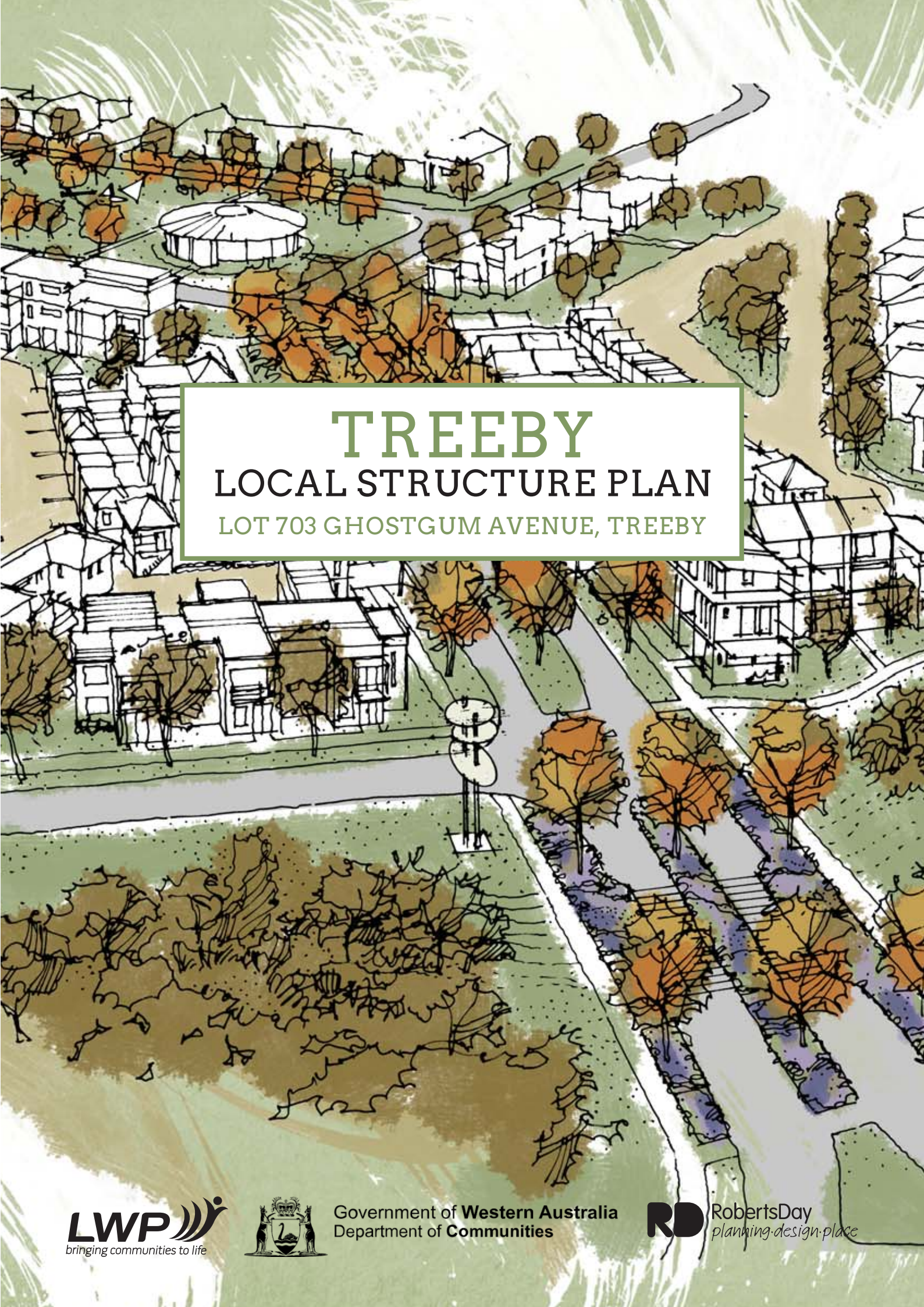


TREEBY

LOCAL STRUCTURE PLAN

LOT 703 GHOSTGUM AVENUE, TREEBY

LWP
bringing communities to life

Government of Western Australia
Department of Communities

RobertsDay
planning·design·place

DOCUMENT CONTROL		
Title:	Treeby Local Structure Plan Lot 703 Ghostgum Avenue, Treeby	
Prepared for:	LWP Group Pty Ltd in partnership with Department of Communities (Housing)	
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	Environmental	RPS Group
	Bushfire	Strategen-JBS&G
	Landscape Architect	Emerge Associates
	Land Surveyor	McMullen Nolan Group Pty Ltd
	Hydrology	RPS Group
	Acoustic	Lloyd George Acoustics
	Traffic and Transport	Riley Consulting Pty Ltd

REVISION	COMMENT	AUTHOR	APPROVED BY	DATE ISSUED
A	Lodge with City of Cockburn	EVDL	TT	21.10.2019
B	Respond to CoC email dated 7.11.2019	EVDL	TT	14.11.2019
C	Respond to CoC email dated 19.11.2019	EVDL	TT	26.11.2019

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www.robertsday.com.au

ENDORSEMENT PAGE

This Structure Plan is prepared under the provisions of the City of Cockburn Town Planning Scheme No. 3.

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

.....
Date

Signed for and on behalf of the Western Australian Planning Commission

.....

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

.....
Witness

.....
Date

.....
Date of Expiry

TABLE OF AMENDMENTS

AMENDMENT NO.	SUMMARY OF AMENDMENT	AMENDMENT TYPE	DATE ENDORSED BY WAPC
1			
2			

TECHNICAL APPENDICES INDEX

APPENDIX	DOCUMENT	CONSULTANT	SUMMARY OF MODIFICATIONS
A	Environmental Assessment and Management Strategy	RPS Group	
B	Traffic and Transport Report	Riley Consulting Pty Ltd	
C	Local Water Management Strategy	RPS Group	
D	Bushfire Management Plan	Strategen-JBS&G	
E	Landscape Concept Plan	Emerge Associates	
F	Engineering Services Report	Cossill & Webley	
G	Acoustic Report	Lloyd George Acoustics	

executive summary

Treeby Local Structure Plan (Structure Plan) has been prepared to guide the subdivision and development of Lot 703 Ghostgum Avenue, Treeby (the subject site). Implementation of a Structure Plan over this 19.91 hectare development site will assist in the delivery of strategic planning objectives set out by the State Government and the City of Cockburn in relation to housing supply, affordability and delivery of urban development.

The Structure Plan provides an overarching planning framework which will ensure future urban development is undertaken in a coordinated and systematic manner, as required by the sites 'Development' zoning under the City of Cockburn *Town Planning Scheme No. 3* (TPS3). The Structure Plan is aligned with the Treeby District Structure Plan (DSP), which provides a high-level development framework for the broader locality through the allocation of land uses and service delivery.

The Structure Plan provides for a range of residential densities and lot typologies, contributing towards the availability of diverse and affordable housing product within the South Metropolitan Sub-Region. It also includes an interconnected and legible movement network and generous provision of public open space. It is anticipated that the LSP area will accommodate approximately 324 lots and 379 dwellings, for a community of around 1,023 residents.

Development of the Structure Plan will be guided by a Concept Plan which accommodates a variety of residential lot sizes, ranging from approximately 120m² through to more than 550m², this is to encourage diversity of households to live in Treeby, both in design and affordability. This diversity will be further encouraged through Design Guidelines that will be tailored to achieve specific innovative housing product. Larger lots are provided on the south-west periphery as a transition to Armadale Road, smaller lots located around the central boulevard and areas of public open space.

A central boulevard will connect residents to Ghostgum Avenue providing access to Armadale Road connecting the site to Cockburn Central Station and Cockburn Gateway Shopping Centre, to the West.

Key attributes of the development include the retained natural bushland, conservation of the Spider Orchid, extensive POS network which will incorporate a Community Hub, diverse and affordable housing options.

executive summary

ITEM	DATA	STRUCTURE PLAN REF (SECTION NO.)
Total area covered by the Structure Plan	19.91 ha	
Area of each land use proposed: • Residential • Public Open Space • Child Care Centre	 10.7ha 2.121ha 0.2ha	
Estimated lot yield	324 lots	
Estimated number of dwellings	379 dwellings	
Estimated residential site density	19 dwellings/gross urban zoned hectare 35 dwellings/site hectare	
Estimated population	1,023 people (2.7 persons per household)	
Estimated percentage of public open space	11.2%	

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Appendix H: Treeby Local Structure Plan Map (RobertsDay)

1.0 Structure Plan Area

This Local Structure Plan (LSP) applies to Lot 703 Ghostgum Avenue, Treeby being the land contained within the inner edge of the line denoting the structure plan boundary on the Structure Plan Map (refer Plan 1).

