the level of risk from bushfire to existing landowners.

This can be achieved in various ways and the following assessment points are made for the proposed subdivision:

- Planning for smaller lot sizes can reduce the level of risk from bushfires as a greater percentage of their total area will be comprised of land managed to APZ standards. This results in a reduction in the bushfire hazard over a broader area and establishes discontinuous fuels. This has benefits to all development in the area;
- For adjoining landowners the more bushfire resilient dwellings and reduced area of hazard on the proposed lots, will lower their level of risk from bushfire because the threat levels from the bushfire attack mechanisms on the adjoining land will be reduced. These reduced fuels will also be between them and a conservation reserve; and
- There is potential to improve vehicular access for the surrounding area as part of the proposed development.

The potential for reduction in bushfire risk to surrounding properties compared to the present situation is considered, there is significant merit in the proposed subdivision that it is appropriate to consider.

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	(Sb) Structure plan where the lot layout is known and subdivision application				
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				
Acceptable Solutions - Assessment Statements *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.*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
E2 Siting and Design of Development				**Compliant:**	Yes
A2.1 Asset Protection Zone (APZ)		**Applicable:**	Yes	**Compliant:**	Yes

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

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.

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 (refer to Appendix B). The required separation distances will vary according to the site specific conditions and local government requirements.

The APZ dimensions stated and/or illustrated in this Report can vary dependent on the purpose for which they are being identified.

> *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.*

THE 'PLANNING BAL-29' APZ DIMENSIONS

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/m^2, either exist or can be implemented (with certain exceptions). These separation distances are 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 sole purpose is to identify if an acceptable solution for planning approval can be met.

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

☑ ☐ ☐	**APZ Width:** The proposed (or a future) habitable building(s) on the lot(s) of the proposed development - or an existing building for a proposed change of use – can be (or is) 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.
☐ ☐ ⦸	**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 BAL-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 January 2024 and Guidelines s5.3.2).
☐ ☐ ⦸	**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.
☑ ☐ ☐	**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 (refer to Appendix B).
☑ ☐ ☐	**APZ Location:** It can be justified that any adjoining (offsite) land forming part of a 'Planning BAL-29' APZ will: • If non-vegetated, remain in this condition in perpetuity; and/or • If vegetated, be low threat vegetation maintained in this condition in perpetuity (refer to Appendix B).

☑ ☐ ☐	**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).
☐ ☐ ⊘	**Staged Subdivision:** The subdivision proposes development in stages and each stage is to comply with the relevant bushfire protection criteria. A balance lot is created or classified vegetation within a subsequent stage will be removed and/or modified and/or be subject to ongoing management, to ensure that proposed lots within the current stage of the subdivision achieve a development site subject to 29 kW/m^2 or below. The planned approach for achieving the required outcome is described in the supporting assessment details below.
☑ ☐ ☐	**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.

Supporting Assessment Details: Asset protection zones can be contained both within and external of the boundaries of the subject land. It can be justified that adjoining land can form part of an APZ, meeting s2.2.3.2 exclusion requirements of AS3959-2018.

The APZ that will likely exist, will consist of the following:

- Roads and unvegetated verges
- Footpaths
- Any applicable landscaping

APZ Management Within the Subject Land:

Refer to Figures 3.1b and 3.2 - The exclusion requirements of s2.2.3.2 of AS3959 demonstrates that vegetation that is onsite is within the control of the subject site's landowner and therefore can potentially be removed or modified to mitigate the bushfire risk.

APZ Management Outside the Lot:

The exclusion requirements of s2.2.3.2 of AS3959 can be demonstrated by the established and developing residential area. Refer to aerial imagery and photographic evidence contained within this plan.

APZ Management - General: Where any part of the required APZ dimension is vegetated for the purposes of landscaping, it will be managed in accordance with the technical requirements established by the Schedule 1: 'Standards for Asset Protection Zones (Guidelines). The APZ specifications are also detailed in Appendix 1 and the City of Rockingham Fire Control Notice.

ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)

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."

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.

The lots sizes provide sufficient area to accommodate a building and the establishment of an APZ dimensioned to ensure a maximum BAL rating of BAL-29 will apply to that building.

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	(Sb) Structure plan where the lot layout is known and subdivision application				
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				
Acceptable Solutions - Assessment Statements *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.* *The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices C and D. 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).*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
E3 Vehicular Access				**Compliant:**	Yes
A3.1 Public roads – technical requirements			**Applicable**: Yes	**Compliant**:	Yes
☑ ☐ ☐	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).				
☑ ☐ ☐	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. or The applicable class(s) of road and technical requirements have been confirmed with the relevant local government/Main Roads WA. These can and will be complied with.				
☑ ☐ ☐	A traversable verge is available adjacent to classified vegetation (Guidelines, E3.1), as recommended.				
Supporting Assessment Details: None Required.					

A3.2a Multiple access routes	Applicable:	Yes	Compliant:	Yes

☑ ☐ ☐	For each lot, two-way public road vehicular access is provided in two different directions to at least two different suitable destinations with an all-weather surface.
☑ ☐ ☐	The two-way access is available at an intersection no greater than 200m from the relevant boundary of each lot, via a no-through road.
☐ ☐ ⊘	The two-way access is not 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: • 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/m^2).
Supporting Assessment Details: Refer to Figures 1.1 and 1.2 contained within this plan. With the exception of the proposed cul-de-sac (less than 200 metres in length) each lot has access/egress in two different directions to two different destinations.	

A3.2b Emergency access way	Applicable:	No	Compliant:	N/A

☐ ☐ ⊘	The proposed or existing EAW provides a through connection to a public road.
☐ ☐ ⊘	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.
☐ ☐ ⊘	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.
☐ ☐ ⊘	The subdivision proposes development in stages and each stage is to comply with the relevant bushfire protection criteria. A temporary EAW is planned to facilitate the staging arrangements of a subdivision as an interim second access route until the required second access route is constructed as a public road in a subsequent stage. The planned approach for achieving the required outcome is described in the supporting assessment details below.
Supporting Assessment Details: None Required.	

A3.3 Through-roads	Applicable:	Yes	Compliant:	Yes

☐ ☐ ⊘	A no-through public road is necessary as no alternative road layout exists due to site constraints.
☑ ☐ ☐	The no-through public road length does not exceed the established maximum of 200m to an intersection providing two-way access (Guidelines, E3.3).
☐ ☐ ⊘	The no-through public road exceeds 200m but satisfies the exemption provisions of A3.2a as demonstrated in A3.2a above.

☑ ☐ ☐	The public road technical construction requirements (Guidelines, Table 6 and E3.1. Refer also to Appendix C in this BMP), can and will be complied with as established in A3.1 above.
☑ ☐ ☐	The turnaround area requirements (Guidelines, Figure 24) can and will be complied with.
Supporting Assessment Details: Refer to Figures 1.1 and 1.2 contained within this plan. With the exception of the proposed cul-de-sac (less than 200 metres in length) each lot has access/egress in two different directions to two different destinations.	

A3.4a Perimeter roads	**Applicable**: Yes	**Compliant**: Yes

☑ ☐ ☐	The proposed greenfield or infill development consists of 10 or more lots (including those that are part of a staged subdivision) and therefore should have a perimeter road. This is planned to be installed.
☐ ☐ ⊘	The proposed greenfield or infill development consists of 10 or more lots (including those that are part of a staged subdivision). However, it is not required on the established basis of: • The vegetation adjoining the proposed lots is classified Class G Grassland; • Lots are zoned rural living or equivalent; • It is demonstrated that it cannot be provided due to site constraints; or • All lots have existing frontage to a public road.
☑ ☐ ☐	The technical construction requirements of widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.4a) can and will be complied with.
Supporting Assessment Details: Refer to Figures 1.1 and 1.2 contained within this plan. Compliance with this Acceptable Solution can be achieved via the existing and proposed Public Road Network. The construction technical requirements established by the Guidelines and/or the local government can and will need to be complied with.	

A3.4b Fire service access route	**Applicable**: No	**Compliant**: N/A

☐ ☐ ⊘	The FSAR can be installed as a through-route with no dead ends, linked to the internal road system every 500m and is no further than 500m from a public road.
☐ ☐ ⊘	The technical construction requirements of widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.4b. Refer also to Appendix C in this BMP), can and will be complied with.
☐ ☐ ⊘	The FSAR can and will be signposted. Where gates are required by the relevant local government, the specifications can be complied with.
☐ ☐ ⊘	Turnaround areas (to accommodate type 3.4 fire appliances) can and will be installed every 500m on the FSAR.
Supporting Assessment Details: None Required.	

A3.5 Battle-axe access legs	**Applicable**: No	**Compliant**: N/A

☐ ☐ ⊘	It can be demonstrated that a battle-axe leg cannot be avoided due to site constraints.

☐ ☐ ⊘	The proposed development is in a reticulated area and the battle-axe access leg length from a public road is no greater than 50m. No technical requirements need to be met.
☐ ☐ ⊘	The proposed development is not in a reticulated area. The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.5. Refer also to Appendix C in this BMP), can and will be complied with.
☐ ☐ ⊘	Passing bays can and will be installed every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m.
Supporting Assessment Details: None Required.	

A3.6 Private driveways	**Applicable**:	No	**Compliant**:	N/A

☐ ☐ ⊘	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.
☐ ☐ ⊘	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.
☐ ☐ ⊘	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: None Required - The proposed lots are likely to have frontage to the internal subdivision road networks. In addition, there will be limited building setbacks due to their size/area. Increased driveway standards will not be required for this proposal.	

5.6 Assessment Statements for Element 4: Water

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	(Sb) Structure plan where the lot layout is known and subdivision application				
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				
Acceptable Solutions - Assessment Statements *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.* *The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices C and D. 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).*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
E4 Water				**Compliant:**	Yes
A4.1 Identification of future firefighting water supply			**Applicable:**	No	**Compliant:** N/A
☐ ☐ ⃠	It can be demonstrated that reticulated or sufficient non-reticulated water for firefighting can be provided at the subdivision and/or development application stage in accordance with the specifications of the relevant water supply authority or the requirements of Schedule 2.				
Supporting Assessment Details: None Required.					
A4.2 Provision of water for firefighting purposes			**Applicable:**	Yes	**Compliant:** Yes
☑ ☐ ☐	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.				
☑ ☐ ☐	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.				
☐ ☐ ⃠	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.				
☐ ☐ ⃠	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.				

☐ ☐ ⊘	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).
☐ ☐ ⊘	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: Refer to Figure 1.2 of this plan. Potential hydrant locations have been indicated in this plan in accordance with the specifications of the relevant water supply authority. Furthermore – Hydrants currently exist in the area at regular intervals along neighbouring/surrounding roads/streets. Refer to information contained in Appendix D for the firefighting water supply specifications and technical requirements.	

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:	N/A
					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 Clause 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 (refer to Appendix B) and that any required active management can be expected to continue in perpetuity, and this can be adequately justified.

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:	None
Assessment Statement:	No vegetation types exist close enough, or to a sufficient extent, within the relevant area to influence classification of vegetation within 100 metres of the subject site.

VEGETATION AREA 1						
Classification	**N/A**					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - 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	
Description/Justification:	A combination of established and developing residential areas. Managed private gardens, Public Open Space Areas, Schools, street frontages and median strips/road verges. Grasses slashed and maintained to less than 50mm. Mulch used to suppress weed growth. Footpaths/hardstand areas cleared of unmanaged vegetation.					
Post Development Assumptions:	Not Applicable.					



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VEGETATION AREA 1						
Classification	**N/A**					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - 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	
Description/Justification:	As Above.					
Post Development Assumptions:	As Above.					



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VEGETATION AREA 1						
Classification	**N/A**					
Types Identified	N/A					
Exclusion Clause	2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - 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	
Description/Justification:	As Above.					
Post Development Assumptions:	As Above.					



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<table>
<tr><th colspan="8">VEGETATION AREA 1</th></tr>
<tr><td>Classification</td><td colspan="7">N/A</td></tr>
<tr><td>Types Identified</td><td colspan="7">N/A</td></tr>
<tr><td>Exclusion Clause</td><td colspan="7">2.2.3.2 (e) Non-vegetated areas and (f) Low threat vegetation - minimal fuel condition.</td></tr>
<tr><td>Effective Slope</td><td>Measured</td><td colspan="2">N/A</td><td>Applied Range (Method 1)</td><td colspan="3">N/A</td></tr>
<tr><td>Foliage Cover (all layers)</td><td>N/A</td><td>Shrub/Heath Height</td><td>N/A</td><td>Tree Height</td><td colspan="3">N/A</td></tr>
<tr><td>Description/Justification:</td><td colspan="7">As Above.</td></tr>
<tr><td>Post Development Assumptions:</td><td colspan="7">As Above.</td></tr>
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VEGETATION AREA 2						
Classification	**A. FOREST**					
Types Identified	Open forest A-03					
Exclusion Clause	N/A					
Effective Slope	Measured	d/slope 1.4 degrees		Applied Range (Method 1)	Downslope >0-5 degrees	
Foliage Cover (all layers)	30-70%	Shrub/Heath Height	>2m	Tree Height	Up to 30m	
Description/Justification:	Mixed composition consisting of predominantly native species inclusive of Eucalypts Banksia and Sheaok. Understorey consists of unmanaged grasses, low shrub and low trees in some sections. Other sections have minimal understorey. Occasional open areas between canopies.					
Post Development Assumptions:	Not Applicable					



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<table>
<tr><th colspan="8">VEGETATION AREA 3</th></tr>
<tr><td>Classification</td><td colspan="7">B. WOODLAND</td></tr>
<tr><td>Types Identified</td><td colspan="7">Woodland B-05</td></tr>
<tr><td>Exclusion Clause</td><td colspan="7">N/A</td></tr>
<tr><td>Effective Slope</td><td>Measured</td><td colspan="2">flat 0 degrees</td><td>Applied Range (Method 1)</td><td colspan="3">Upslope or flat 0 degrees</td></tr>
<tr><td>Foliage Cover (all layers)</td><td colspan="2">10-30%</td><td>Shrub/Heath Height</td><td colspan="2">N/A</td><td>Tree Height</td><td>Up to 30m</td></tr>
<tr><td>Description/Justification:</td><td colspan="7">Woodland Dominant Area. Eucalypt Dominant Area. Understorey consists of predominantly low grasses and leaf litter. Occasional open areas between canopies.</td></tr>
<tr><td>Post Development Assumptions:</td><td colspan="7">Not Applicable.</td></tr>
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VEGETATION AREA 4						
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)	30-70%	Shrub/Heath Height	>2m		Tree Height	Up to 30m
Description/Justification:	Mixed composition consisting of predominantly native species inclusive of Eucalypts Banksia and Sheaok. Understorey consists of unmanaged grasses, low shrub and low trees in some sections. Other sections have minimal understorey. Occasional open areas between canopies.					
Post Development Assumptions:	Not Applicable					



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VEGETATION AREA 5				
Classification	**G. GRASSLAND**			
Types Identified	Dense sown pasture G-25 Sown pasture G-26			
Exclusion Clause	N/A			
Effective Slope	Measured	flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees
Description/Justification:	Assessed as Grassland due to areas of grasses present in paddock/open areas. While some sections appear managed, other sections do appear unmanaged. As such, the entire area/s have been classified in accordance with AS3959-2018 as a precautionary measure. Foliage cover less than 10%.			
Post Development Assumptions:	Not Applicable.			



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VEGETATION AREA 6						
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)	30-70%	Shrub/Heath Height	>2m	Tree Height	Up to 30m	
Description/Justification:	Mixed composition consisting of predominantly native species inclusive of Eucalypts Banksia and Sheaok. Understorey consists of unmanaged grasses, low shrub and low trees in some sections. Other sections have minimal understorey. Occasional open areas between canopies.					
Post Development Assumptions:	It is anticipated that sections of Area 6 within the boundaries of the subject site will have some form of modification as a result of Asset Protection Zone (APZ) Implementation.					



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VEGETATION AREA 6						
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)	30-70%		Shrub/Heath Height	>2m	Tree Height	Up to 30m
Description/Justification:	As Above.					
Post Development Assumptions:	As Above.					



PHOTO ID: 35



PHOTO ID: 36

VEGETATION AREA 7						
Classification	**A. FOREST**					
Types Identified	Open forest A-03					
Exclusion Clause	N/A					
Effective Slope	Measured	d/slope 4 degrees		Applied Range (Method 1)	Downslope >0-5 degrees	
Foliage Cover (all layers)	30-70%	Shrub/Heath Height	>2m	Tree Height	Up to 30m	
Description/Justification:	Mixed composition consisting of predominantly native species inclusive of Eucalypts Banksia and Sheaok. Understorey consists of unmanaged grasses, low shrub and low trees in some sections. Other sections have minimal understorey. Occasional open areas between canopies.					
Post Development Assumptions:	It is anticipated that sections of Area 7 within the boundaries of the subject site will have some form of modification as a result of Asset Protection Zone (APZ) Implementation.					



PHOTO ID: 37



PHOTO ID: 38



PHOTO ID: 39



PHOTO ID: 40

VEGETATION AREA 7						
Classification	**A. FOREST**					
Types Identified	Open forest A-03					
Exclusion Clause	N/A					
Effective Slope	Measured	d/slope 4 degrees		Applied Range (Method 1)		Downslope >0-5 degrees
Foliage Cover (all layers)	30-70%		Shrub/Heath Height	>2m	Tree Height	Up to 30m
Description/Justification:	As Above.					
Post Development Assumptions:	As Above.					



PHOTO ID: 41



PHOTO ID: 42

A1.3: EFFECTIVE SLOPE

EXPLAINING THE ASSESSMENT METHODOLOGY APPLIED BY BUSHFIRE PRONE PLANNING

DEFINITION: Effective slope is "the slope under that classified vegetation which most influences the bushfire attack" (AS 3959:2018, Clause 1.5.11).

"The effective slope under the classified vegetation is not the same as the average slope for the land surrounding the site of the proposed building. The effective slope is that slope which most significantly influences bushfire behaviour" (AS 3959:2018, Clause CB4).

The slope is described as upslope, flat or downslope when viewed from an exposed element (e.g., building) and looking towards the vegetation. It is measured in degrees.

[Note: Additional relevant guidance provided by AS 3959:2018 and NSW RFS, Planning for Bushfire Protection (2019) is incorporated into the applied assessment methodology and is presented at the end of this explanation.]

COMPOUND SLOPES UNDER VEGETATION AND DETERMINING SLOPE SIGNIFICANCE

Non-Linear Slopes: When the slope of ground under the vegetation out to the distance to be assessed (100 m or further if necessary), is not a straight line or nearly straight line slope, then it is made up of several different slopes i.e., it is a compound slope. The different slope angles and lengths must be factored into the determination of the effective slope value to be applied. Different slopes will potentially influence the bushfire rate of spread and intensity, both increasing and decreasing it.

Significant Slope: The AS 3959:2018 bushfire attack level determination methodology, with default inputs, models a fully developed bushfire. Therefore, a 'significant' slope is one that will significantly influence bushfire behaviour. To be 'significant' the length of the slope must be 'sufficient' to support a fully developed fire on that slope. The angle of a significant slope could be the determined effective slope for the area of classified vegetation if it is the one that 'most influences the bushfire attack'.

Sufficient Slope Length: Is a slope that will, as a minimum, allow the entire flame depth (flaming zone) of a fully developed fire (100m flame width) to exist on that slope.

The expected flame depth of a fully developed bushfire is a function of the length of time the flaming phase will exist on a section of the fuel bed (the 'residence time') and the bushfire's 'rate of spread'. For a given rate of spread, longer residence times result in greater flame depths. Greater flame depths are correlated with greater flame temperatures and greater flows of radiant heat.

The primary factors that will increase the residence time are:

- Heavier fine fuel loads of grass, leaf litter, twigs, bark etc less than 6mm in width and existing within the surface and near surface layers (and elevated fuel layers when contiguous with the base layers); and
- A greater percentage of larger fine fuels within the fuel load.

The primary factors that increase the rate of spread (apart from fire weather factors), include finer fuels, drier fuels, horizonal continuity of fuel and steeper upward ground slope in the direction of fire travel.

Example values:

- Residence Time: Grassfire 5 – 15 seconds, Forest fire 25 -50 seconds.
- Rate of Spread: Grassfires of a few km/hr are considered fast moving, 5-10 km/hr is common and fastest in the order of 25km/hr. Forest fire typically recorded in metres/hour with 1-1.5 km/hr being considered fast moving and fastest in the order of 3–4 km/hr.
- Flame Depth: More typically, a few metres for grasses to tens of metres for forest fires.

An Isolated Slope: For scenarios where there is a single significant slope (based on the above criteria) additional consideration would need to be given to the time and distance consumed by a bushfire still in its 'developing' phase. This will require due consideration be given to how it is potentially ignited i.e., from a single or multiple points, as this will influence the time and distance required to fully develop. For such scenarios, a normally significant slope may not be sufficiently long. It may be necessary to determine the potential bushfire impact more accurately by

justifying the application of a lesser effective slope, or a lower threat vegetation classification, or calculating a reduced head fire width (using short fire run modelling).

Determined Effective Slope: Only a 'significant' slope can potentially be the effective slope by itself. In which case, for a defined area of classified vegetation area, the worst significant slope under that vegetation is to apply.

The table below presents Bushfire Prone Planning's considerations applied to assessing short and/or compound slopes in determining the effective slope.

Slope Length (m)	Considered a Significant Slope	Considerations in Determining the Effective Slope
< 5	No	Where these short slopes exist as part of a compound slope under an area of classified vegetation, they can be ignored as they will not influence the fire behaviour in that vegetation.
5-20	No	These slopes will have a range of influence on fire behaviour from very little to a degree of influence that must be accounted for to some extent by the determined effective slope that is applied (i.e., with a greater length apply to a greater extent). But the actual slope of these shorter slopes is likely not to be applied as it is not a 'significant' length.
20-30	Maybe	The same considerations applied to the 5-20m slope lengths should be applied here. However, more justification would need to be presented to support their assessment as not being 'significant' slopes. For these slope lengths, consideration must be given more broadly to the potential level of risks associated with a bushfire event in this location. The risk level will be a function of the bushfire hazard threat levels (direct attack mechanisms) within the immediate and broader assessment area as influenced by local topography, vegetation extents and types and the exposure and vulnerability of persons and/or buildings/structures to these threats. Higer risk levels require greater precaution meaning these slopes should be considered 'significant', and vice versa. Consider the potential for a bushfire on adjoining or nearby land be a source of ignition and/or pre-heating to vegetation on the subject slope. Consider if vegetation on the slope is likely be ignited by a single ignition point or is multipoint ignition possible from bushfire an adjoining slopes or the surrounding area. Single point ignition will require a fire to travel further before being fully developed (DFES considers less than 100m fire runs may be considered a short fire run for forest, woodland and scrub vegetation classifications, RFS NSW applies 150m). Isolated slopes of this length are less likely to be considered significant as compared to when part of a compound slope.
>30	Yes	Likely to always be a significant slope unless isolated (i.e., exists alone) – in which case, justifying the application of a lesser effective slope, or a lower threat vegetation classification, or calculating a reduced head fire width, are approaches that may need to be applied.

BPP Approach - Slope Variation Within Areas of Vegetation

When multiple 'significant' slope lengths with large differences in degrees of effective slope (or different applicable slope ranges when AS 3959:2018 Method 1 is applied), exists under a single vegetation classification, these will be delineated as separate vegetation areas of classified vegetation to account for the difference in potential bushfire behaviour and impact, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

Effective Slope Variation Due to Multiple Development Sites

When the effective slope, under a single 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).

AS 3959:2018 EFFECTIVE SLOPE DETERMINATION - GUIDANCE

The Standard presents a broad set of guidance statements that indicate the intent of deriving an effective slope value for use in calculations, rather than detailing the 'in the field' determination process. These include:

- Highlighting the importance of the value by stating "The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the severity of the fire and the ultimate level of radiant heat flux" (Clause C2.2.5). [Note: A common rule of thumb is that for every 10 degrees of upslope, a fire will double its rate of spread if moving in the direction of the prevailing wind].
- It may be necessary to consider the slope under the classified vegetation for distances greater than 100 m in order to determine the effective slope for that vegetation classification.
- "Where there is more than one slope within the classified vegetation, each slope shall be individually assessed, and the worst case Bushfire Attack Level shall apply" (Clause 2.2.5).

NSW RFS 2019, PLANNING FOR BUSHFIRE PROTECTION - APPENDIX A1.5 - ADDITIONAL DETERMINATION GUIDANCE

- "In identifying the effective slope - it may be found that there are a variety of slopes covering different distances within the vegetation. The effective slope is considered to be the slope under the vegetation which will most significantly influence the bushfire behaviour for each aspect. This is usually the steepest slope. In situations where this is not the case, the proposed approach must be justified".
- "Vegetation located closest to an asset may not necessarily be located on the effective slope".

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 a BAL contour map in Figure 3.2.

APPENDIX B: ADVICE - ONSITE VEGETATION MANAGEMENT - THE APZ

THE ASSET PROTECTION ZONE (APZ) – EXPLANATORY INFORMATION

The APZ is an area surrounding a building/structure in which fire fuels are intensively managed (reducing sources and quantities) to provide localised protection. Any retained or planted vegetation must be able to be considered low threat (due to a range of characteristics) or as being continuously maintained in a minimal fuel condition. The primary objectives of establishing an APZ are:

1. Ensure a reduction in the exposure of the building/structure to bushfire direct attack mechanisms (threats) of flame contact, radiant heat transfer and ember attack, by establishing appropriate separation from the bushfire prone vegetation. The required APZ dimensions will be dependent on site specific conditions and the use of the site;
2. Ensure a reduction in the exposure of the building/structure to bushfire indirect attack mechanisms (threats) by:
   - Preventing surface fire spreading to the building/structure;
   - Minimising the potential for tree strike; and
   - Limiting the potential for consequential fire to impact the building/structure by eliminating, reducing and/or shielding consequential fire fuels. These fuels include accumulated debris, stored combustible/flammable items and constructed combustible items. Consequential fire, typically ignited by embers, is the primary cause of building loss in a bushfire event; and
3. To provide a defendable space for firefighting activities.

The *Guidelines for planning in bushfire prone areas* (WAPC 2021 v1.4) Appendix 4, Element 2 Explanatory Notes and Schedule 1: Standards for APZ, provide an example of how the objectives might be met.

B1: The Asset Protection Zone (APZ) - Dimension and Location Requirements

PLANNING APPLICATION REQUIREMENTS VERSUS LANDOWNER IMPLEMENTATION REQUIREMENTS

ONE IDENTIFIES THE ABILITYOF DEVELOPMENT TO ACHIEVE A MAXIMUM LEVEL OF EXPOSURE TO CERTAIN BUSHFIRE THREATS AND THE OTHER ESTABLISHES WHAT IS TO BE PHYSICALLY IMPLEMENTED SURROUNDING BUILDINGS/STRUCTURES

THE 'PLANNING BAL-29 APZ'

For planning approval purposes, an assessment against the Bushfire Protection Criteria in the *Guidelines for planning in bushfire prone areas* (WAPC 2021, v1.4), is conducted. Element 2 of the criteria (Siting and Design) establishes the acceptable solution (A2.1: APZ) requiring proposed development to depict on submitted plans that every habitable building can be surrounded by an APZ that can be reasonably expected to comply with the maintenance requirements (APZ standards) in perpetuity, and meets the following dimension and location requirements:

Dimensions: The minimum dimensions of the 'Planning BAL-29 APZ' are those that will ensure the potential radiant heat impact on the relevant buildings does not exceed 29 kW/m^2. These dimensions will vary dependent on the site specific conditions.

Location: The 'Planning BAL-29 APZ' dimensions must not extend past lot boundaries onto land the landowner has no responsibility for or control over. Limited exceptions include:

- When adjoining land is not vegetated (e.g., built out, roads, carparks, drainage systems, rock, water body etc.);
- When adjoining land does or will contain low threat vegetation (refer to Appendix B) and it can be justified that enforceable mechanisms are in place to ensure the APZ status of this land will exist in perpetuity. Such areas of land include:

- Publicly managed areas of vegetation (e.g., public open space, recreation grounds/areas and services installed in a common section of land). For certain situations, evidence of an entity's enforceable requirement to manage these areas to the required standard would be included in either the BAL Assessment Report or Bushfire Management Plan;

- Land on a neighbouring lot that is/will be part of the required APZ surrounding buildings/structures on that lot, and/or required firebreak, and for which the owner of that lot has a recognised responsibility to implement and maintain.

- Adjoining land for which a formalised and enforceable authority and responsibility is created for the owner of the lot on which development is proposed, or another third party, to manage vegetation in perpetuity, on land they do not own. This is not common, and the necessary evidence of the responsibility would be included in the BAL Assessment Report or Bushfire Management Plan.

If the proposed development can potentially satisfy these dimension and location requirements, then planning approval can be considered for this requirement, and then be subject to all other planning requirements being met.

KEY POINT

The 'Planning BAL-29 APZ' dimensions are not necessarily those that must be physically implemented and maintained by a landowner. Implementation requirements may be different (see 'Determined BAL Rating APZ' below).

The purpose of identifying the ability of proposed development to apply the 'Planning BAL-29 APZ' dimensions is solely to inform decision makers as to the ability of the proposed building works to limit exposure to certain bushfire threats (flame contact, radiant heat transfer and ember attack), to the extent represented by a BAL-29 rating.

Note for certain vulnerable land uses, evidence of the ability to implement a larger APZ may be required to inform planning decisions. These include dimensions corresponding to radiant heat impact levels of 10 kW/m² and/or 2 kW/m² and calculated using a flame temperature of 1200 K – rather than 29kW/m² at 1090 K.

THE 'DETERMINED BAL RATING APZ'

The dimensions associated with the 'Determined BAL Rating APZ' are derived for the specific site conditions and are to be physically implemented and maintained by the landowner. The rating also establishes the bushfire construction requirements for any new building works which results in the built resilience to bushfire threats corresponding to their distance from the bushfire hazard. Variations of these dimensions will only exist as the result of either:

- A requirement presented within an associated Bushfire Management Plan to increase the size of the APZ as part of an alternative solution, and which is subsequently approved by the decision maker; or

- A directive of the relevant Local Government through their annual Firebreak/Hazard Reduction Notice (see below) that results in a larger dimension.

The applicable 'determined' BAL rating is stated in the BAL Assessment Data section of the BAL Assessment Report or Bushfire Management Plan.

If an 'indicative' or 'conditional' rather than a 'determined' BAL rating is stated, the corresponding separation distances (dimensions) are just informative. Confirmation that the stated BAL rating (or a different rating) will apply, is still subject to either certain physical requirements being met or approval from relevant authorities for native vegetation removal is obtained (refer to explanatory information in Section 3).

Dimensions: The minimum dimensions of the 'BAL Rating APZ' will be those associated with the 'determined' BAL rating for the relevant buildings/structures and stated in the following Table B1.

Note for certain vulnerable land uses and relevant buildings/areas, 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 a flame temperature of 1200K– rather than 29kW/m² at 1090 K.

Location: As for the 'Planning BAL-29 APZ'.

THE 'LOCAL GOVERNMENT APZ'

Certain Local Government's state the dimensions of the APZ that must be established surrounding buildings in their annual Firebreak/Hazard Reduction Notice. For certain vegetation/sites, based on environmental considerations, they may also establish a maximum allowable dimension, typically that corresponding to a BAL-29 rating.

THE 'REQUIRED APZ'

The dimensions associated with the 'Required APZ' are to be established and maintained by the landowner within the subject lot and surrounding the subject buildings/structures. The 'Required APZ' will be appropriately depicted in Reports and Plans on the Property Bushfire Management Statement when it is required to be included.

Dimensions: The 'Required APZ' dimensions are the minimum distances away from the subject building/structure that the APZ must extend towards each relevant area of classified vegetation (note: a distance may also be a maximum distance when relevant as an environmental constraint). These distances are stated in the following Table B1.

The dimensions to implement are determined by:

A. Those associated with the 'Determined BAL APZ' for the subject building(s) when distances are greater than 'B' below (except when 'B' has established a maximum distance); or

B. The 'Local Government' APZ' derived from their 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' as they may apply to different areas of classified vegetation.

Location: As for the 'Planning BAL-29 APZ'.

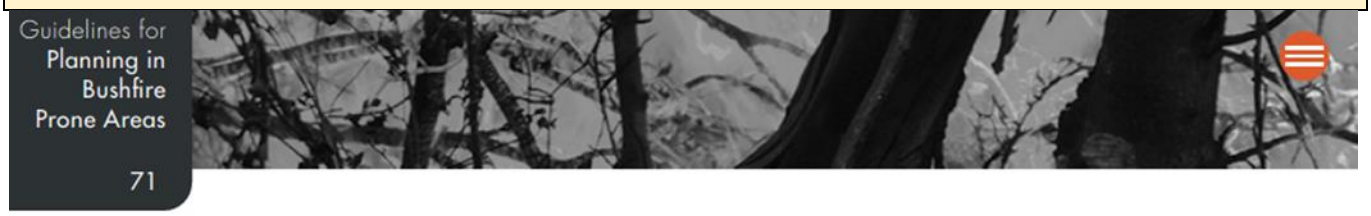
Table B1: The APZ dimensions required to be implemented and maintained by the landowner.

DETERMINATION OF THE 'REQUIRED' APZ DIMENSIONS TO BE IMPLEMENTED AND MAINTAINED BY LANDOWNER WITHIN THEIR LOT										
Relevant Buildings(s)	Vegetation Classification [Refer to Fig 3.1a & 3.1b]		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		
All Proposed Allotments	1	Excluded cl 2.2.3.2(e & f)			N/A	N/A	N/A	N/A	None Stated		All land within the subject lot surrounding the proposed buildings/structures will be the required APZ. The road verge should also be managed to the APZ Standard.
	2	(A) Forest			27	37	50	100	None Stated		
	3	(B) Woodland			14	20	29	100	None Stated		
	4	(A) Forest			21	31	42	100	None Stated		
	5	(G) Grassland			8	12	17	50	None Stated		
	6	(A) Forest			21	31	42	100	None Stated		
	7	(A) Forest			27	37	50	100	None Stated		
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.										
Comments: None Required.										

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.

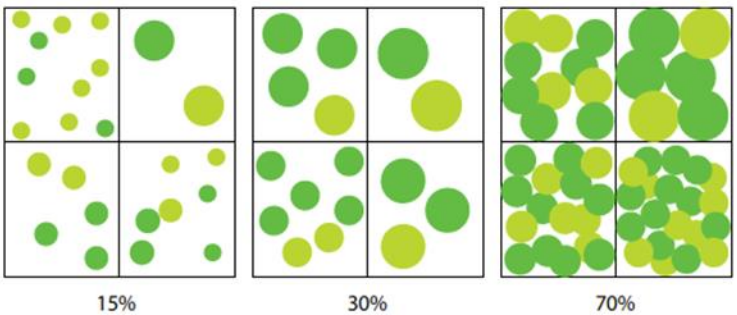


ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• 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)	• 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)	• 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.	• 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)	• 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	• 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	• 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	• 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 Excluded from Classification - Ensure Continued Low Threat Status

EXPLANATORY NOTES

When applying AS 3959:2018 BAL determination methodology, vegetation adjoining or adjacent to the subject site can be excluded from classification based on being 'low threat'. To maintain this status, certain requirements must continue to be met in accordance with the below extract from AS3959:2018. Refer to the 'Classified Vegetation and Topography Map' for the relevant areas associated with the subject site.

Determination of 'low threat' vegetation is based on factors such as:

- Proximity to the subject site
- Small areas of vegetation
- Low flammability
- High moisture content
- Low fuel load

Aside from a naturally occurring low fuel load, vegetation maintained in a minimal fuel condition through active management can be excluded. The associated key requisite is that the active management can be expected to continue in perpetuity, and this can be adequately justified.

Acceptable forms of justification typically involve supportable evidence or the existence of an enforceable mechanism. Examples of enforceable mechanisms include:

- Requirements established by a Section 33 (Bush Fires Act 1954) notice issued by a local government;
- An appropriate and enforceable agreement between relevant parties (which may involve additions to land titles); and
- For public open space, written evidence that the land manager e.g., local government or State Government Department, agrees to maintain the public open space in a low threat state in perpetuity.

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.

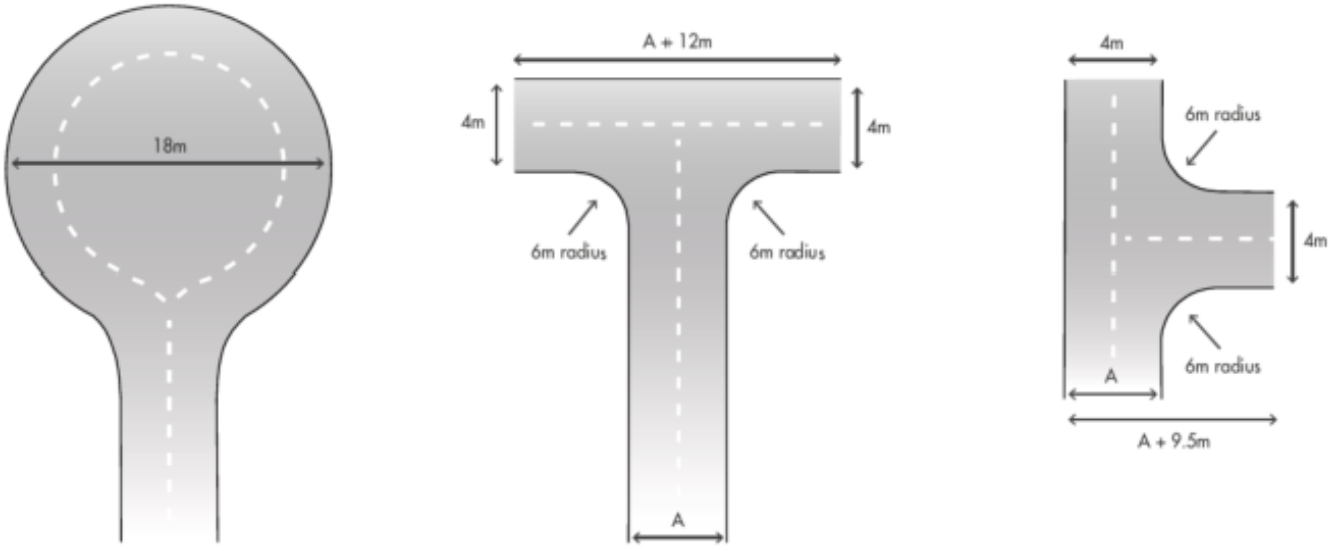
APPENDIX C: TECHNICAL REQUIREMENTS FOR VEHICULAR ACCESS

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.

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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ATTACHMENT 7

Acoustic Assessment

LOT 1402 (319) FIFTY ROAD
BALDIVIS

SPP 5.4 ACOUSTIC ASSESSMENT

APRIL 2020

OUR REFERENCE: 24488-6-15129-02

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
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DOCUMENT CONTROL PAGE

ACOUSTIC ASSESSMENT

LOT 1402 (319) FIFTY ROAD, BALDIVIS

Job No: 15129-02

Document Reference: 24488-6-15129-02

FOR

AIGLE ROYAL DEVELOPMENTS

DOCUMENT INFORMATION			
Author:	Tim Reynolds	**Checked By:**	George Watts
Date of Issue :	25 June 2019		

REVISION HISTORY

Revision	Description	Date	Author	Checked
1	Revised Plan	06/08/19	TR	GW
2	Revised for Client comments	09/08/19	TR	PLD
3	Updated for September 2019 revision of Policy	06/04/20	TR	PLD
4	Revised Plan	29/07/2024	TR	N/A
5	Corrected Lot Number	11/09/2024	TR	N/A

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A Local Structure Plan

B Extent of Fencing

C Figures C1 to C3 – $L_{Aeq\ (16hr)}$ Day Period Noise Contours

D Figure E1 – Lots Requiring “Quiet House” Design and Notifications

E “Quiet House” Design Packages – General Information

EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned by Aigle Royal Developments to carry out a road traffic noise assessment for the proposed residential development of Lot 1402 (319) Fifty Road, Baldivis.