2.0 Operation

This Structure Plan comes into effect on the date on which it is approved by the Western Australian Planning Commission (WAPC) and is valid for a period of 10 years from that date, or another period determined by the WAPC in accordance with the *Planning and Development (Local Planning Scheme) Regulations 2015* Schedule 2 – Deemed Provisions.

The Structure Plan is to be given due regard when making decisions on the development and subdivision of land within the Structure Plan area.

3.0 Staging

The staging will commence in the from the western portion of the site, with access provided via Ghostgum Avenue and developed for Sales Office and Display Village to facilitate the 'first release' residential purposes. The staging will progress in an easterly direction towards the northern and eastern boundaries.

Residential lots which interface the eastern boundary are not to be developed until the adjacent landholding is cleared and managed to achieve rating of BAL-29 or lower.

4.0 Subdivision and Development Requirements

4.1 Land Use Zones and Reserves

Land Use permissibility within the Structure Plan area shall be in accordance with the Structure Plan Map (refer Plan 1) and corresponding Zones and Reserves under the City of Cockburn *Town Planning Scheme No. 3* (TPS3). Where there is a conflict between the Structure Plan, the standards of TPS3 shall prevail to the extent of any inconsistency, in accordance with the *Planning and Development (Local Planning Schemes) Regulations 2015* Schedule 2 – Deemed Provisions.

In addition to the uses permitted under the Scheme, temporary land uses, such as Sales Office, Car Park and Café, which facilitate the sale of lots within the Structure Plan area are permissible land uses within the 'Development' zone.

4.2 Hazards and Separation Areas

Residential lots identified as a Bushfire Prone Area in the Bushfire Management Plan (Appendix D) require a Bushfire Attack Level assessment and BAL Contour Plan to be prepared, in accordance with *State Planning Policy 3.7*, for an application of subdivision and/or development.

Residential lots which interface the eastern boundary are not to be developed until the adjacent landholding is cleared and managed to achieve rating of BAL-29 or lower.

Residential lots identified within the Acoustic Report (Appendix G) require a Detailed Noise Assessment (customised noise mitigation measure to be implemented), in accordance with *State Planning Policy 5.4*, to be prepared and submitted with an application for subdivision and/ or development where noise limit is likely to be exceeded.

The Noise Assessment (Appendix G) identifies the site is located within the 'Frame Area' of the Jandakot Airport. Under the City of Cockburn's Noise Attenuation Local Planning Policy residents will be made aware that thicker glass (6.38mm laminated glazing) to habitable rooms will perform better acoustically.

4.3 Public Open Space

The provision of a minimum 10% public open space (POS) is to be provided in accordance with *Liveable Neighbourhoods*. POS is to be provided generally in accordance with the Structure Plan Map (refer Plan 1). An updated POS schedule to be provided at the time of subdivision for determination by the WAPC, upon advice of the City of Cockburn.

Should land zoned 'Local Centre' be developed solely for residential land uses, a cash-in-lieu contribution to the equivalent of 10% of the site area is to be provided as a condition of subdivision or development approval.

4.4 Residential Development

4.4.1 Density Target

Residential densities applicable to the Structure Plan area shall be those densities shown on the Structure Plan Map (Plan 1).

Under *Perth and Peel @ 3.5 million* 'Connected City' scenario new urban areas are to use a minimum average residential density target of 15 dwellings per gross hectare of or Urban Zoned Land. The Structure Plan area complies, providing approximately 19 dwellings per net site ha.

Based on *Liveable Neighbourhoods* 'Site Hectare' definition, the Structure Plan 'developable area' equates to 10.7ha to be developed for residential purposes and excludes non-residential uses including street, laneways and POS. Based on 379 dwelling, the Structure Plan estimates 35 dwellings per site hectare, this complies with LN target of average 22 dwellings per site hectare.

5.0 Local Development Plans

Local Development Plans (LDPs) are to be prepared in accordance with Part 6 of the *Planning and Development (Local Planning Schemes) Regulations 2015* Schedule 2 – Deemed Provisions. LDPs may be required as a condition of subdivision approval for lots comprising one or more of the following site attributes:

a. Lots with an area of 260m² or less;
b. Irregular shaped lots;
c. Lots with an interface with, or outlook to POS;
d. Lots that obtain access from a laneway or right-of-way;
e. Lots that propose grouped or multiple dwelling development;
f. Lots identified as 'Over 55's Seniors Living';
g. Lots zoned 'Local Centre';
h. Lots affected by Bushfire Hazard, as identified by the Bushfire Management Plan (refer Appendix D); and
i. Lots affected by transport noise which exceeds the noise target as defined by the *State Planning Policy 5.4* in relation to Armadale Road.

LDPs will generally be prepared to address one or more of the following:

a. Building orientation;
b. Building design and setbacks;
c. Overlooking and/or privacy;
d. Vehicle access;
e. Car parking;
f. Private open space;
g. Interface with POS (fencing, frontage, footpath location);
h. Noise protection provisions (if any);
i. Bushfire protection provisions (if any); and
j. Laneway treatments;
k. Any such information considered relevant by the proponent and/or determining authority to address the requirements of this Structure Plan.

5.1 Residential Design Code Variations

The City of Cockburn Local Planning Policy 1.16 '*Single House Standards for Medium Density Housing in the Development Zone*' sets out acceptable variations to the deemed-to-comply provisions of the R-Codes for lots coded R25-R60. Except in a situation where an approved Local Development Plan (LDP) imposes R-Code variation to the deemed-to-comply provisions of the R-Codes, the standards set out in Local Planning Policy 1.16 shall apply to this Structure Plan.

6.0 Other Requirements

6.1 Notifications on Title

In respect of applications for the subdivision of land the City of Cockburn may recommend to the WAPC that a condition be imposed on the granting of subdivision approval for a notification to be placed on the Certificate(s) of Title(s) to advise of the following:

a. The lot is situated in the vicinity of a the Armadale Road transport corridor and is currently affected, or may in the future be affected by transport noise.

b. Building setbacks and construction standards to achieve a Bushfire Attack Level -29 or lower in accordance with *Australian Standards (AS3959-2009): Construction of buildings in bushfire prone areas*.

c. This property is situated in the vicinity of Jandakot Airport and is currently affected, or may be affected in the future by aircraft noise. Noise exposure levels are likely to increase in the future as a result of an increase in the aircraft using the airport, changes in aircraft type, or other operational changes. Further information about aircraft noise is available from the Jandakot Airport website. Information regarding development restrictions and noise insulation requirements for noise-affected property is available on request from the relevant local government offices.

6.2 Developer Contributions

The Structure Plan area is subject to the requirements of proposed Developer Contribution Plan 15 upon approval and Developer Contribution Plan 13 (Community Infrastructure), as detailed in Clause 5.3 and Table 10 of the City of Cockburn Town Planning Scheme No. 3.

Contributions for the upgrade of Soloman Road and Jandakot Road will be negotiated with the City of Cockburn reflective of an analysis of the vehicles generated by the Structure Plan on the road network.

Plan 1: Treeby Local Structure Plan Map





part two
explatory

1.0 Introduction

1.1 Purpose

The Treeby Local Structure Plan (Structure Plan) has been prepared by RobertsDay and the project team on behalf of LWP Group Pty Ltd (the developer) in partnership with the Department of Communities (the landowner). The purpose of the Structure Plan is to guide the orderly and proper subdivision and development of Lot 703 Ghostgum Avenue, Treeby (subject site) for residential use, in line with the Treeby District Structure Plan (TDSP).

The Structure Plan is prepared in accordance with the requirements of *Planning and Development (Local Planning Schemes) Regulations 2015* and the Western Australian Planning Commission (WAPC) Structure Plan Framework, with regard to the City of Cockburn *Town Planning Scheme No. 3* (TPS3) Table 9 – Development Area 41.

1.2 Project Vision & Objectives

The project vision and objectives for the Structure Plan will provide the overarching principles that guide the design, planning and place making development efforts.

Vision

"Nestled amongst its natural bushland, the Treeby Project will provide a liveable, environmentally sustainable and well-connected community offering a diverse range of affordable land and innovative housing choices" – Department of Communities (Housing)

Objectives

- Affordability: the delivery of land and housing product that is appropriate and affordable.
- Diversity: the provision of a mix of housing product that has the ability to cater to, and attract a mix of household types.
- Environmental sustainability: the ongoing commitment required to maintain the physical and natural environment.
- Liveability: provide quality and attractive natural and built environment, safety and security, connectivity and access to amenities and services.
- Economic returns: support the development and social wellbeing for the community.

1.0 Introduction

1.3 Land Description

1.3.1 Location

The Structure Plan area is located within the municipality of the City of Cockburn and in the locality of Treeby, which is located approximately 20km south of central Perth (refer Figure 1). The Structure Plan is approximately 2km east of Cockburn Central which contains Cockburn Train Station, Gateway Shopping Centre and Cockburn Aquatic and Recreation Centre (refer Figure 2).

The site is well connected to major employment hubs such as Cockburn Central, Murdoch Knowledge Precinct, Fiona Stanely Hospital and the Jandakot and Bibra Lake Industrial Estates. The site is well serviced with public transport via bus routes on Armadale Road, connecting to Cockburn Central Train Station.

The site is within close proximity to a number of local services and amenities which will provide immediate benefit to future residents, including Calleya Trampoline Park, Calleya Dog Park, Calleya Primary School and the future Calleya Local Centre (refer Figure 3).

1.3.2 Area and Land Use

The Structure Plan area is bound by Armadale Road to the south, Ghostgum Avenue to the east, Bush Forever reserved land to the north and vacant Urban zoned land to the east. The Structure Plan area encompasses 19.91 ha and comprising largely of vacant land with portions of remnant vegetation (refer Figure 4). Although largely cleared, the site has a unique 'bowl shape' to its land formation, reflective of the previous mining use as a sand quarry.

1.3.3 Legal Description and Ownership

The site is legally described as Lot 703 on Plan 413031 within Certificate of Title Volume 2941 Folio 911, the Department of Communities (Housing) are the listed landowners.

Under a development agreement with LWP Group Pty Ltd, the Department of Communities (Housing) will retain a **maximum** of 1 in 9 lots to be developed for its social housing program.

1.4 Project Team

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

DISCIPLINE	CONSULTANT
Planning	RobertsDay
Servicing and Infrastructure	Cossill & Webley
Environmental	RPS Group
Bushfire	Strategen-JBS&G
Landscape Architect	Emerge Associates
Land Surveyor	McMullen Nolan Group Pty Ltd
Hydrology	RPS Group
Acoustic	Lloyd George Acoustics
Traffic and Transport	Riley Consulting Pty Ltd

1.0 Introduction

Figure 1: Regional Location Plan

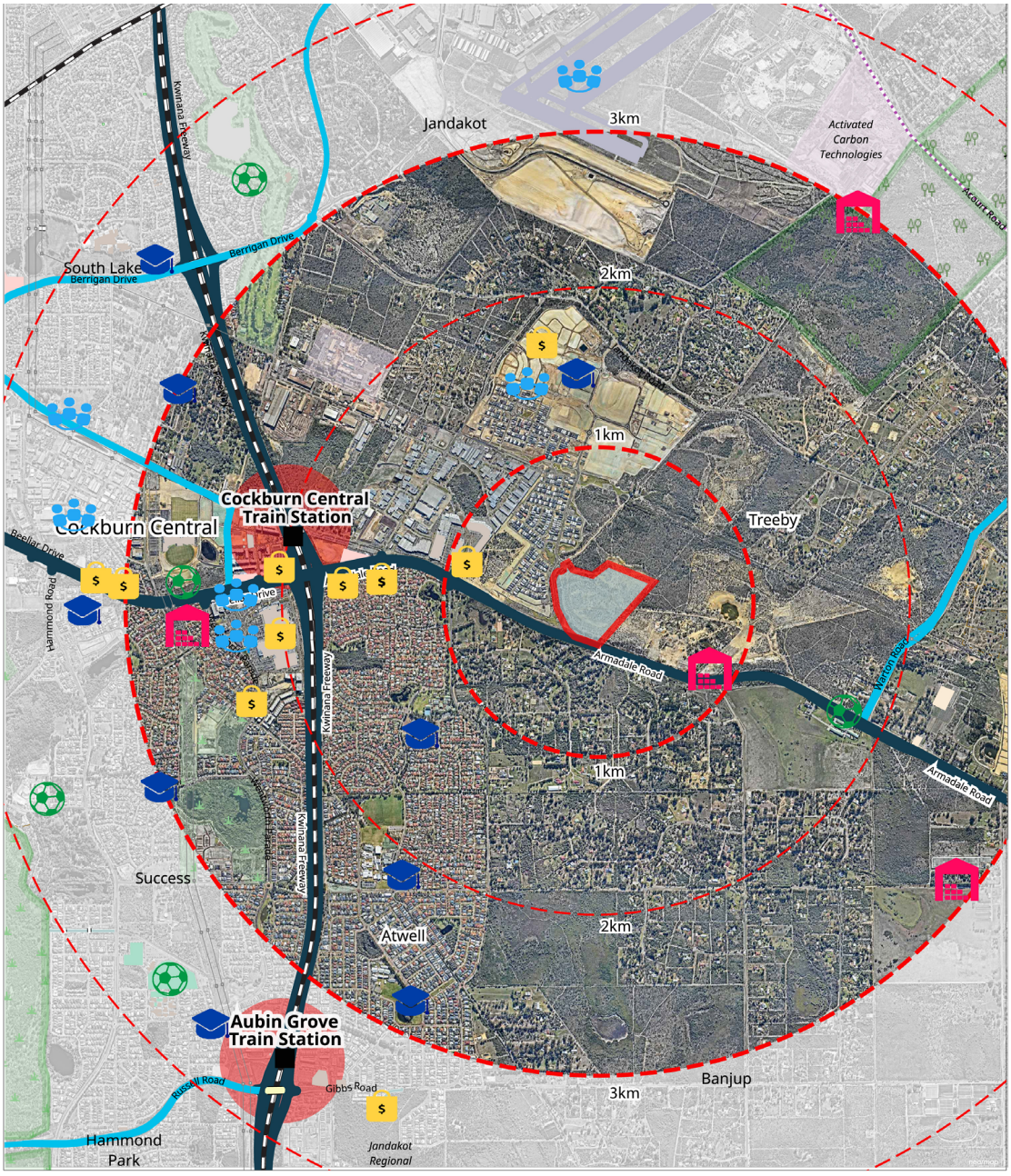


1.0 Introduction

Figure 2: Location Plan



Figure 3: Local Context Plan



Public Amenity

Jandakot Hall
City of Cockburn Library
Cockburn Youth Centre
Red Door
Community Church
Civic Space

Retail

Tony Ale & Co
Last Drop Pub
Dome
McDonalds
KFC
Hungry Jacks
Local Centre
The Gate Bar & Bistro
Retail Precinct (Good Guys, Super A Mart, Officeworks, Bunnings)
Harvest Lakes
Shopping Centre

Sporting

Cockburn-Fremantle
Piston Club
Success Regioanl Sporting Facility
Oceanic Waterbabies
Swim School
Golf Course

Education

Atwell Primary
Atwell College
Divine Mercy College
Success Primary
Jandakot Primary
Harmony Primary
Lakeland Highschool
Goodstart Early Learning

Commercial

BP Petrol Station
Boral Bricks
Richgro Jandakot
Market Gardens

Site Area

1.0 Introduction

Figure 4: Site Plan



2.1 Zoning and Reservations

2.1.1 Metropolitan Region Scheme

The current *Metropolitan Region Scheme* (MRS) zoning and reservations are shown in Figure 5.

Amendment 1289/57 to the MRS rezoned the Structure Plan area from 'Rural' to 'Urban', as well as the land directly north to 'Parks and Recreation' reserve and designated as 'Bush Forever Area'. This amendment was gazetted on 20 May 2016.

The Structure Plan area abuts Armadale Road to the south which is reserved as 'Primary Regional Road' being a significant regional road under the control of Main Roads Western Australia (MRWA). Land directly to the east and west of the Structure Plan is also zoned 'Urban'.