The purpose of this study was to assess noise received at future residences within the subdivision from vehicles travelling on the future Nairn Road and where applicable, comment on possible noise attenuation measures that could control noise intrusion to acceptable levels. Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External	
Day	55 dB(A) L_{Aeq}
Night	50 dB(A) L_{Aeq}

The policy states that the "outdoor targets are to be met at all outdoor living areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

The Policy states the following acceptable internal noise levels:

Internal	
Living and Work Areas	$L_{Aeq(Day)}$ of 40 dB(A)
Bedrooms	$L_{Aeq(Night)}$ of 35 dB(A)

The noise modelling indicates that without any noise amelioration, noise received at the residence located adjacent Nairn Road would exceed the "Noise Targets". For this development a 2.2 metre high barrier located at the boundary to portions of the Nairn Road reserve where the residences back on to the road is recommended. With this barrier, the lots requiring "Quiet House" design and Notifications on Titles would be as shown on Figure D1 in Appendix D. Additionally, information on "Quiet House" design packages, as contained in the Implementation Guidelines are also attached in Appendix E.

Note: The assessment was based on the proposed Structure Plan and as such, the acoustic requirements will need to be confirmed once the Lot layouts have been finalised.

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Aigle Royal Developments to undertake an acoustical assessment of noise received within the proposed residential subdivision of Lot 1402 (319) Fifty Road, Baldivis. As part of the study, the following was carried out:

- Determine by noise modelling of the noise levels that would be received at residences within the development from vehicles travelling on the future Nairn Road.
- Assess the predicted noise levels received at residence for compliance with the requirements of the WAPC State Planning Policy 5.4 *"Road and Rail Noise"* (SPP 5.4).
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

For information, the local structure plan is attached in Appendix A.

2. CRITERIA

2.1 STATE PLANNING POLICY 5.4

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 *"Road and Rail Noise".* The requirements of State Planning Policy 5.4 are outlined below.

POLICY APPLICATION (Section 4)

When and where it applies (Section 4.1)

SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:

a) *noise-sensitive land-use within the policy's trigger distance of a transport corridor as specified in* ***Table 1****;*
b) *New or major upgrades of roads as specified in* ***Table 1*** *and maps* ***(Schedule 1,2 and 3);*** *or*
c) *New railways or major upgrades of railways as specified in maps (****Schedule 1, 2 and 3);*** *or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.*

Policy trigger distances (Section 4.1.2)

Table 1 *identifies the State's transport corridors and the trigger distances to which the policy applies.*

The designation of land within the trigger distances outlined in ***Table 1*** *should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.*

Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/

*mitigation required. An initial screening assessment (**guidelines: Table 2: noise exposure forecast**) will determine if the lot is affected and to what extent."*

TABLE 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES

Transport corridor classification	***Trigger distance***	***Distance measured from***
Roads		
Strategic freight and major traffic routes *Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume*	*300 metres*	*Road carriageway edge*
Other significant freight/traffic routes *These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)*	*200 metres*	*Road carriageway edge*
Passenger railways		
	100 metres	*Centreline of the closest track*
Freight railways		
	200 metres	*Centreline of the closest track*

Proponents are advised to consult with the decision making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.

POLICY MEASURES (Section 6)

The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.

Noise Targets (Section 6.1)

***Table 2** sets out noise targets that are to be achieved by proposals under which the policy applies. Where exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.*

In the application of the noise targets the objective is to achieve:

- *indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*
- *a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.*

It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.

TABLE 2: NOISE TARGETS

Proposals	***New/Upgrade***	***Noise Targets***		
		Outdoor		***Indoor***
		Day (L_{Aeq}(Day) dB) (6 am-10 pm)	***Night (L_{Aeq}(Night)dB) (10 pm-6 am)***	***(L_{Aeq} dB)***
Noise-sensitive land-use and/or development	*New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor*	*55*	*50*	*L_{Aeq} (Day) 40(Living and work areas)* *L_{Aeq} (Night) 35 (bedrooms)*
Roads	*New*	*55*	*50*	*N/A*
	Upgrade	*60*	*55*	*N/A*
Railways	*New*	*55*	*50*	*N/A*
	Upgrade	*60*	*55*	*N/A*

Notes:

- *The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.*
- *For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.*
- *The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.*
- *Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.*

<u>Noise Exposure Forecast (Section 6.2)</u>

*When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/ or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:*

- *no further measures is required;*
- *noise-sensitive land-use and/or development is acceptable subject to deemed-to-comply mitigation measures; or*
- *noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/ or development is subject to mitigation measures outlined in a noise management plan."*

3. MODELLING

Current and future road traffic volumes were based on information used in previous noise assessments. This and other information relevant to the calculations are shown below in Table 3.1.

TABLE 3.1 - NOISE MODELLING INPUT DATA

Parameter	Value
	Future
Traffic flows Nairn Road	20,400
Heavy Vehicles (%)	8.0

Other input data for the model included:

- Topographical data, with the ground level within the subdivision from information supplied by client;
- For future traffic, as listed in Table 5.1.
- A +2.5 dB adjustment to allow for façade reflection.

To determine the noise that would be received within the development from the surrounding road network, acoustic modelling was carried out using the computer program 'SoundPlan'.

To determine the noise received at the residence located adjacent to the future Nairn Road, noise modelling was undertaken for the flowing scenarios :

1. Without any noise amelioration.
2. With a 2.2m high barrier at boundary of the road reserve to Nairn Road, where residence back on to Nairn Road and future residences. The extent of fencing is shown in Appendix B on Figure B1.

It is understood that in some locations, although the residential lots will abut Nairn Road, they would be oriented such that they would face Nairn Road, with garages on to a rear laneway. In these locations, to comply with the requirements of SPP 5.4 with regards to the outdoor living area, the outdoor living area would need to be located either on the far side of the residence from Nairn Road (ie between the residence and the garage) or within a courtyard along the side of the residence, protected from Nairn Road either by a barrier or part of the residence. Thus, in these locations, no fencing is proposed.

We note from the Implementation Guidelines, that to determine the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$, reference is made to the DEFRA publication. Thus, using the provided formula in the DEFRA publication, for Nairn Road the difference between the $L_{A10(18hr)}$ and the $L_{Aeq(8hr)}$ and the $L_{Aeq(16hr)}$ has been determined to be around 10 and 2 dB(A) respectively. Thus, for residence located adjacent to Nairn Road, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be greater than 5 dB(A) and the day period is the critical period for compliance. Thus only the noise contours for the day period are considered in this assessment. The noise contours for the above scenarios are contained in Appendix C.

Additional to the above, to determine the extent of residences requiring "Quiet House" design and/or Notifications, noise modelling was also undertaken with the inclusion of generic residential premises. For this scenario, the day noise contours for Nairn Road attached in Appendix C as Figure C3.

4. DISCUSSION / RECOMMENDATION

Under the WAPC State Planning Policy 5.4, for this development, the "Noise Target" as listed in Table 1 are the appropriate noise levels for to be achieved for this development. Under SPP 5.4, the "Noise Target" criteria which are applicable external to a residence are:

External

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

The policy states that the outdoor criteria apply to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the “Noise Target” levels in least one outdoor living area. The Policy states the following acceptable internal noise levels:

Internal

Living and Work Areas	$L_{Aeq(Day)}$ of 40 dB(A)
Bedrooms	$L_{Aeq(Night)}$ of 35 dB(A)

For Nairn Road the difference between the $L_{Aeq(Day)}$ and $L_{Aeq(Night)}$ has been determined to be greater than 5 dB(A). Thus for this development, compliance with the requirements of SP 5.4, noise modelling and assessment are based on the day period for residence located adjacent to Nairn Road.

The results of the acoustic assessment indicate that noise received at residences located adjacent to Nairn Road would exceed the “Noise Targets” as outlined in the Western Australian Planning Commission (WAPC) Planning Policy 5.4 “Road and Rail Noise”. To comply with the requirements of SPP 5.4, to protect the outdoor living area, it is recommended that a 2.2 metre high barrier located at the boundary of the road reserve to Nairn Road be constructed in locations as shown on Figure B1 in Appendix B, where residence back on to Nairn Road.

With the construction of the barrier to Nairn Road, noise received at these residences would, on the ground floor, comply with the “Noise Target”. However, noise received at any first floors would exceed the “Noise Target” and to comply with SPP5.4, “Quiet House” design would be required.

We note that the requirement for “Notification on Titles” and “Quiet House” Design are based on the noise that would be received at the ground and first floor of a residence.

Based on the results of the noise modelling, the residential lots requiring “Quiet House” Design and Notifications would be as shown on Figure D1 attached in Appendix D. Attached, for information in Appendix E, is general information on the Packages construction requirements. It is noted that alternative constructions are acceptable, provided they are supported by a report from a suitably qualified acoustic consultant.

It is understood that in some locations, although the residential lots will abut Nairn Road, they would be oriented such that they would face Nairn Road, with garages on to a rear laneway. In these locations, to comply with the requirements of SPP 5.4 with regards to an outdoor living area, an outdoor living area would need to be located either on the far side of the residence from Nairn Road (ie between the residence and the garage) or within a courtyard along the side of the residence, protected from Nairn Road either by a barrier or part of the residence. Thus, in these locations, no fencing is proposed. These locations are also noted on Figure D1 in Appendix D.

Finally, it is noted that this assessment has been based on the proposed Structure Plan and existing ground contours. Therefore, confirmation of the actual Lots requiring "Quiet House" design and / or notification will be required once the ground levels (Lot RL's) and Lot Layouts have been finalised.

Notes :

1 Barriers fencing to be a minimum surface density of 15 kg/m^2.

2 It is noted that the "Quiet House" design requirements shown on Figure D1 in Appendix D, are for single storey residences only. For multiple storey residences, specialist acoustical advice would be required to determine the construction requirements to achieve compliance with State Planning Policy 5.4.

3 The stated Quiet House design packages attached in Appendix E are deemed to satisfy requirements. Alternative constructions are acceptable, provided they are supported by an acoustic assessment report, prepared by a suitably qualified acoustic consultant.

APPENDIX A

LOCAL STRUCTURE PLAN



STRUCTURE PLAN CONCEPT - INTEGRATED

LOT 1402 FIFTY ROAD

BALDIVIS

N

0 50m

SCALE @ A3: 1:2000

8785-CON-11-B

DRAWN: JS
DATE CREATED: 2024.06.13
PROJECTION: MGA50 GDA94
CADASTRE: LANDGATE

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ROWE GROUP DESIGN

APPENDIX B

EXTENT OF FENCING



STRUCTURE PLAN CONCEPT - INTEGRATED
LOT 1402 FIFTY ROAD
BALDIVIS

N
0 50m
SCALE @ A3: 1:2000
8785-CON-11-B

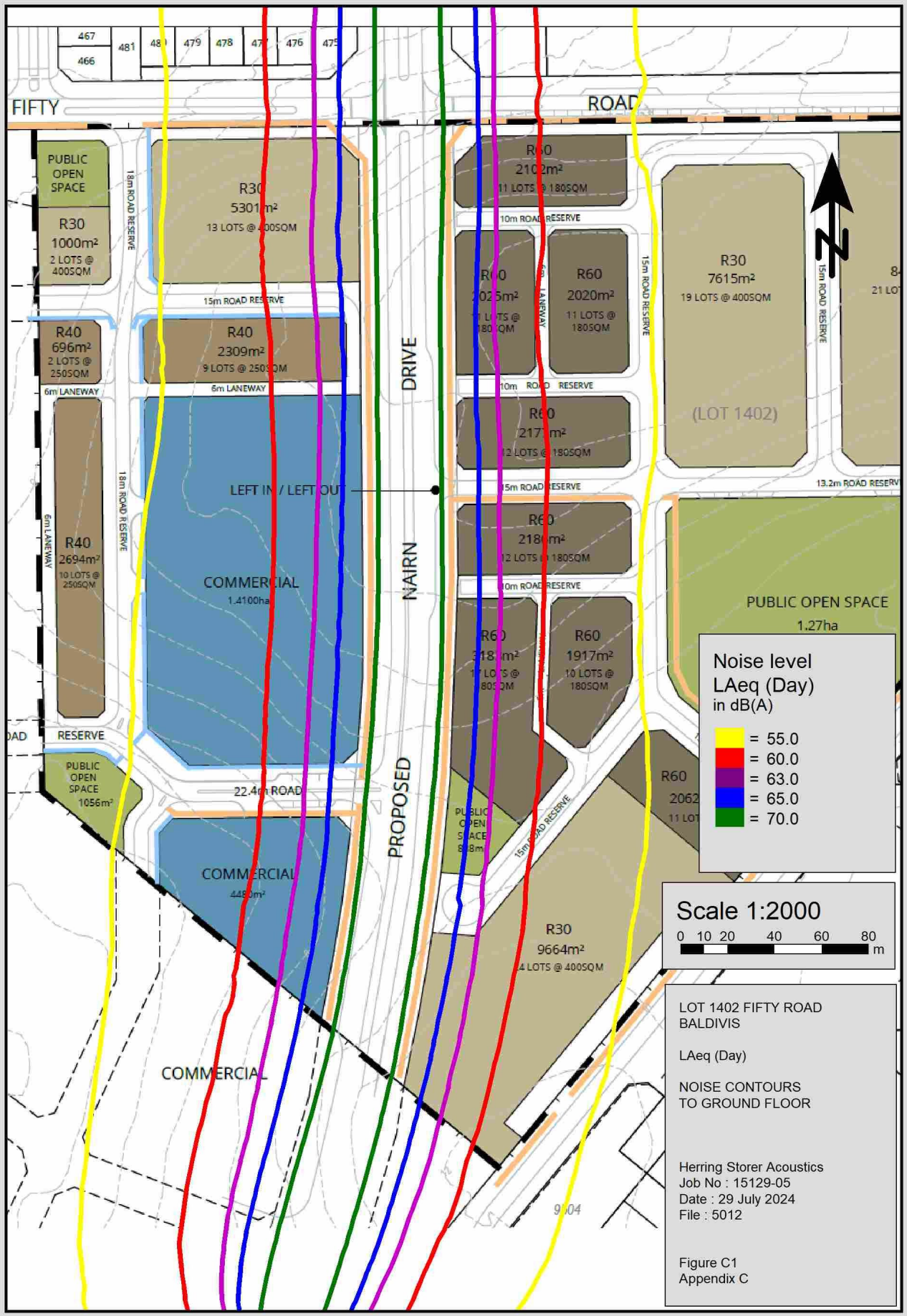
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CADASTRE: LANDGATE

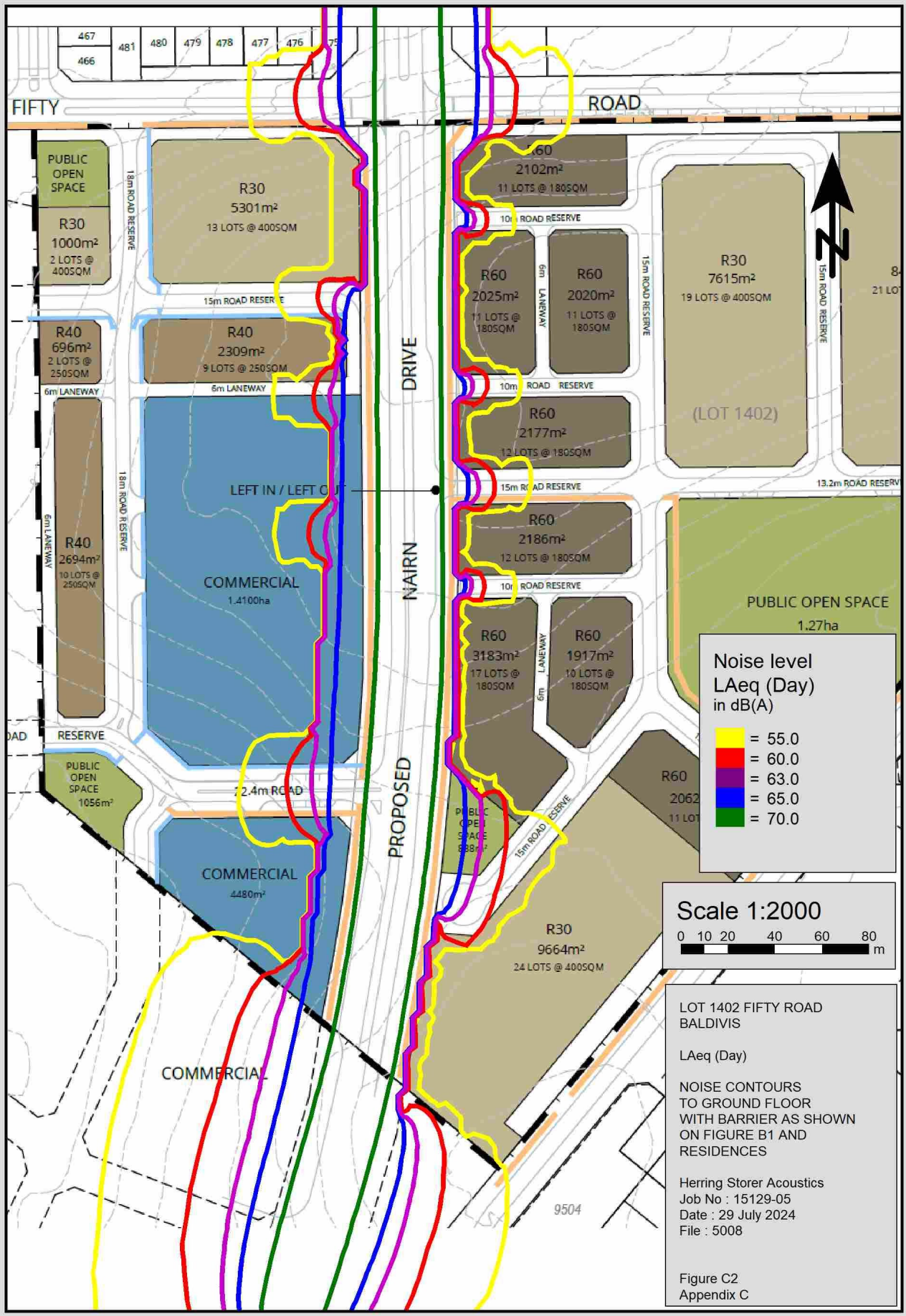
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ROWE GROUP DESIGN

APPENDIX C

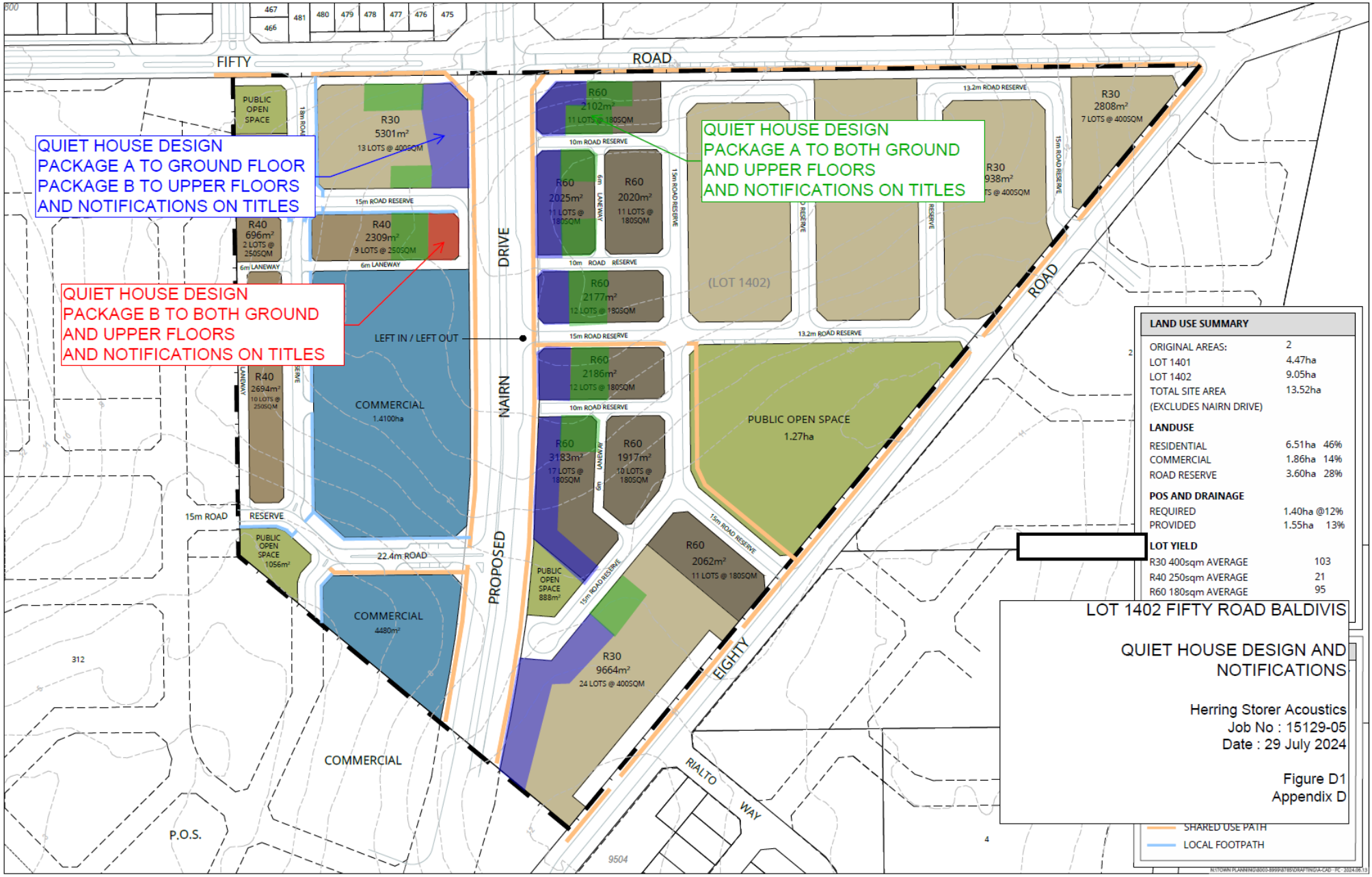
FIGURES C1 TO C2
$L_{Aeq(16hr)}$ DAY PERIOD NOISE CONTOURS


FIFTY
ROAD
PUBLIC OPEN SPACE
R30
1000m²
2 LOTS @ 400SQM
R30
5301m²
13 LOTS @ 400SQM
R40
696m²
2 LOTS @ 250SQM
R40
2309m²
9 LOTS @ 250SQM
6m LANEWAY
18m ROAD RESERVE
15m ROAD RESERVE
DRIVE
NAIRN
PROPOSED
LEFT IN / LEFT OUT
COMMERCIAL
1.4100ha
R40
2694m²
10 LOTS @ 250SQM
RESERVE
PUBLIC OPEN SPACE 1056m²
22.4m ROAD
COMMERCIAL
R60
2102m²
11 LOTS @ 180SQM
10m ROAD RESERVE
R60
2020m²
11 LOTS @ 180SQM
R30
7615m²
19 LOTS @ 400SQM
(LOT 1402)
13.2m ROAD RESERVE
R60
2180m²
12 LOTS @ 180SQM
R60
1917m²
10 LOTS @ 180SQM
PUBLIC OPEN SPACE
1.27ha
R30
9664m²
24 LOTS @ 400SQM
Noise level
LAeq (Day)
in dB(A)
= 55.0
= 60.0
= 63.0
= 65.0
= 70.0
Scale 1:2000
0 10 20 40 60 80 m
LOT 1402 FIFTY ROAD
BALDIVIS
LAeq (Day)
NOISE CONTOURS
TO GROUND FLOOR
Herring Storer Acoustics
Job No : 15129-05
Date : 29 July 2024
File : 5012
Figure C1
Appendix C


FIFTY ROAD
PROPOSED NAIRN DRIVE
467
466
481
480
479
478
477
476
PUBLIC OPEN SPACE
R30
1000m²
2 LOTS @ 400SQM
R30
5301m²
13 LOTS @ 400SQM
18m ROAD RESERVE
15m ROAD RESERVE
R40
696m²
2 LOTS @ 250SQM
R40
2309m²
9 LOTS @ 250SQM
6m LANEWAY
R40
2694m²
10 LOTS @ 250SQM
LEFT IN / LEFT OUT
COMMERCIAL
1.4100ha
RESERVE
PUBLIC OPEN SPACE
1056m²
12.4m ROAD
COMMERCIAL
4480m²
COMMERCIAL
R60
2102m²
11 LOTS @ 180SQM
10m ROAD RESERVE
R60
2025m²
11 LOTS @ 180SQM
R60
2020m²
11 LOTS @ 180SQM
R30
7615m²
19 LOTS @ 400SQM
(LOT 1402)
R60
2177m²
12 LOTS @ 180SQM
13.2m ROAD RESERV
R60
2186m²
12 LOTS @ 180SQM
PUBLIC OPEN SPACE
1.27ha
R60
3183m²
17 LOTS @ 180SQM
R60
1917m²
10 LOTS @ 180SQM
R30
9664m²
24 LOTS @ 400SQM
9504
Noise level
LAeq (Day)
in dB(A)
= 55.0
= 60.0
= 63.0
= 65.0
= 70.0
Scale 1:2000
0 10 20 40 60 80
m
LOT 1402 FIFTY ROAD
BALDIVIS
LAeq (Day)
NOISE CONTOURS
TO GROUND FLOOR
WITH BARRIER AS SHOWN
ON FIGURE B1 AND
RESIDENCES
Herring Storer Acoustics
Job No : 15129-05
Date : 29 July 2024
File : 5008
Figure C2
Appendix C

APPENDIX D

FIGURE D1 LOTS REQUIRING “QUIET HOUSE” DESIGN
AND NOTIFICATIONS



STRUCTURE PLAN CONCEPT - INTEGRATED

LOT 1402 FIFTY ROAD
BALDIVIS

N

0 50m
SCALE @ A3: 1:2000

8785-CON-11-B

DRAWN: JS
DATE CREATED: 2024.06.13
PROJECTION: MGA50 GDA94
CADASTRE: LANDGATE

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ROWE GROUP DESIGN

APPENDIX E

"QUIET HOUSE" DESIGN PACKAGES – GENERAL INFORMATION

Road Traffic and Passenger Rail
Quiet House Requirements
(*Based on Table 3 of State Planning Policy 5.4 2019*)

Exposure Category	Orientation to corridor	Acoustic rating and example constructions					Mechanical ventilation/air conditioning considerations
		Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor Living areas	
A **Quiet House A**	**Facing**	**Bedroom and Indoor Living and work areas to Rw + Ctr 45dB** **Stud Frame Walls** ➢ One row of 92mm studs at 60mm centres with: ➢ Resilient steel channels fixed to the outside of the studs; and ➢ 9.5mm hardboard or 9mm fibre cement weatherboards or one layer of 19mm board cladding fixed to the outside of the channels; and ➢ 75mm glass wool (11kg/m3) or 75mm polyester (14kg/m3) insulation, positioned between the studs; and ➢ -Two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs. **Brick Walls** ➢ Single leaf of 150mm brick masonry with 13mm cement render on each face: **OR** ➢ Double brick: two leaves of 90 mm clay brick masonry with a 20mm cavity between leaves.	**Bedrooms**: ➢ Fully glazed hinged door with certified R_w+C_{tr} **28dB** rated door and frame including seals and 6mm glass **Indoor Living and work areas:** ➢ 35mm solid core timber hinged door and frame system certified to **Rw 28dB** including seals: **OR** ➢ Glazed sliding door with 10 mm glass and weather seals	**Bedrooms**: ➢ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulted glazing (R_w+C_{tr} **28 dB**). Sealed awning or casement windows may use 6 mm glazing instead: **OR** ➢ Up to 60% floor area: as per above but must be sealed awning or casement type windows (R_w+C_{tr} **31dB**). **Indoor Living and work areas** ➢ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulted glazing (R_w+C_{tr} **25dB**): **OR** ➢ Up to 60% floor area: As per Bedrooms at up to 40% area (**Rw+Ctr28 dB : OR** ➢ Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} **31 dB**).	**To R_w+C_{tr} 35dB** ➢ Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling	➢ At least one outdoor living area located on the opposite side of the building from the transport corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2 metres height above ground level	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of **Rw 40dB** into sensitive spaces ➢ Evaporative systems require attenuated ceiling air vents to allow closed windows ➢ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements ➢ Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable
	Side On		As per "Facing" above, except R_w+C_{tr} values may be 3dB less, e.g. glazed sliding door with 10 mm glass and weather seals for bedrooms	As above, except R_w+C_{tr} values may be 3dB less, or max % area increased by 20%			
	Opposite		No specific requirements	No specific requirements			

Road Traffic and Passenger Rail
Quiet House Requirements
(*Based on Table 3 of State Planning Policy 5.4 2019*)

Exposure Category	Orientation to corridor	Acoustic rating and example constructions					Mechanical ventilation/air conditioning considerations
		Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor Living areas	
B **Quiet House B**	**Facing**	**Bedroom and indoor living and work areas to R_w+C_{tr} 50dB** **Single leaf of 90 mm clay brick masonry with:** ➢ A row of 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres; ➢ A cavity of 25 mm between leaves; ➢ 50 mm glass wool or polyester cavity insulation (R2.0+) insulation between studs; and ➢ One layer of 10mm plasterboard fixed to the inside face ➢ Single leaf of 220mm brick masonry with 13mm cement render on each face ➢ 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face **Double brick: two leaves of 90mm clay brick masonry with:** ➢ A 50mm cavity between leaves ➢ 50mm glass wool or polyester cavity insulation (R2.0+) ➢ Resilient ties where required to connect leaves **Double brick: two leaves of 110mm clay brick masonry with** ➢ 50mm cavity between leaves and R2.0+ cavity insulation	**Bedrooms** ➢ Fully glazed hinged door with certified R_w+C_{tr} **31dB** rated door and frame including seals and 10mm glass **Indoor Living and work areas** ➢ 35mm solid core timber hinged door and frame system certified to **Rw 28dB** including seals: **OR** ➢ Glazed sliding door with 10 mm glass and weather seals	**Bedrooms:** ➢ Total external door and window system area up to 40% of room floor areas: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulted glazing (**Rw+Ctr 31dB**). ➢ Up to 60% floor area: as per above but must be minimum10mm single or 6mm-12mm-10mm double insulated glazing (**Rw+Ctr 34dB**) **Indoor Living and work areas** ➢ Up to 40% floor area; Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulted glazing (R_w+C_{tr} 28dB). Sealed awning or casement windows may use 6mm glazing instead. : **OR** ➢ Up to 60% floor area: As per Bedrooms at up to 40% area (R_w+C_{tr} **31dB**). : **OR** ➢ Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} **34dB).**	**To R_w+C_{tr} 35dB** ➢ Concrete or terracotta tile sarking and at least 10mm plasterboard ceiling, R3.0+ insulation **OR** ➢ Metal sheet roof, sarking and at least 10mm plasterboard ceiling, R3.0+ insulation	➢ At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum **2.4 metres** height above ground level	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of **Rw 40dB** into sensitive spaces ➢ Evaporative systems require attenuated ceiling air vents to allow closed windows ➢ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements ➢ Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable
	Side-On		**Bedrooms:** ➢ Fully glazed hinged door with certified R_w+C_{tr} **28dB** rated door and frame including seals and 6mm glass **Indoor Living and work areas:** ➢ 35mm solid core timber hinged door and frame system certified to **Rw 28dB** including seals: **OR** ➢ Glazed sliding door with 10 mm glass and weather seals	**Bedrooms:** ➢ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulted glazing (R_w+C_{tr} **28 dB**). Sealed awning or casement windows may use 6 mm glazing instead. : **OR** ➢ Up to 60% floor area: as per above but must be sealed awning or casement type windows (R_w+C_{tr} **31dB**). **Indoor Living and work areas** ➢ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulted glazing (R_w+C_{tr} **25dB**). : **OR** ➢ Up to 60% floor area: As per Bedrooms at up to 40% area (**Rw+Ctr28 dB**) : **OR** ➢ Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} **31 dB**).			
	Opposite		As above, except R_w+C_{tr} values may be 3dB less, or max % area increased by 20%	As above, except R_w+C_{tr} values may be 3dB less, or max % area increased by 20%			

Road Traffic and Passenger Rail
Quiet House Requirements
(*Based on Table 3 of State Planning Policy 5.4 2019*)

Exposure Category	Orientation to corridor	Acoustic rating and example constructions					
		Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor Living areas	Mechanical ventilation/air conditioning considerations
C **Quiet House C**	Facing	**Bedroom and indoor living and work areas to R_w+C_{tr} 50dB** **Single leaf of 90 mm clay brick masonry with:** ➢ A row of 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres; ➢ A cavity of 25 mm between leaves; ➢ 50 mm glass wool or polyester cavity insulation (R2.0+) insulation between studs; and ➢ One layer of 10mm plasterboard fixed to the inside face ➢ Single leaf of 220mm brick masonry with 13mm cement render on each face ➢ 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face **Double brick: two leaves of 90mm clay brick masonry with:** ➢ A 50mm cavity between leaves ➢ 50mm glass wool or polyester cavity insulation (R2.0+) ➢ Resilient ties where required to connect leaves **Double brick: two leaves of 110mm clay brick masonry with** ➢ 50mm cavity between leaves and R2.0+ cavity insulation	**Bedrooms** ➢ External doors to bedrooms facing the corridor are not recommended. **Indoor Living and work areas** ➢ Fully glazed hinged door with certified **Rw+Ctr 31dB** rated door and frame including seals and 10mm glass: **OR** 40mm solid core timber frame and door (without glass or with glass inserts not less than 6mm), side hinged with certified **Rw 32dB** acoustically rated door and frame system including seals	**Bedrooms:** ➢ Total external door and window system area up to 20% of room floor area: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulted glazing (R_w+C_{tr} **31dB**): **OR** ➢ Up to 40% floor area; as per above but must be minimum 10mm single or 6mm-12mm-10mm double insulted glazing (R_w+C_{tr} **34dB**). **Indoor Living and work areas** ➢ Up to 40% floor area: Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (R_w+C_{tr} **31dB**). Sealed awning or casement windows may use 6mm glazing instead: **OR** ➢ Up to 60% floor area: As per Bedrooms at up to 40% area (**Rw+Ctr 34dB**)	**To R_w+C_{tr} 40dB** ➢ To al bedrooms, 2 layers of 10mm plasterboard, or one layer 13mm high density sealed plasterboard (minimum surface density of 12.5 kg/m2), affixed using steel furring channels beneath ceiling rafters/supports: **and** ➢ R3.0+ insulation batts laid in cavity : **and** ➢ Concrete or terracotta tile roof with sarking, or metal sheet roof with foil backed R2.0+ fibre insulation between steel sheeting and roof battens	➢ At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum **2.4 metres** height above ground level	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces. ➢ Evaporative systems require attenuated ceiling air cents to allow closed windows. ➢ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements ➢ Openings such as eaves, vents and air inlets must be acoustically treated, close or relocated to building sides facing away from the corridor where practicable.
	Side-on		**Bedrooms** ➢ Fully glazed hinged door with certified R_w+C_{tr} **31dB** rated door and frame including seals and 10mm glass **Indoor Living and work areas** ➢ 35mm solid core timber hinged door and frame system certified to **Rw 28dB** including seals: **OR** ➢ Glazed sliding door with 10 mm glass and weather seals				
	Opposite		**Bedrooms:** ➢ Fully glazed hinged door with certified R_w+C_{tr} **28dB** rated door and frame including seals and 6mm glass **Indoor Living and work areas:** ➢ 35mm solid core timber hinged door and frame system certified to **Rw 28dB** including seals: **OR** ➢ Glazed sliding door with 10 mm glass and weather seals	**Bedrooms:** ➢ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulted glazing (R_w+C_{tr} **28 dB**). Sealed awning or casement windows may use 6 mm glazing instead: **OR** ➢ Up to 60% floor area: as per above but must be sealed awning or casement type windows (R_w+C_{tr} **31dB**). **Indoor Living and work areas** ➢ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulted glazing (R_w+C_{tr} **25dB**): **OR** ➢ Up to 60% floor area: As per Bedrooms at up to 40% area (**Rw+Ctr28 dB : OR** ➢ Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} **31 dB**).			