Figure 5: Metropolitan Region Scheme Map



2.0 planning framework

2.1.2 Town Planning Scheme No. 3

The Structure Plan area is zoned 'Development' under the provisions of the City of Cockburn's *Town Planning Scheme No. 3* (TPS3). Land to the west is also zoned 'Development' and land directly east of Structure Plan areas is zoned 'Resource'. Refer to Figure 6 for TPS3 zoning map.

The subject site is identified within Special Control Area – Development Area 41 'Ghostgum Avenue'. Clause 5.2.2 of TPS3 requires the subdivision and development of land identified in a Development Area to be undertaken in accordance with conditions contained within Table 9.

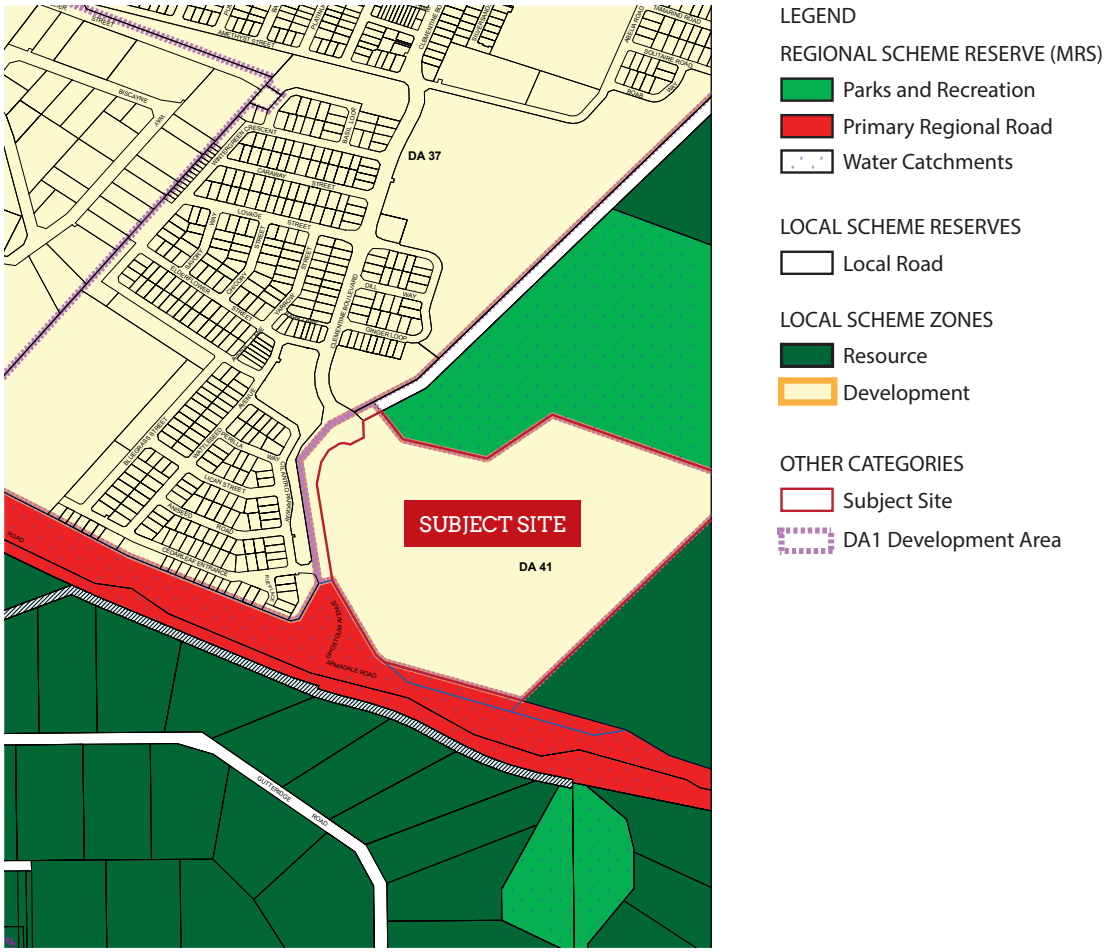
Table 9 conditions of Development Area 41 include:

1. *An approved Structure Plan together with all the approved amendments shall be given due regard in the assessment of application for subdivision, land use and development accordance with Clause 27(1) of the Deemed Provisions.*
2. *The Structure Plan is to provide for an appropriate mix of residential and compatible land uses.*
3. *The Structure Plan is to be provided for an appropriate mixed for residential and compatible land uses.*
4. *The Structure Plan is to be provided to the Office of Environmental Protection Agency (OEPA) for consultation and comment part of the advertising period.*

The Structure Plan has been prepared in accordance with Part 4 of the *Planning and Development (Local Planning Schemes) Regulations 2015* Schedule 2 – Deemed Provisions and Table 9 of TPS 3 which requires a Structure Plan to be prepared before any future subdivision or development is to be undertaken.

2.0 planning framework

Figure 6: City of Cockburn Town Planning Scheme No. 3 Map



2.2 Regional and sub-regional structure plan

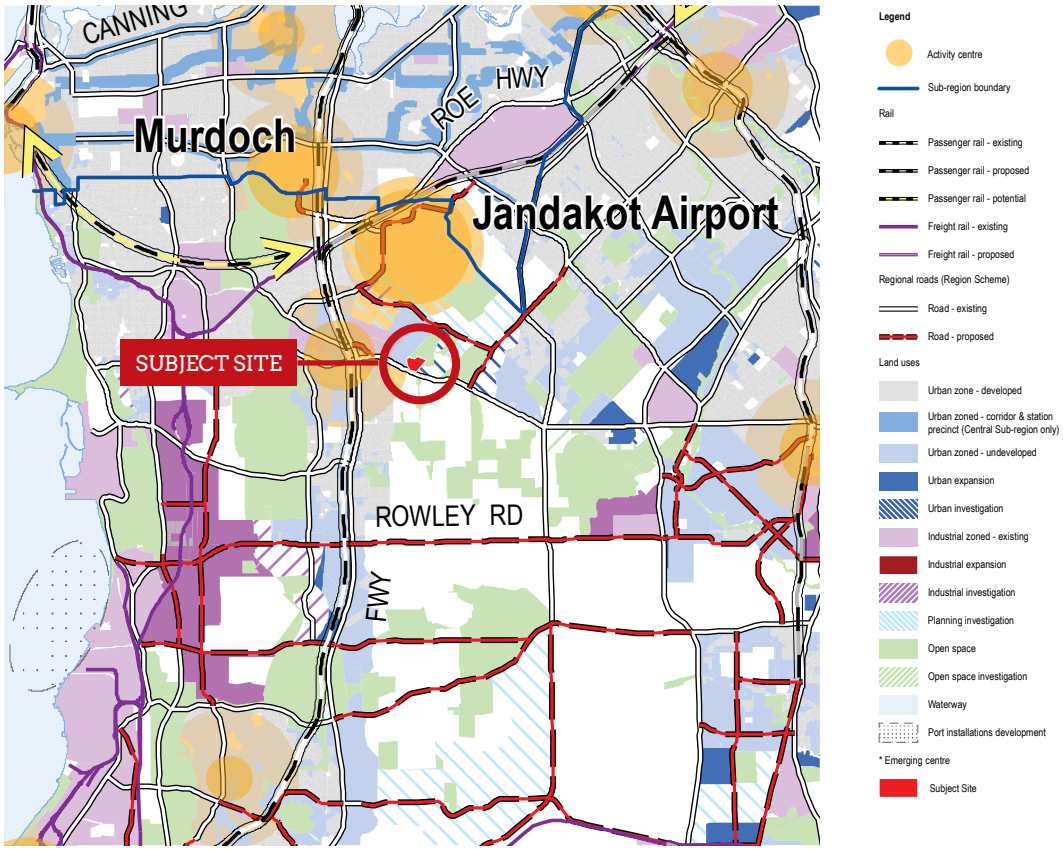
2.2.1 *Perth and Peel @ 3.5 million*

Perth and Peel @ 3.5 million is the highest-level strategic planning document which establishes a vision for the future expansion of Perth Metropolitan and Peel Regions, which projected to grow to a population of 3.5 million, with a total 800,000 new dwellings to be provided by 2050. In order to achieve this expected growth without impacting on our way of life, natural environment and physical infrastructure the State advocate for a 'Connected City' model which seeks to provide 47% of all new dwellings (380,000 dwellings) within existing infill areas by setting housing targets for each Sub Region.

The Structure Plan area is located within the South Metropolitan Sub Region, which has an infill housing target of 75,510 to be provided by 2050, of which the City of Cockburn will contribute 14,680 new dwellings.

The Structure Plan area is identified in the Sub Regional Framework as 'Urban Undeveloped' as an area for priority increased density that can be serviced by the required infrastructure and located in proximity to activity centres, transit corridors and areas of high amenity (refer Figure 7). The Sub Regional Framework also includes anticipated timeframes for the delivery of urban development sites, with the Structure Plan area identified as 'short term' to be developed by 2015 - 2021.

Figure 7: *Perth and Peel @ 3.5 million*



2.3 Planning strategies

2.3.1 City of Cockburn Local Planning Strategy

The Local Planning Strategy sets out the framework of State and regional policies and interprets these for the local area. It provides the planning rationale for zones, reservations and statutory provisions contained in the Town Planning Scheme.

The Local Planning Strategy outlines the intended development outcome over a 10-15 year period considering future population and employment; the broad strategies for housing, employment, shopping and business activities; and proposals for transport, parks, regional open space and other public uses.

Council will have regard to the principles of the Local Planning Strategy as follows:

- Environmental Principle: To protect and enhance the key natural and cultural assets of the State and deliver to all Western Australians a high quality of life which is based on sound environmentally sustainable principles.
- Community Principle: To respond to social changes and facilitate the creation of vibrant, accessible, safe and self-reliant communities.
- Economic Principle: To actively assist in the creation of regional wealth, support the development of new industries and encourage economic activity in accordance with sustainable development principles.
- Infrastructure Principle: To facilitate strategic development by ensuring land use, transport and public utilities are mutually supportive.
- Regional Principle: To assist the development of regional Western Australia by taking account of the region's special assets and accommodating the individual requirements of each region.

2.3.2 Treeby District Structure Plan

The Structure Plan area forms part of a larger group of landholdings on which development is to be undertaken in accordance with the Treeby District Structure Plan (TDSP) approved by Council in February 2017.

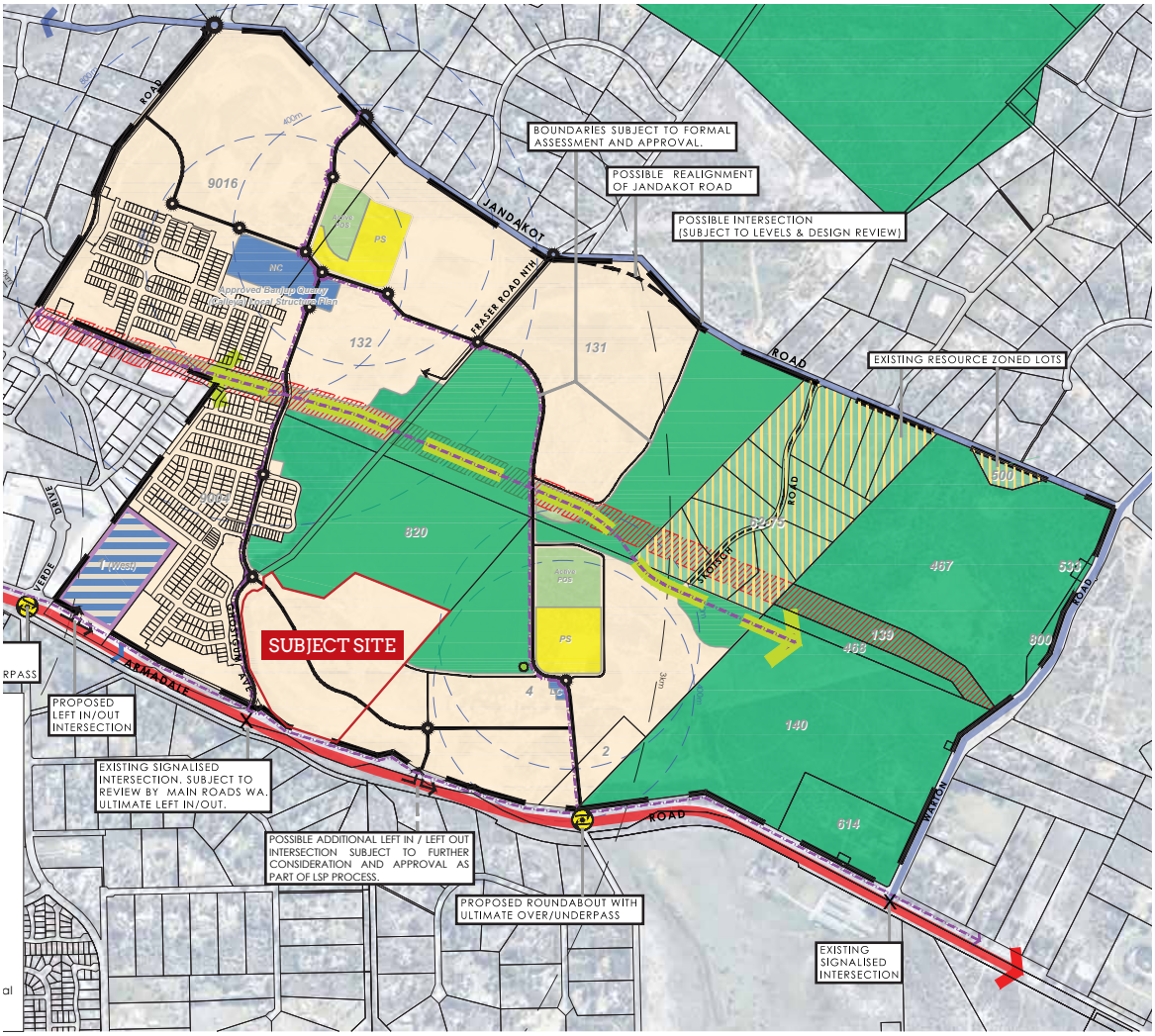
TDSP provides a high-level spatial framework to coordinate the development of land and has been used as a base to guide the design of the Structure Plan and allocation of land uses.

The Structure Plan area is identified in the TDSP as 'Residential' with a Connector Road running east-west through the site, providing access between Ghostgum Avenue and land to the east (refer Figure 8). The intersection of Ghostgum Avenue and Armadale Road is identified as an existing singalised intersection.

The Structure Plan is consistent with the intent of TDSP in providing range of residential densities, with connecting road through the site and a high-quality POS network.

2.0 planning framework

Figure 8: Treeby District Structure Plan Map



LEGEND

- Treeby (Banjup) DSP
- Residential
- Public Open Space (District level)
- Public Open Space (including areas with Regional Conservation Values)
- Public Purposes - School / Civic
- Neighbourhood / Local Centre
- Mixed Business and/or Residential
- Resource
- Potential Future Residential (pending inclusion by WAPC in 'Perth and Peel @3.5million' documents)
- Powerline Easement
- Subject Site
- Green Linkage
- Primary Regional Road
- District Distributor Road
- Connector Road
- Major Dual Use Path / Cycle path
- distance to Train Station
- distance to Amenities
- X Signalised intersection
- Left IN / OUT Only
- Roundabout with access at grade. Subject to current design review by MRWA.
- Potential to relocate Banjup War Memorial (specific location to be determined at LSP stage)

2.4 Planning policies

The following State Government policies are considered relevant and applicable to the Structure Plan area:

- *SPP 2.3 Jandakot Groundwater Protection*
- *SPP 2.8 Bushland Policy for the Perth Metropolitan Region*
- *SPP 3.7 Planning in Bushfire Prone Areas*
- *SPP 5.3 Land Use Planning in the Vicinity of Jandakot Airport*
- *SPP 5.4 Road and Rail Noise*
- *SPP 7.0 Design of the Built Environment*
- *SPP 7.3 Residential Design Codes Volume 1*

A number of Local Planning Policies and strategies have bene taken into account as part of the Structure Plan design, these include but are not limited to:

- *LPP 1.12 Noise Attenuation*
- *LPP 1.16 Single House Standards for Medium Density Housing in the Development Zone*

2.4.1 Liveable Neighbourhoods

Liveable Neighbourhoods (LN) is an operational policy used to guide the design and assessment of structure plans and subdivision applications in greenfield areas and larger infill sites.

The key initiatives of LN are covered under eight design elements: community design, movement network, lot layout, public parkland, urban water management, utilities, activity centers and employment and schools.

LN focuses on achieving higher densities of development to achieve more sustainable urban outcomes and support for planned facilities through the application of density targets. These targets should be achieved by providing a wider range of lot sizes and dwelling types resulting in a greater range of housing and lifestyle choices.