ATTACHMENT 8

Landscape Concept Plan



LEGEND

- EXTENT OF WORKS
- INDICATIVE BASIN TOP WATER LEVELS
- COMMERCIAL LOTS
- RESIDENTIAL LOTS
- TURF
- PLANTED DRAINAGE BASIN
- PROPOSED STREET TREES
- PROPOSED POS TREES
- PROPOSED PLANTINGS
- SHARED USE PATH
- FOOTPATH
- PLAY AREA
- SHELTER
- PICNIC SEATING
- JOGGING
- CYCLING

LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

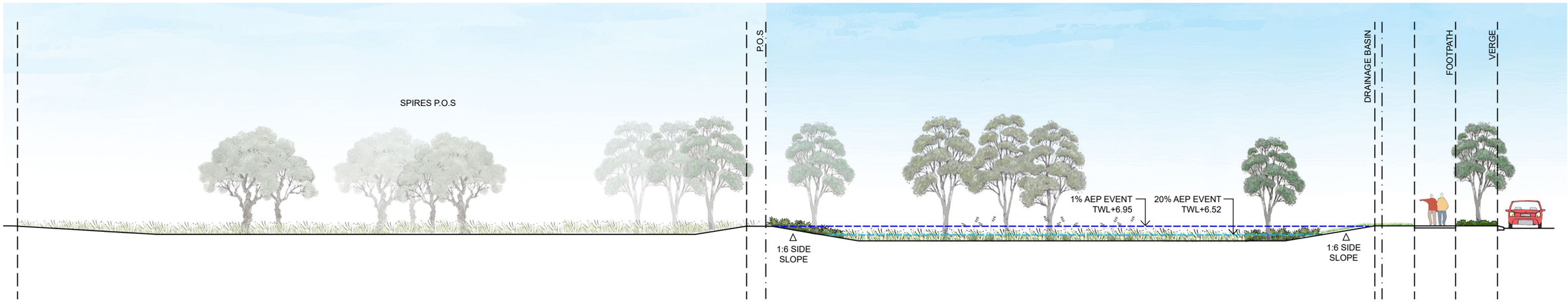
CONCEPT MASTERPLAN

DWG EMG-37-SK01
REV F
DATE 01.10.24
SCALE 1 : 2000 @ A3
0 5 10 15 20 25 m

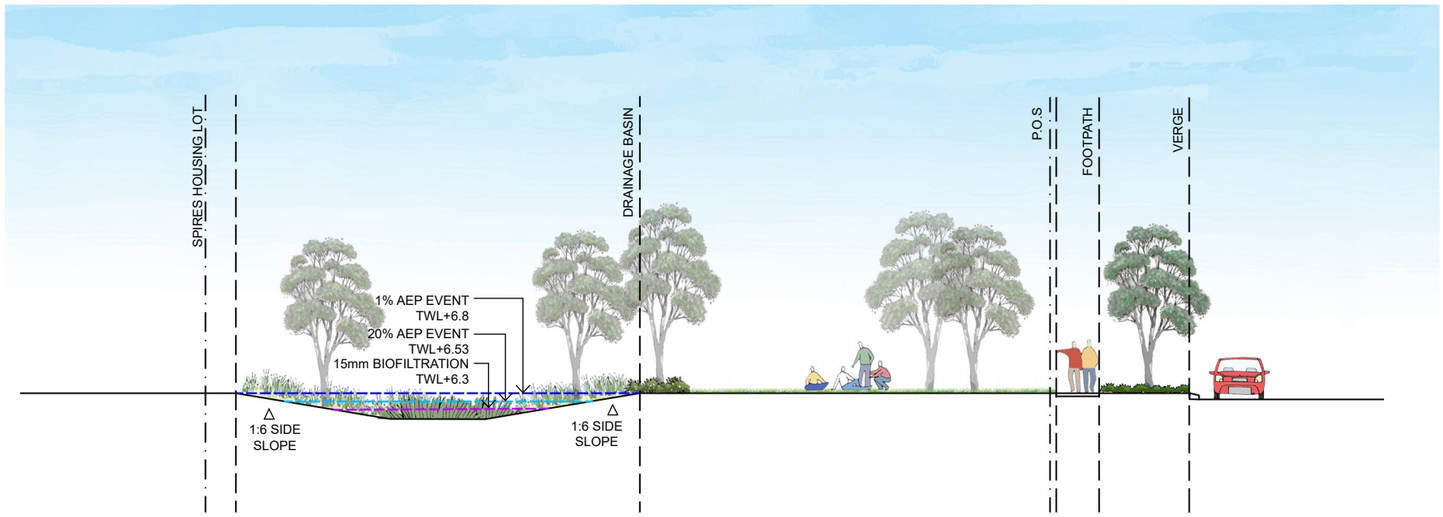
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SECTION A
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SECTION B
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LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

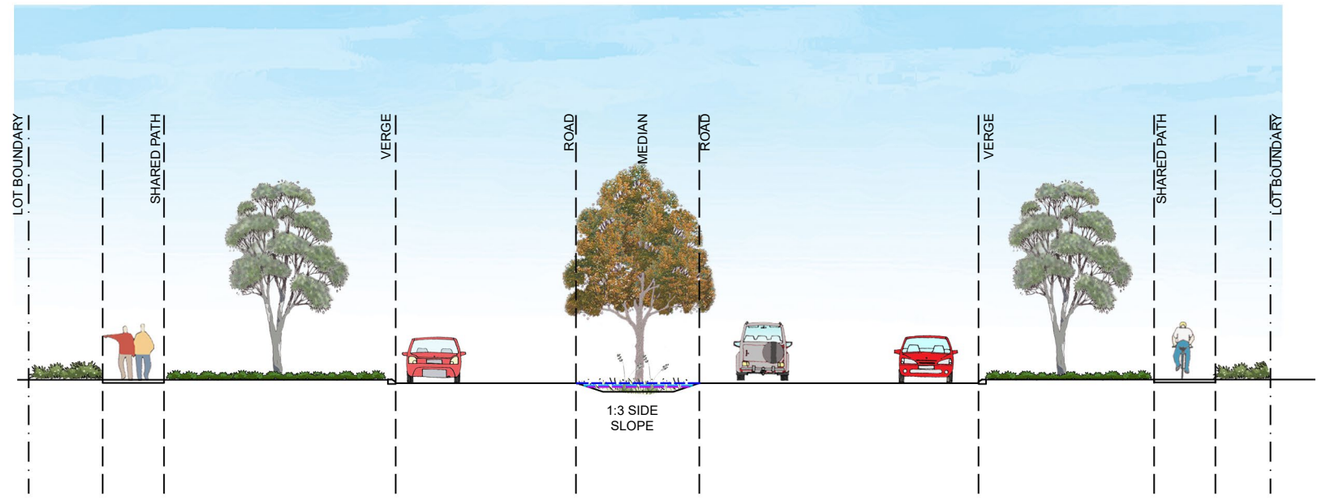
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REV **F**
DATE **01.10.24**

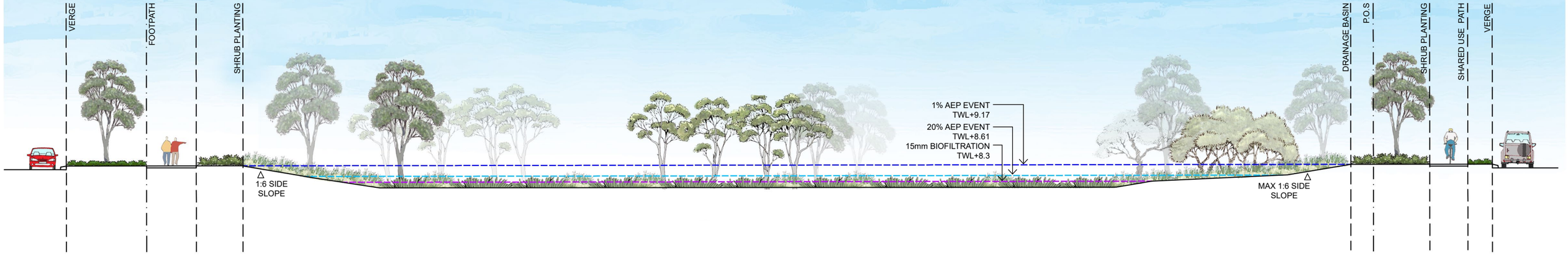
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SECTION C
1:200 @ A3



SECTION D
1:250 @ A3

LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

SECTIONS

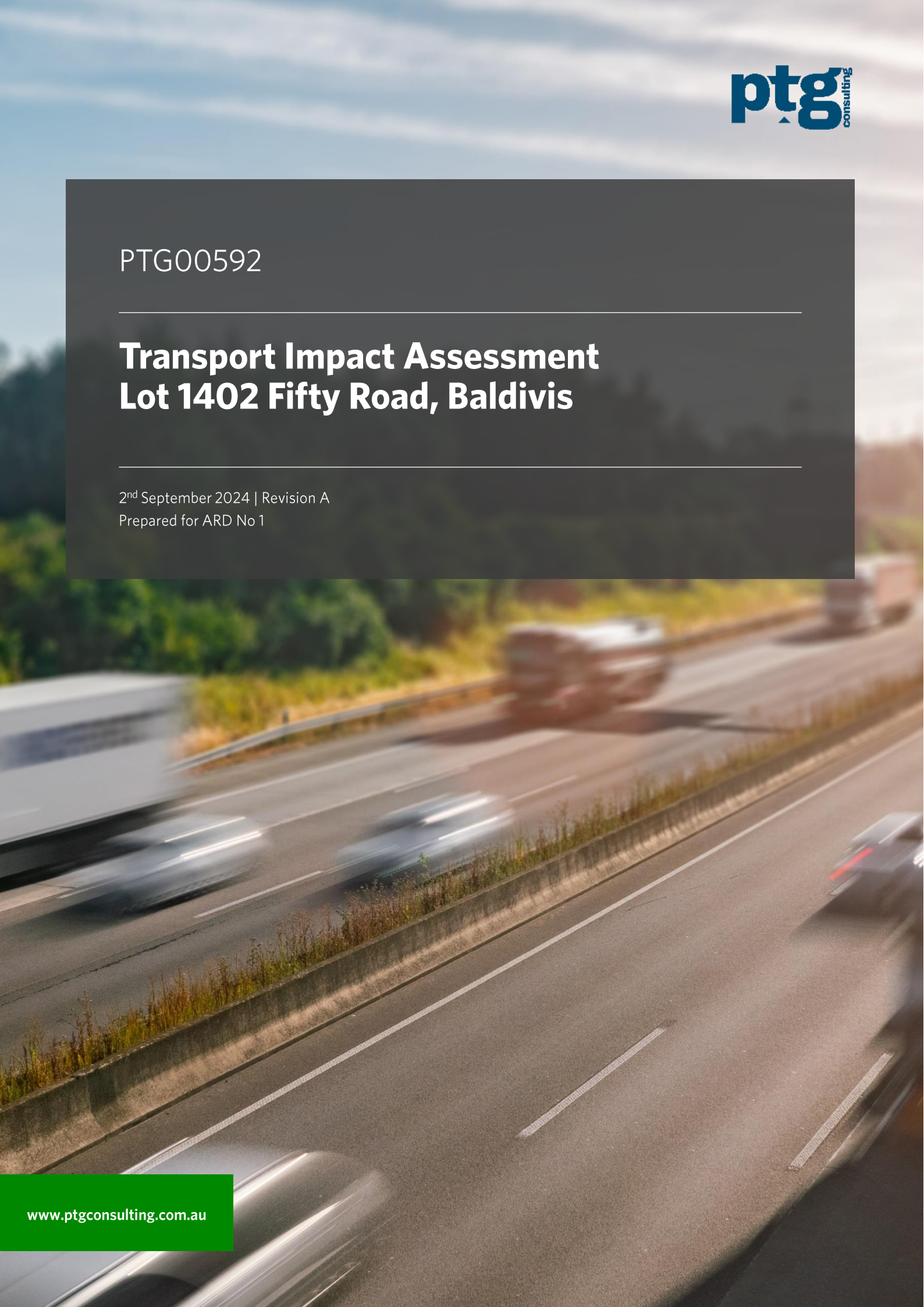
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REV **E**
DATE **01.10.24**

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ATTACHMENT 9

Transport Impact Assessment



PTG00592

Transport Impact Assessment
Lot 1402 Fifty Road, Baldivis

2nd September 2024 | Revision A
Prepared for ARD No 1

www.ptgconsulting.com.au

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REPORT DETAILS

Unique Document Identification

	Information
Document Title	TIA
Project Number	PTG00592
Document ID	Rev A
Client	ARD No 1

Revision Details

Revision No.	Date	Comments	Author	Approved by
Rev A	2/09/2024	For issue	BS	SJL

1 INTRODUCTION

1.1 Background

PTG Consulting WA (PTG) has been commissioned by ARD No.1 ('the Client') to prepare a Traffic Impact Assessment (TIA) for the proposed Structure Plan amendment ("LSP") of Lot 1402 Fifty Road, located at the southwest corner of Fifty Road and Eighty Road intersection ('the Site').

The LSP was previously approved by the Western Australia Planning Commission (WAPC) on the 10th July 2024 which includes land use and layout changes to Lot 1401 Baldivis Road, east of Nairn Drive. Stantec were the consultants previously engaged by the client to prepare the TIA for the assessment of the previous LSP update.

1.2 Purpose of the report

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 re-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 amended structure plan 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 STRUCTURE PLAN

2.1 Site Location

The proposed Structure is located at Lot 1402 Fifty Road, Baldivis. The LSP is located on both sides of Nairn Drive, bounded by Fifty Road to the north, Eighty Road (future Everest Way) to the east. The location of the structure plan is shown in **Figure 1**.

Figure 1 Site Location



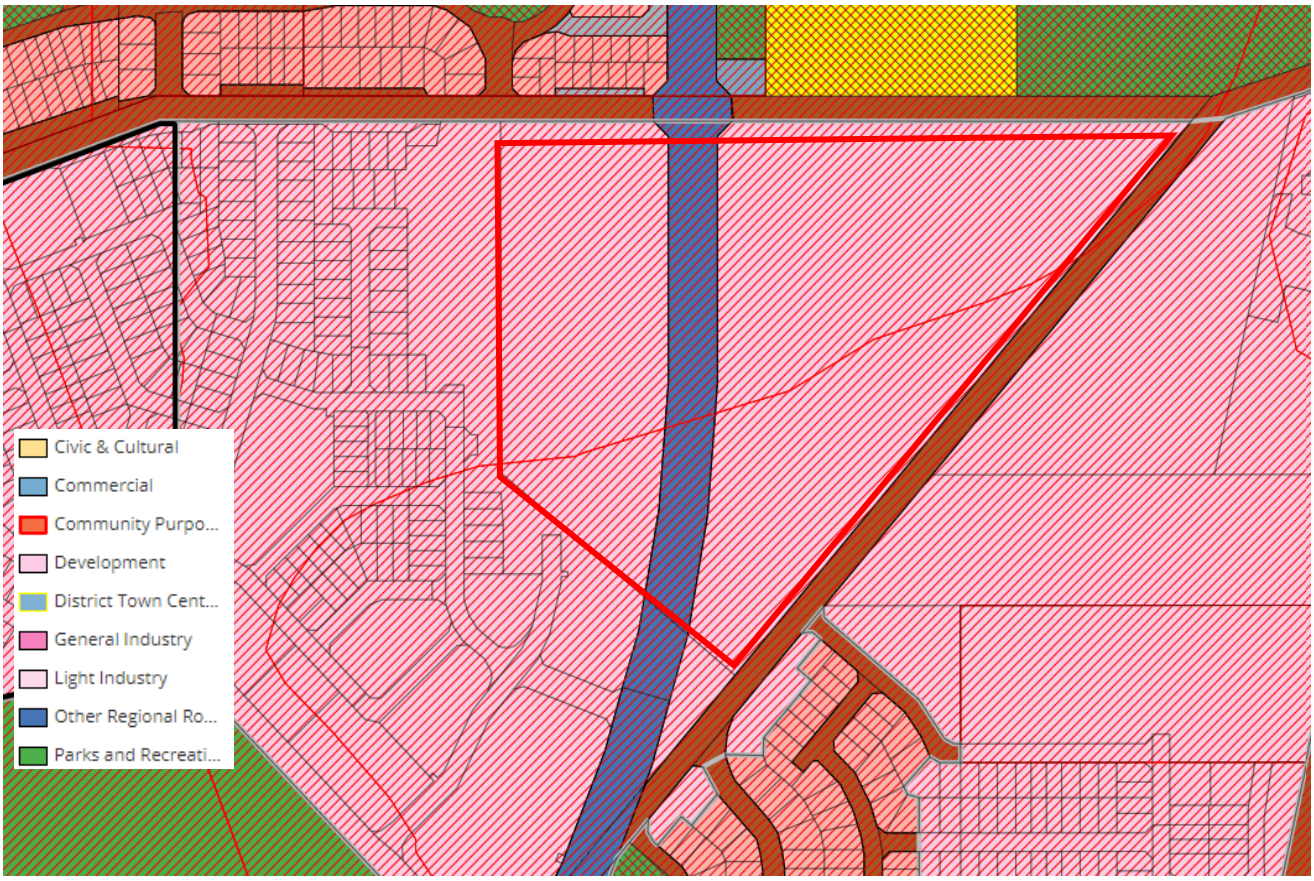
Figure 2 Proposed Structure Plan Amendment



While there are minor changes proposed within the LSP west of Nairn Drive, the majority of the changes are located within the predominately residential eastern portion of the LSP area.

The land zoning map obtained from the *City of Rockingham Intramaps* GIS system shows that the LSP is currently zoned as "Development". (See **Figure 3)**.

Figure 3 Land Zoning Map



2.2 Proposed Land Uses

The proposed land uses of the Structure Plan amendment are summarised below:

Land Use	Yield
West of Nairn Drive (No changes)	
R30 residential	15 dwellings (0.63ha)
R40 residential	21 dwellings (0.57ha)
Commercial	1.86ha
East of Nairn Drive	
R30 residential	88 dwellings (3.55ha)
R60 residential	95 dwellings (1.77ha)

2.3 Surrounding Attractors/Generators

The proposed structure plan is primarily residential development (6.51ha) which is a generator to surrounding development such as the Spires Estate Local Structure Plan. The commercial development within the LSP however is likely to attract traffic from surrounding residential developments.

2.4 Specific Issues

The location of Baldivis Primary School to the northeastern corner of the LSP and adjacent to the Nairn Drive alignment creates concerns with the method of intersection control at the intersection of Fifty Road. While a roundabout would be a logical intersection treatment, consistent with many intersections along the southern sections of Nairn Drive, the expected high volumes of primary school aged pedestrians using the intersection would suggest that a traffic signal-controlled intersection that can facilitate controlled pedestrian crossing would be a more suitable method of intersection control in this instance.

3 EXISTING SITUATION

3.1 Existing and Approved Land Uses

The Site is currently vacant with no existing development. The land use breakdown of the latest approved LSP is summarised below:

Land Use	Yield
R20 residential	0.16ha
R25 residential	4.2ha
R30 residential	1.38ha
R40 residential	1.1 ha
Commercial	1.86ha

3.2 Existing Road Network

The layout and classifications of the road network in the vicinity of the Site, defined in the Main Roads Functional Hierarchy is shown in **Figure 4.**

The highest order roads in the vicinity of the LSP are Baldivis Road (Regional Distributor) to the east of the LSP, Fifty Road (Local Distributor) and Eighty Road (Local Distributor). The rest of the roads are classified as Access Road. It is noted that once the Nairn Drive connection is completed, the existing section of Eighty Road to the east of the LSP will be disconnected from its southern section and will instead be diverted to connect to Everest Way to the south of the site.

Figure 4 Road Hierarchy



Source: Main Roads Road Information Mapping System (2024)

The characteristics of the existing road network in the vicinity of the Site are summarised in Table 1.

Table 1 Surrounding Road Characteristics

Road Name	Road Hierarchy	Jurisdiction	No. Traffic Lanes	No. of Footpaths	Posted Speed Limit (km/h)
Fifty Road	Local Distributor	LGA	2 lanes (two-way)	1	60km/h
Eighty Road	Local Distributor	LGA	2 lanes (two-way)	0	70km/h
Pantheon Road	Access Road	LGA	2 lanes (two-way)	1	Default

Source: Main Roads Road Information Mapping System (2024)

3.3 Existing Pedestrian / Cycle Networks

There are currently no formal footpaths or cycling facilities in the vicinity of the Site. Existing Public Transport Services are provided within Fifty Road and Everest Way. There are no formal cycle lanes currently provided on the surrounding road network. However, it is noted that sealed shoulders are available on both sides of Nairn Drive, south of Pantheon Road.

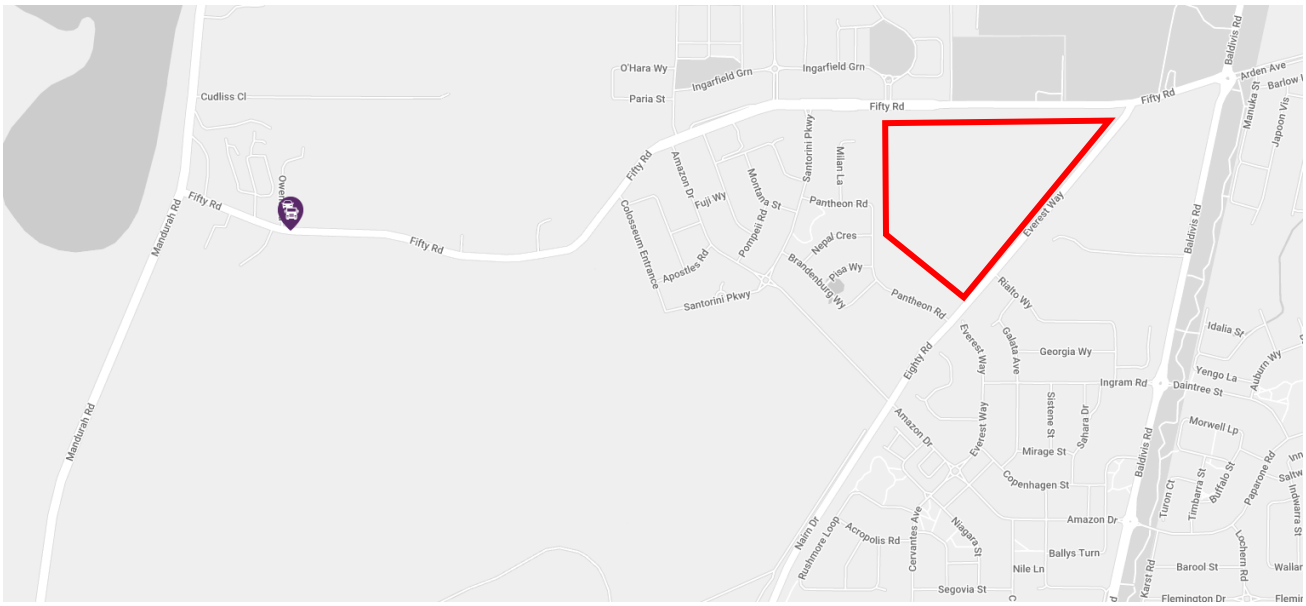
3.4 Traffic Flows on Surrounding Roads and Intersections

The traffic data available in the vicinity of the LSP has been sourced from both Main Roads WA and City of Rockingham, summarised in Table 2.

Table 2 Traffic Data Summary

Location	Year	Daily Average (HV%)	AM Peak	PM Peak
Fifty Road (east of Mandurah Road) - MRWA	2023/24	4,005 (3.3%)	340	371
Fifty Road (west of Baldivis Road) - CoR	2022	7,062	N/A	N/A

Figure 5 MRWA Traffic Map



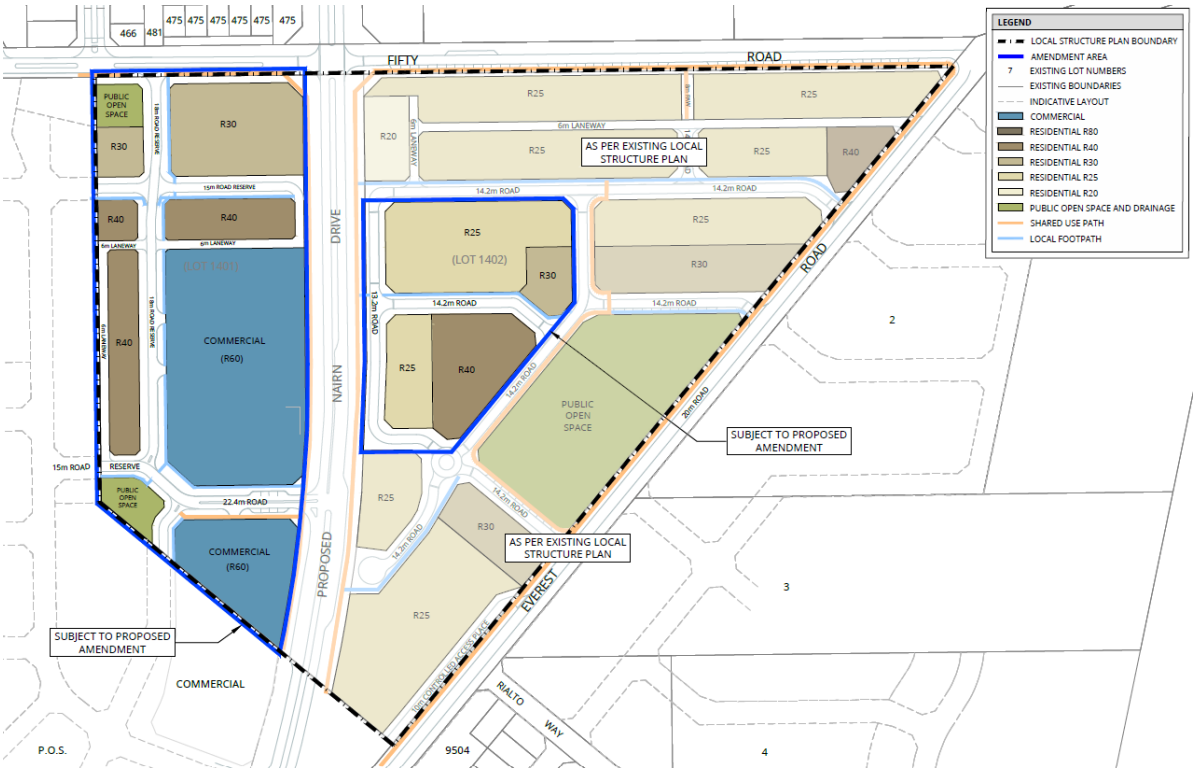
4 CHANGES TO INTERNAL TRANSPORT NETWORKS

4.1 Existing Internal Road Network

The proposed LSP is to include the extension of Nairn Drive, a main north-south distributor type road that will bisect the LSP. This road is proposed to ultimately be a dual carriageway (four-lane road) within a maximum of 40m wide road reserve as per the *Baldivis Roads Needs Study* and already constructed portions of Nairn Drive within the vicinity.

The internal road network of the latest approved LSP is shown in **Figure 6**. It is noted that the internal road layout to the west of Nairn Drive is not proposed to be significantly modified in this amendment.

Figure 6 Latest Approved Lot 1402 Structure Plan



4.2 Road Reserve Widths

The internal road reserve widths to the west of Nairn Drive were approved to range between 15m for the residential development access streets and between 18 to 22.4m higher order local roads near the commercial development. No changes are proposed to these road reserve widths under this amendment.

The internal access road reserve widths to the east of Nairn Drive were approved to range between 13.2 to 14.2m. The LSP amendment proposes to modify a portion of the internal road reserve widths to 10m fronting the R60 residential development, and up to 15m adjacent to the R30 residential development.

4.3 Road Cross Sections and Speed Limits

The speed limit through the LSP internal roads is proposed to be the default built up area limit of 50km/h for the access streets, and Nairn Drive expected to be posted at 70km/h. The general road cross sections remain largely the same as previously approved. The proposed internal road cross sections are shown in **Figure 7** to **Figure 9**.

Figure 7 Cross Section - 10m Road Reserve

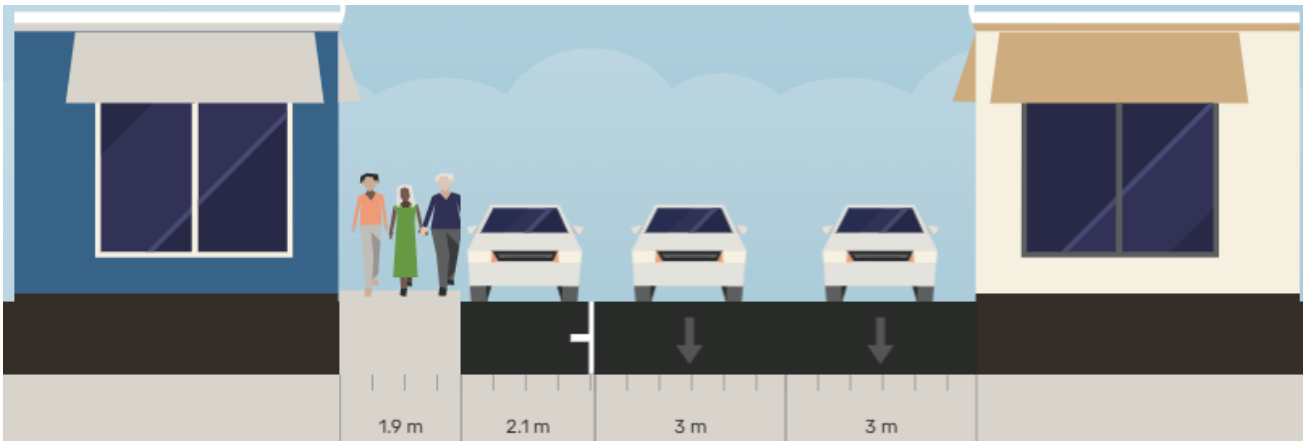


Figure 8 Cross Section - 15m Road Reserve

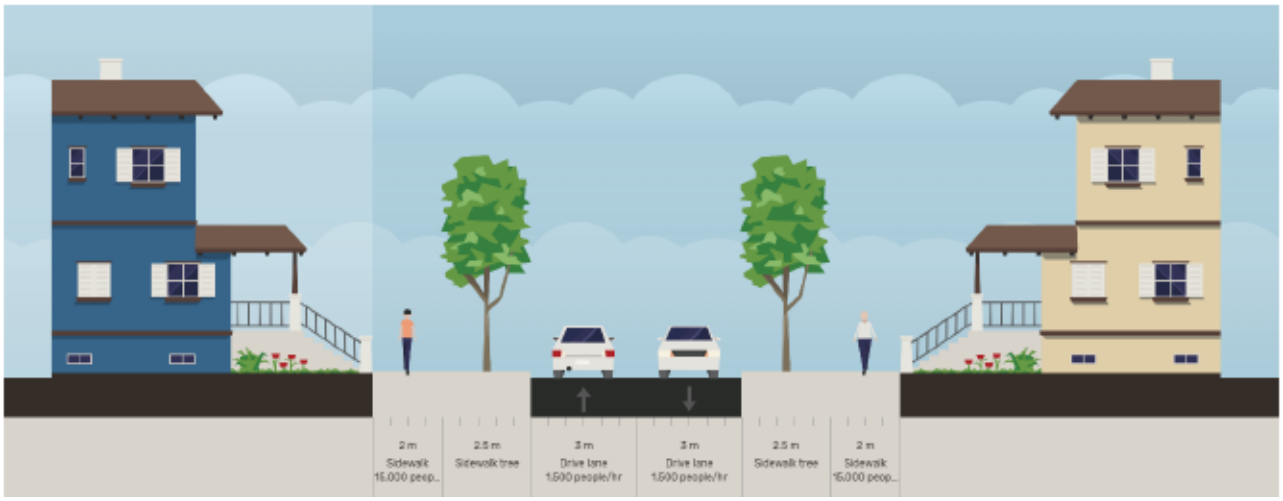
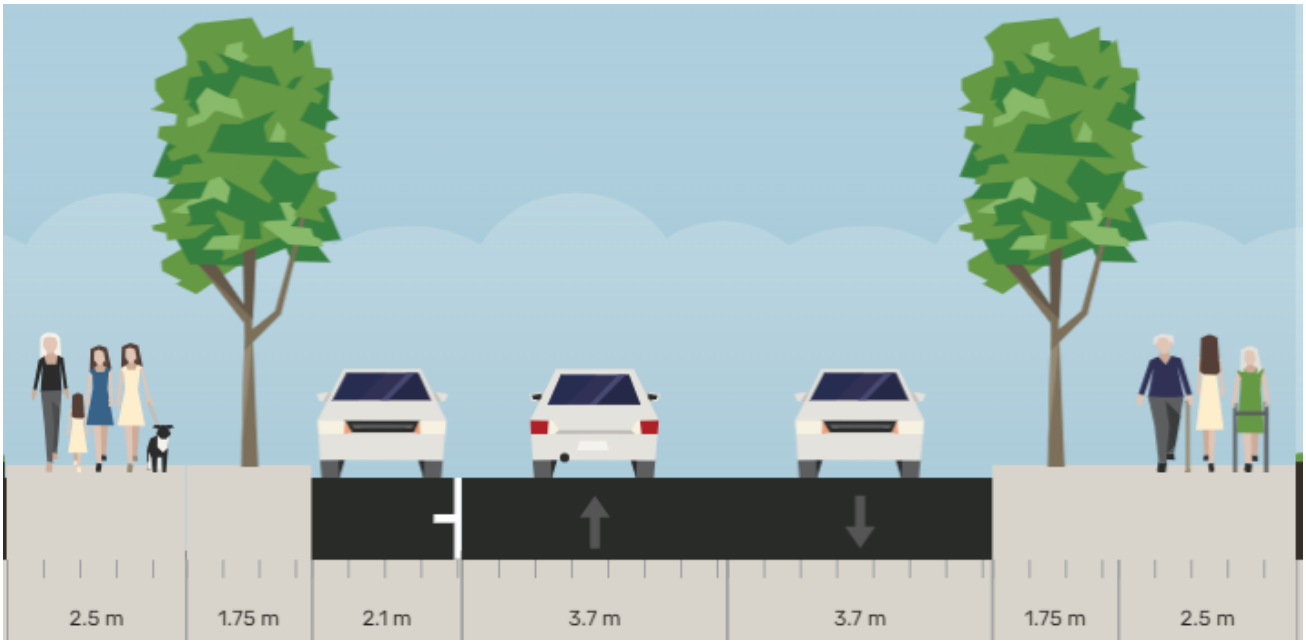


Figure 9 Cross Section - 18m Road Reserve (Yellowstone Rd)



4.4 Intersection Layouts and Controls

All Access Road to Access Road 3-way intersections within the internal road network will be priority-controlled, with terminating road traffic giving way to traffic on the through road.

The intersection controls on Yellowstone Road (north-south road west of Nairn Drive), are not proposed to be modified and remain as priority-controlled as advised within the previous TIA.

4.5 Pedestrian / Cycle Networks and Crossing Facilities

Footpaths are proposed on at least one side of all internal roads, where width allows. Footpaths are to be provided at a width of 2 metres, in accordance with the City of Rockingham's requirements.

Internal traffic volumes, including pedestrian and vehicular traffic, are expected to be low within the residential areas of the LSP. As such, the internal roads will be suitable for on-road or on-footpath cycling.

Main Street is proposed to have a 22.4m wide road reserve with on-street parking provision. Due to the higher traffic volume expected around the commercial precinct, it is recommended that bicycle lanes or sealed shoulders be provided along Yellowstone Road and Main Street to better cater for on-street cycling.

4.6 Public Transport Services

As part of this LSP amendment, no public transport services or routes are proposed to be located within the internal road network.

5 CHANGES TO EXTERNAL TRANSPORT NETWORKS

5.1 Existing External Road Network

The proposed LSP amendment does not proposed any changed to the previously approved structure plan. Nairn Drive alignment

5.2 Intersection Layouts and Controls

For the eastern lot (Lot 1402), three 3-way full movement intersections have been proposed onto Eighty Road (Everest Way), as per previous assessment. As part of this LSP amendment, a new Left-in Left-out (LILO) access has been proposed on Nairn Drive to provide access for the residential development to the east of Nairn Drive. The LILO intersection will be designed to relevant Austroads standard with turning pockets provided if deemed necessary.

5.3 Pedestrian / Cycle Networks and Crossing Facilities

There are no proposed changes to the pedestrian and cycling network and crossing facilities

5.4 Public Transport Services

There're no proposed changes to the public transport services as a result of the proposed LSP.

6 INTERGRATION WITH SURROUNDING AREA

6.1 Surrounding Major Attractors / Generators

Within a 2km radius of the site, there are several attractors including:

- Baldivis Primary School
- Baldivis Gardens Primary School
- Paradox Church
- Lakeside Caravan Park
- Commercial development directly south of the LSP (The Spires)

6.2 Proposed Changes to Land Uses within 800 metres

The Site is currently zoned as "Development" under TPS 2 and is subject to DA22. There are no changes proposed to the Site, apart from residential development layout modification to the eastern Lot 1402.

6.3 Travel Desire Lines from Structure Plan to the Attractors / Generators

The main travel desire lines to and from the LSP is via Nairn Drive (to the south) onto Safety Bay Road (west) or Fifty Road onto Baldivis Road and Kulija Road to access the Kwinana Freeway.

6.4 Adequacy of Existing Transport Networks

The surrounding road network is currently being developed and will need to be integrated with the external network. Generally, the major road network is in line with the Baldivis Roads Needs Study, which was produced based on future traffic modelling.

6.5 Deficiencies in Existing Transport Networks and Remedial Measures

The external transport network currently lacks other mode of transport other than private vehicles. This results in a high proportion of private vehicle usage and may result in a higher regional and LSP generated traffic volume, particularly on Nairn Drive.

7 ANALYSIS OF INTERNAL TRANSPORT NETWORKS

7.1 Assessment Years and Time Periods

The proposed LSP is expected to begin development in 2031 and be fully developed by 2041, which will be adopted as assessment year(s):

- Scenario 1- 2031 Background + Development Traffic
- Scenario 2 – 2041 Background with 1% p/a growth + Development Traffic
- Scenario 3 – 2041 Background with 1% p/a growth only
- Scenario 4 – 2041 Background with 1% p/a growth + Development Traffic (6-lane)

7.2 Structure Plan Generated Traffic

7.2.1 Trip Generation

The proposed LSP is predominantly residential dwellings with a proportion of commercial uses. The traffic generation of the LSP has been calculated based on the WAPC TIA Guideline Vol 5 for residential component and Institute of Transportation Engineers (ITE) Trip Generation Rates 11th Edition for the commercial developments.

The amended LSP will contain a total of approximately 220 dwellings (183 dwellings to the east of Nairn Drive, and 36 to the west of Nairn Drive). In addition to the residential development, the amended LSP also includes a gross commercial land use of 1.9ha (including car parks), with a likely built floor space of approximately 4,500m^2. The trip generation calculation is shown in **Table 3.**

Table 3 Trip Generation Calculation

Land Use	Source	Yield	Trip Generation Rates			Total Trip Generation (trips)		
			AM	PM	Daily	AM	PM	Daily
Residential (east of Nairn Dr)	WAPC	183 dwellings	0.8 trips / dwelling	0.8 trips / dwelling	8 trips / dwelling*	146	146	1464
Residential (west of Nairn Dr)	WAPC	36 dwellings	0.8 trips / dwelling	0.8 trips / dwelling	8 trips / dwelling*	29	29	288
Supermarket	ITE 820	3000m^2	7.29 trips / 100m^2	9.88 trips / 100m^2	93.84 trips / 100m^2	219	296	2815
Café	ITE 932	500 m^2	10.3 trips / 100m^2	9.74 trips / 100m^2	115.4 trips / 100m^2	52	49	577
Specialty Store (Hair Salon)	ITE 918	150 m^2	1.3 trips / 100m^2	1.56 trips / 100m^2	N/A	2	2	20*
Specialty Store (Variety Store)	ITE 814	400 m^2	3.27 trips / 100m^2	7.21 trips / 100m^2	38.53 trips / 100m^2	13	29	154
Small Office	ITE 712	400 m^2	1.8 trips / 100m^2	2.33 trips / 100m^2	15.5 trips / 100m^2	7	9	62
Total Trip Generation						468	560	5380

**Daily trip generation rate assumed to be 10 times the peak hour trip generation*

The trip generation rates used for each land uses are based on their respective peak periods. In reality, it is highly unlikely that the peak of all land uses will occur within the same hour. For example, the peak periods of supermarket and other retail stores would generally occur outside of the road network peak periods.

This assessment assumes that the peak periods of all land uses will occur within the same hour (network peak) and is therefore considered a robust assessment.

7.2.2 Trip Distribution

The directional distribution of the generated trips was adopted from the same sources, as shown in **Table 4**.

Table 4 Trip Directional Distribution

Land Use	Source	Directional Distribution					
		AM		PM		Daily	
		IN	OUT	IN	OUT	IN	OUT
Residential	WAPC	25%	75%	62.5%	37.5%	50%	50%
Supermarket	ITE 820	52%	48%	51%	49%	50%	50%
Café	ITE 932	55%	45%	61%	39%	50%	50%
Spec – Hair Salon	ITE 918	83%	17%	17%	83%	50%	50%
Spec – Variety Store	ITE 814	55%	45%	51%	49%	50%	50%
Small Office	ITE 712	82%	18%	34%	65%	50%	50%

Based on the information above, the total calculated trip generation and distribution of the amended LSP is shown in **Table 5**.

Table 5 Calculated Trip Generation and Distribution

Land Use	Yield	Directional Distribution					
		AM		PM		Daily	
		IN	OUT	IN	OUT	IN	OUT
Residential (east of Nairn Drive)	183 dwellings	37	110	91	55	732	732
Residential (west of Nairn Drive)	36 dwellings	7	22	18	11	144	144
Supermarket	3000m^2	114	105	151	145	1408	1408
Café	500 m^2	29	23	30	19	289	289
Specialty Store (Hair Salon)	150 m^2	2	0	0	2	0	0
Specialty Store (Variety Store)	400 m^2	7	6	15	14	77	77
Small Office	400 m^2	6	1	3	6	31	31
Total Trip Generation and Distribution		**202**	**267**	**308**	**252**	**2,691**	**2,691**

The previously approved LSP was expected to generate approximately 5,580 daily trips, with AM and PM Peak hours generating approximately 475 and 566 trips respectively.

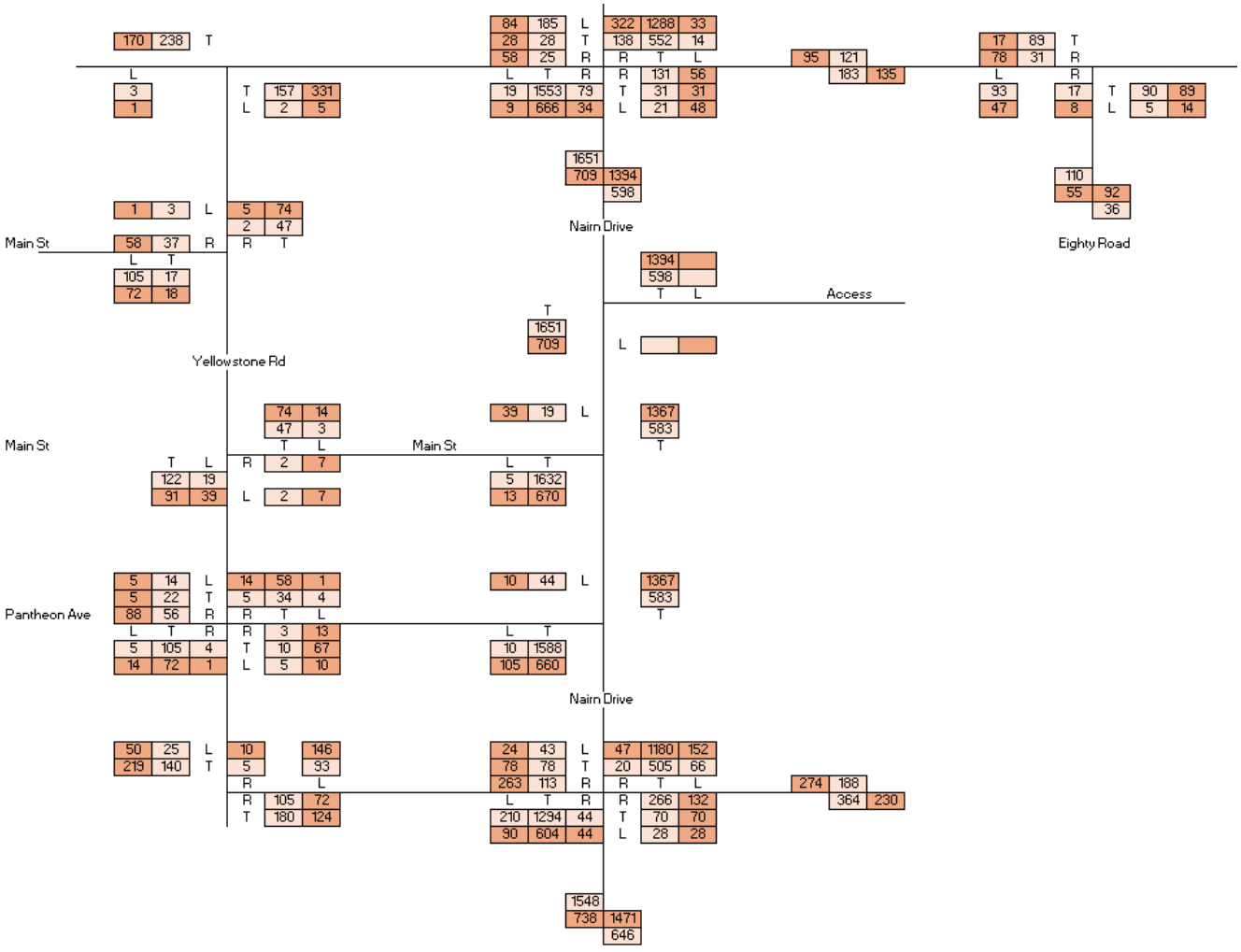
This update LSP with slight modifications to the residential development will see a slight decrease in trip generation, with a **net decrease** of approximately 6 to 7 trips in the peak periods, and approximately 200 daily trips throughout the whole LSP.

7.3 Existing Background Traffic Flows

In reference to the *Baldivis Road Needs Study*, Nairn Drive is expected to carry approximately 22,400 VPD in 2031. This estimation being based on future modelling means it is likely to include the proposed development traffic generation of the originally approved LSP. Notwithstanding the potential increase in traffic generation of the proposed LSP due to the land use amendment, this assessment has retained the link volume estimated within the *Baldivis Roads Needs Study* as the background traffic and added the total development traffic distribution for robustness.

The estimated background traffic distribution in the opening year 2031 has been sourced from Stantec's TIA, historical traffic counts / SCATs and planning guidelines, presented in **Figure 10**.

Figure 10 2031 Background Traffic Flow Diagram



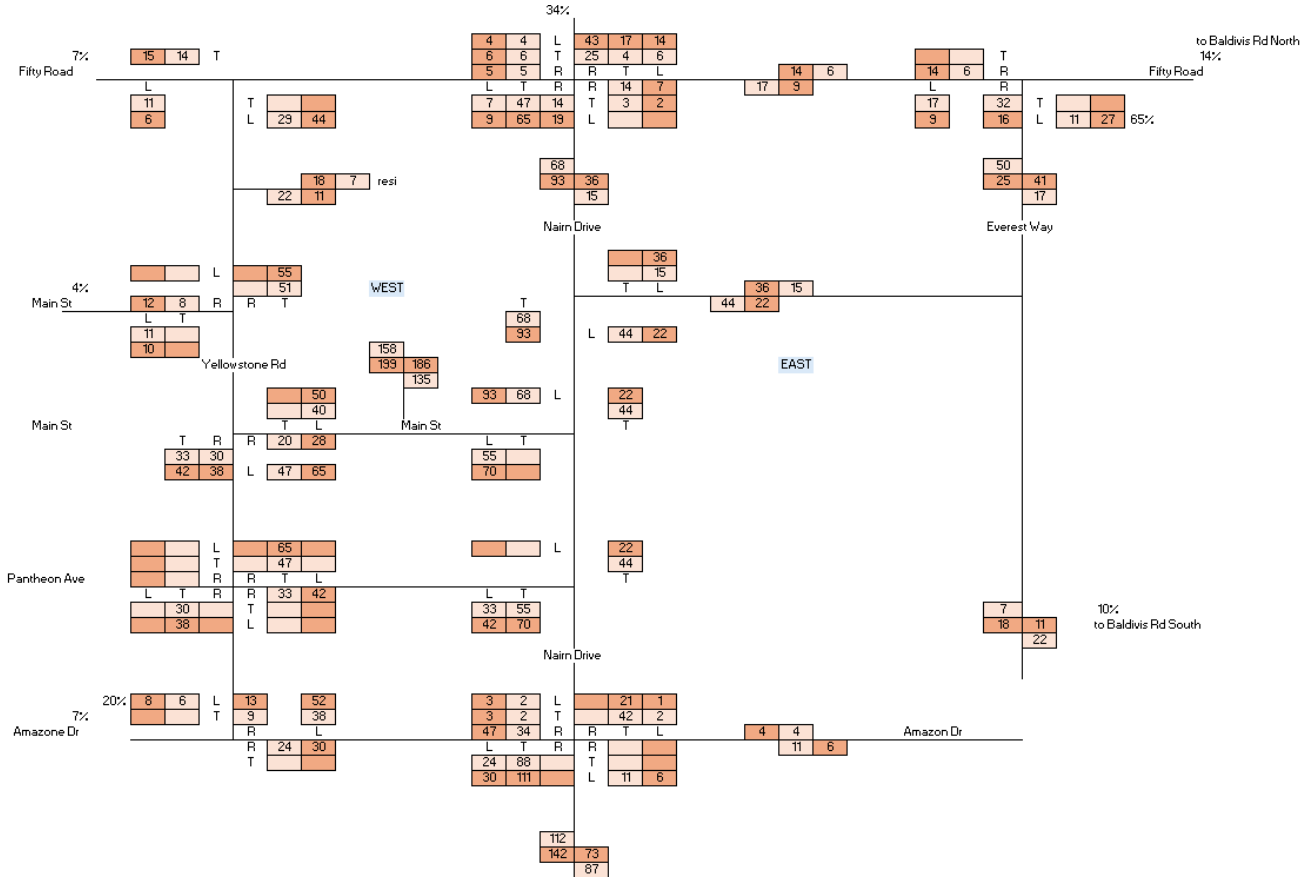
7.4 Existing Background and 'With Development' Traffic Flows

The expected traffic generation of the amended LSP has been distributed based on the surrounding attractors and access to major/regional road network, in reference to the indicative 2031 volumes outlined in the *Baldivis Roads Needs Study* as below:

- Nairn Drive – North of Fifty Road: 34%
- Nairn Drive – South of Amazon Drive: 24%
- Fifty Road – West of Nairn Drive: 7%
- Fifty Road – East of Nairn Drive: 6%
- Amazon Drive – West of Nairn Drive: 8%
- Baldivis Road – North of Fifty Road: 7%
- Baldivis Road – South of Amazon Drive: 10%
- Main Street – West of Yellowstone Road: 4%

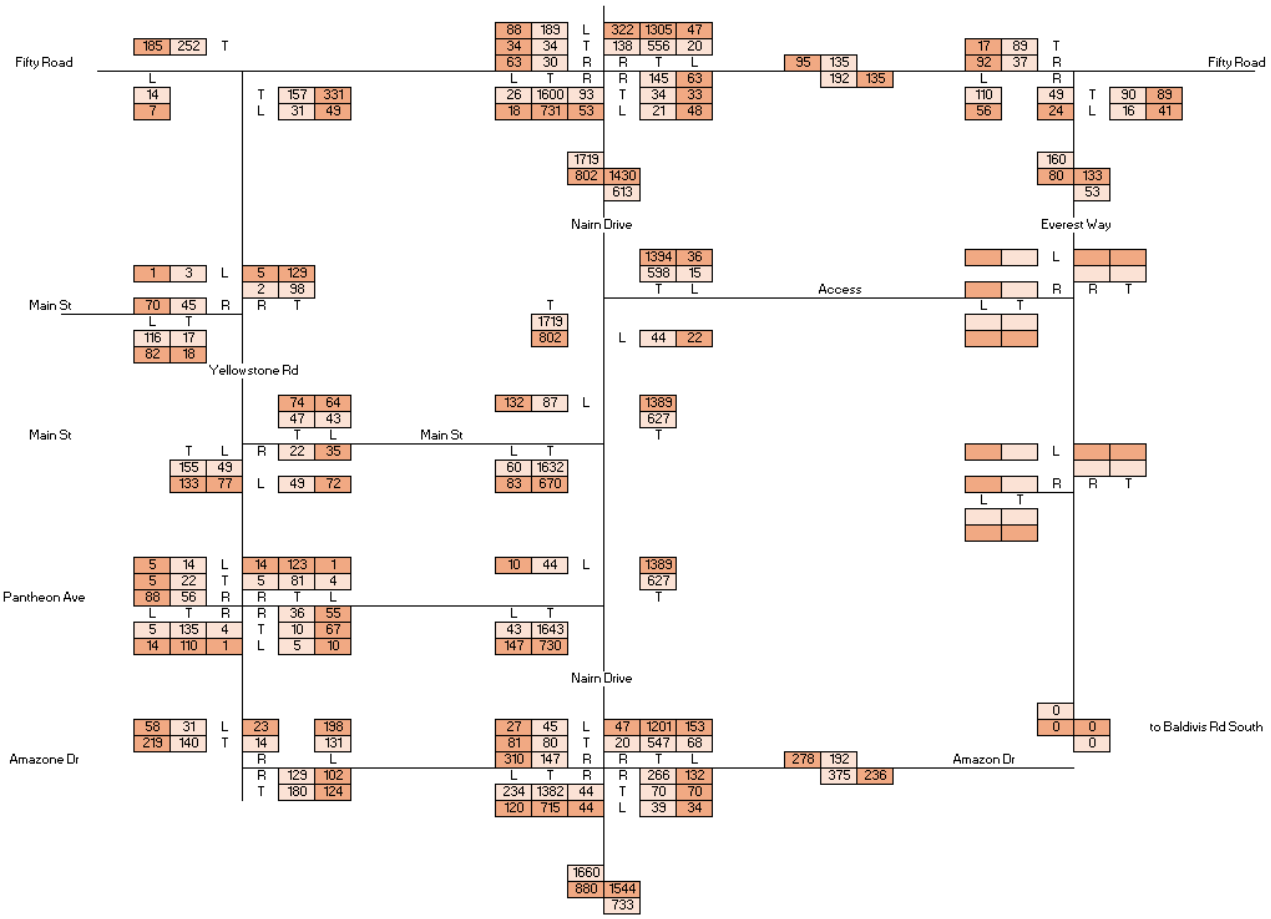
The traffic flow diagram of the expected development traffic distribution in the surrounding road network is presented in **Figure 11**.

Figure 11 Development Traffic Distribution



The traffic flow diagram of Scenario 1 2031 BG + Development is shown in **Figure 12**.

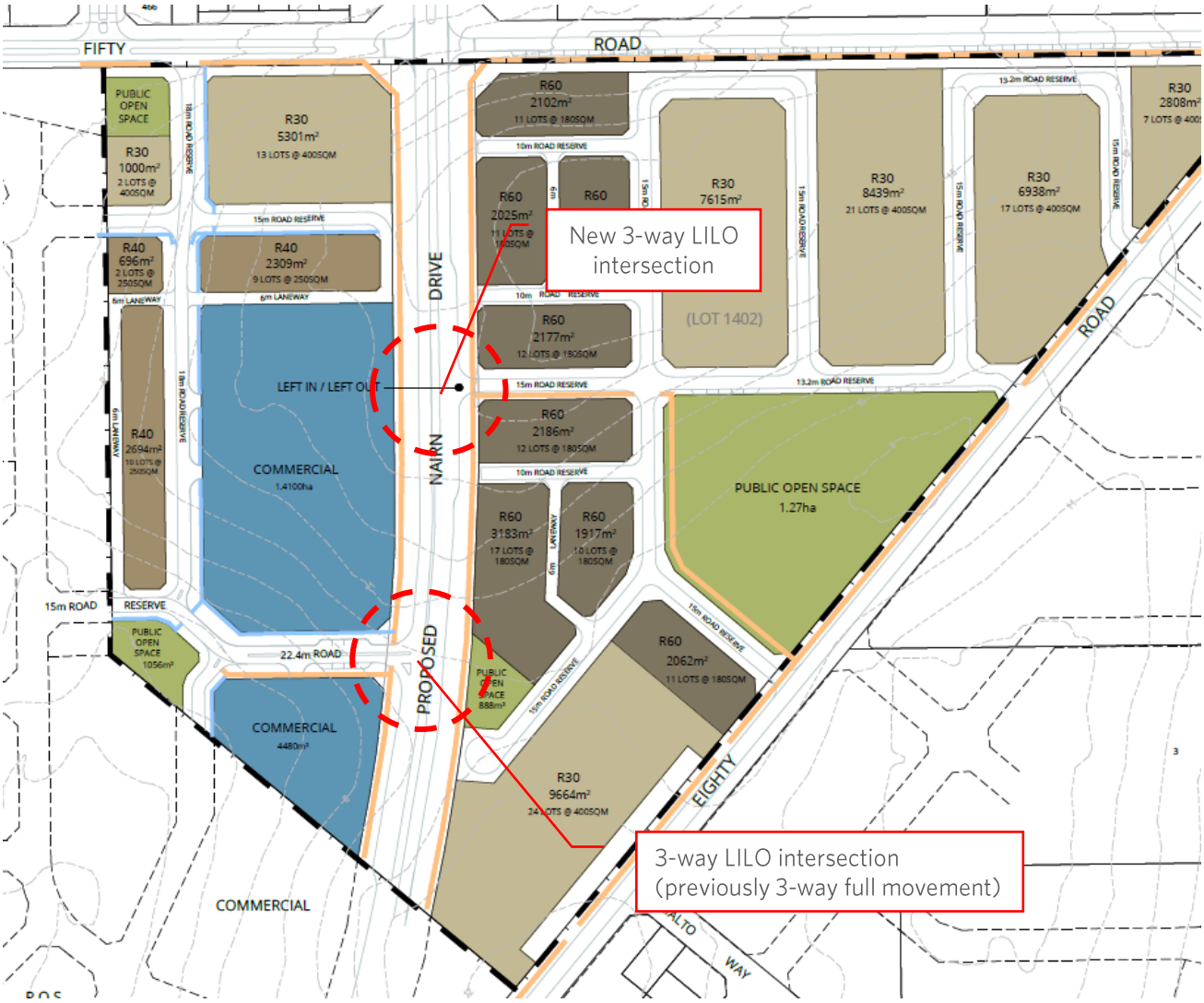
Figure 12 Scenario 1 - 2031 BG + Development Traffic Flow



7.5 Access Strategy

Previous LSP has a 3-way full movement intersection of Main Street onto Nairn Drive to provide access for the western cell. The amended LSP propose to modify this intersection into a Left In Left Out (LILO) 3-way intersection, with appropriate turning pocket. As part of the amendment, a new 3-way LILO intersection has been proposed, approximately 100m north of the Main Street intersection to service the residential development in the eastern cell of the LSP. Other external access arrangements remain largely unchanged. **Figure 13** shows the changes to the access strategy proposed by this amendment. It is noted that this intersection arrangement off of Nairn Drive more closely resembles that of the originally approved LSP.

Figure 13 Access Arrangement Modification



7.6 Impact on Surrounding Internal Roads and Intersections

The internal intersection arrangements remain largely unchanged for the western cell, with minor road layout modifications to the eastern cell. The overall traffic impact of the internal intersections is likely to be negligible, with the critical intersections on Main Street and Yellowstone assessed in **Section 8**.

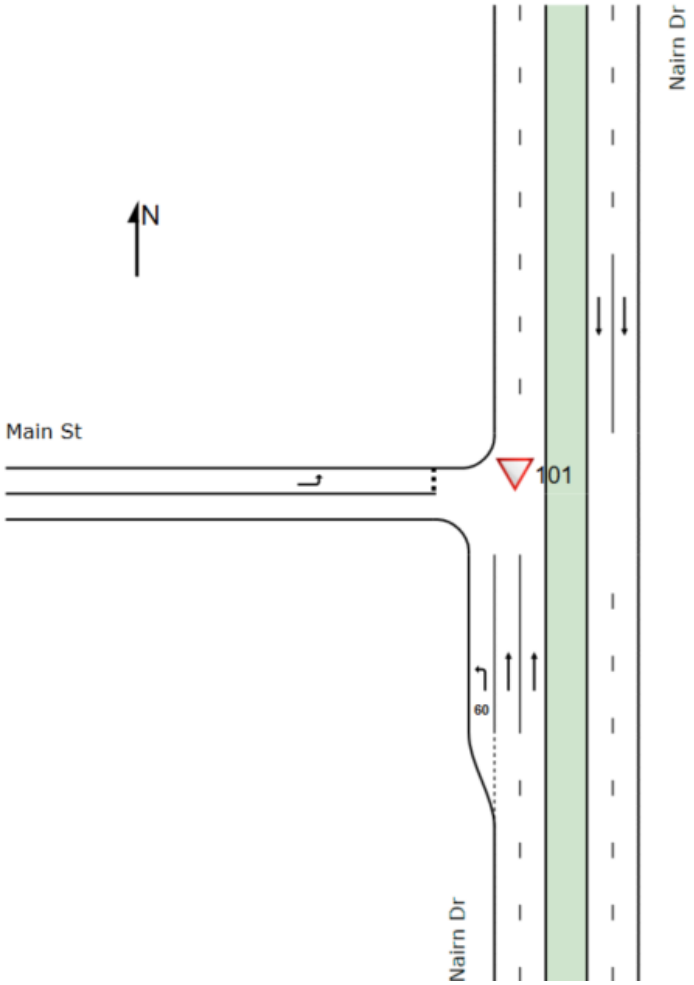
8 ANALYSIS OF EXTERNAL TRANSPORT NETWORKS

8.1 Impact on Neighbouring Areas

8.1.1 Intersection of Nairn Drive / Main Street

The intersection of Nairn Drive and Main Street was previously approved as a 3-way full movement intersection. This proposal amended the intersection into a 3-way Left-in Left-out intersection, providing access to the western cell of the LSP via Main Street. The SIDRA intersection layout of this intersection is shown in **Figure 14**.

Figure 14 Intersection of Nairn Drive and Main Street

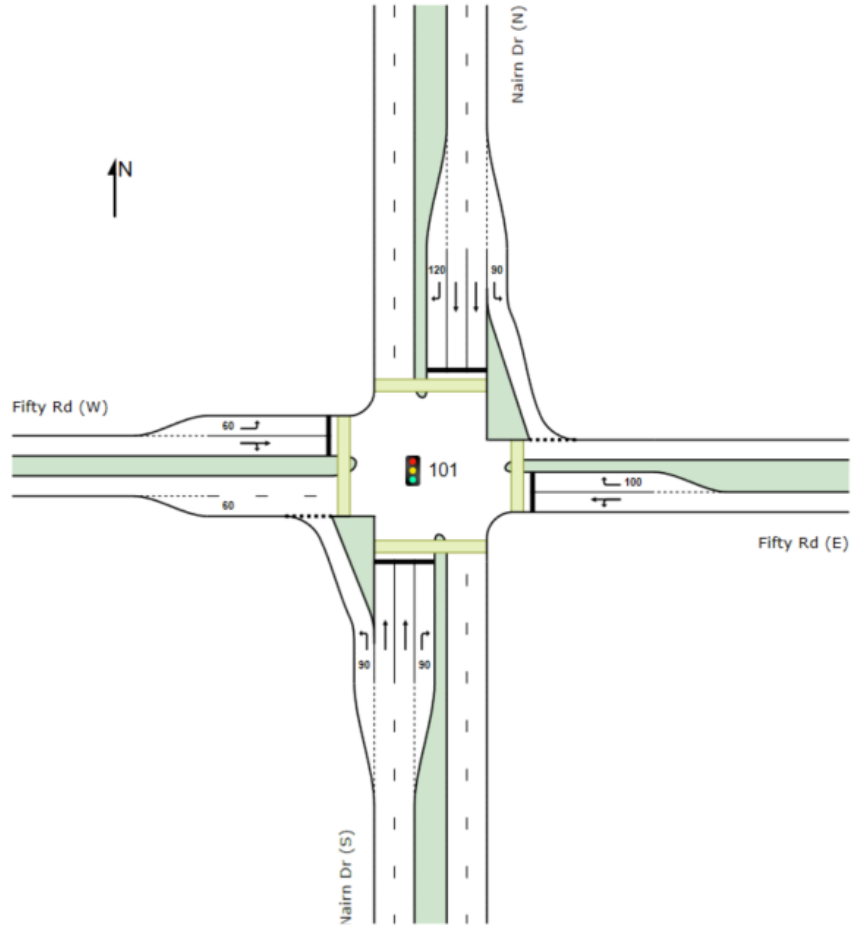


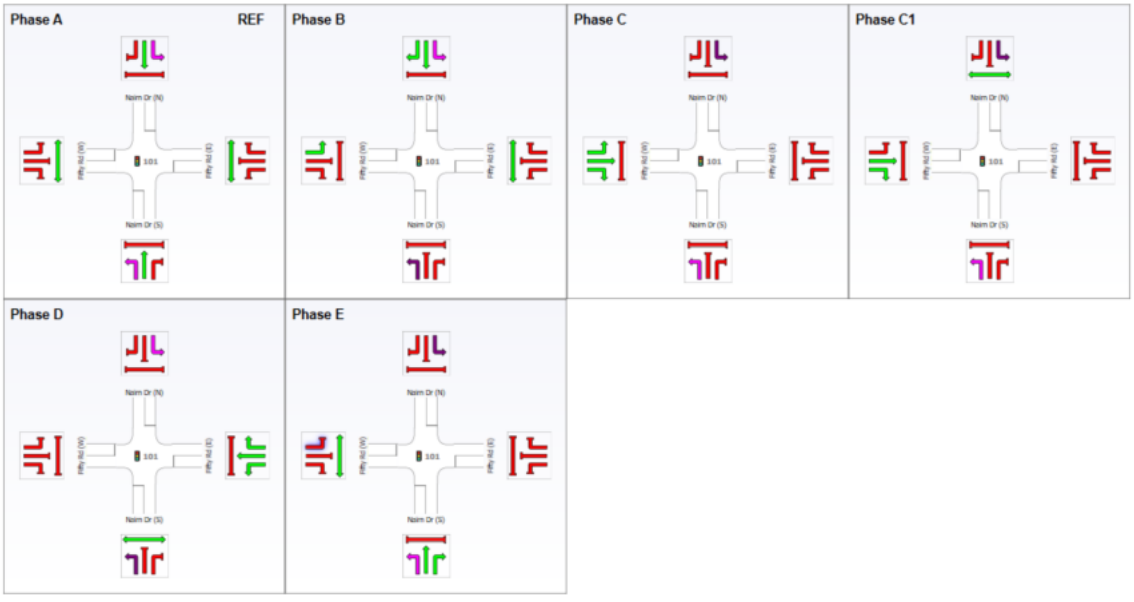
8.1.2 Intersection of Nairn Drive / Fifty Road

The intersection has been proposed to be a signalised intersection. It is noted that traffic signals are the preferred treatment identified within the City's Baldivis Roads Needs Study for this intersection due to better pedestrian access given the adjacent primary school. A formal assessment will be undertaken at subdivision stage, including a Stage 1 assessment under the Main Roads WA's Traffic Signal Assessment Policy (TSAP).

The geometry and phasing utilised above in the assessment are shown below in **Figure 15**

Figure 15 SIDRA Layout - Nairn Drive / Fifty Road Indicative Traffic Signal Layout

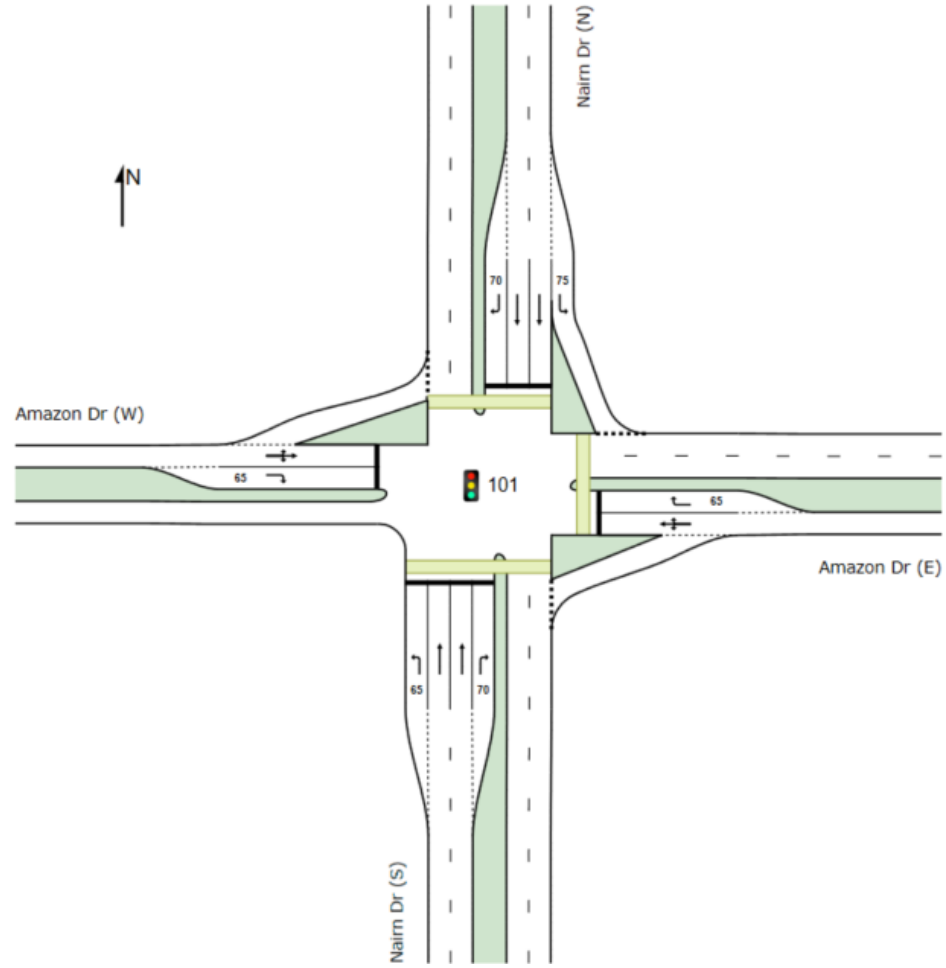


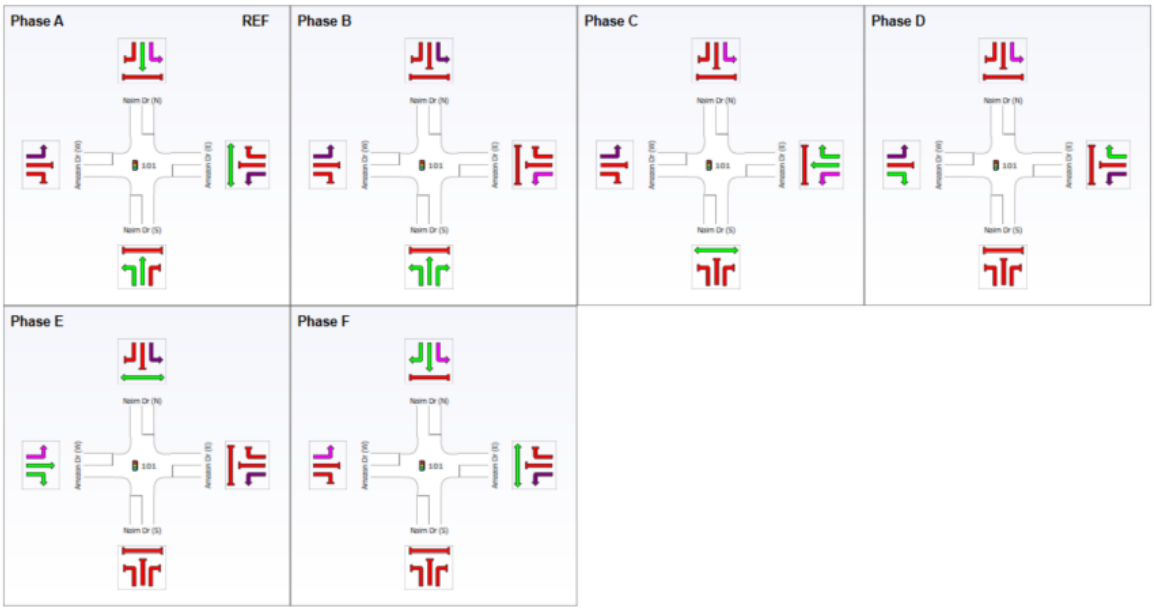


8.1.3 Intersection of Nairn Drive and Amazon Drive

According to the Baldivis Roads Needs Study, the intersection of Nairn Drive and Amazon Drive is expected to be controlled by signals. Similar to the Nairn Drive and Fifty Road signalised intersection, the layout is expected to be a 4-lane Nairn Drive with turning pockets and two-lane Amazon Drive with turning pockets as illustrated in **Figure 16**. As of the writing of this revision of report, the intersection is nearing its completion.

Figure 16 SIDRA Layout - Nairn Drive / Amazon Drive Indicative Traffic Signal Layout

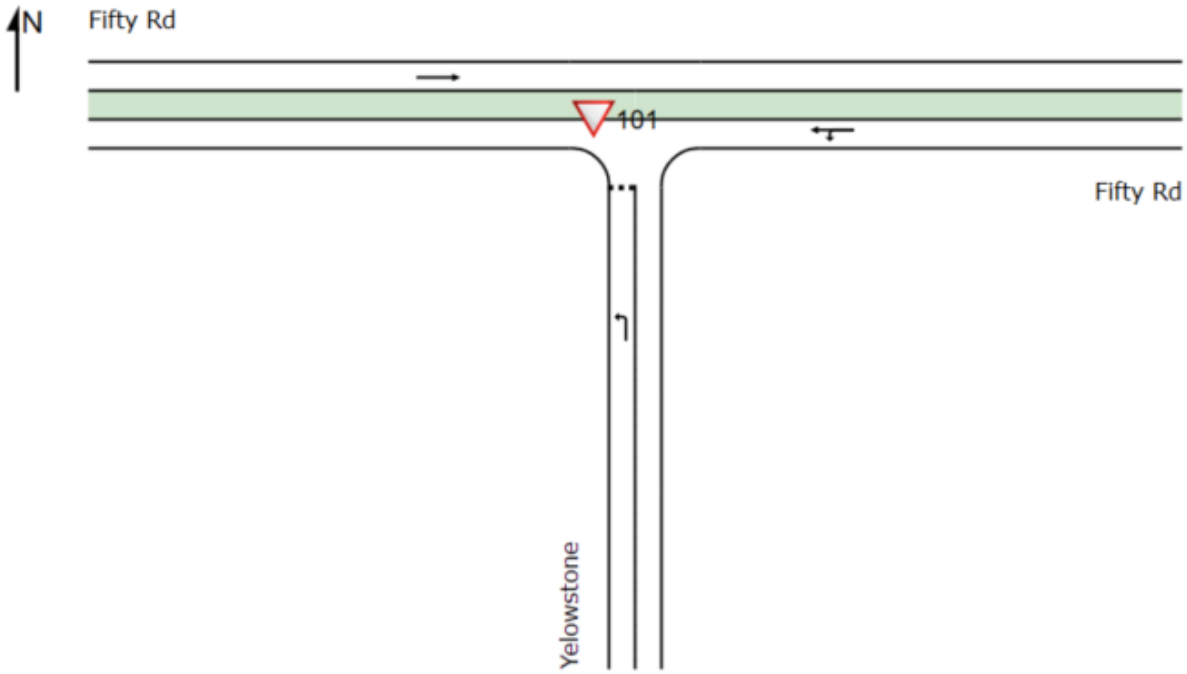




8.1.4 Intersection of Fifty Road/Yellowstone Road

The intersection of Fifty Road and Yellowstone Road is a Left-in Left-out intersection located to the northwest of the LSP. While the critical movements for this intersection are likely to occur in the PM peak when the residential and commercial trips coincide, the impact is likely to be very low due to the LILO arrangement. The SIDRA intersection layout is shown in Figure 17.

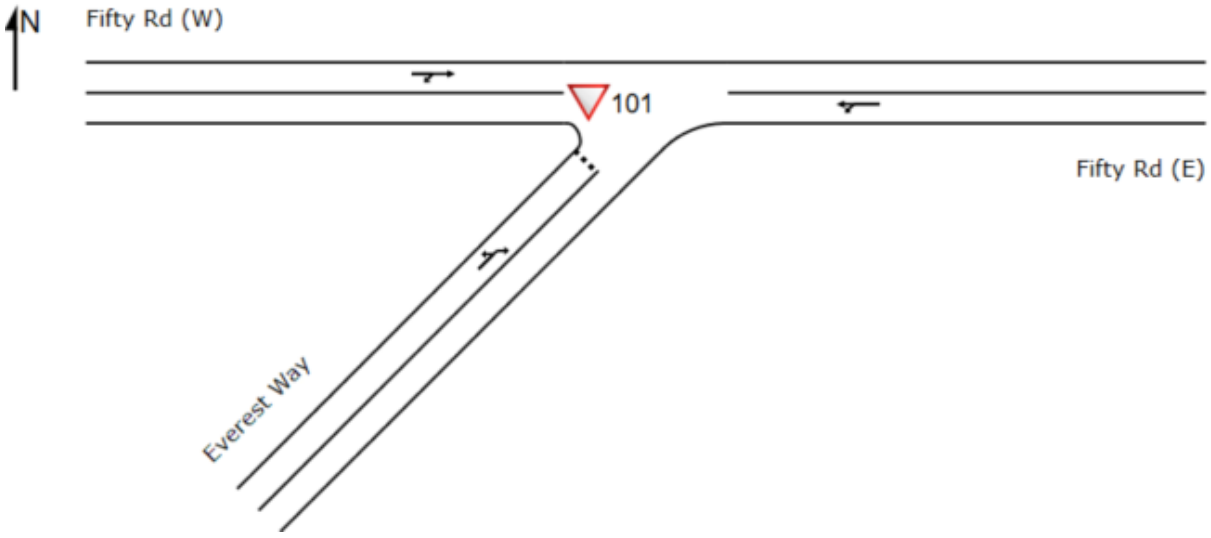
Figure 17 SIDRA Layout - Fifty Road / Yellowstone Road intersection



8.1.5 Intersection of Fifty Road / Everest Way

The intersection of Fifty Road and Everest Way is located to the northeast of the LSP. It is noted that the southern leg is previously Eighty Road, which will be realigned onto Everest Way when Nairn Drive is built. This intersection is likely to be primarily used by vehicles accessing Baldivis Road. The SIDRA layout of Fifty Road and Everest Way is shown in Figure 18.

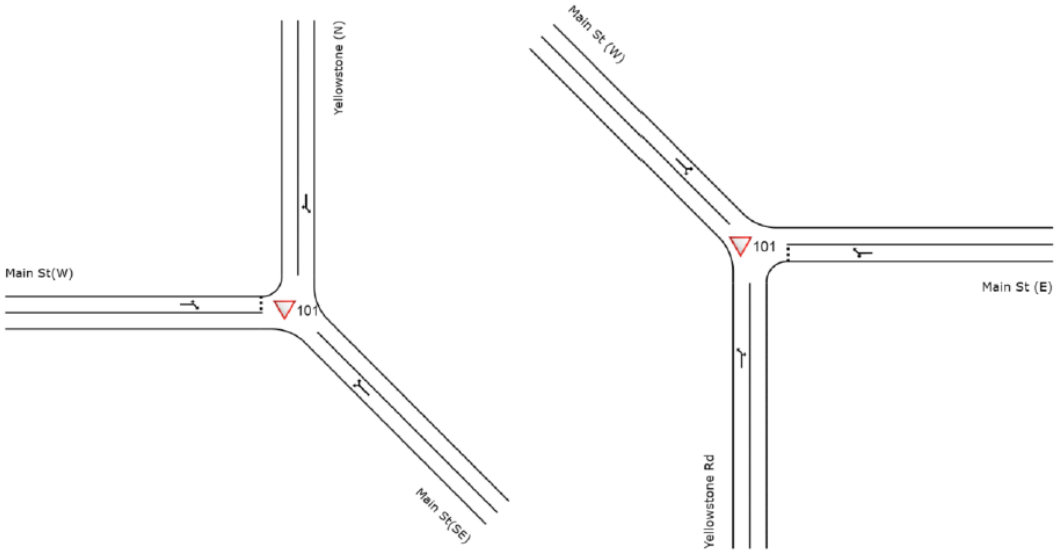
Figure 18 SIDRA Layout - Intersection of Fifty Road / Everest Way



8.1.6 Intersection of Main Street and Yellowstone Road

The SIDRA intersection layout of Main Street and Yellowstone Road intersections is shown in Figure 19. The spacing between the two intersections is approximately 40m, with Yellowstone Road having priority over Main Street in both directions.