LN is a performance-based document where the requirements of LN may be satisfied in a number of ways. LN aims to balance the maintenance of acceptable standards and meeting the strategic vision, with encouraging greater innovation in response to market needs.

By providing for a diverse range of housing within a connected and walkable neighbourhood, structured around high-quality POS, the Structure Plan reflects the key aims of the document.

Where an inconsistency arises between LN and the deemed-to-comply provisions of the Residential Design Codes (R-Codes), a Local Development Plan (LDP) may be used to override the R-Codes.

2.0 planning framework

2.4.2 State Planning Policy 2.3 Jandakot Ground Water Protection Area

This policy applies to land identified in the Jandakot Groundwater Protection Area, which aims to manage development and land uses that may have a detrimental impact on the water resource. The policy allocates management priority designation 1-3 for assessing development risk.

Under the "Underground Water Pollution Control Area" the Structure Plan area is identified as 'Priority 3' (P3) area. 'P3' areas under the policy reflect land zoned Urban under the MRS.

The use of land in 'P3' is to be assessed with the aim of risk management, rather than land use restrictions, to minimise potential pollution to the water source. The policy outlines the need to provide reticulated sewerage and implementing best management practices.

2.4.3 State Planning Policy 3.1 Residential Design Codes

State Planning Policy 7.3 Residential Design Codes Volume 1 (R-Codes) provides a comprehensive basis for the control of residential development throughout the State. The key objectives of the policy are:

a. To encourage design which is responsive to the site, size and geometry of the development site;
b. To allow variety and diversity as appropriate where it can be demonstrated this better reflects context or scheme objectives;
c. To ensure clear scope of scheme objectives to influence the assessment of proposals; and
d. To ensure certainty in timely assessment and determination of proposals applied consistently across the State and local governments.

The R-Codes is a performance based document, where an application can either be assessed to satisfy the 'deemed-to-comply' provisions or address the design principles under the exercise of judgment by the City of Cockburn.

A Local Planning Policy (LPP) or Local Development Plan (LDP) may vary the provisions of the R-Codes where consistent with the 'design principles'.

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

This policy applies to land in the vicinity of Jandakot Airport, with may be affected be aircraft noise associated with the movement of aircraft.

The policy refers to the level of noise exposure based on ANEF contours, which range from 20 ANEF up to 40 ANEF, with 40 ANEF being the closest to the runway.

The Structure Plan area is located within the area identified as 'Frame Area', being land bound by Roe Highway, Randford Road, Warton Road, Armdale Road and Kwinana Freeway, but does not include areas within the ANEF contours. There are no restrictions to the zoning or development within the 'Frame Area' which is outside the 20 ANEF exposure level.

A notification on titles is required pursuant to s70a of the *Transfer of Land Act 1893* advising of the potential for noise nuisance is to be required as a condition of any subdivision or planning approval, within the 'Frame Area'.

2.4.5 *State Planning Policy 5.4* Road and Rail Noise

The purpose of this policy is to minimise the adverse impact of road and rail noise on noise-sensitive land use and development within specified trigger distances of strategic freight and major traffic routes.

Armadale Road is identified as a Primary Regional Road (red road) that has more than 23,000 daily traffic count, but less than 50,000 traffic volume per day. Armadale Road has a trigger distances of 200m measured from the road carriageway edge. The policy therefore requires development within this trigger distance to require the preparation of a noise management plan to determine the actual noise levels and demonstrate the proposal can mitigate the impacts of noise through attenuation measures.

2.0 planning framework

2.4.6 Local Planning Policy 1.16 Single House Standards for Medium Density Housing in the Development Zone

The City of Cockburn's *Local Planning Policy 1.16 Single House Standards for Medium Density Housing in the Development Zone* adopts the Medium-density single house development standards (R-MD Codes) via the WAPC Planning Bulletin 112/2016. The R-MD Codes reflect contemporary housing typologies and incorporate existing R-Code variations that have been applied to date.

The R-MD Codes replace the deemed-to-comply requirements of the following clauses of the R-Codes:

- Building and Garage setbacks;
- Open Space;
- Parking;
- Visual Privacy; and
- Solar Access.

All other relevant R-Code standards continue to apply. Where there is a conflict between the provisions of the R-MD Codes and an approved LDP, the LDP provisions prevail to the extent of any inconsistency.

2.4.7 Local Planning Policy 5.19 Structure Plans and Telecommunications Infrastructure

The City of Cockburn's *Local Planning Policy 5.19 Structure Plans and Telecommunications Infrastructure* requires the consideration for telecommunication services as part of forward planning to consider the location of telecommunication infrastructure is incorporated into the design process and mitigate any potential visual impacts to the community.

Mapping provided by the Australian Mobile Telecommunications Association, the peak industry body which represents Australia's mobile telecommunications industry, on the Radio Frequency National Site Archive (RFNSA) identifies existing and proposed telecommunication infrastructure. This mapping indicates the nearest planned telecommunications tower is to be located at 40 Solomon Road and 67 Buckely Street, Jandakot.

There are currently no future telecommunication sites identifies for the Treeby locality. The planning consultants who act for the mobile phone provides (Optus, Vodafone and Telstra) were contacted to ascertain if any formal planning is being undertaken for Treeby. It is our understanding that no formal planning regarding site identification has been undertaken for the Treeby locality.

3.1 Biodiversity and Natural Area Assets

An Environmental Assessment Report has been prepared by RPS Group (refer Appendix A) to review the existing environmental factors that may be impacted as a result of the development and outline management measures to mitigate any potentially significant environmental impacts.

Historically, the Structure Plan area was used as a sand quarry with the site now largely consisting of cleared or poorly revegetated land, which provides limited environmental value.

RPS Groups assessment of the remnant native vegetation indicates there is approximately 0.98ha of native Banksia Woodland across the site. Based on the Commonwealth Conservation Advice criteria for Banksia Woodland Threatened Ecological Communities (TEC) the remnant Banskia Woodland does not trigger the need for Commonwealth referral being a patch less than 1.0ha in size.

The areas of Banksia Woodland mapped as being 'Good' to 'Very Good' quality include 0.42ha patch of vegetation located to the west and south-west boundaries of the Structure Plan area. The Structure Plan proposes to retain this vegetation in an area identified as Conservation POS. The remaining 0.56ha of Banksia Woodland is spread over a large area which exposes the vegetation to the effects of disturbances, this vegetation is considered to be 'Low' quality. Areas of POS will aim to retain trees where possible, subject to engineering constraints.

The patch of high-quality remnant vegetation to the west and south-west of the site is co-located with the Threatened Flora species *Caladenia huegelii*, (better known as a Spider Orchid) which is protected under the State *Biodiversity Consercation Act 2016 and the Environmental Protection and Biodiversity Conservation Act 1999*. There are no records of the Spider Orchid occurring elsewhere in the Structure Plan area.

RPS Group completed a flora and vegetation review for the site in July 2019 which included the following:

- Review of the historical mapped locations of the Spider Orchid in the local area based on DBCA's database and records from the Orchid Society;
- Review PGV Environmental assessment report and orchid monitoring report (2013) findings;
- Targeted searched for the Spider Orchid undertaken by PGV Environmental between 2012-2016; and
- RPS targeted search for the Spider Orchid undertaken in 2019.

3.0 site conditions and constraints

In order to address the retention and protection of the Spider Orchid, the area will be fenced and is indicated on the Structure Plan Map as Conservation POS. This fenced area also includes the patch of 'Good' to 'Very Good' Banksia Woodland.

An assessment of the likely occurrence of each fauna species identified by the *Environmental Protection and Biodiversity Conservation Act 1999 Protected Matters* database has been undertaken. Of the species, the Forest Red-Tailed Black Cockatoo, the Baudin's Cockatoo and the Carnaby's Black Cockatoo were likely to be found within the area.

The Commonwealth draft referral guidelines for threatened black cockatoo species is triggered when clearing more than 1.0ha of quality foraging habitat or any known nesting tree which would pose significant impacts to the cockatoo species and would required Federal referral. The LSP does not trigger these requirements. The clearing of 0.56ha of 'Low' quality Banksia Woodland vegetation and six Jarrah Trees is unlikely to result in a significant impact occurring to threatened black cockatoo habitat.