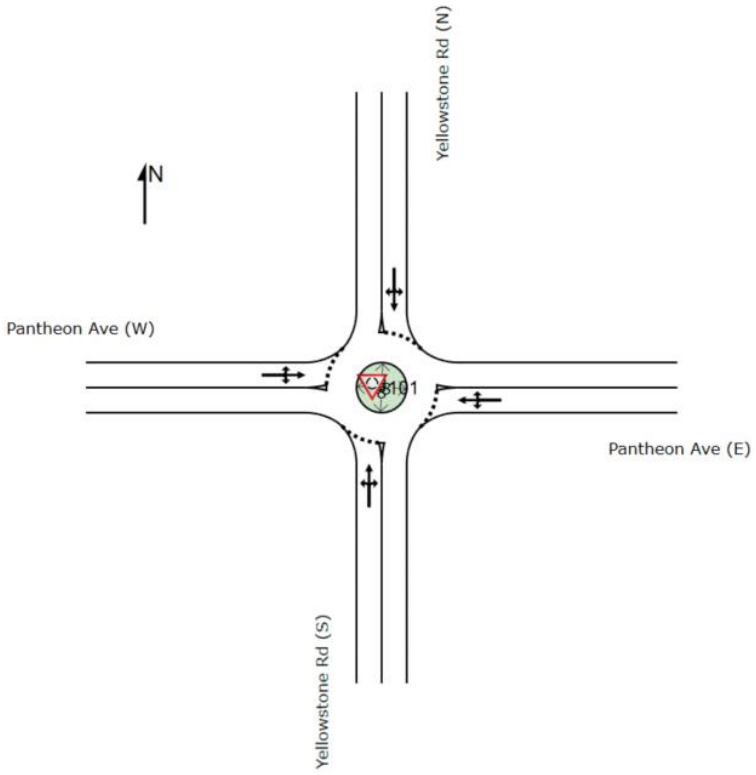
Figure 19 SIDRA Layout - Staggered Intersection of Yellowstone Road and Main Street



8.1.7 Intersection of Yellowstone Road and Pantheon Avenue

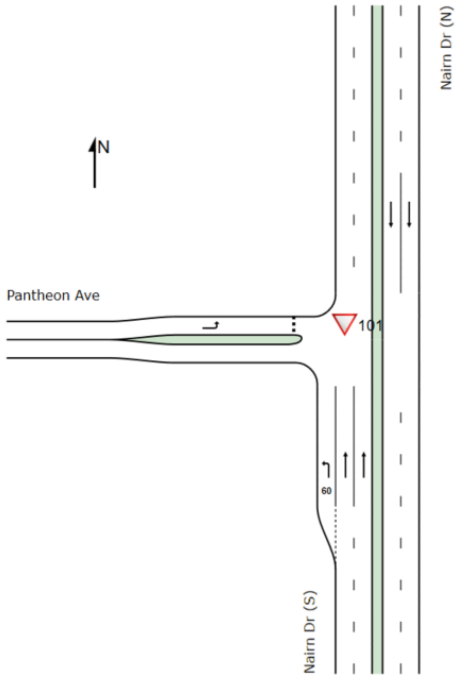
The roundabout intersection is being constructed as part of the adjacent development. The SIDRA intersection layout is shown in Figure 20.

Figure 20 SIDRA Layout - Yellowstone Road and Pantheon Avenue

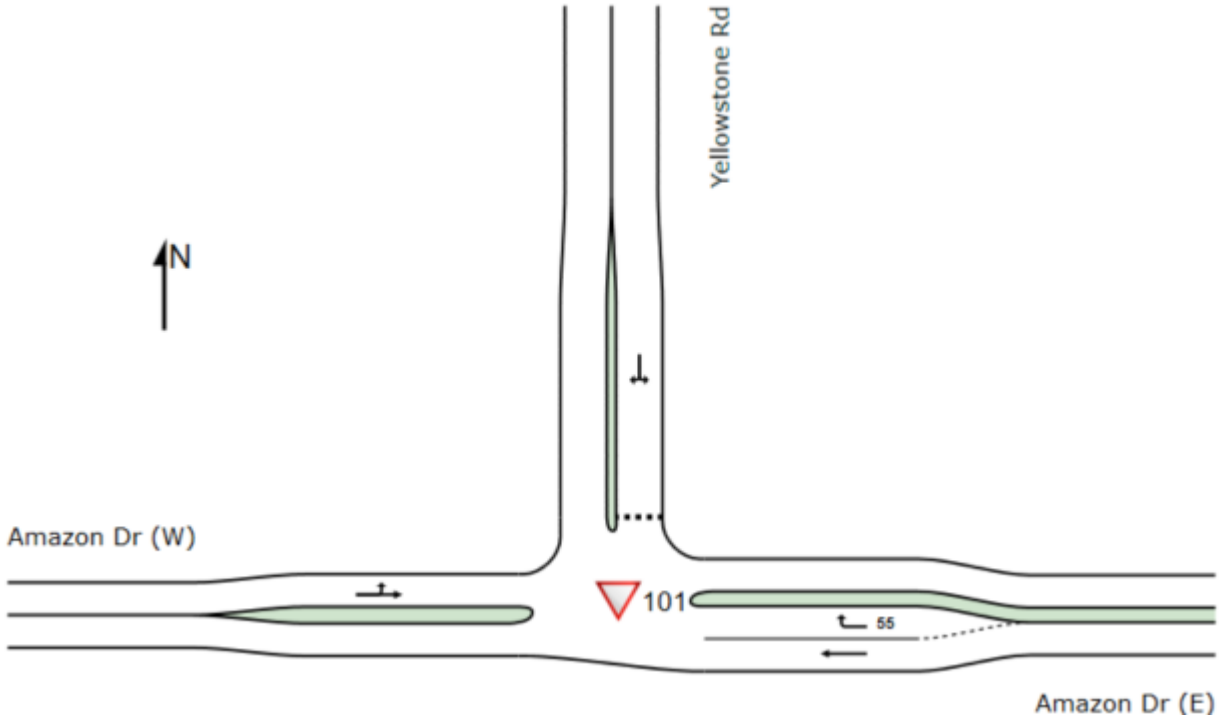


8.1.8 Intersection of Pantheon Avenue / Nairn Drive

The intersection is a LILO 3-way intersection, currently being constructed as part of the adjacent development

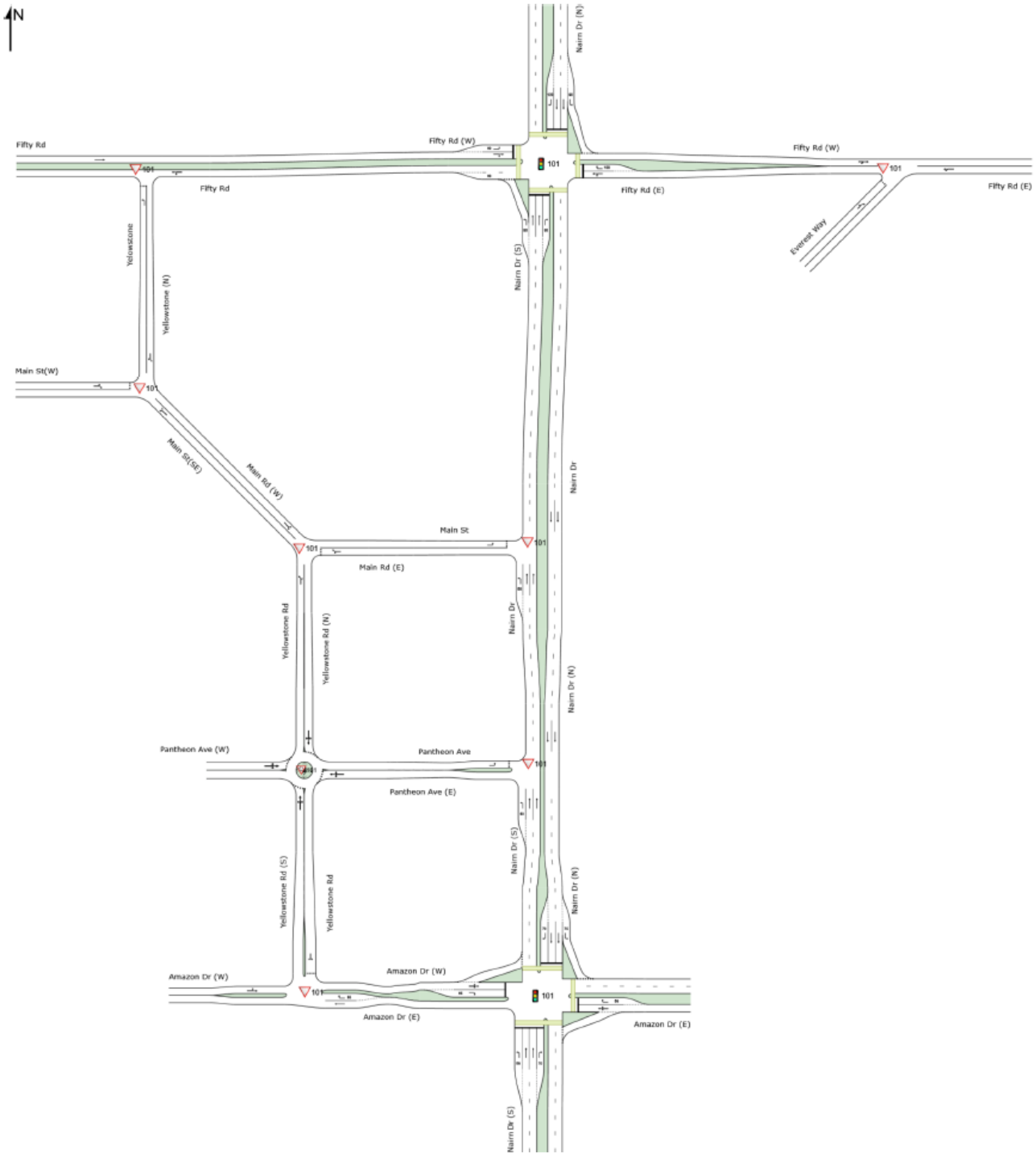


8.1.9 Intersection of Amazon Drive and Yellowstone Road



The intersections of the surrounding road network have been assessed using the SIDRA Intersection Software, set up as a network within the software with the layout shown in **Figure 21**.

Figure 21 SIDRA Intersection Network Layout



8.2 Future Background and 'With Development' Traffic Flows

The proposed LSP is anticipated to be full developed by 2041, which will be assessed as part of this assessment.

Figure 22 2041 Background Traffic with Growth only (Scenario 3)

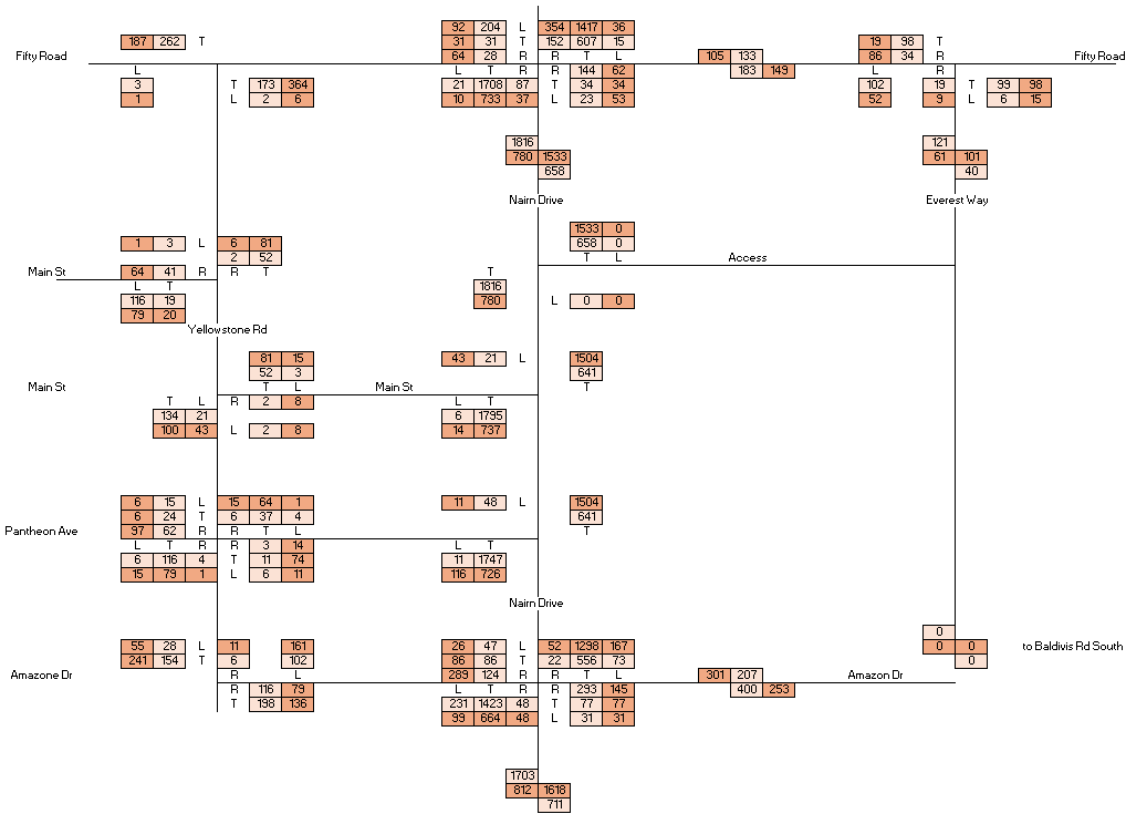
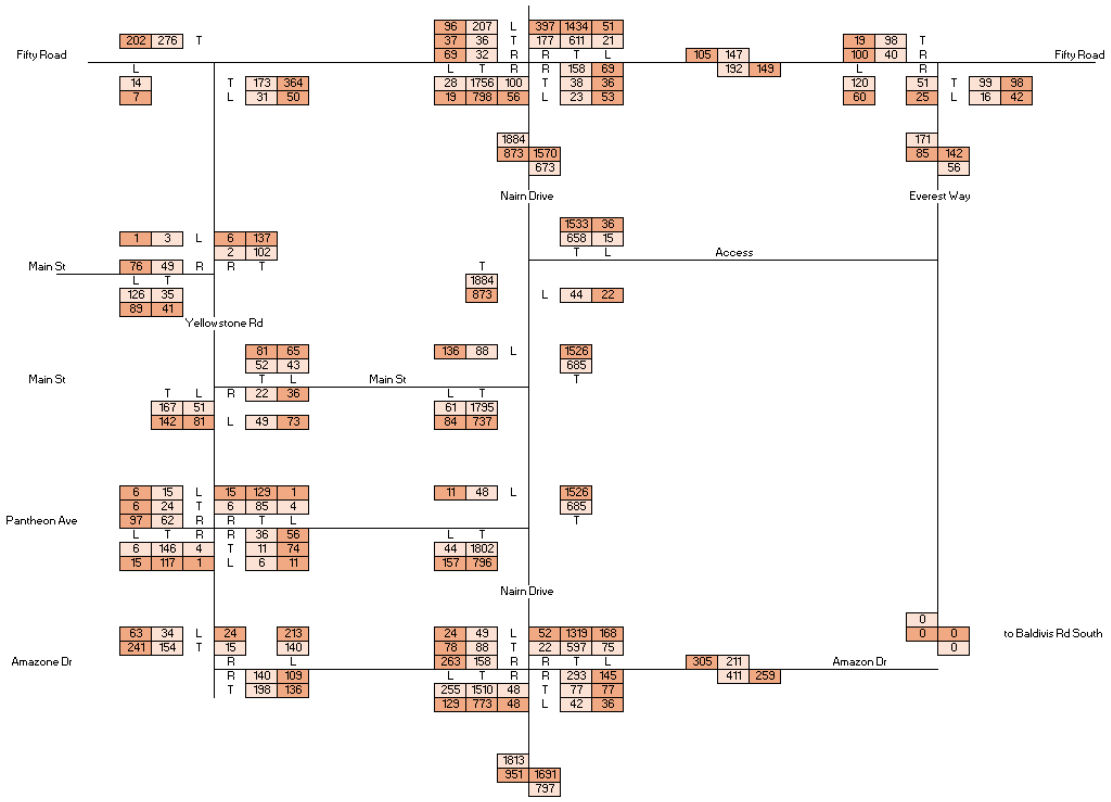


Figure 23 2041 BG + DEV Traffic Flow (Scenario 2)



8.3 Impact on Surrounding External Roads and Intersections

The SIDRA network assessment outcomes of each scenario are summarised and discussed in the following sections:

8.3.1 Scenario 1 – 2031 BG + DEV

Table 6 SIDRA Result - Scenario 1 (2031 BG + DEV)

2031 BG + DEV	AM Peak				PM			
Intersection	Dos	Delay (s)	LoS	Queue (m)	Dos	Delay (s)	LoS	Queue (m)
Nairn Dr / Fifty Rd	0.937	68	Los E	453.7	0.859	45.3	Los D	348.5
Nairn Dr / East Access	0.468	0.2	LoS A	212.2	0.38	0.2	LoS A	1.1
Nairn Dr / Main St	0.446	0.7	LoS A	51.8	0.38	0.7	LoS A	3.9
Nairn Dr / Pantheon Ave	0.449	0.4	LoS A	2.6	0.438	0.4	LoS A	0.3
Nairn Dr / Amazon Dr	0.861	47.4	LoS D	348.5	0.859	41.3	LoS D	255.2
Fifty Rd / Everest Way	0.127	3.1	LoS A	3.8	0.072	4	LoS A	2.2
Yellowstone Rd / Fifty Rd	0.252	0.5	LoS A	0.3	0.21	0.5	LoS A	0.2
Yellowstone Rd / Main St (L)	0.075	3.8	LoS A	1.1	0.075	3.9	LoS A	1.7
Yellowstone Rd / Main St ®	0.125	4.3	LoS A	2.3	0.123	4.3	LoS A	2.8
Yellowstone Rd / Pantheon Ave	0.123	4.9	LoS A	4.9	0.148	5.5	LoS A	6.1
Yellowstone Rd / Amazon Dr	0.117	2.5	LoS A	3.7	0.194	2.9	LoS A	6.4

The overall Level of Service at the signalised intersection of Nairn Drive / Fifty Road is expected to be the worst (LoS E) in the AM peak, with a similar LoS and queue length as per pervious assessment. The average delays for each leg are within acceptable margin. Other intersections are expected to perform with acceptable LoS and delay.

8.3.2 Scenario 2 – 2041 BG + DEV

Table 7 SIDRA Result - Scenario 2 (2041 BG + DEV)

2041 BG + DEV	AM Peak				PM			
Intersection	Dos	Delay (s)	LoS	Queue (m)	Dos	Delay (s)	LoS	Queue (m)
Nairn Dr / Fifty Rd	1.031	99.9	LoS F	453.7	0.878	50.2	LoS D	340.8
Nairn Dr / East Access	0.513	0.2	LoS A	212.2	0.418	0.2	LoS A	1.2
Nairn Dr / Main St	0.506	0.7	LoS A	233.7	0.417	0.7	LoS A	4.2
Nairn Dr / Pantheon Ave	0.629	0.5	LoS A	3.2	0.586	0.5	LoS A	0.4
Nairn Dr / Amazon Dr	0.953	60.5	LoS E	490.4	0.855	45.6	LoS D	304.3
Fifty Rd / Everest Way	0.137	3.1	LoS A	4.2	0.08	4	LoS A	2.5
Yellowstone Rd / Fifty Rd	0.152	0.5	LoS A	34	0.229	0.5	LoS A	0.2
Yellowstone Rd / Main St (L)	0.081	3.8	LoS A	1.2	0.08	3.9	LoS A	1.9
Yellowstone Rd / Main St ®	0.133	4.3	LoS A	2.5	0.131	4.3	LoS A	3.6
Yellowstone Rd / Pantheon Ave	0.133	4.9	LoS A	5.4	0.16	5.5	LoS A	6.6
Yellowstone Rd / Amazon Dr	0.128	2.6	LoS A	4.1	0.213	3	LoS A	7.1

Overall, the result of the assessment is worse than the 2031 scenario, which indicates that background traffic growth is the major contributor to the intersection performance. The overall LoS and queue length appear to be similar to the previous assessment.

8.3.3 Scenario 3 – 2041 BG Only

Table 8 SIDRA Result - Scenario 3 (2041 BG Only)

2041 BG only	AM Peak				PM			
Intersection	Dos	Delay (s)	LoS	Queue (m)	Dos	Delay (s)	LoS	Queue (m)
Nairn Dr / Fifty Rd	1.009	90	LoS F	453.7	0.859	45.3	LoS D	278.7
Nairn Dr / East Access	0.485	0.1	LoS A	212.2	0.41	0	LoS A	0
Nairn Dr / Main St	0.491	0.2	LoS A	206.4	0.38	0.7	LoS A	3.9
Nairn Dr / Pantheon Ave	0.512	0.3	LoS A	2.9	0.438	0.4	LoS A	0.3
Nairn Dr / Amazon Dr	0.888	50.6	LoS D	381.3	0.841	41.3	LoS D	255.2
Fifty Rd / Everest Way	0.092	2.6	LoS A	2.8	0.072	4	LoS A	2.2
Yellowstone Rd / Fifty Rd	0.144	0.1	LoS A	13	0.21	0.5	LoS A	0.2
Yellowstone Rd / Main St (L)	0.076	3.6	LoS A	1	0.075	3.9	LoS A	1.7
Yellowstone Rd / Main St (R)	0.091	4.1	LoS A	1.1	0.123	4.3	LoS A	3.4
Yellowstone Rd / Pantheon Ave	0.098	4.5	LoS A	3.7	0.148	5.5	LoS A	6.1
Yellowstone Rd / Amazon Dr	0.108	2.2	LoS A	2.6	0.194	2.9	LoS A	6.4

As shown in **Table 8**, the intersection of Nairn Drive and Fifty Road would still perform unsatisfactorily even without the proposed LSP development, with the intersection of Nairn Drive and Fifty Road performing at LoS F and delay of up to 90 seconds in the AM peak. This shows that the background traffic growth assumed within the assessment is the major contributor to the intersection performance, and that the suggested intersection layout would not be capable of supporting such traffic flow, noting the previously mentioned likely double up of the LSP generated traffic within the model.

8.3.4 Scenario 4 – 2041 BG + DEV (6-lane)

An alternative assessment on the signalised intersection with 6-lanes Nairn Drive as shown in **Figure 24** has been conducted.

Figure 24 SIDRA Layout - Nairn Drive / Fifty Road (6-Lane)

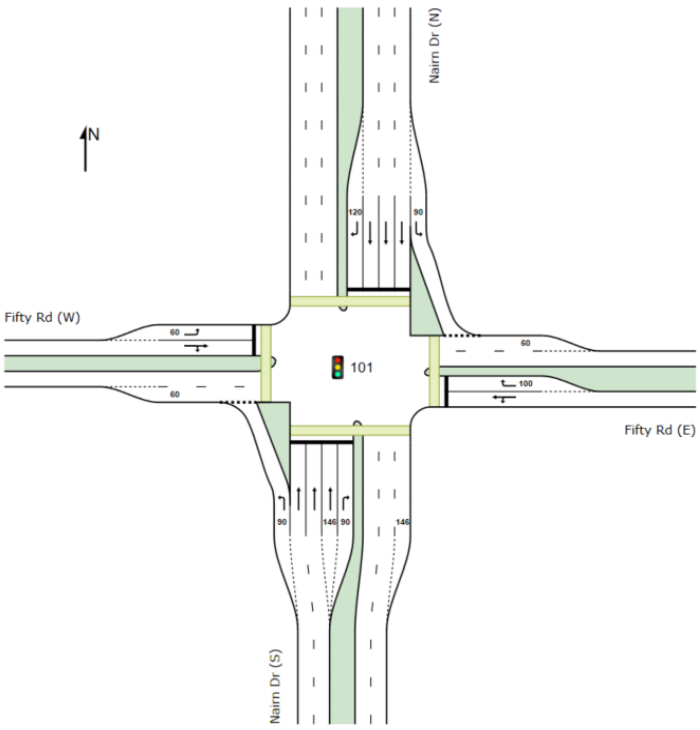


Table 9 SIDRA Result - 2041 BG + DEV (6 Lane)

2041 BG + DEV (6 lane)	AM Peak				PM			
Intersection	Dos	Delay (s)	LoS	Queue (m)	Dos	Delay (s)	LoS	Queue (m)
Nairn Dr / Fifty Rd	0.894	61	LoS E	241.5	0.889	43.3	LoS D	195.9
Nairn Dr / East Access	0.513	0.2	LoS A	102.2	0.418	0.2	LoS A	1.2
Nairn Dr / Main St	0.491	0.7	LoS A	6.2	0.417	0.6	LoS A	4.2
Nairn Dr / Pantheon Ave	0.125	4.3	LoS A	2.4	0.586	0.5	LoS A	0.4
Nairn Dr / Amazon Dr	0.953	60.5	LoS E	65.4	0.855	45.6	LoS D	304.3
Fifty Rd / Everest Way	0.137	3.1	LoS A	4.2	0.08	4	LoS A	2.5
Yellowstone Rd / Fifty Rd	0.261	0.5	LoS A	0.3	0.229	0.5	LoS A	0.2
Yellowstone Rd / Main St (L)	0.081	3.8	LoS A	1.2	0.08	3.9	LoS A	1.9
Yellowstone Rd / Main St (R)	0.125	4.3	LoS A	2.4	0.131	4.3	LoS A	3.6
Yellowstone Rd / Pantheon Ave	0.133	4.9	LoS A	5.4	0.16	5.5	LoS A	6.6
Yellowstone Rd / Amazon Dr	0.128	2.6	LoS A	4.1	0.213	3	LoS A	7.1

The SIDRA assessment outcome suggests that a 6-lane Nairn Drive approach would allow the signalised intersection with Fifty Road to perform within acceptable LoS with significantly lower queue lengths during the AM peak. However, it should be noted that due to the limited road reserve width on Nairn Drive north of Fifty Road, a 6-lane road may not be feasible without further land resumptions, which would incur a significant construction cost.

9 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**.

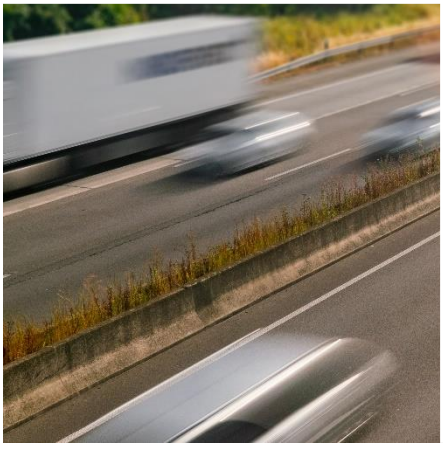
The following conclusions can be drawn from this TIA:

- Nairn Drive and Fifty Road traffic signal intersection shows capacity issues, predominantly caused by the assumed level of regional background traffic growth in 2041 and will require further detailed design and assessment during the subdivision stage. It is noted that the preferred signalised intersection control will require Main Roads WA approval via the TSAP process.
- Despite the poor intersection performance outcomes in the 2041 horizon scenario, traffic signals at Nairn Drive / Fifty Road intersection will provide excellent permeability and safety for pedestrians and cyclists to cross Nairn Drive in the vicinity of the neighbourhood centre and the adjacent Baldivis Primary School.
- The proposed road cross sections are consistent with the *Liveable Neighbourhoods 2009* and adequately accommodate the expected traffic volumes generated by the development.
- The amended LSP is expected to generate approximately 5,580 daily trips, with AM and PM Peak hours generating approximately 475 and 566 trips respectively. This is less than the approximately 6,000 trips per day estimated for the previously approved LSP, due to a more accurately estimated number of dwellings.
- The additional traffic volumes associated with the LSP are considered to have a very minor impact to the surrounding road network during the peak periods, as the greater contributor to the delay and queue concerns along the Nairn Drive intersection is the background traffic growth / regional traffic.



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	





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ATTACHMENT 10

Local Water Management Strategy

20 January 2025

Your Ref:
Our Ref: H24018Bv1

Aigle Royal Developments
Level 8, 225 St Georges Tce
Perth, WA 6000
ATTENTION: Kris Kennedy

Dear Kris,

LOT 1401 & 1402 FIFTY RD, BALDIVIS LWMS ADDENDUM : ALTERNATIVE LSP

This LWMS addendum has been prepared by Hyd2o on behalf of Aigle Royal Developments for the revised local structure plan regarding Lots 1401 and 1402 at Fifty Rd within the suburb of Baldivis located 39 km south of Perth CBD.

Stormwater remodelling has been provided to support revisions to the local structure plan, which have resulted in a proposed changes to the sites stormwater management areas.

The modelling in this report is intended to supersede previous modelled as detailed in the site LWMS (Peritas, 2020). Key principles and objectives of the approved LWMS remain current and valid for implementation.

This addendum report does not intend to reproduce all elements of the previously approved LWMS (Peritas, 2020). It is intended to be read in conjunction with the previous document and provide only the relevant information necessary to demonstrate overall compliance with the original LWMS.

A copy of previous LWMS extracts related to stormwater modelling are contained as Attachment A.

1. REVISED STORMWATER MODELLING

The proposed revised local structure plan is shown in Figure 1. The total catchment area is estimated as 16.6 ha in size with the land use breakdown summarised in Table 1.

Stormwater modelling for the vegetated detention/bioretention and flood storage areas was performed using XP-Storm. The design rainfall storms modelled in XP-Storm were based on methodology in Australian Rainfall and Runoff (AR&R) (Ball et al, Australia, 2016). All design rainfall and temporal patterns were imported into the model using the ARR Data Hub. Rainfall was assumed to be spatially uniform across the catchment.

Storm durations modelled ranged from 30 minutes to 72 hours and all ensembles were run for each storm to determine critical design events. Various runoff coefficients applied to different land uses for each of the AEP's modelled were based on rates identified in the LWMS (Peritas, 2020).

The following key parameters were used for stormwater modelling:

- Runoff rates calculated and applied based on the LWMS (Peritas, 2020).
- Side slopes of 1:6 for the POS infiltration storages.

- The storages to include biofiltration areas sized to manage the 15mm event for water quality treatment, with the overall storage sized to retain and infiltrate the 1% Annual Exceedance Probability (AEP) event.
- Saturated hydraulic conductivity of 5 m/d used for modelling of flood storages consistent with previous modelling from the LWMS (Peritas, 2020).
- For the biofiltration area part of the storage an infiltration rate of 2.5 m/day was adopted considering the use of biofilter media and a 50% reduction for long term clogging effects.
- A maximum allowable storage depth less than 1.2 m adopted consistent with the City of Rockingham requirements.

Revised modelling results are presented in Figure 2 and Table 1, with details outputs of stormwater modelling included as Attachment B and updated landscape plans included as Attachment C. The results show the proposed POS areas to be sufficient in size to manage storage runoff from the site post development up to the 1% AEP event and should be used to inform future Urban Water Management Plan (UWMP) preparation for the site.

2.REFERENCES

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) (2016), Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia.

Department of Water & Environmental Regulation (2024) Perth Groundwater Map (online)

Department of Water & Environmental Regulation (2017). Decision Process for Stormwater Management in WA

Department of Water & Environmental Regulation (2022). Stormwater Management Manual for Western Australia

Peritas Group (2020), Lot 1401 and Lot 1402 Fifty Road Baldivis Local Water Management Strategy, August 2020.

Western Australian Planning Commission (2008), Better Urban Water Management

Should you have any queries regarding this report, please do not hesitate to contact Sasha Martens or Brian Lau of this office.

Yours sincerely,



Brian Lau, Environmental Hydrologist

Table 1: Revised Stormwater Management Modelling

Catchment & Design Parameters	Catch 1	Catch 2	Catch 3	Catch 4
Commercial (ha) Managed On Site	-	-	1.83	-
R20 Lot (ha) 80% RO	-	0.17	-	-
R25 Lot (ha) 80% RO	-	4.18	-	-
R30 Lot (ha) 80% RO	0.63	0.76	-	-
R40 Lot (ha) 80% RO	0.46	0.53	0.13	-
POS (ha) 20% RO	0.08	1.23	0.11	-
Road (ha) 80% RO	0.70	3.72	0.49	1.62
Total Area (ha)	1.87	10.59	2.56	1.62
EIA 15mm (ha)	0.56	2.98	0.39	1.30
EIA 1%AEP (ha)	1.45	7.73	0.51	1.30
Storage Design Parameters				
Type	Storage	Storage	Storage	Swale
Permeability (m/day)	2.5 (bio) 5.0	2.5 (bio) 5.0	2.5 (bio) 5.0	2.5
Indicative Invert (mAHD)	5.8	8.0	6.0	varies
Base Area (m^2)	143@ 5.8mAHD 280@ 6.1mAHD	880@ 8.0mAHD 2250@ 8.3mAHD	100	730
Side Slopes (v:h)	1:6	1:6	1:6	1:3
15mm Biofiltration				
Flood Rise (m)	0.29	0.29	0.27	0.1
TWL (mAHD)	6.09	8.29	6.27	varies
Top Area (m^2)	243	1123	203	951
Volume (m^3)	56	284	38	85
20%AEP Event				
Flood Rise (m)	0.73	0.6	0.44	0.14
TWL (mAHD)	6.53	8.6	6.44	varies
Top Area (m^2)	503	2641	260	1039
Volume (m^3)	223	1033	76	124
Critical Storm (hr)	3	3	1	1
1%AEP Event				
Flood Rise (m)	1.18	1.16	0.69	0.29
TWL (mAHD)	6.98	9.16	6.69	varies
Top Area (m^2)	793	3440	376	1372
Volume (m^3)	507	2723	153	301
Critical Storm (hr)	6	6	3	1

Runoff parameters adopted as per previous LWMS, except Commercial assumed to manage all stormwater on site.

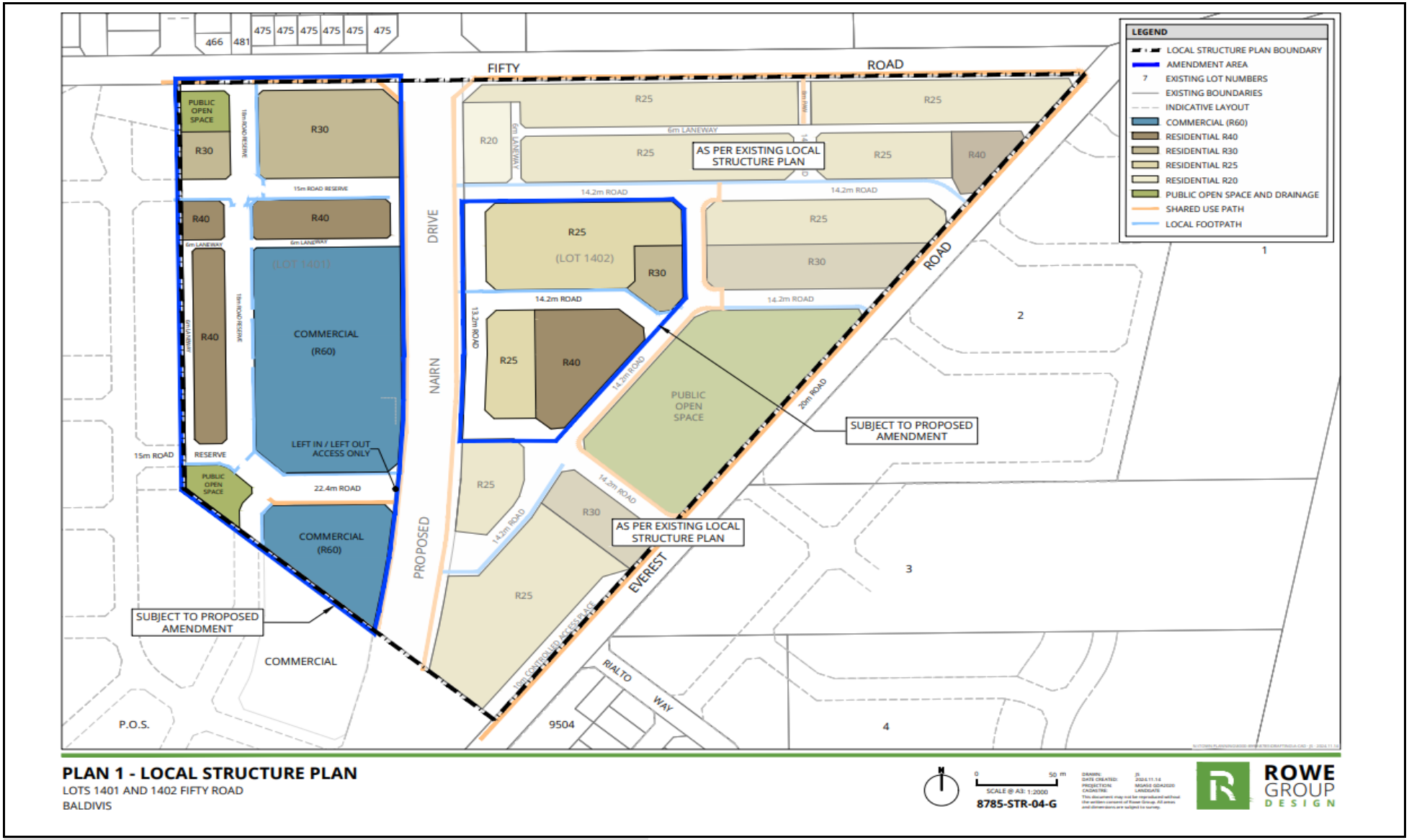
Attachments

Figure 1: Revised Structure Plan
Figure 2: Revised Stormwater Management Plan
Attachment A: LWMS Stormwater Plan Extracts (Peritas, 2020)
Attachment B: Revised Stormwater Modelling Results
Attachment C: Landscape Plans

This document is published in accordance with and subject to an agreement between Hyd2o and the Client for whom it has been prepared, and is restricted to those issues that have been raised by the Client in its engagement of Hyd2o. It has been prepared using the skill and care ordinarily exercised by hydrologists in the preparation of such documents. Hyd2o recognise site conditions change and contain varying degrees of non-uniformity that cannot be fully defined by field investigation. Measurements and values obtained from sampling and testing in this document are indicative within a limited timeframe, and unless otherwise specified, should not be accepted as conditions on site beyond that timeframe. Any person or organisation that relies on or uses the document for purposes or reasons other than those agreed by Hyd2o and the Client does so entirely at their own risk. Hyd2o denies all liability in tort, contract or otherwise for any loss, damage or injury of any kind whatsoever (whether in negligence or otherwise) that may be suffered as a consequence of relying on this document for any purpose other than that agreed with the Client.

FIGURES

Date: 15/01/2025 Job No H24018



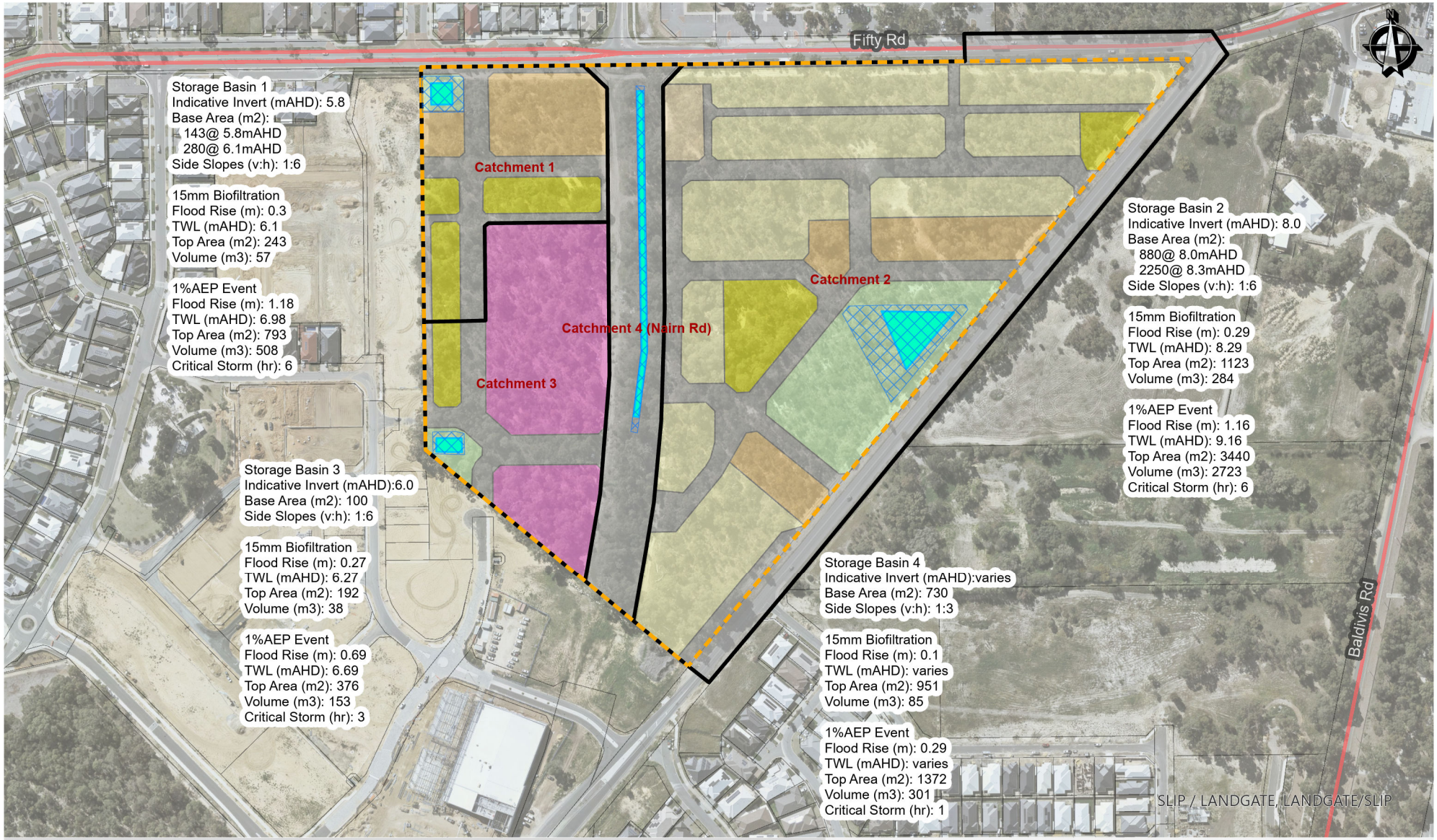
PLAN 1 - LOCAL STRUCTURE PLAN
LOTS 1401 AND 1402 FIFTY ROAD
BALDIVIS

SCALE @ A3: 1:2000
8785-STR-04-G

ROWE GROUP DESIGN

(Rowe Group Design, 2024)

Date: 15/01/2024 Job No. H24018



Site Boundary
Catchment
1% AEP Basin
15mm Biofiltration

Land Use

R20 Lot
R25 Lot
R30 Lot
R40 Lot
Commercial
POS
Road Reserve

0 25 50 75 100 Meters

hyd2o

Lot 1401 & 1402 Fifty Rd Baldivis LWMS Addendum: Alternative LSP

Stormwater Management Plan

Figure 2

ATTACHMENT A

LWMS Stormwater Plan Extracts
(Peritas, 2020)

4. STORMWATER MANAGEMENT STRATEGY

The Local Structure Plan (LSP) area is divided into eastern and western catchments by Nairn Drive.

Nairn drive has a 40m wide road reserve, which provided a unique opportunity to incorporate stormwater Best Management Practices (BMP) completely within the road reserve, therefore Nairn Drive is isolated as its own Catchment 4. All other catchments incorporated Public Open Space (POS), incorporating basins to manage stormwater for 15mm, 20% Annual Exceedance Probability (AEP) and 1% AEP.

The eastern Catchment 2 is the largest in the LSP area with a 1.2ha POS proposed.

The western catchment is divided into two lesser catchments. Both north-western (Catchment 1) and south-western catchments (catchment 4) drains to POS adjoining existing Spire estate to the west of the Development. Refer to concept Landscaping plan in Appendix 12, which shows integration with adjoining landscaped POS.

Table 4-1 and Appendix 14 shows Catchment properties and boundaries respectively.

Table 4-1 Catchment Properties

Catchment											
ID	AREA (m²)	% Impervious	90%	75%	75%	80%	80%	20%	80%	80%	80%
		Land Use	Commercial (m²)	R20 (m²)	R25 (m²)	R30 (m²)	R40 (m²)	POS (m²)	PAW (m²)	Road (m²)	Eighty & Fifty Rd (m²)
Catchment 1	27,750	Land Use Total	4,821	0	5,020	6,804	2,521	1,062	0	7,522	0
		Impervious	4,339	0	3,765	5,443	2,017	212	0	6,018	0
		Pervious	482	0	1,255	1,361	504	850	0	1,504	0
Catchment 2	106,776	Land Use Total	0	1,656	41,735	7,404	5,250	12,316	241	22,174	16,000
		Impervious	0	1,242	31,301	5,923	4,200	2,463	193	17,739	12,800
		Pervious	0	414	10,434	1,481	1,050	9,853	48	4,435	3,200
Catchment 3	16,674	Land Use Total	13,674	0	354	0	0	497	0	2,149	0
		Impervious	12,307	0	266	0	0	99	0	1,719	0
		Pervious	1,367	0	89	0	0	398	0	430	0
Catchment 4	16,000	Land Use Total	0	0	0	0	0	0	0	16,000	0
		Impervious	0	0	0	0	0	0	0	12,800	0
		Pervious	0	0	0	0	0	0	0	3,200	0

The site is expected to be sandy with good permeability, suitable for in-situ stormwater management. Accordingly, stormwater management is by infiltration, all runoff will be collected either at source or within Public Open Space (POS).

The stormwater management approach is modelled in PCSump. Detailed explanation on modelling parameters and model results are included in Appendix 16.

4.1. 15mm Rainfall

4.1.1. Residential Lots Retention

In accordance with City of Rockingham (CoR) Planning Policy 3.4.3, all residential lots are to retain the first 15mm of rainfall. This is typically by means of soakwells, installed by builders, which can be enforced by the City of Rockingham (CoR) at building license application.

Typical volumes for various R-Code lots are as shown on Table 4-2.

Table 4-2 Residential Lots – Typical 15mm Retention Requirements.

R Code	Average Area (m^2)	Min. Open Space[1] (%)	Additional Impervious Areas [2] (%)	Total Impervious area (%)	Total Impervious area (m^2)	Typical Retention Volume/lot (m^3)
R20	450	50	25	75%	338	5.1
R25	350	50	25	75%	263	3.9
R30	300	45	25	80%	240	3.6
R40	220	45	25	80%	176	2.6

[1] Minimum Open Space ratio dictated by R-codes.
[2] Allowance for paving, driveways, etc.

Soakwells relies on infiltration and accordingly, it is recommended that a minimum of 0.3m clearance is maintained from DWER 2015 Lower Serpentine Hydrological Report (DWER GWL). Some LSP areas has more groundwater separation than others. The soakwell depth to be used at each location shall be assessed at building license stage.

Preliminary sizing of lot drainage BMP is as shown on Table 4-3 showing different soakwell size options depending on soakwell depths.

Table 4-3 Residential Lots – Soakwells for 15mm Retention

R Code	Typical Retention Volume/lot (m^3)	900 deep Soakwells[1]	1500 deep Soakwells[1]	1800 deep Soakwells[1]
R20	5.1	3 x DN 1500 – 5.9m^3	2 x DN 1500 – 6.3m^3	1 x DN 1800 – 5.3m^3
R25	3.9	2 x DN 1500 – 3.9m^3	2 x DN 1200 – 4.2m^3	1 x DN 1800 – 5.3m^3
R30	3.6	2 x DN 1500 – 3.9m^3	2 x DN 1200 – 4.2m^3	1 x DN 1500 – 3.8m^3
R40	2.6	2 x DN 1200 – 2.6m^3	2 x DN 1200 – 4.2m^3	1 x DN 1500 – 3.8m^3

[1] Soakwells assumed to be installed with 0.15m bluemetal aggregate surround with 20% void ratio (added storage capacity).

Residential lots are unlikely to engage their own civil engineering consultant during building phase. Accordingly, the CoR have advised that the retention criteria will be stipulated as volumetric criteria for simplicity. This means that infiltration by the Soakwells are not considered.

When infiltration is accounted, the specification of 15mm volumetric retention effectively allow the lots to manage up to 1% AEP event. PCSump modelling result are summarised on Table 4-4, detailed result included in Appendix 16.

Table 4-4 Residential Lots – 1% AEP Management

R Code	BMP Modelled	Soakwell Volume	1% AEP modelled volume
R20 & R25	1 x DN1800 x 1800	5.3m^3	3.0 m^3
R30 & R40	1 x DN1500 x 1800	3.8m^3	1.0 m^3

4.1.2. Commercial Lots Management

Commercial properties shall manage up to 10% AEP event. This is further discussed in Section 4.3.

4.1.3.

4.1.3. LSP Internal Access Roads and Laneways Management

The 15mm runoff generated from LSP internal access roads and laneways shall be managed within POS by means of bio-retention infrastructures.

Typical bio-retention infrastructure profile is as shown on Figure 4-1. The first 15mm of rainfall (first flush) would be conveyed into the structure and retained for treatment. The first flush wash the pollutants on roadways, carrying it into the treatment zones. Typically, lined reconstituted limestone blocks are used to form the boundaries of the water retention structure.

The retained water would filter through an amended filter media (typically with Phosphorous Retention Index of 5 and permeability rate of 5m/day) to strip phosphorous and planted with specific vegetation to treat hydrocarbons. Typical filter media included the Bunbury Loam, Busselton Loam, Cowaramup Sandy loam, etc. Commonly used product in Perth region (due to supply availability) included the Gingin Loam, Eclipse Soil products, Spearwood sand, etc.

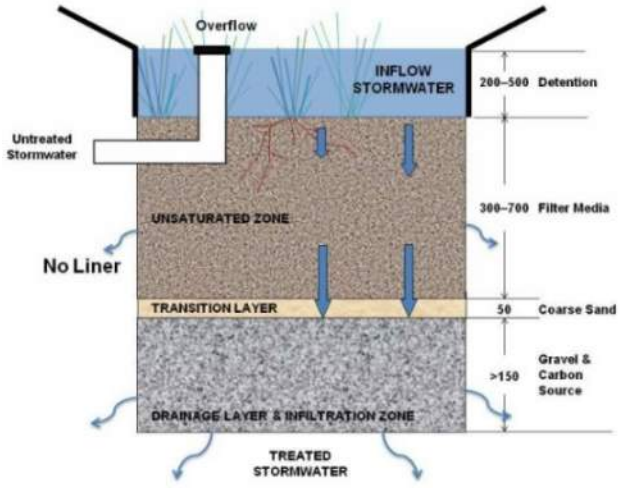


Figure 4-1 Typical Bio-retention profile (Facility for Advancing Water Bio-filter)

Bio-retention requirements for each catchment is summarised on Table 4-5. Bio-retention requirements are modelled to consider infiltration.

Table 4-5 Internal Access Roads and Laneways Bio-retention Requirements Within POS

Catchment	Pedestrian Access Way	Road Reserve	Eighty and Fifty Road	Retained Volume	Water Depth	Water Surface Area
1	0 m²	7,522 m²	0 m²	21 m³	0.3 m	98 m²
2	241 m²	22,174 m²	16,000 m²	197 m³	0.3 m	773 m²
3	0 m²	2,149 m²	0 m²	1 m³	0.3 m	12 m²

4.1.4. Eighty and Fifty Road Management

Eighty and Fifty road are existing road reserves. The majority of Fifty road have been upgraded into urban road profile, kerbed and grades to the west. The proposed Development does not alter the pre-existing drainage regime to the existing upgraded Fifty Road (urban profile).

However, there are sections of Eighty and Fifty road which has rural road profile (un-kerbed with roadside swales). These roads currently drain forwards a low point, where POS 2 is proposed.

The Development of the LSP area will include the upgrading of the Eighty and Fifty Road reserves into a kerbed urban profile and potentially re-grading it to suit new development levels. Accordingly, an allowance is made within POS 2 to manage existing road catchments.

Runoff from future Eighty and Fifty is to be piped into POS 2. Refer to Table 4-5 for bio-retention area within Catchment 2, which accounted for Eighty and Fifty Road runoff.

Catchment plan, showing Eighty and Fifty Road catchment incorporated as part of Catchment 2 is as shown on Appendix 14.

4.1.5. Nairn Drive Management

Nairn Drive is a future proposed Integrator Type A road. In accordance with Liveable Neighbourhood (LN), Nairn Drive incorporated 2 x 10.9m carriageway and a 6m wide central medial (Figure 4-2). The Nairn Road reserve is 40m wide, 2.2m wider than the reserve specified in LN, therefore allowing 6.1m verge on each side.

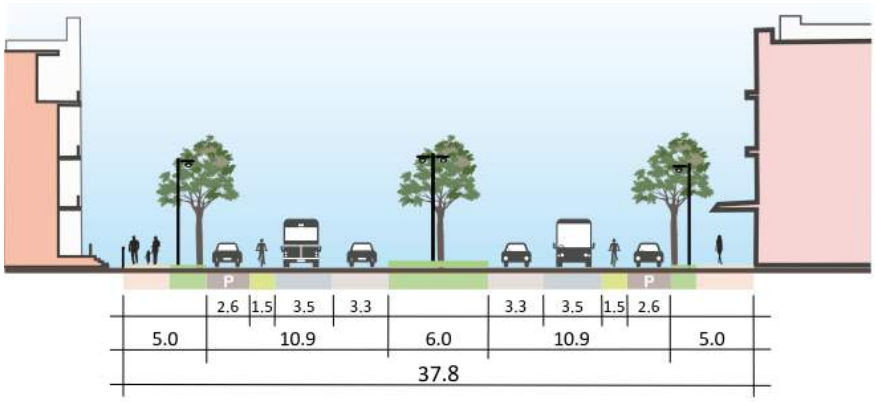


Figure 4-2 Extract from Liveable Neighbourhood – Integrator A Arterial

Assuming 2m dual use footpath is proposed on each side of the verges, a 4.1m corridor is available for bio-retention and retention swale. A shallow swale is proposed for the verges to manage runoff from all storm events. The proposed swale is expected to have 1:6 slope, 0.3m deep with a 0.5m wide base (total top width of 4.1m). The swale sizing are further discussed in Section 4.2 for 20% AEP event and Section 4.4 for 1% AEP event.

The bio-retention requirement for Nairn Drive is as shown on Table 4-6.

Table 4-6 Nairn Drive bio-retention Requirements Within Road Reserve

Catchment	Road Reserve	Retained Volume	Water Depth	Water Surface Area
4	16,000 m²	55 m³	0.1 m	1,073 m²

4.2. 20% AEP Management – Roadways

4.2.1. LSP Internal Access Roads and Laneways

All roads within the development area shall be kerbed and provided with a conventional pipe drainage network consisting of collector gullies, manholes and drainage pipes. The stormwater piped network shall ideally terminate into a headwall. However, a free outfall option may be restricted by invert levels, in which case, a bubble-up arrangement within the proposed swales or compensation (soakage) basins shall be considered.

The proposed stormwater retention/detention basin /swales that will be incorporated within the development area shall be landscaped.

Table 4-7 summarise the water level extent in the POS for 20% AEP event.

Table 4-7 20% AEP Basin Characteristics

Catchment ID	Critical Event	Retained Volume	Water Depth	Water Surface Area
1	2 hrs	143 m³	0.3 m	498 m²

Catchment ID	Critical Event	Retained Volume	Water Depth	Water Surface Area
2	3 hrs	996 m³	0.8 m	1,478 m²
3	30 min	0 m³	0.0 m	36 m²

4.2.2. Eighty and Fifty Road Catchment

The proposed upgrade of Eighty and Fifty road to kerbed urban road profile require runoff to be captured and drained towards POS by means of pipework.

Eighty and Fifty Road catchment is incorporated as part of Catchment 2. 20% AEP event management required is as shown on Table 4-7.

4.2.3. Nairn Road Catchment

The 20% AEP management requirements for Nairn Road is as shown on Table 4-8.

Table 4-8 Nairn Road 20% AEP Basin Characteristics

Catchment ID	Critical Event	Retained Volume	Water Depth	Water Surface Area
4	30 min	95 m³	0.1 m	1,406 m²

4.3. 10% AEP Storm Management – Commercial Lots

The CoR require commercial zoned areas to manage up to 10% AEP event. Accounting for the larger retention requirements, soakwells often became less viable option due to its cost.

There is a higher tendency for commercial spaces to be developed incorporating a combination of proprietary underground stormwater storage systems (examples listed on Table 4-9) and system storages within pit and pipe networks.

Table 4-9 Examples of Proprietary Underground Stormwater Storage Systems

Supplier	Product
ACO	StormBrixx SD and StormBrixx HD
Atlantis	Flo-Tank® Mini, Flo-Tank® Single, Flo-Channel®
Cubicm³	SC-310, SC740
DSAgency	Rainsmart Ellipse Tank
Geofabrics	ecoAID®
Global Synthethics	ProTank®
Novaplas	Drainwell™ DW1595, Drainwell™ DW1992
Humes	StormTrap®

The above list of proprietary underground stormwater storage products has variable dimensions, storage efficiency, load rating, installation procedures etc. If adopted, the proprietary products are to be designed and installed to manufacturer's recommendation on a case by case basis.

It should also be noted that most of the suppliers offer design services to assist in appropriately sizing the storage requirements. This option is available to future owners if the commercial parcels are too small to require its own consultant design team.

The CoR will be provided an opportunity to review and regulate the design by means of the building license application process.

The management requirements for commercial spaces are modelled using PCSump for critical 10% AEP storm event. The outcome of the model are as shown on Table 4-10. Refer to Appendix 16 for calculations.

Table 4-10 Commercial area retention requirements

Catchment ID	Critical Event	Retained Volume
1	3 0min	44 m³
2	6 hr	262 m³

4.4. Major Flood Management up to 1% AEP

Surface runoff from roads and lots in major storm events will be conveyed via overland flow within road reserves towards the POS areas. The grading through the LSP area shall ensure that roads grade towards the MUCs, and that finished lot levels achieve a minimum of 0.3m freeboard above the 1% AEP flood levels.

Table 4-11 summarise the flood extent in the POS for 1% AEP event.

Table 4-11 1% AEP Basin Characteristics

Catchment ID	Critical Event	Retained Volume	Water Depth	Water Surface Area
1	9 hrs	687 m³	0.4 m	955 m²
2	9 hrs	3,637 m³	1.2 m	9,565 m²
3	9 hrs	171 m³	1.2 m	306 m²
4	30 Min	198 m³	0.2 m	2,037 m²

4.4.1. Nuisance insect management

The extended ponding of water in drainage structures can create a favourable environment for mosquitoes and midges to breed. The drainage system at the site needed to be designed to avoid this, by minimising the areas where water can pond.

All trapped gullies should have weep-holes at the base to allow water to infiltrate. Trapped gullies shall be installed above groundwater table only. Bio-retention infrastructures shall be designed with high permeability filter media with a minimum of 10m/day permeability.

Basins and swales within each catchment shall be designed to drain within 96hours. Estimated BMP emptying times are noted on Table 4-12. The emptying times are based on clogged based model calculated by PCSump. Refer to Appendix 16 for calculations.

Table 4-12 1% AEP Estimated basin Empty Time.

Catchment ID	Basin/swale empty duration (hrs)
1	67
2	80
3	75
4	20

4.5. BMP Configuration

During the LWMS consultation process with the CoR, two elements have been identified to have potential impact on stormwater BMPs configuration. These elements needed further investigation at UWMP (subdivision stage).

4.5.1. Nairn Drive Services Corridor

The feasibility of stormwater BMP in verges rely on consent from other services authorities. Standard services alignment adopted after May 2001 as shown on Figure 4-3.

SUMMARY:

1. TOTAL SITE AREA = 15.11ha
2. MINIMUM TOTAL P.O.S. = 10% OF GROSS AREA
3. REFER TO 'LOCAL WATER MANAGEMENT STRATEGY' REPORT FOR DRAINAGE DESIGN CALCULATIONS.
4. EXISTING STORMWATER DRAINAGE ALONG EIGHTY ROAD AND FIFTY ROAD TO BE CONFIRMED BY SURVEY DURING DESIGN STAGE.

LEGEND

- EXISTING CONTOUR AND LABEL
- 11.00 PROPOSED PAD LEVEL
- x 10.25 PROPOSED SPOT LEVEL
- PROPOSED FLOW DIRECTION
- DEVELOPMENT BOUNDARY
- SUB-CATCHMENT BOUNDARY
- DRAINAGE CATCHMENT 1
- DRAINAGE CATCHMENT 2
- DRAINAGE CATCHMENT 3
- DRAINAGE CATCHMENT 4
- 1% AEP INDUNDATION AREA
- 20% AEP INDUNDATION AREA
- 1%EY INDUNDATION AREA

FIFTY ROAD

EIGHTY ROAD

RIALTO WAY

CATCHMENT 1

CATCHMENT 2

CATCHMENT 3

CATCHMENT 4

PUBLIC OPEN SPACE 1.2ha

PUBLIC OPEN SPACE 1035m²

COMMERCIAL (R60) 4821m²

COMMERCIAL (R60) 1.37ha

R30 5922m²

R30 882m²

R40 2521m²

R25 5020m²

R25 5591m²

R20 1656m²

R25 5450m²

R25 4649m²

R40 1307m²

R25 2685m²

R25 6425m²

R30 1271m²

R25 4457m²

R30 3879m²

R25 2266m²

R40 3943m²

R25 2297m²

R30 2254m²

R25 7915m²

SK02 A, B, C, D, E

1:1000 AT A1

0 10m 20m 40m 60m

6/08/2020 6:09:57 PM Daniel Ayres
E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2018\PC18008 - Lot 311 Baldivis Road, Baldivis - LWMS\2.0 Design\23 - Drawings\SK01 & SK02.dwg

No.	REVISION	BY	DATE
N	EXTENT OF BASINS/SWALES UPDATED	DA	05.08.20
M	BASIN LAYOUT AT SECTION C AMENDED	DA	19.06.20
L	SECTION REFERENCES ADDED	DA	18.06.20

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CLIENT: ALLERDING & ASSOCIATES

PROJECT: LOT 1401 & 1402 FIFTY ROAD BALDIVIS

DRAWING TITLE: DRAINAGE CATCHMENT PLAN

SCALE	AS SHOWN	FILE	PC18008
HORIZONTAL	–	DESIGN	EBF
VERTICAL	–	DRAWN	SH
SURVEY DATUM	AHD	CHECKED	
WAPC No	–	DATE	MAR 20
CADFILE NAME	–	DRAWING No.	SK01
		REV.	N

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BELOW

APPROVED .....



LEGEND

- EXTENT OF WORKS
- INDICATIVE BASIN TOP WATER LEVELS
- COMMERCIAL LOTS
- RESIDENTIAL LOTS
- TURF
- PLANTED DRAINAGE BASIN
- PROPOSED STREET TREES
- PROPOSED POS TREES
- PLAY AREA
- SHELTER
- PICNIC SEATING
- JOGGING
- CYCLING

LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

CONCEPT MASTERPLAN

DRAFT

DWG EMG-37-SK01
REV D
DATE 06.07.20
SCALE 1 : 2000 @ A3
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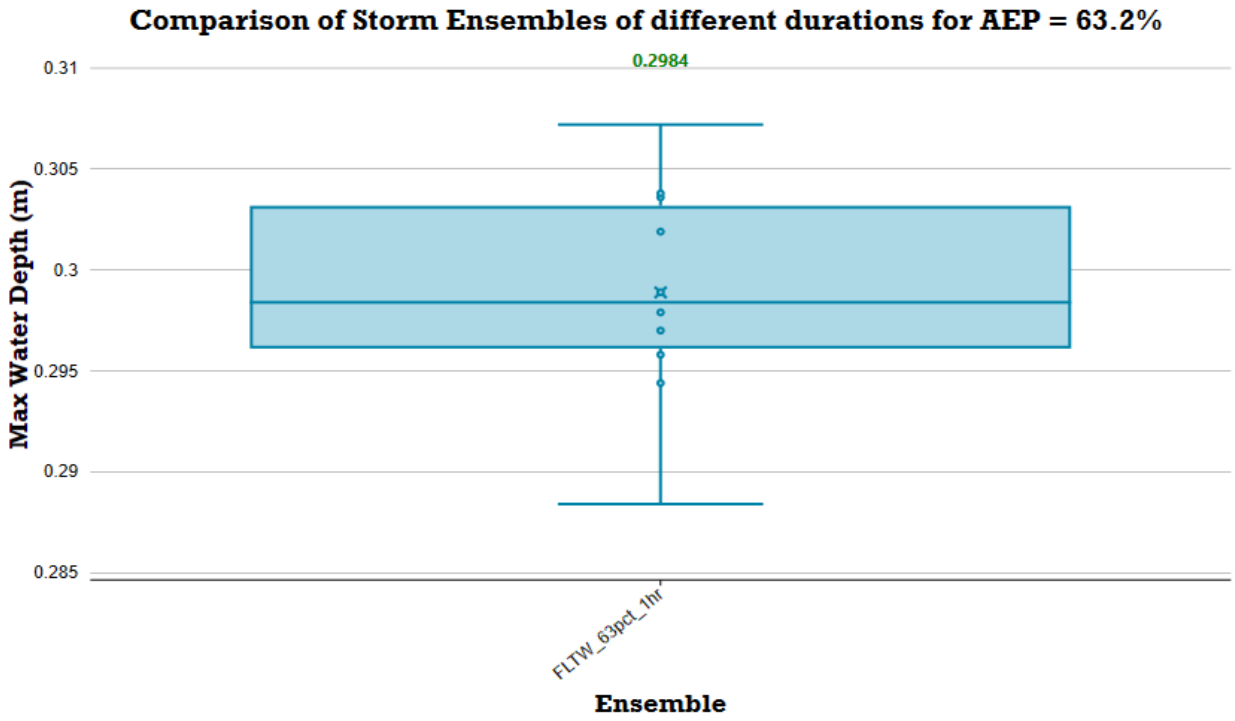
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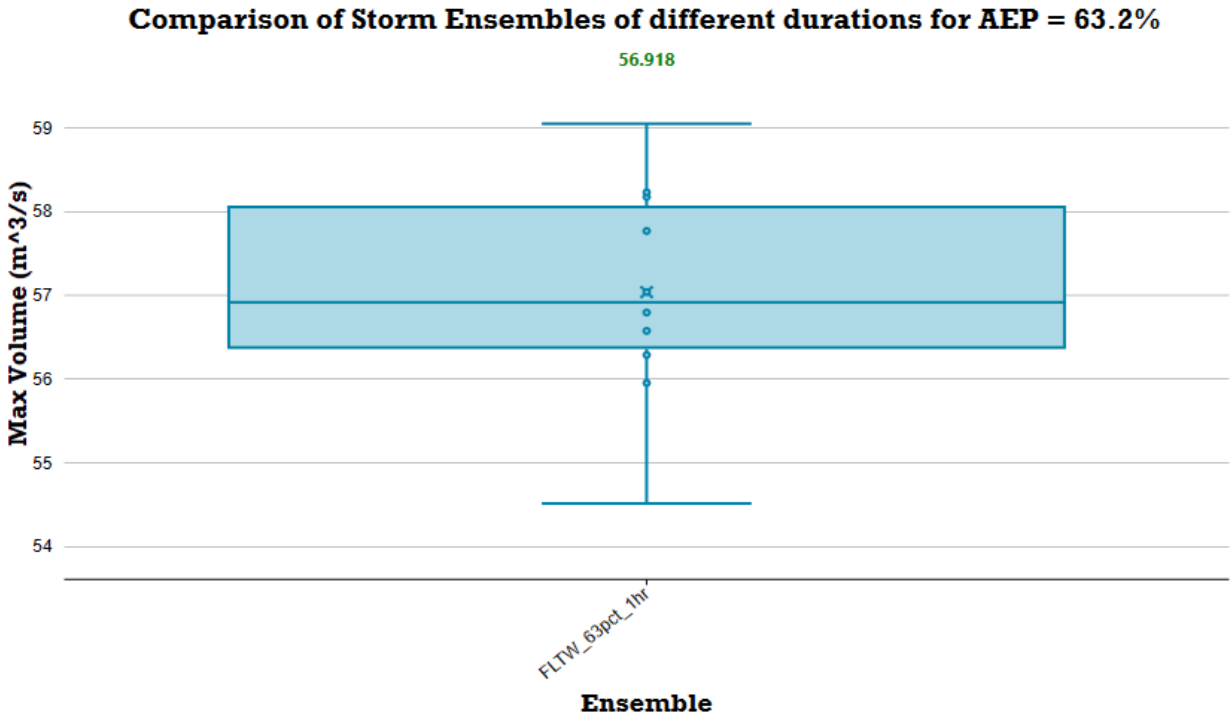
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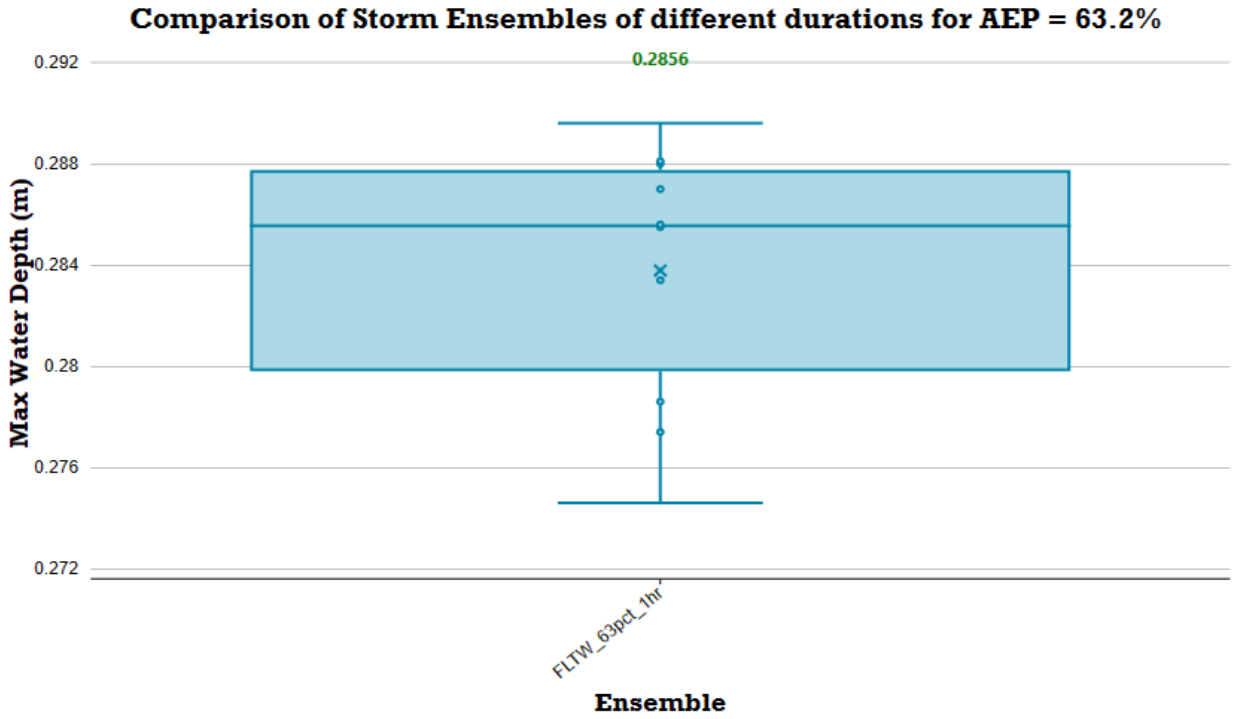
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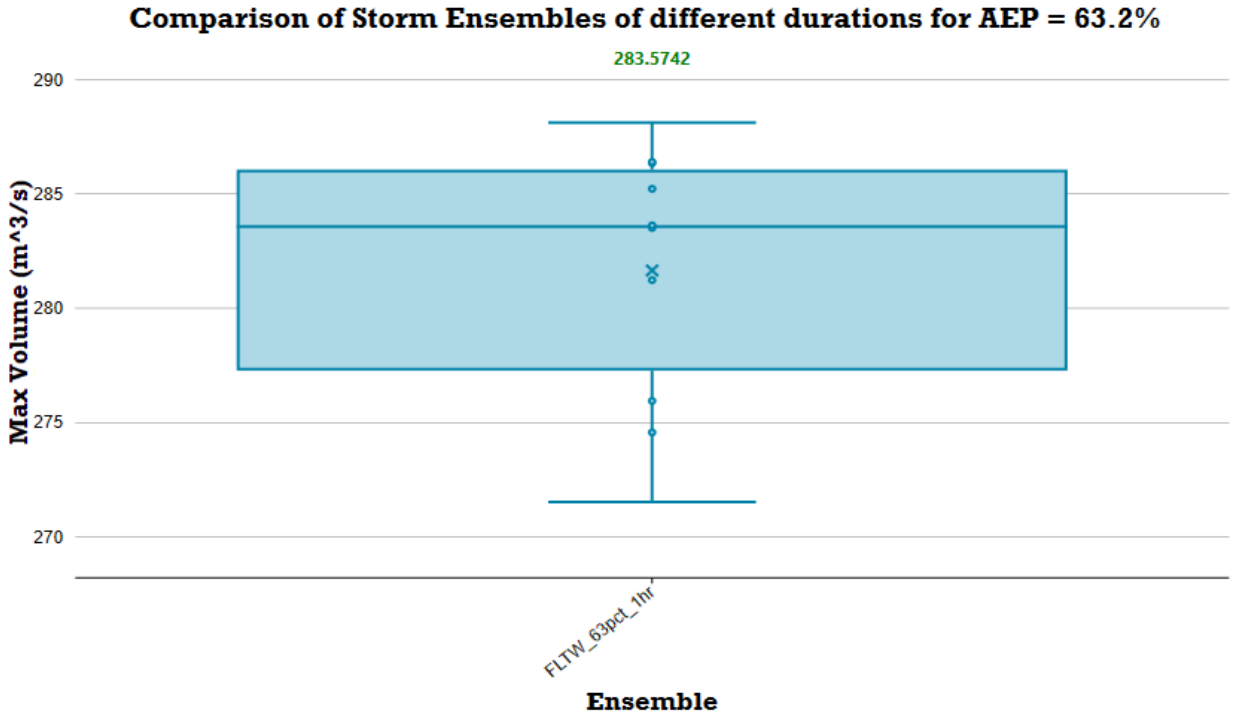
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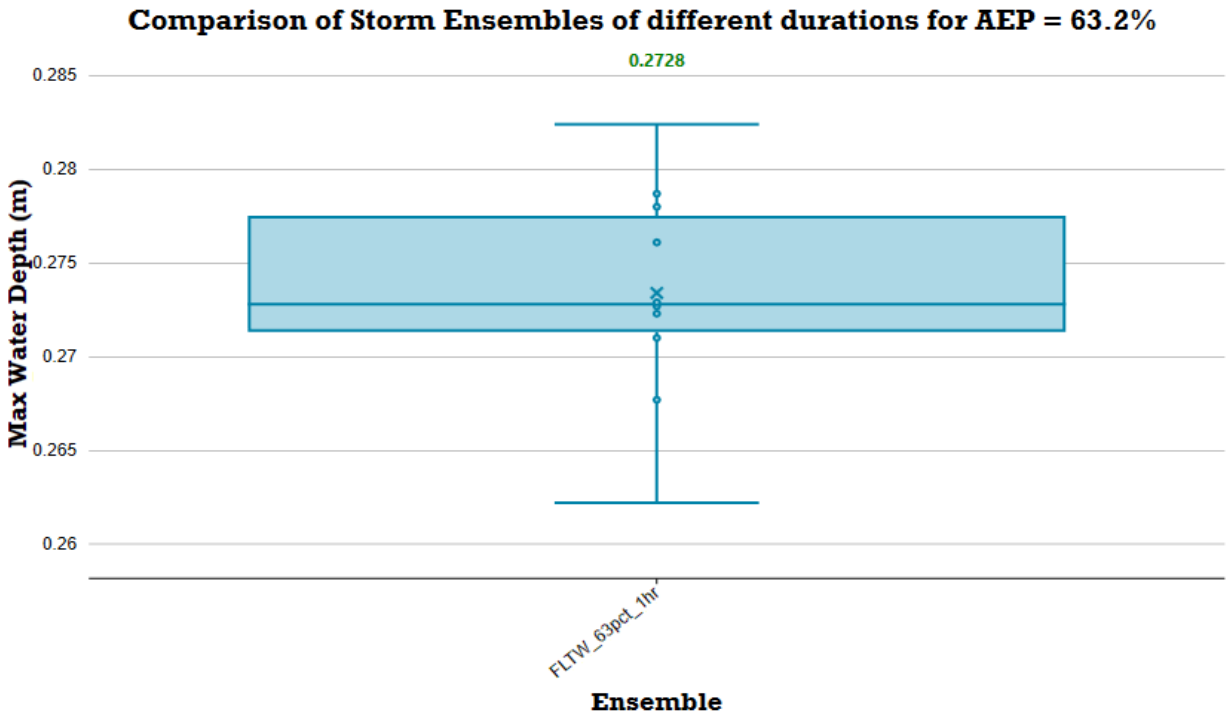
Revised Stormwater Modelling Results