3.0 site conditions and constraints

3.2 Landform and Soils

The site was historically used as a sand quarry which has resulted in the unique bowl shape of the site. The site has a steep ridge which frames the site to the south and south-west with a maximum height of 43m AHD, approximately 6.0m-10.0m higher than the balance of the site, the ridge then batters down to Armadale Road duplication works. Theremainder of the is relatively flat at a level of approximately 30m AHD (refer Figure 9). A site constraint presented by this landform is developing along the western bund to provide vehicle access to Ghostgum Avenue.

The site forms part of the Bassendean Dune system predominantly, consisting of Bassendean Sands. This soil type is generally free draining and is suitable for urbanisation. On steeper land a combination of civil, landscape and built form solutions will be needed to address character and functional considerations.

The Department of Environment and Conservation *Acid Sulfate Soil Risk Map* identifies the site as having 'Moderate' to 'Low Risk' of Acid Sulfate Soils occurring within 3 metres from the soil surface. The potential presence of Acid Sulfate Soils is not considered a constraint to development, however, it is anticipated that the presence of Acid Sulfate Soils will be managed through the preparation of an Acid Sulfate Soils Management Plan prior to subdivision commencing.

3.0 site conditions and constraints

Figure 9: Topography



3.0 site conditions and constraints

3.3 Heritage

A desktop search indicates there are no European or Aboriginal Registered Heritage site within the Structure Plan area.

One 'other heritage place', the Readymix Sandpit 1 (ID 4108), is recorded at the intersection of Ghostgum Avenue and Armadale Road, partially intersecting the subject site.

As part of the Main Roads duplication works for Armadale Road a report was prepared by Brad Goode and Associates Consulting Anthropologists and Archaeologist in 2017 to determine if there are any sites of places of Aboriginal heritage significance, as defined by Section 5 of the Aboriginal Heritage Act to ensure the works adhere to the obligations under the Act.

During the course of the archaeological survey undertaken by Brad Goode and Associates the location of Readymix Sandpit 1 (ID 4108) 'other heritage place' was targeted and scrutinized, with no Aboriginal archaeological artefacts or materials identified. The previous quarry and associated industrial activity in the area had resulted in the destruction of this 'other heritage place'.

It was concluded in their report that Readymix Sandpit 1 (ID 4108) 'other heritage place' no longer exists.

3.4 Ground Water and Surface Water

The site is located within the Jandakot ground water area, and the following sub-areas:

- Superficial Aquifer: Canning Value sub-area;
- Leederville Aquifer: Jandakot confined sub-area; and
- Yarragadee North Aquifer: Jandakot confined sub-area.

Regional groundwater mapping from *Perth Groundwater Map* shows that the historical maximum ground water levels of the Superficial Aquifer range from 37m AHD to 28m AHD across the site. Groundwater contours indicate that the flow gradient is relatively flat across the site with a regional flow generally in a south-westerly direction towards Thomson's Lake. Site specific groundwater monitoring indicates maximum groundwater levels range from 26.30m AHD to 26.81m AHD. The separation from the existing surface to the ground water table is typically 2.0m or more throughout the site, as such ground water management will need to be considered during development.

There are no surface water features within the Structure Plan area. The topography of the site is relatively flat which indicates that rainfall would infiltrate and/or evaporate rather than run-off.

To facilitate the development of the proposed LSP, the stormwater and groundwater management strategies are detailed within the Local Water Management Strategy (LWMS) refer to Part 4.7 of this report and Appendix C.

3.5 Existing Movement Networks

A Transport Assessment, prepared by Riley Consulting (refer Appendix B), identified the following characteristics of the existing movement network.

The Structure Plan area is located immediately north of Armadale Road, classified as a Primary Distributor Road and is currently being upgraded to provide to four lanes. Armadale Road will have the capacity to carry 45,000vpd once fully constructed.

Under the TDSP Ghostgum Avenue is designated as a Neighbourhood Connector A, with a capacity of 7,000vpd, with an estimated 5,000vpd expected with full development realised. The TDSP traffic report analysed the operation of the existing traffic signals of Ghostgum Avenue and Armadale Road for long term traffic demands (5,000vpd) and demonstrated the intersection would operate in an acceptable manner.

Fraser Road is an existing road reserve which connects to the existing round-a-bout at Ghostgum Avenue and Clementine Boulevard. TDSP does not show this road being constructed. The road reserve currently provide cycle and pedestrian access to Calleya Dog Park to the north.

The Structure Plan area is approximately 2.0km east of the Cockburn Central Train Station, which provides frequent services via the Mandurah and Joondalup train lines. The existing bus route 518 services along Armadale Road connecting to Cockburn Central Train Station, which runs at a frequency of approximately 30 minutes.

As part of the TDSP a bus route is proposed via Ghostgum Avenue through Calleya Estate. The majority of the Structure Plan area will be within 400m walking distance to Ghostgum Avenue where future bus services are expected to operate, connecting Jandakot Road to Armadale Road via Clementine Boulevard and Ghostgum Avenue.

A dedicated cycle and footpath is proposed on the existing arterial road network including Armadale Road.

4.0 design philosophy

The Site conditions highlights opportunities and constraints the Structure Plan design must respond, these include:

- Location and conservation of Spider Orchid;
- Land predominantly cleared resulting from historic sand quarry mining activities;
- Remnant Banksia Woodland fringing the Structure Plan area;
- Interface with Armadale Road;
- Single entry point from Ghostgum Avenue connecting to landholdings east; and
- Bowl shaped topography.

The following section provides a response to these considerations.

4.1 Concept Plan

A Concept Plan has been prepared to support the Structure Plan and provide a greater degree of certainty on the future pattern of subdivision and development (refer Figure 10). The Concept Plan is subject to detailed refinement at the subdivision stage.

The Concept Plan design is the product of the convergence of locational, landform and landscape features of the site with the project objectives of affordability, diversity, environmental sustainability, livability and economic returns.

Consistent with the *Liveable Neighbourhoods*, the Concept Plan has been predicated on the following objectives:

- Utilise the bowl shape of the site to create an intimate space framed by development;
- Centrally focused village green;
- Transition of lot size from core to boundary;
- Connected green fringe;
- Modern urban character and architecture;
- Diverse housing options;
- Single entry point, sweeping downwards into the core of the village;
- Climate response and sustainable of the site;
- Celebration of heritage and nature; and
- Creation of a Community Hub

In response to the above objectives the Structure Plan embraces the unique bowl shape topography of the site which provides an opportunity for a fully contained and self-sufficient residential neighbourhood. The design focuses on a POS centerpiece as the meeting point for a surrounding residential neighbourhood, which is framed by remnant vegetation to the west and south-west which includes the retention of the Spider Orchid and provides appropriate transitional interface to Armadale Road. The street network is a modified grid layout which provides an efficient design, maximising walkability, access to POS and utilises the natural low points for drainage. The grid layout also supports safe low speed vehicle movement and integrated pedestrian/ cyclist network.

4.0 design philosophy

Figure 10: Concept Plan















4.0 design philosophy

4.2 Design Interface

To ensure a compatible design across landholdings identified in TDSP, liaison and meetings were held with the adjoining landowner to the east (Lot 4) and their planning consultant (CLE). The outcome of this collaboration being an integrated design along the eastern boundary of the Structure Plan in terms of road alignment and design interface.

4.3 Land Use

The Structure Plan provides for residential, recreational and educational land uses. In accordance with the TDSP, the majority of the land is identified for residential purposes. The residential blocks have been configured to respond to the constraints of the land and maximise site efficiencies.

Where possible, area's of POS have been position to allow for the retention of existing trees and collocated the natural low points on site.

An overview of the Structure Plan land uses is provided in Table 1:

Table 1: Land Use

LAND USE	LAND AREA
Total area covered by the Structure Plan	19.91 ha
Estimated area of each land use proposed:	
• Residential	10.7ha
• Public Open Space	2.12ha
• Conservation POS	0.54ha
• Child Care	0.2ha
• Seniors Living	1.68ha
• Roads / Laneways	4.67ha
Estimated area and number:	
Neighbourhood parks	1
Local parks	2

4.4 Public Open Space

The location of POS is influenced by a number of factors including drainage requirements, topography, the surrounding road network, adjoining sites and the need to provide local amenity and proximity to POS for future residents. The Structure Plan proposes three areas of Public Open Space (POS) in additional to an area of Conservation POS (refer Figure 11).