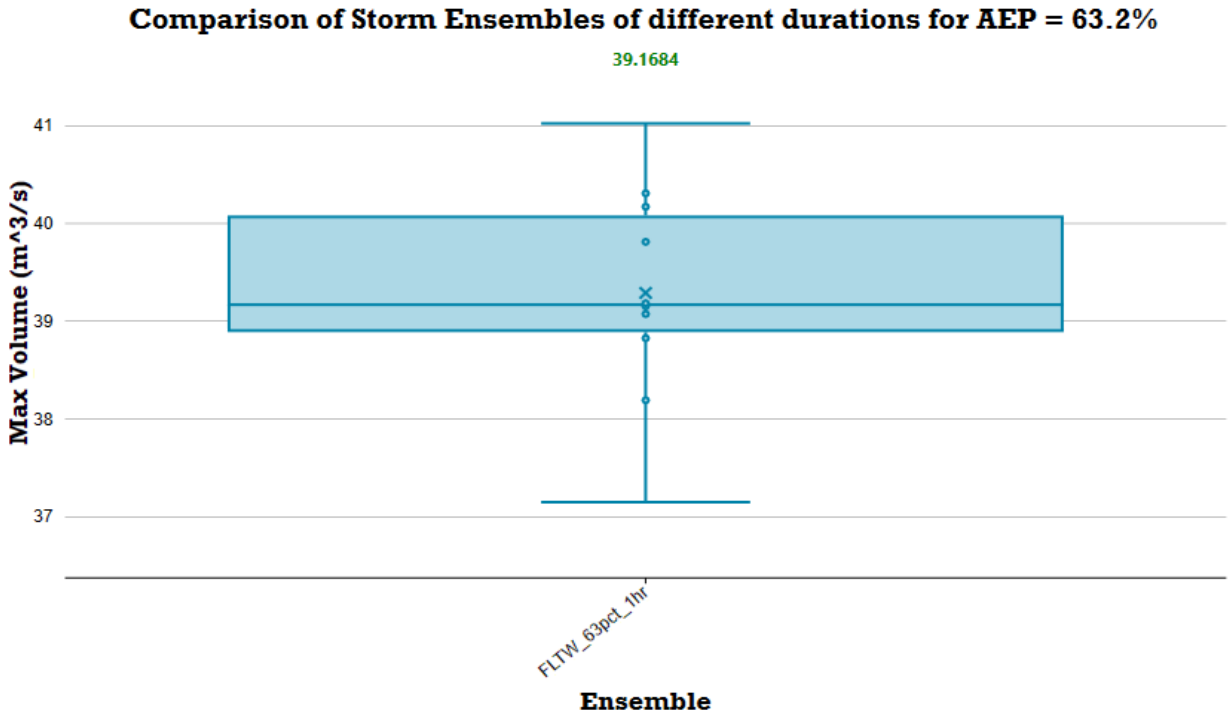

Comparison of Storm Ensembles of different durations for AEP = 63.2%
0.2984
0.31
0.305
0.3
0.295
0.29
0.285
Max Water Depth (m)
FLTW_63pct_1hr
Ensemble

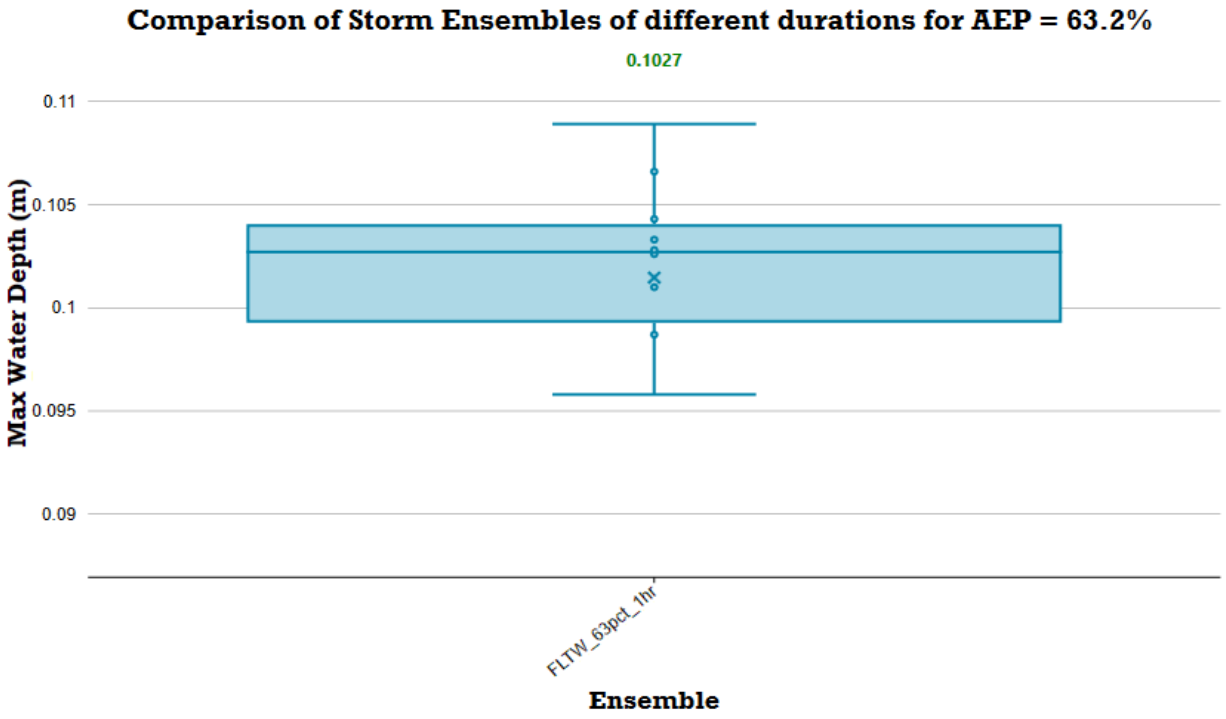

Comparison of Storm Ensembles of different durations for AEP = 63.2%
56.918
59
58
57
56
55
54
Max Volume (m^3/s)
FLTW_63pct_1hr
Ensemble

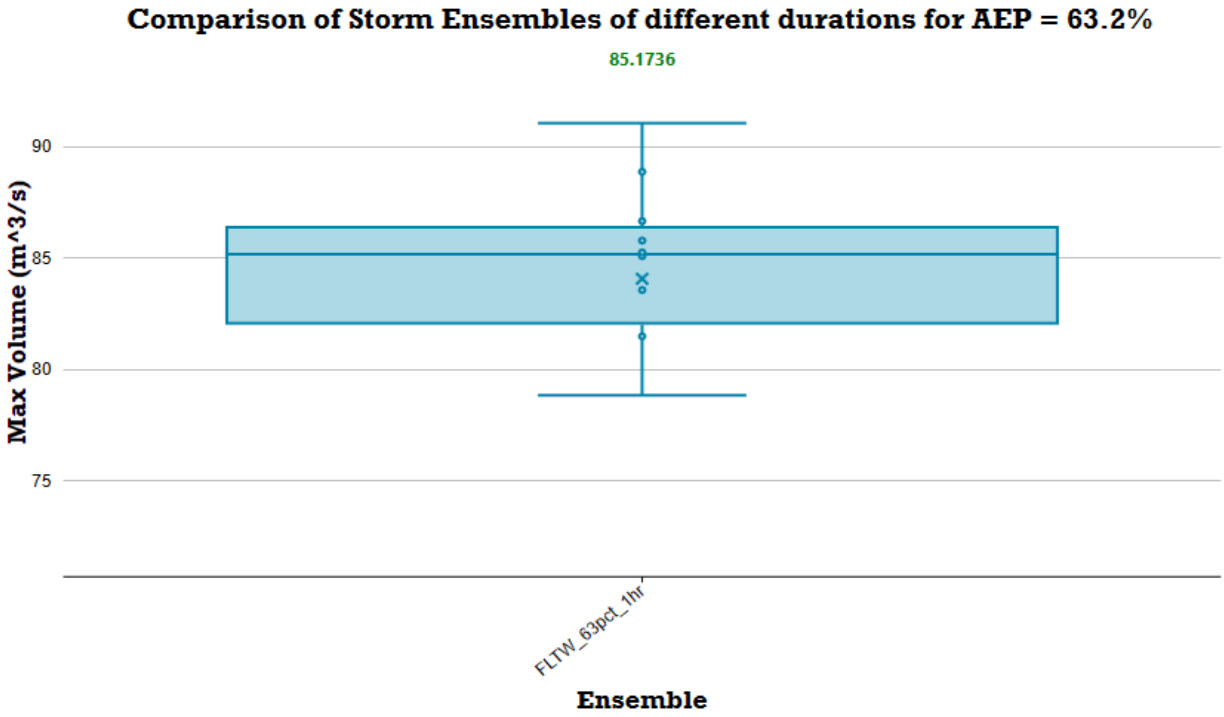

Comparison of Storm Ensembles of different durations for AEP = 63.2%
0.2856
0.292
0.288
0.284
0.28
0.276
0.272
Max Water Depth (m)
FLTW_63pct_1hr
Ensemble

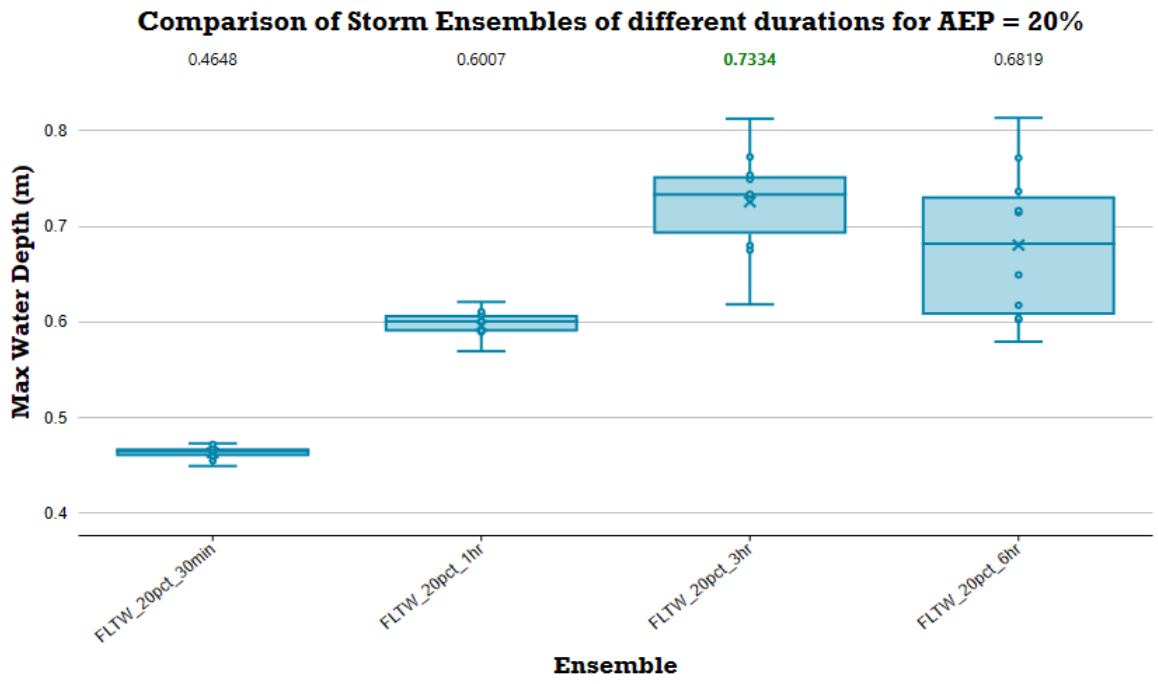

Comparison of Storm Ensembles of different durations for AEP = 63.2%
283.5742
290
285
280
275
270
Max Volume (m^3/s)
FLTW_63pct_1hr
Ensemble

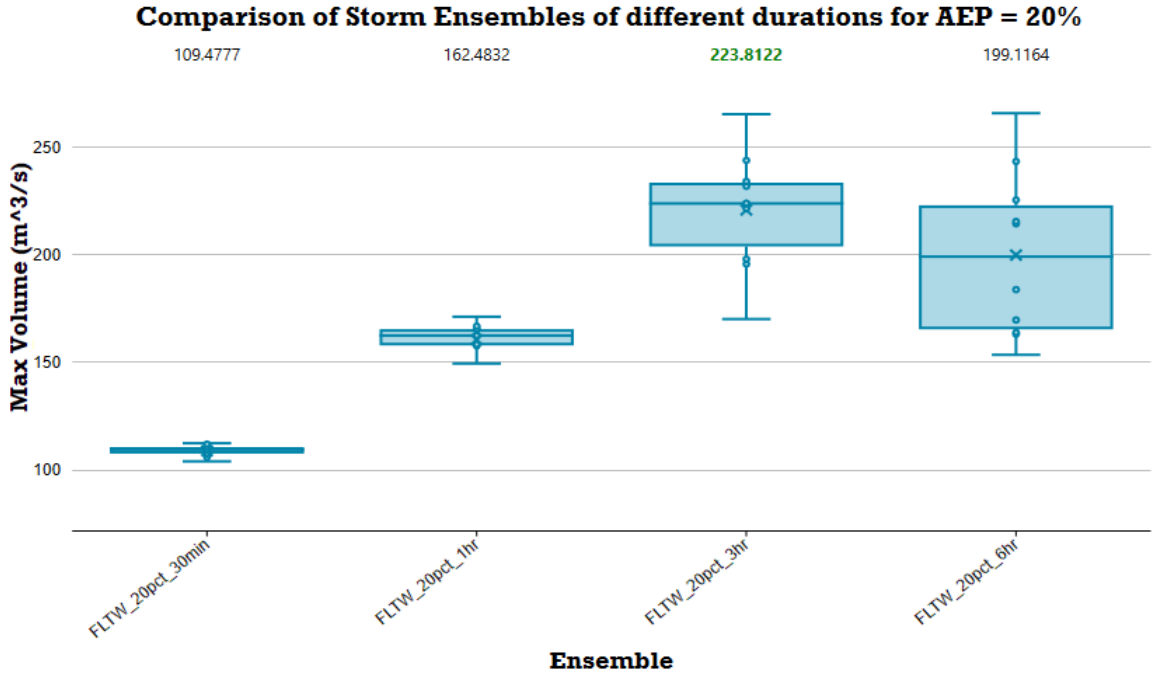

Comparison of Storm Ensembles of different durations for AEP = 63.2%
0.2728
0.285
0.28
0.275
0.27
0.265
0.26
Max Water Depth (m)
FLTW_63pct_1hr
Ensemble

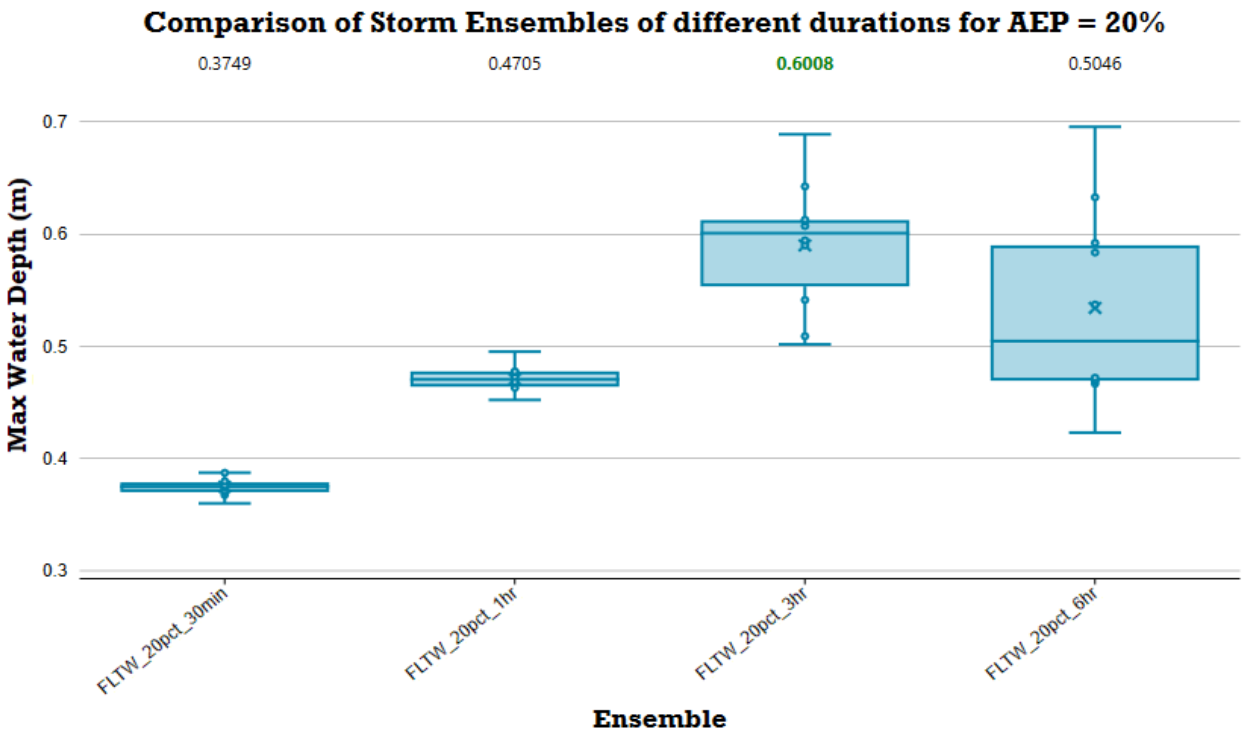

Comparison of Storm Ensembles of different durations for AEP = 63.2%
39.1684
41
40
39
38
37
Max Volume (m^3/s)
FLTW_63pct_1hr
Ensemble

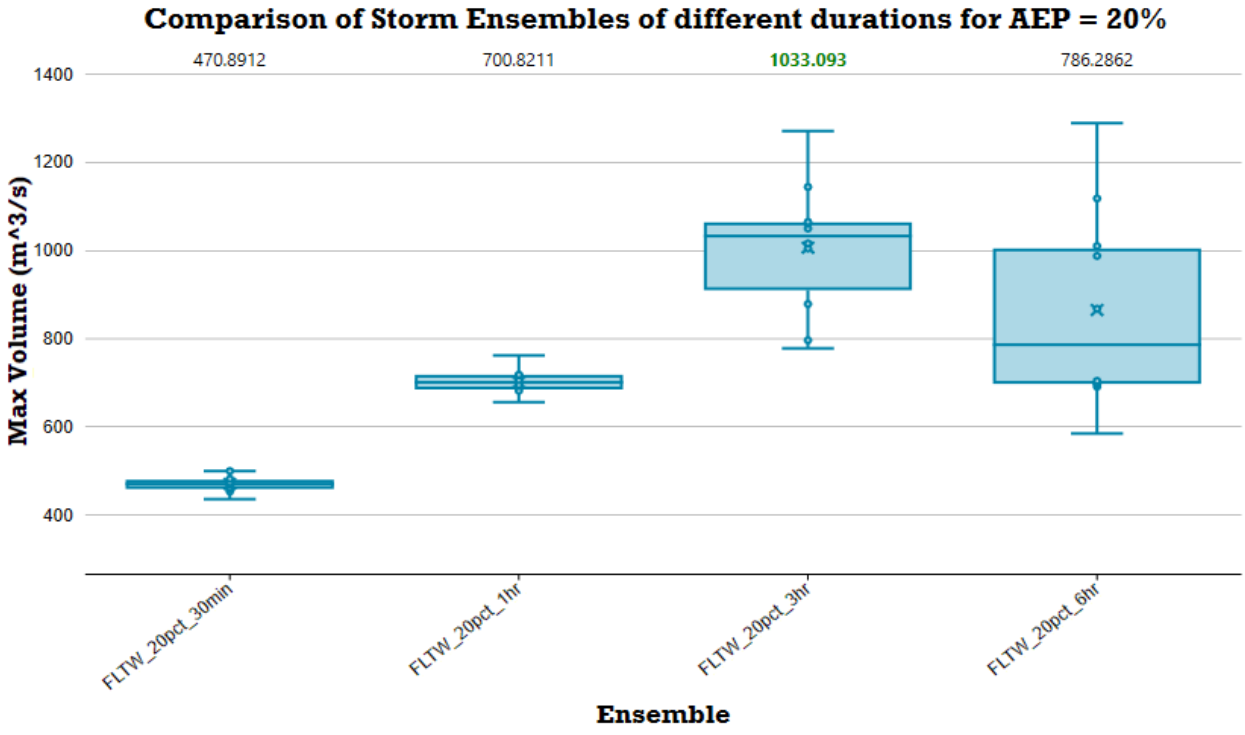

Comparison of Storm Ensembles of different durations for AEP = 63.2%
0.1027
0.11
0.105
0.1
0.095
0.09
Max Water Depth (m)
FLTW_63pct_1hr
Ensemble

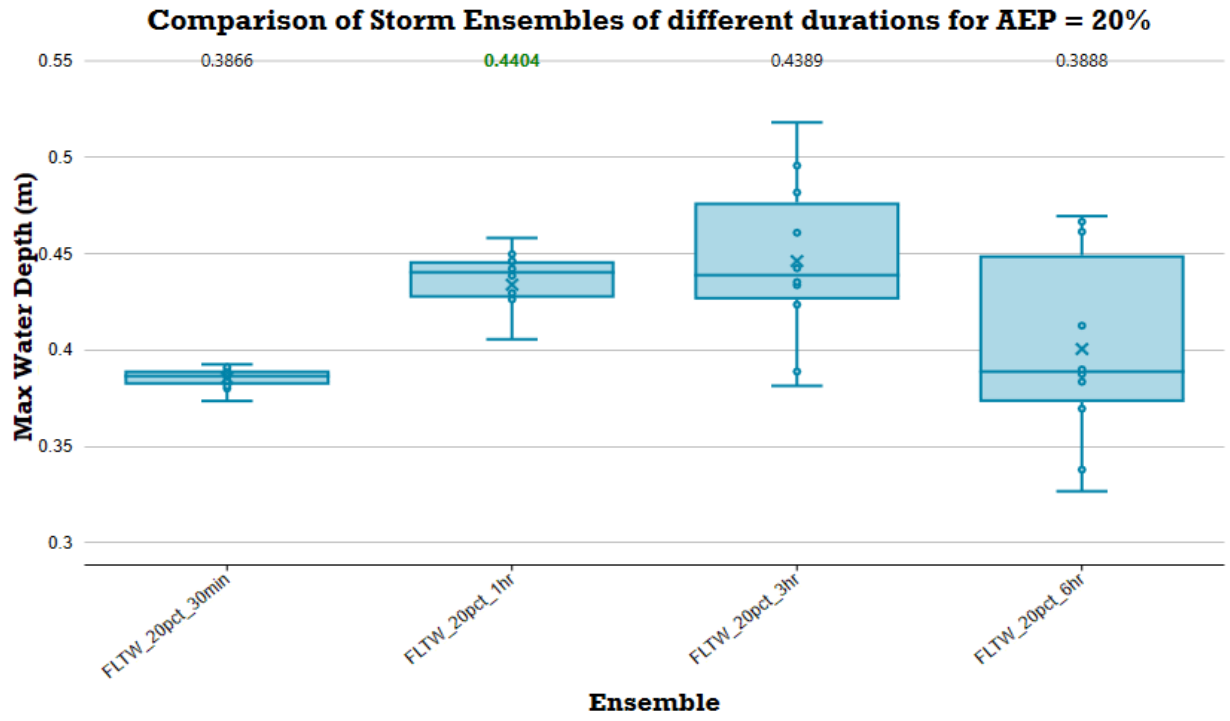

Comparison of Storm Ensembles of different durations for AEP = 63.2%
85.1736
90
85
80
75
Max Volume (m^3/s)
FLTW_63pct_1hr
Ensemble

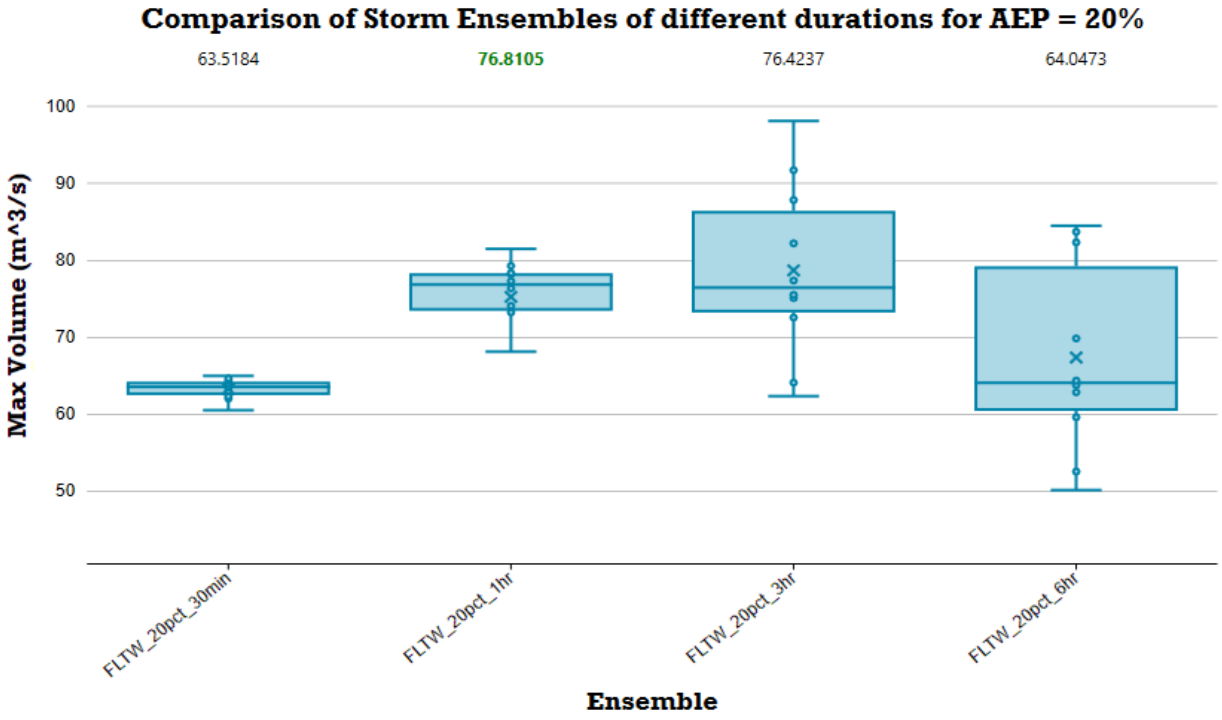

Comparison of Storm Ensembles of different durations for AEP = 20%
0.4648
0.6007
0.7334
0.6819
Max Water Depth (m)
0.8
0.7
0.6
0.5
0.4
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

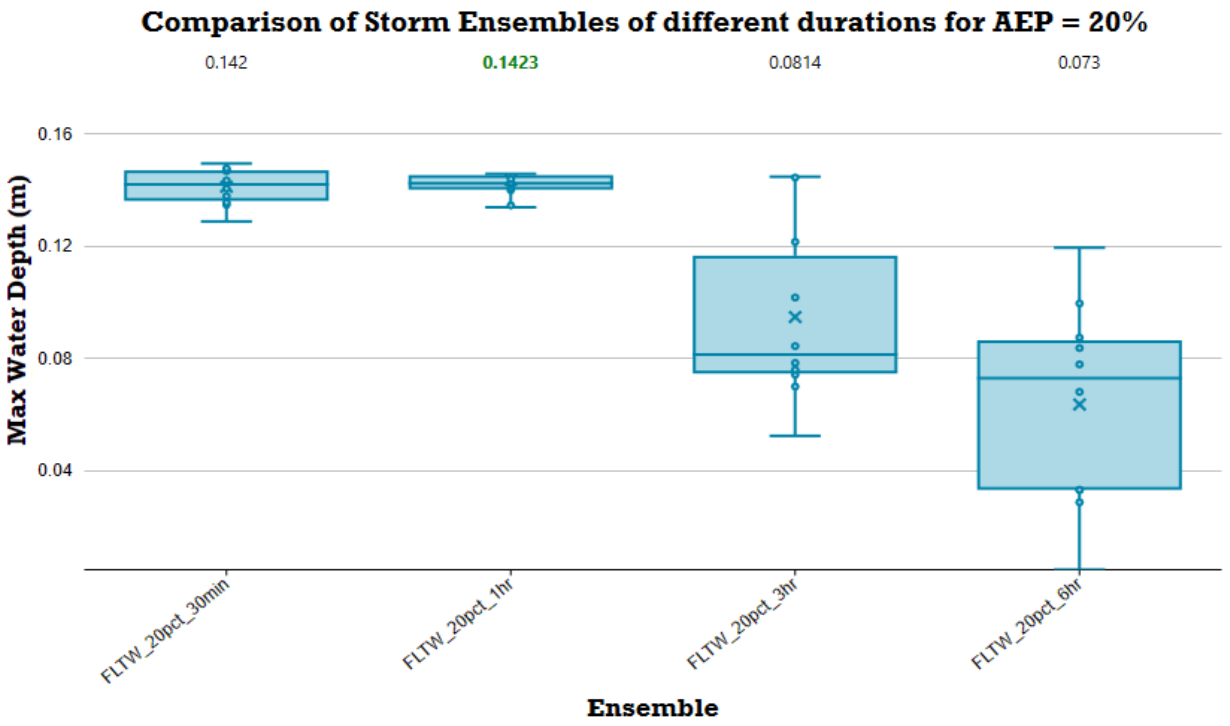

Comparison of Storm Ensembles of different durations for AEP = 20%
109.4777
162.4832
223.8122
199.1164
Max Volume (m^3/s)
250
200
150
100
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

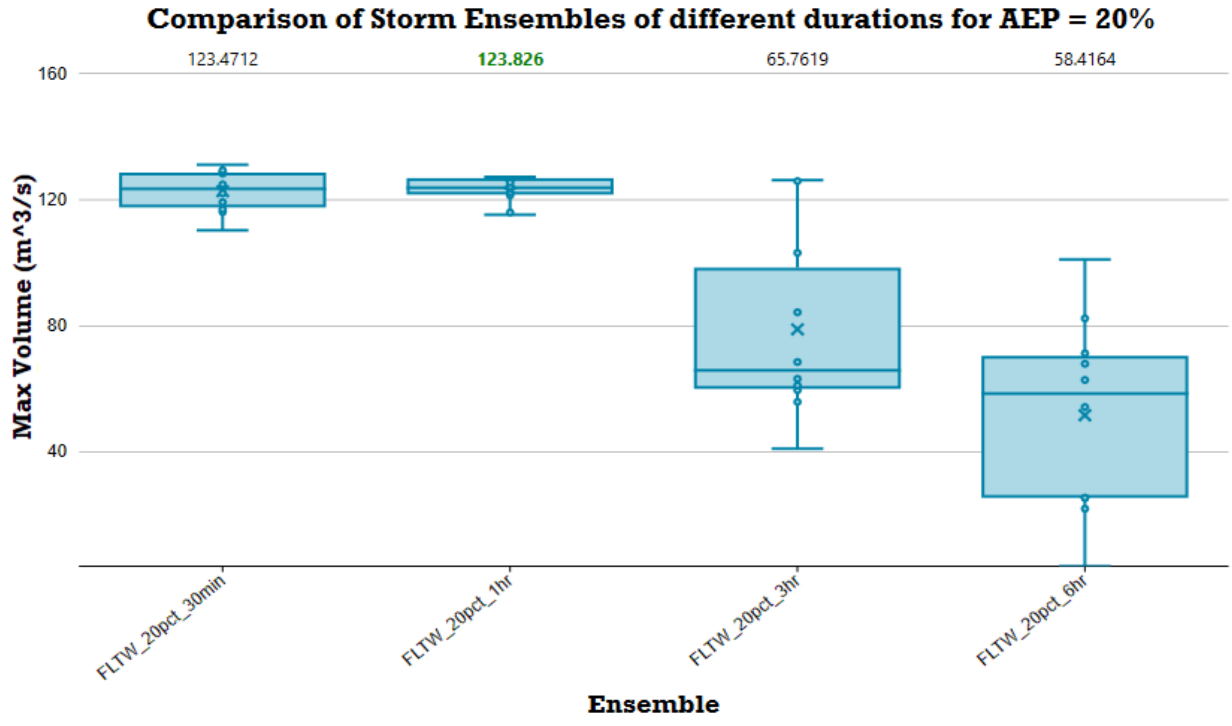

Comparison of Storm Ensembles of different durations for AEP = 20%
0.3749
0.4705
0.6008
0.5046
Max Water Depth (m)
0.7
0.6
0.5
0.4
0.3
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

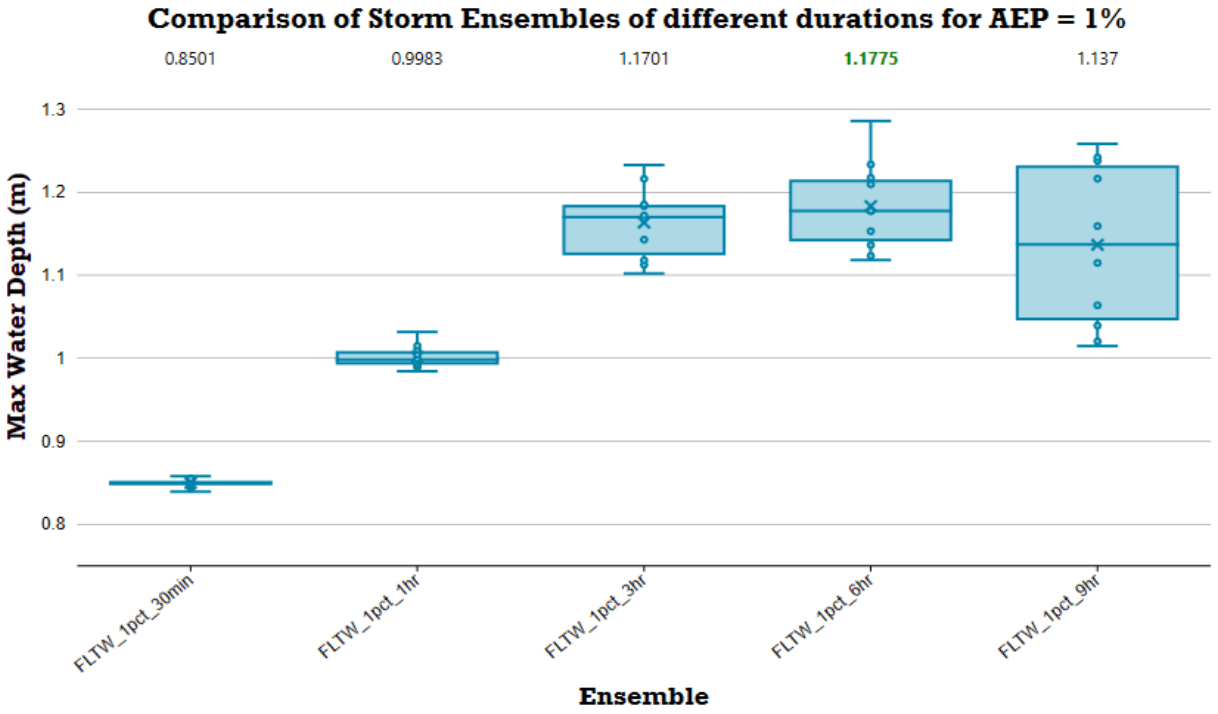

Comparison of Storm Ensembles of different durations for AEP = 20%
470.8912
700.8211
1033.093
786.2862
Max Volume (m^3/s)
1400
1200
1000
800
600
400
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

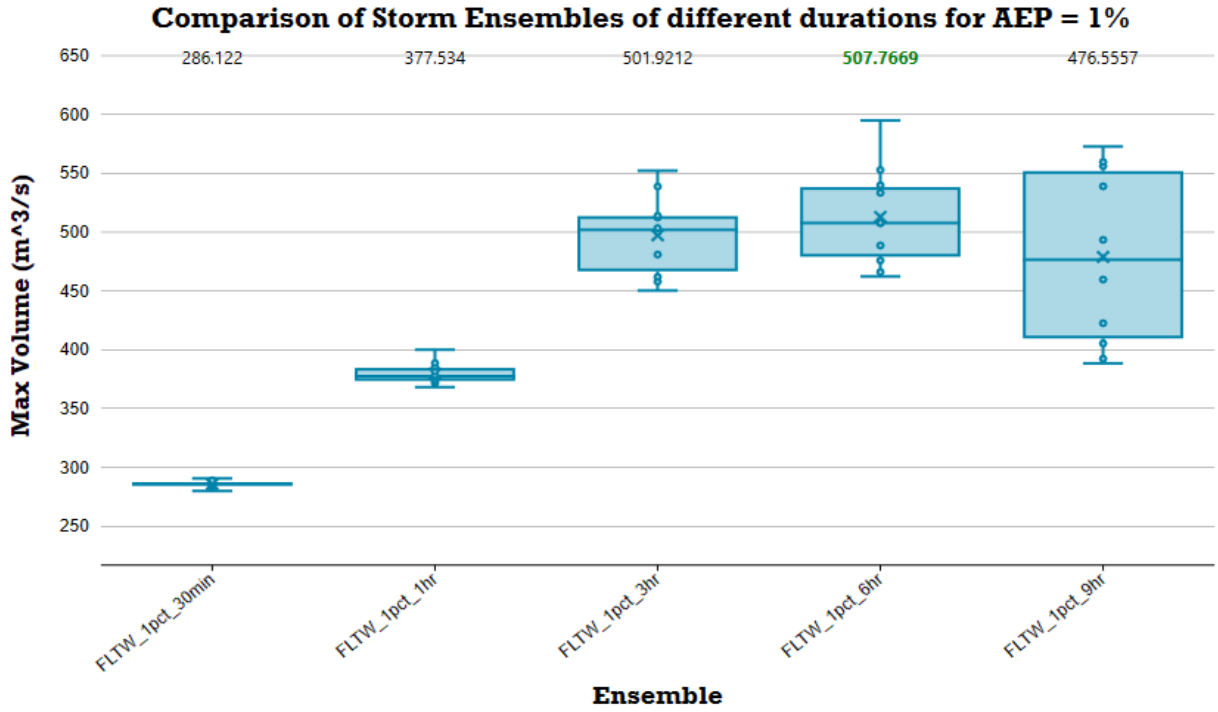

Comparison of Storm Ensembles of different durations for AEP = 20%
0.3866
0.4404
0.4389
0.3888
0.55
0.5
0.45
0.4
0.35
0.3
Max Water Depth (m)
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

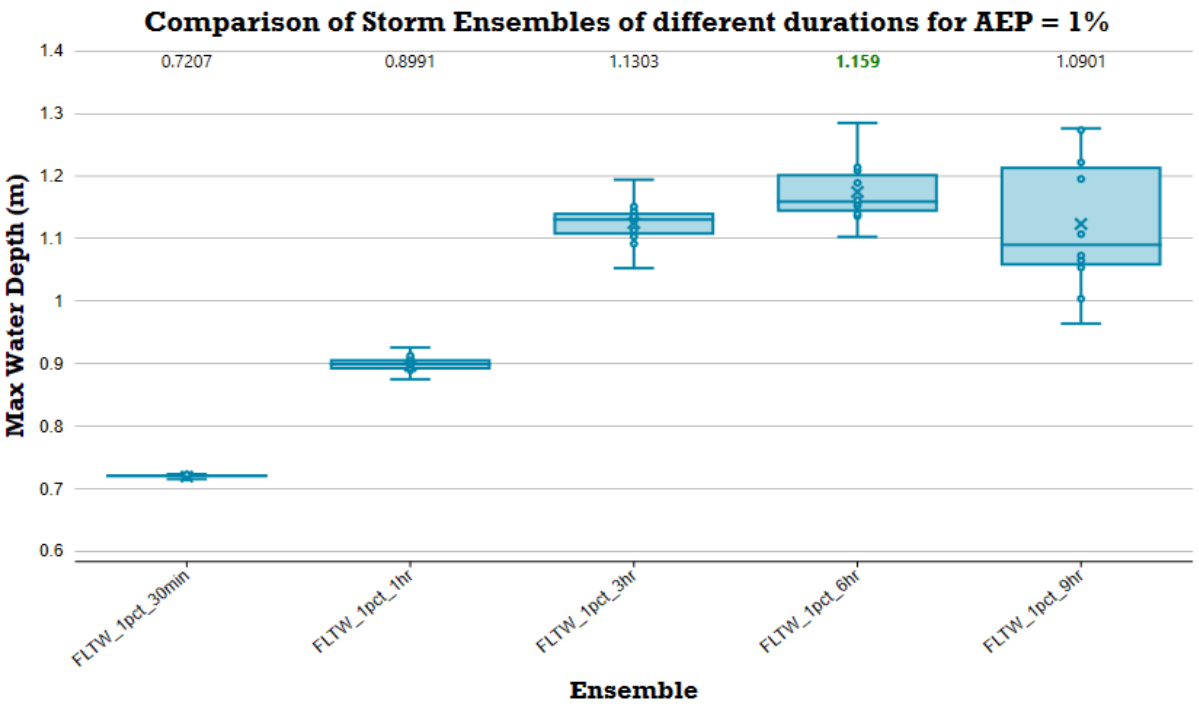

Comparison of Storm Ensembles of different durations for AEP = 20%
63.5184
76.8105
76.4237
64.0473
100
90
80
70
60
50
Max Volume (m^3/s)
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

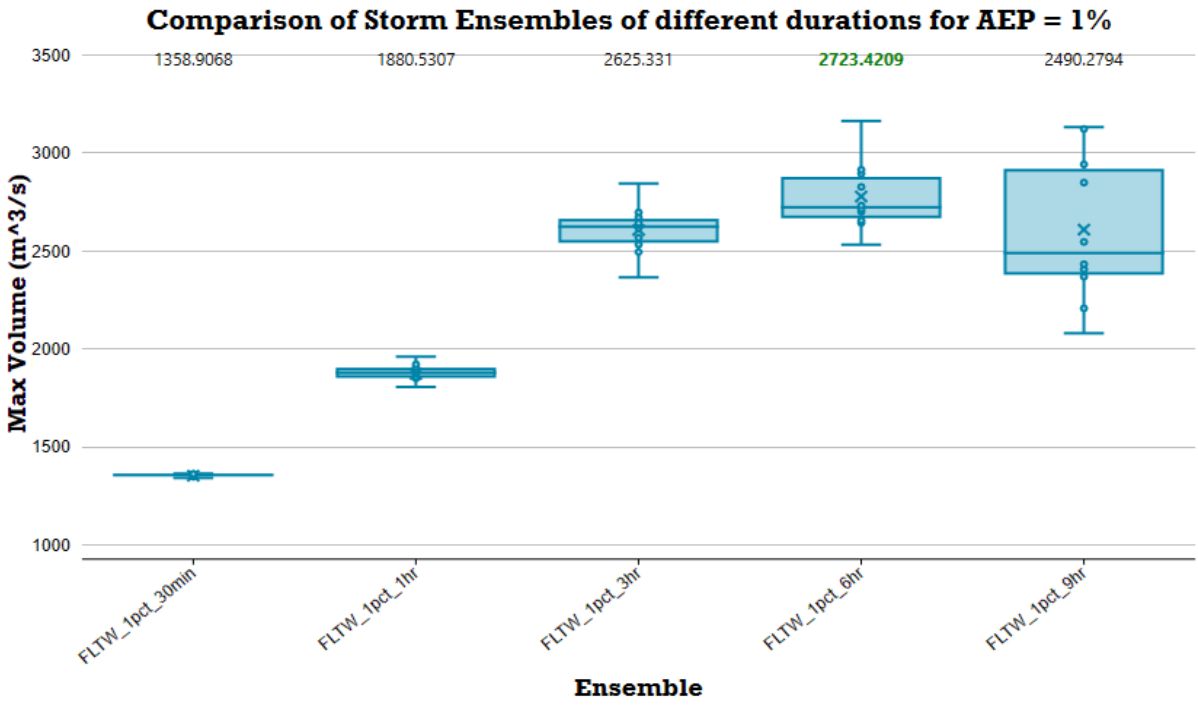

Comparison of Storm Ensembles of different durations for AEP = 20%
0.142
0.1423
0.0814
0.073
Max Water Depth (m)
0.16
0.12
0.08
0.04
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

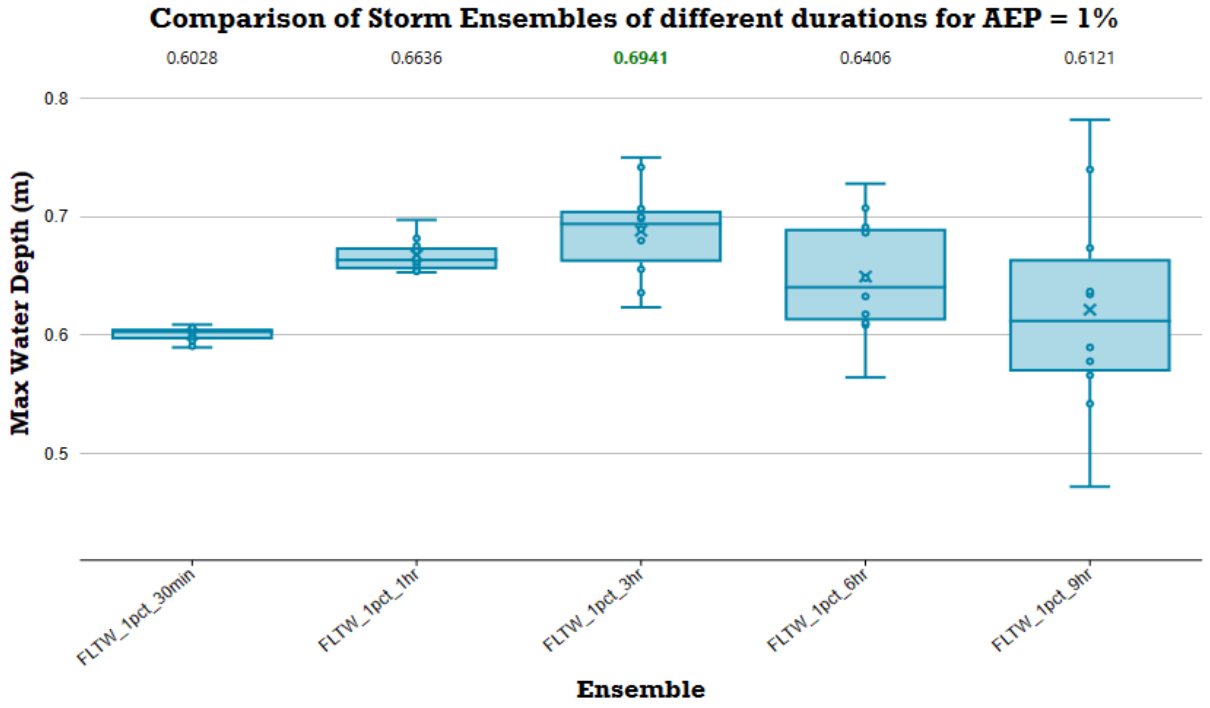

Comparison of Storm Ensembles of different durations for AEP = 20%
123.4712
123.826
65.7619
58.4164
Max Volume (m^3/s)
160
120
80
40
FLTW_20pct_30min
FLTW_20pct_1hr
FLTW_20pct_3hr
FLTW_20pct_6hr
Ensemble

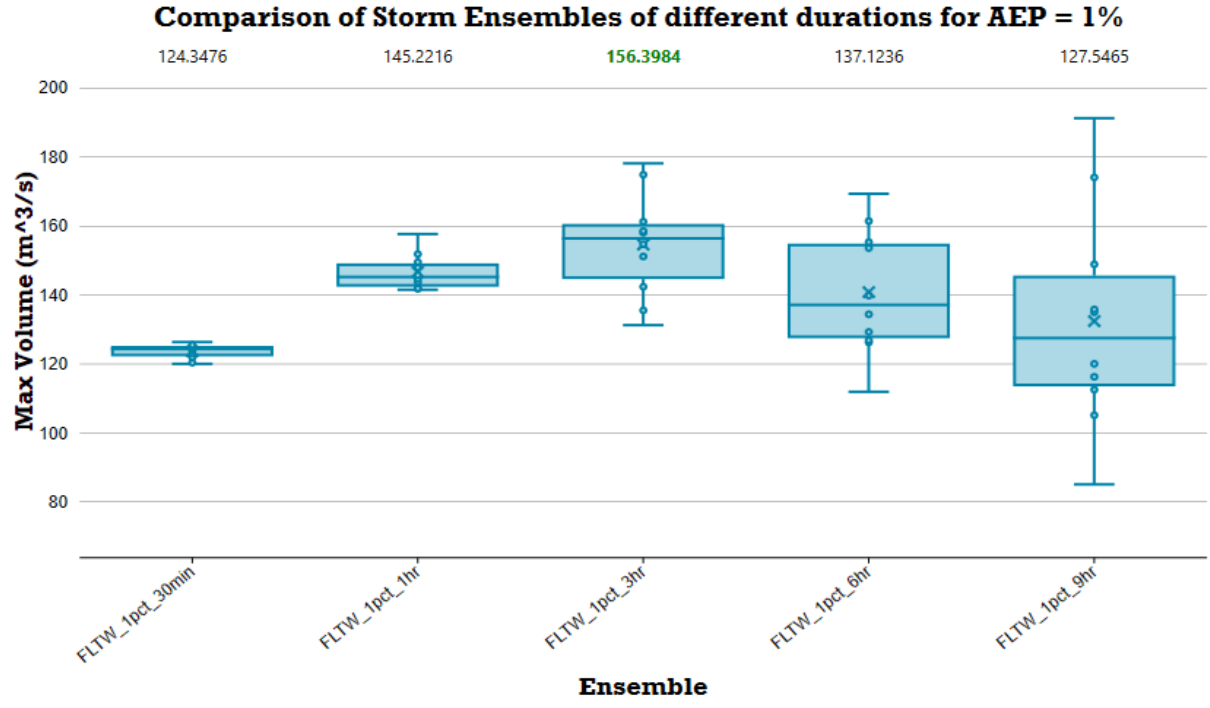

Comparison of Storm Ensembles of different durations for AEP = 1%
0.8501
0.9983
1.1701
1.1775
1.137
Max Water Depth (m)
1.3
1.2
1.1
1
0.9
0.8
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble

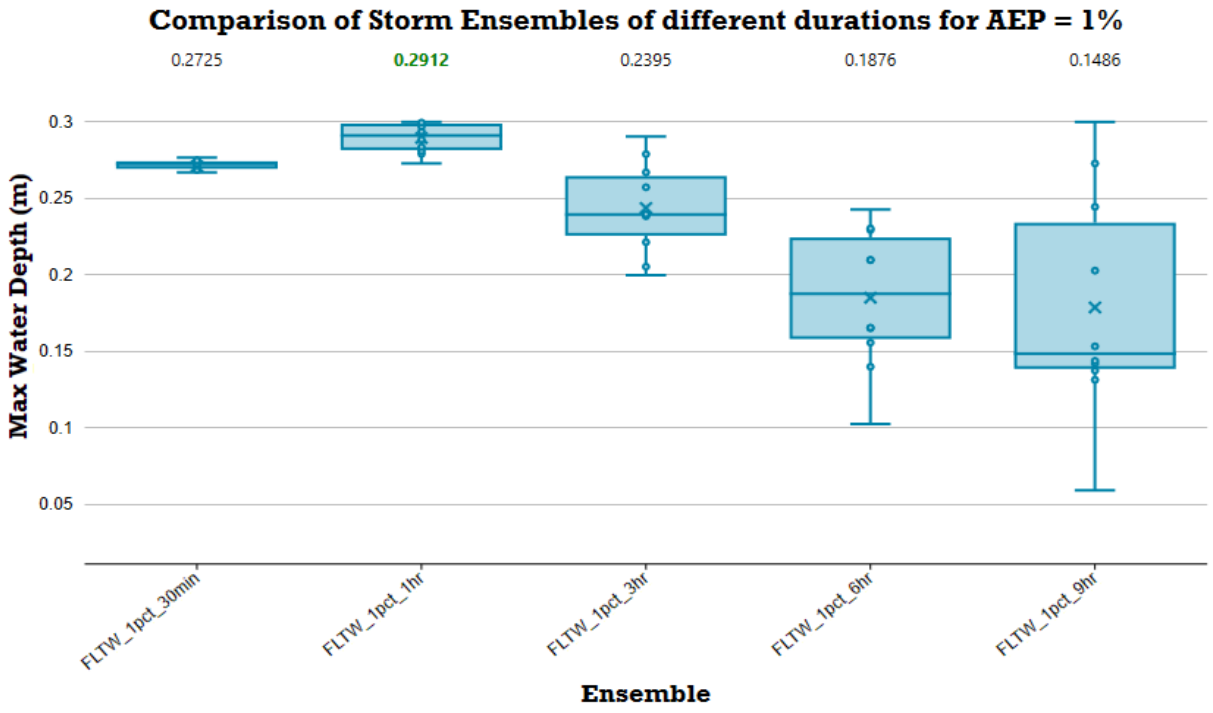

Comparison of Storm Ensembles of different durations for AEP = 1%
286.122
377.534
501.9212
507.7669
476.5557
Max Volume (m^3/s)
650
600
550
500
450
400
350
300
250
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble

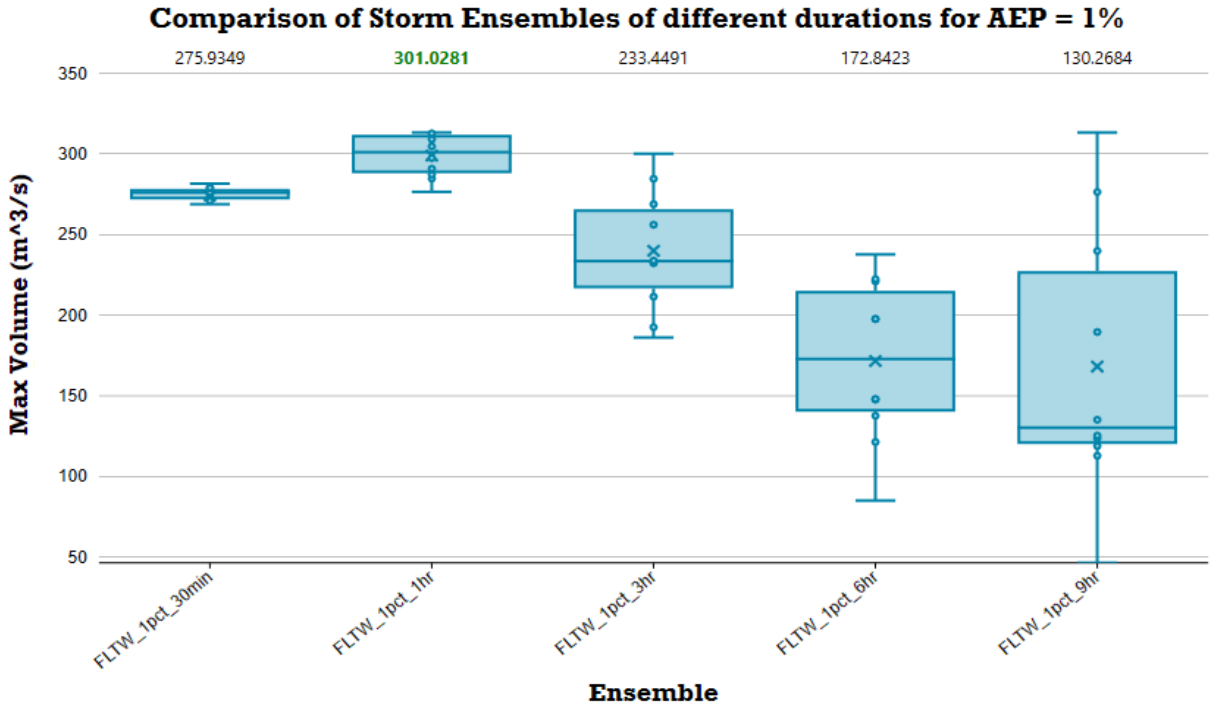

Comparison of Storm Ensembles of different durations for AEP = 1%
0.7207
0.8991
1.1303
1.159
1.0901
Max Water Depth (m)
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 1%
1358.9068
1880.5307
2625.331
2723.4209
2490.2794
Max Volume (m^3/s)
3500
3000
2500
2000
1500
1000
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 1%
0.6028
0.6636
0.6941
0.6406
0.6121
Max Water Depth (m)
0.8
0.7
0.6
0.5
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble

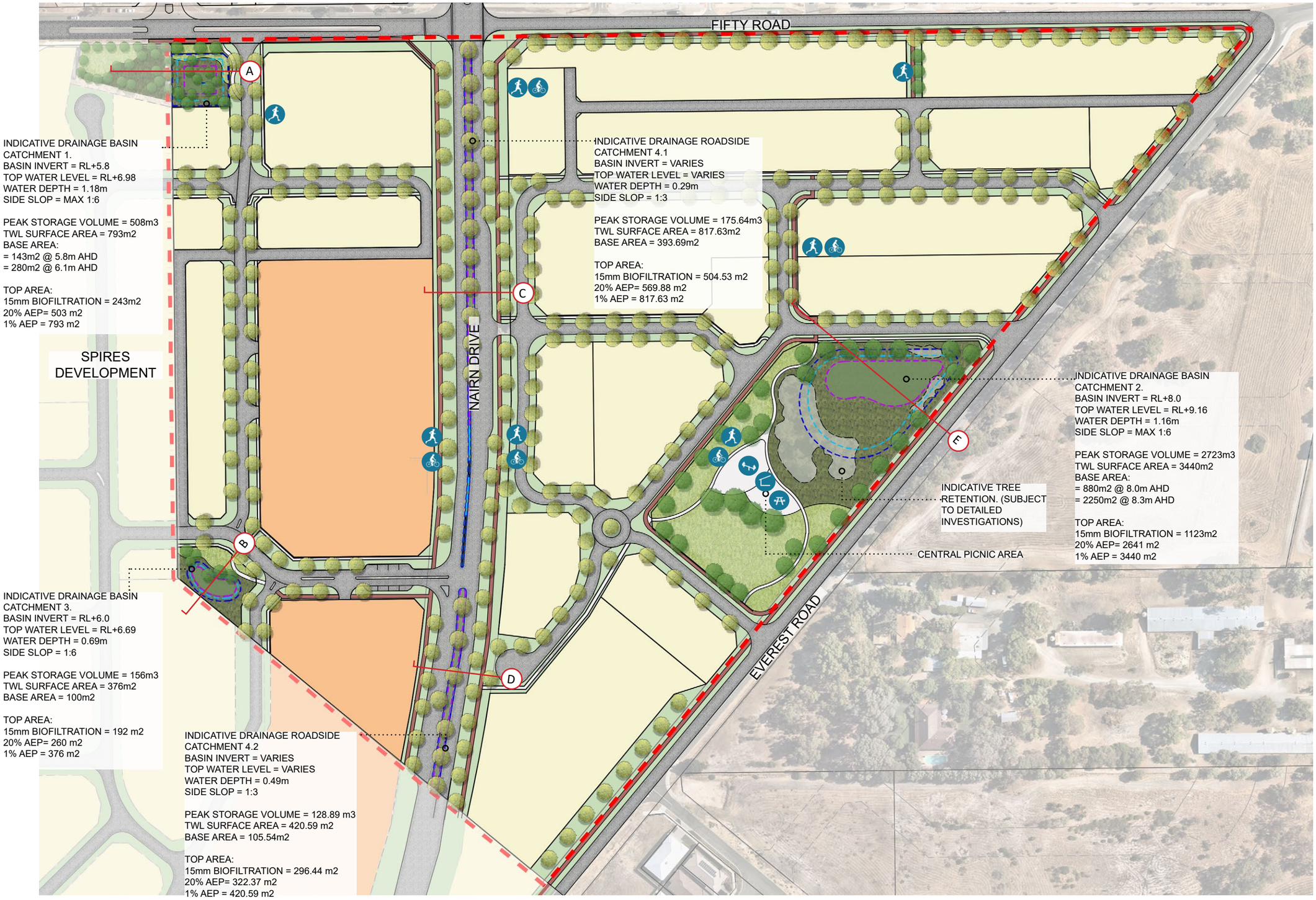

Comparison of Storm Ensembles of different durations for AEP = 1%
124.3476
145.2216
156.3984
137.1236
127.5465
Max Volume (m^3/s)
200
180
160
140
120
100
80
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 1%
0.2725
0.2912
0.2395
0.1876
0.1486
Max Water Depth (m)
0.3
0.25
0.2
0.15
0.1
0.05
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 1%
275.9349
301.0281
233.4491
172.8423
130.2684
Max Volume (m^3/s)
350
300
250
200
150
100
50
FLTW_1pct_30min
FLTW_1pct_1hr
FLTW_1pct_3hr
FLTW_1pct_6hr
FLTW_1pct_9hr
Ensemble

ATTACHMENT C

Landscape Plans



LEGEND

- EXTENT OF WORKS
- INDICATIVE BASIN TOP WATER LEVELS
- COMMERCIAL LOTS
- RESIDENTIAL LOTS
- TURF
- PLANTED DRAINAGE BASIN
- PROPOSED STREET TREES
- PROPOSED POS TREES
- PROPOSED PLANTINGS
- SHARED USE PATH
- FOOTPATH
- PLAY AREA
- SHELTER
- PICNIC SEATING
- JOGGING
- CYCLING

LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

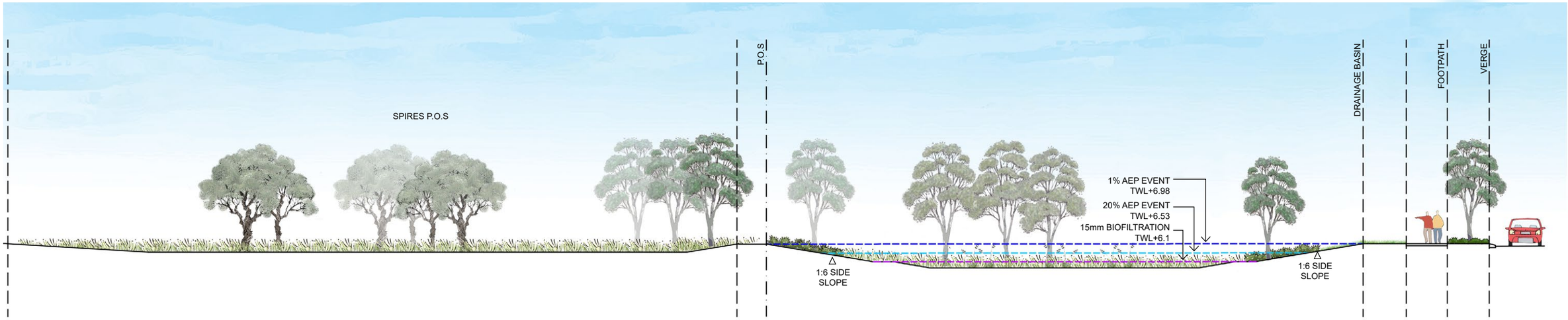
CONCEPT MASTERPLAN

DWG **EMG-37-SK01**
REV **H**
DATE **20.01.2025**
SCALE **1 : 2000 @ A3**
0 5 10 15 20 25 m

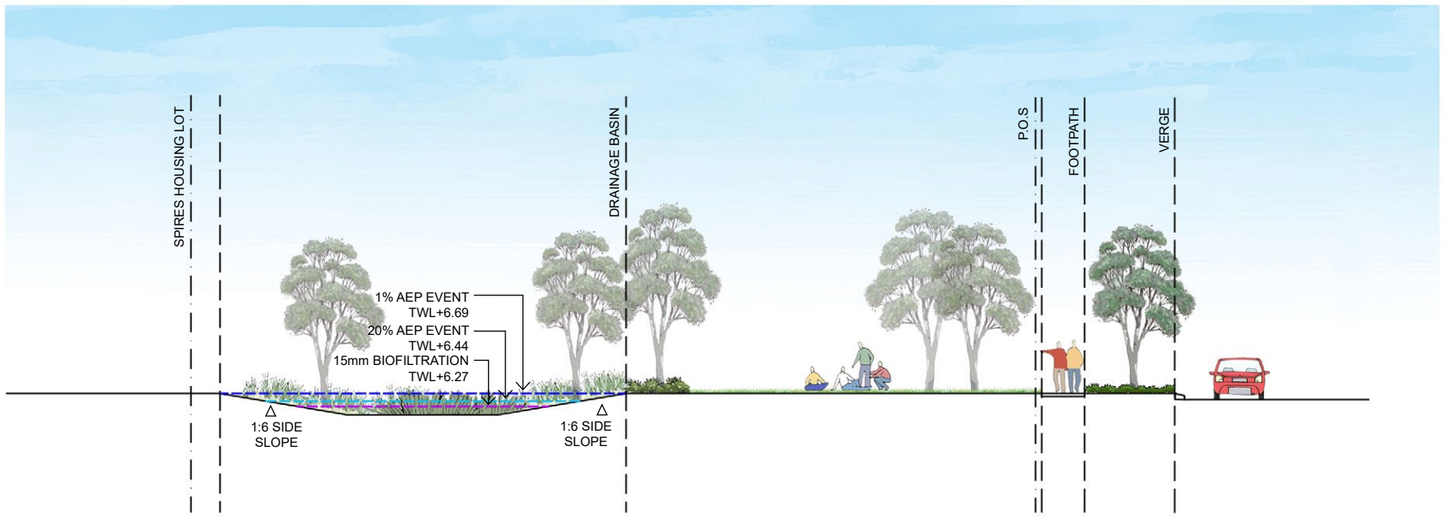
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SECTION A
1:200 @ A3



SECTION B
1:200 @ A3

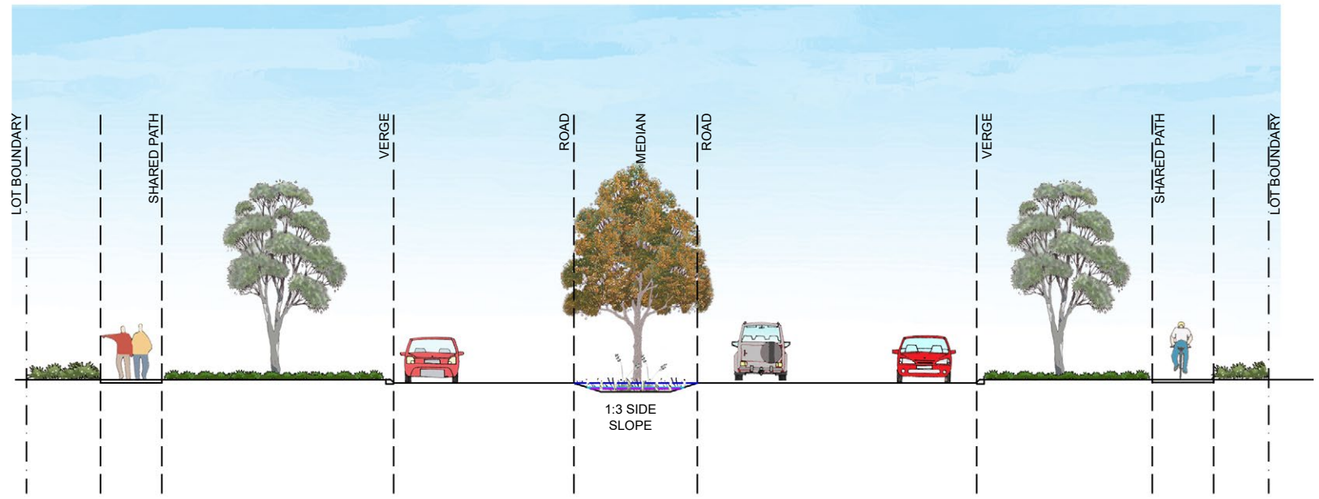
LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

SECTIONS

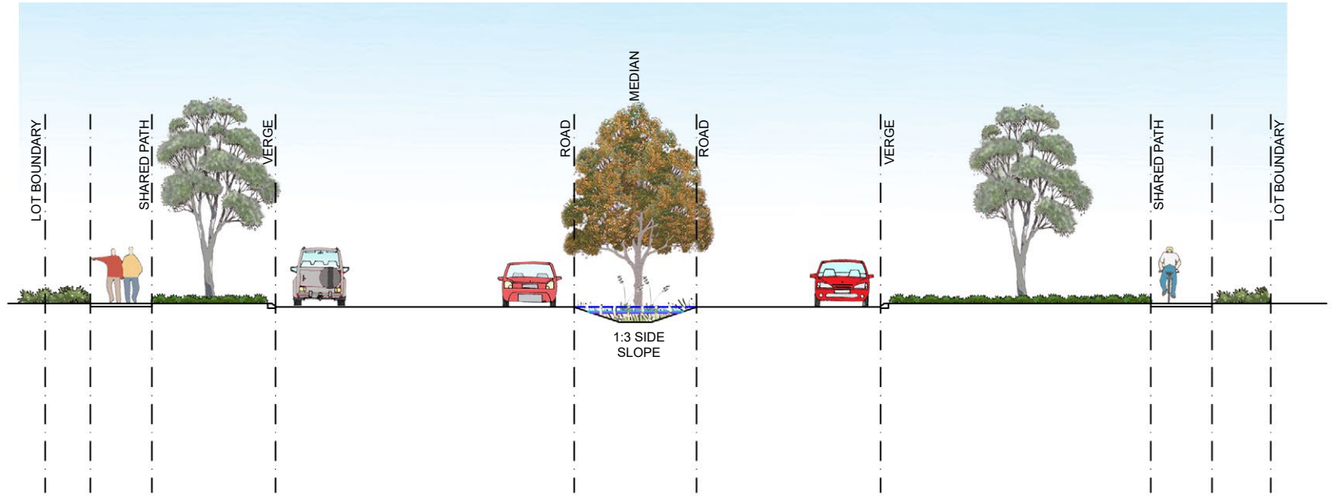
DWG **EMG-37-SK02**
REV **H**
DATE **20.01.2025**

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SECTION C
1:200 @ A3



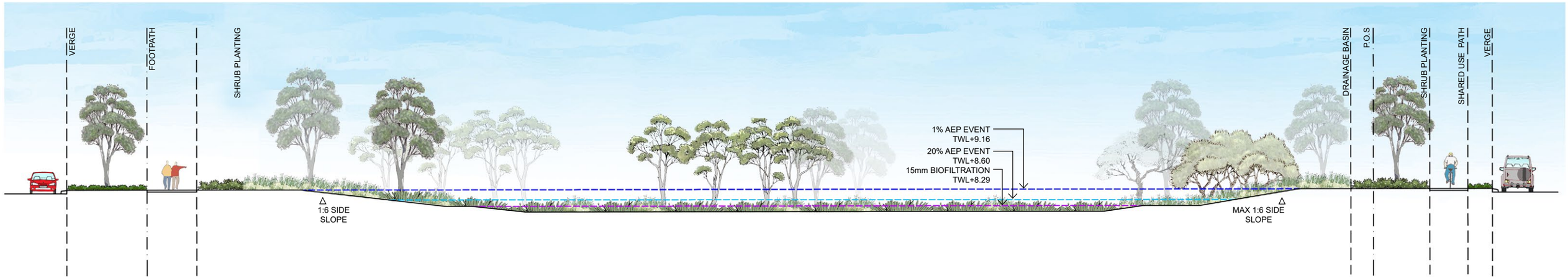
SECTION D
1:200 @ A3

LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

SECTIONS

DWG **EMG-37-SK02**
REV **H**
DATE **20.01.2025**

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SECTION E
1:250 @ A3

LOT 1401 & 1402 FIFTY ROAD, BALDIVIS

SECTIONS

DWG **EMG-37-SK02**
REV **H**
DATE **20.01.2025**

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ATTACHMENT 10A

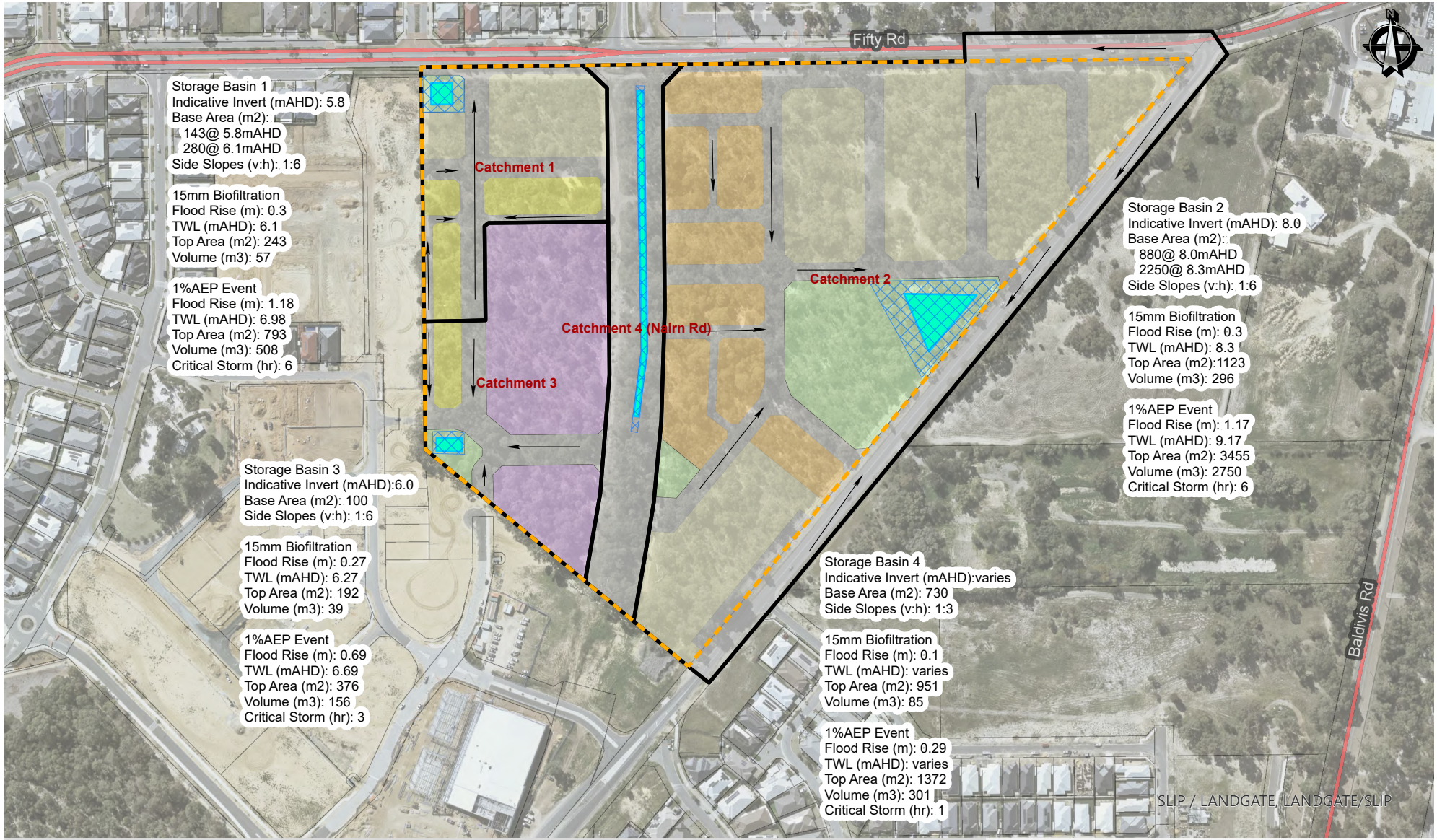
Local Water Management Strategy – Updated Modelling

Table 1: Revised Stormwater Management Modelling 20Nov2024

Catchment & Design Parameters	Catch 1	Catch 2	Catch 3	Catch 4
Commercial (ha) Managed On Site	-	-	1.83	-
R30 Lot (ha) 80% RO	0.63	3.56	-	-
R40 Lot (ha) 80% RO	0.45	-	0.13	-
R60 Lot (ha) 90% RO	-	1.79	-	-
POS (ha) 20% RO	0.09	1.38	0.11	-
Road (ha) 80% RO	0.71	3.84	0.50	1.62
Total Area (ha)	1.87	10.56	2.56	1.62
EIA 15mm (ha)	0.57	3.07	0.40	1.29
EIA 1%AEP (ha)	1.45	7.80	0.52	1.29
Storage Design Parameters				
Type	Storage	Storage	Storage	Swale
Permeability (m/day)	2.5 (bio) 5.0	2.5 (bio) 5.0	2.5 (bio) 5.0	2.5
Indicative Invert (mAHD)	5.8	8.0	6.0	varies
Base Area (m^2)	143@ 5.8mAHD 280@ 6.1mAHD	880@ 8.0mAHD 2250@ 8.3mAHD	100	730
Side Slopes (v:h)	1:6	1:6	1:6	1:3
15mm Biofiltration				
Flood Rise (m)	0.3	0.3	0.27	0.1
TWL (mAHD)	6.1	8.3	6.27	varies
Top Area (m^2)	243	1123	192	951
Volume (m^3)	57	296	39	85
20%AEP Event				
Flood Rise (m)	0.73	0.61	0.44	0.14
TWL (mAHD)	6.53	8.61	6.44	varies
Top Area (m^2)	503	2654	260	1039
Volume (m^3)	224	1059	77	124
Critical Storm (hr)	3	3	1	1
1%AEP Event				
Flood Rise (m)	1.18	1.17	0.69	0.29
TWL (mAHD)	6.98	9.17	6.69	varies
Top Area (m^2)	793	3455	376	1372
Volume (m^3)	508	2750	156	301
Critical Storm (hr)	6	6	3	1

Runoff parameters adopted as per previous LWMS, with Commercial assumed to manage all stormwater on site.

Date: 20/11/2024 Job No. H24018



Site Boundary
Catchment
1% AEP Basin
15mm Biofiltration

Land Use

R30 Lot
R40 Lot
R60 Lot
Commercial
POS
Road Reserve

Flow Direction

0 25 50 75 100 Meters

hyd2o

Lot 1401 & 1402 Fifty Rd Baldivis LWMS Addendum

Stormwater Management Plan

Figure 2

ATTACHMENT 10B

DWER Approval

Government of Western Australia
Department of Water and Environmental Regulation

Your ref: H24018Av3
Our ref: DWERT5842, PA69500
Enquiries: Mark Hingston

Hyd2o
Unit 6 B, 103 Rokeby Road
Subiaco, WA, 6008

Attention: Sasha Martens

Dear Sasha

LOT 1401 & 1402 FIFTY ROAD, BALDIVIS – LOCAL WATER MANAGEMENT STRATEGY ADDENDUM

Thank you for providing the Lot 1401 & 1402 Fifty Road, Baldivis – Local Water Management Strategy Addendum (LWMS) dated 13 January 2025 for the Department of Water and Environmental Regulation (the Department) to assess.

The Department has reviewed the Lot 1401 & 1402 Fifty Road, Baldivis – Local Water Management Strategy Addendum and advises that it meets the requirements of the Department.

The Department's acceptance of Lot 1401 & 1402 Fifty Road, Baldivis – Local Water Management Strategy Addendum does not provide exemption from the need to gain any applicable statutory local government or other agency approvals, nor approvals that may be required under legislation administered by the Department.

In the event there are modifications to the proposal that may have implications on aspects of water management, the Department should be notified to enable the implications to be assessed.

Should you require any further information on the comments please contact Mark Hingston on 9550 4209.

Yours sincerely



Jane Sturgess
A/Program Manager – Planning Advice
Kwinana Peel Region

21 / 02 / 2025

Kwinana Peel Region
107 Breakwater Parade Mandurah Ocean Marina Mandurah Western Australia 6210
PO Box 332 Mandurah Western Australia 6210
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