Most stages of development will frame a central 1.507ha linear park which has been designed as the centerpiece of the development (POS A). This POS is strategically located to ensure all residents are within 2-3 minute walk of the park, and will be the hub of life at Treeby and reinforce the project theming and village aspirations. The size of this POS creates a space that is fit for purpose, and provides passive and active recreation opportunities with the possibility of incorporating a pavilion, play equipment, kickabout and reflection spaces to cater for a variety of ages and abilities.

A second area of POS (POS B) is provided at the entry of the site flanking the central boulevard providing an entry statement and drawing attention of passing motorists from Ghostgum Avenue.

As part of the MRS Amendment 1289/57 the *Environmental Protection Authority (EPA)* recommended that fringing remnant vegetation be retained and that the protection of the Spider Orchid be incorporated into the planning process. These recommendations have been considered into the design with a third area of POS (POS C) framing the development. An area of Conservation has been included in the POS to retain the existing vegetation within the west and south-west of the site and protect the Spider Orchid rare flora species. A pedestrian connection is provided between the site and Ghostgum Avenue through this Conservation POS utilising an existing track, with the Conservation area to be fenced, restricting access.

The POS network create a 'green-link' connecting the site east-west from Ghostgum Avenue towards the adjoining landholdings east and appropriate interface with Armadale Road. The area of POS are positioned adjacent to the central boulevard and entry to the estate a feature and providing an enhanced pedestrian experience.

Residents will also benefit from surrounding POS. Fraser Road reserve provides a pedestrian connection from the Structure Plan area to Calleya Dog Park to the north and the future Calleya Local Centre.

Given the importance of the centerpiece POS (POS A) in the creation of amenity and identity for the future community in Treeby, a Landscaping Concept Plan has been prepared by Emerge Associates (refer Appendix E). The plan details functional, location and philosophical aspects of the POS design and displays the key design features to be incorporated at the development stage. Character and theming of landscape features including enhancement of the existing natural bushland and materiality and public art to create a sense of place and connection with the past.

4.0 design philosophy

Figure 11: Public Open Space Plan



4.0 design philosophy

4.4.1 Community Focus

A primary objective in the planning for Treeby is to create a distinctive character and identify with a 'central place' to foster a sense of community belonging. This central place/ focus at Treeby will be the linear park (POS A). The inter-connected street grid focuses on the central park to ensure all residents are within easy walking distance.

The developer will explore options for the development of a community hub building, in a yet to be determined location, to become the civic and community focus for residents and any visitors to this new community. The community hub will seek to reflect the Spider Orchard via a circular landmark structure with the ability to be delivered in stages as the community grows. The Community Hub may include uses such as:

- Small café
- Toy Library
- Shared Office Space
- Temporary Sales Office
- Children's playground
- Resident concierge service

4.4.2 POS Allocation

The WAPC generally requires that 10 per cent of gross subvisible area be provided as POS. The POS Schedule provided in Table 2 demonstrates that the required minimum amount of open space is provided and is structured in accordance with the requirements of LN.

Where drainage is required within areas of POS, it will be provided as landscaped basis to reserve a recreational and amenity function. Drainage swales catering for events greater than 1 in 5 event (0.2 EY) will incorporate turfed grass enable multiple use and ease of maintenance.

Table 2: Public Open Space Schedule

Site area			19.91ha
Deductions			
1 EY (including swales and dedicated drainage)	0.25ha		
Conservation POS	0.54ha		
Child Care Site	0.2ha		
	Total	0.99ha	
Gross Subdivisible Area			18.92ha
Public Open Space 10%			1.89ha
Public Open Space Contributions may comprise:			
Minimum 80% Unrestricted Public Open Space		1.51ha	
Maximum 20% Restricted use Public Open Space		0.37ha	
Unrestricted Public Open Space (Ex. 1:1 year drainage)			
POS A	1.335ha		
POS B	0.22ha		
POS C	0.55ha		
	Total	2.105ha	
Restricted Public Open Space			
POS A	0.018ha		
	Total	0.018ha	
Total Public Open Space		2.12ha	11.2%

Recent updates to the Australian Rainfall and Runoff have resulted in the following changes in terminology:

1 EY = 1 in 1 year
0.2 EY = 1 in 5 year
1% AEP = 1 in 100 year

4.5 Residential

A Concept Plan has been prepared to demonstrate that the Structure Plan will create a legible, connected and functional residential development. The Structure Plan is intended to facilitate the provisions of a diverse range of lot sizes, which will subsequently facilitate a mix of housing types to cater for existing and emerging markets.

A demographic analysis indicates by 2030 over 26% of Australian homes will be single persons households, this is substantive given 1-2 persons households now account for approximately 58% of the Perth demographic. The local area has a high percentage of families but also a substantial amount of single persons households. A wide range of housing options will suit a broad demographic market, with a focus on families, first homebuyers, single people and seniors.

The development incorporates a radial design, with larger R25 coded lots provided on the periphery as an interface to Armadale Road, transitioning to smaller R40 affordable lots, with terrace style lots with density codes of R60 focused around the central linear POS and boulevard, and R80 terrace lots provided as an entry statement from Ghostgum Avenue (refer Figure 12)

This variety of densities will attract a diversity of households to live in Treeby, both in design and affordability. This diversity will be further encouraged through Design Guidelines that will be tailored to achieve specific character precincts.

4.0 design philosophy

Figure 12: Residential Densities



4.5.1 Built Form

The Concept Plan which accommodates a variety of residential lot sizes and associated building typologies in response to Perth's housing market growing and maturing. Within each lot type the width and depth will vary to provide variation between lots and building types. Table 3 outlines the approximate breakdown of lot typologies across the Structure Plan area.

LWP will explore options for house and land packages for rear loaded lots fronting the entry boulevard to incorporate a staggered built form and lot layout. Detailed design considerations will be included in a Local Development Plan.

Table 3: Lot Typologies

LOT TYPE	R-CODE	LOT SIZE	LOTS	PERCENTAGE
Terrace Lots	R60-R80	100m²-250m²	76	23.5%
Small Affordable Lots	R30-R40	180m²-300m²	135	41.6%
Traditional Lots	R30	260m²-550m²	95	29.3%
Transitional Lots	R25	300m²-600m²	17	5.3%
Seniors Living			1	0.3%
Total			324	100%

Figure 13: Example of Terrace Lot Typologies





Figure 14: Example of Small Affordable Lot Typologies





4.0 design philosophy

Figure 15: Example of Traditional Lot Typologies





Figure 16: Example of Transitional Lot Typologies



4.6 Child Care Site

Child Care Centres are increasingly important to provide immediate community services for young families and support a sense of place. A Child Care site is proposed within the Structure Plan area which supports and leverages off surrounding local amenities being within walking distance from Calleya Trampoline Park to the west and the future Calleya Primary School approximately 1km north of the Structure Plan area.

The Child Care site is located near the entrance of the estate with separated access provided off the central boulevard.

4.7 Seniors Living Site

Treeby will also provide options for Baby Boomers seeking to downsize to smaller, more manageable homes, allowing seniors to remain within the area. An Over 55's Senior Living development site is proposed located adjacent to the central POS. The site is located within close proximity to the central POS (POS A) which provides opportunities for integrated facilities and provides future residents a high amenity outlook.











4.8 Dwelling Forecasts

The Structure Plan proposes approximately 324 lots and 379 dwellings, within a residential density range of R25 to R80, over a 19.91 ha area.

Under *Perth and Peel @ 3.5 million* 'Connected City' scenario new urban areas are to use a minimum average residential density target of 15 dwellings per grow hectare or Urban Zoned Land. The Structure Plan area complies, providing approximately 19 dwellings per net site ha.

The indicative total dwelling yield of 379 equates to a total residential estimate of 1,023 at 2.7 persons per household (based on the 2016 Census average people per household for City of Cockburn statistical area level 3).

Based on *Liveable Neighbourhoods* 'Site Hectare' definition, the Structure Plan 'developable area' equates to 10.7ha to be developed for residential purposes and excludes non-residential uses including street, laneways and POS. Based on 379 dwelling, the Structure Plan estimates 35 dwellings per site hectare, this complies with LN target of average 22 dwellings per site hectare.

The projected dwelling yield across the Structure Plan area are subject to subdivision design and detailed review of drainage, environmental and bushfire constraints. Preferred lot mix and market demand at the time of land release will also influence final dwelling yields.

4.9 Proposed Movement Network

In support of the Structure Plan a Transport Assessment Report has been prepared by Riley Consultant WA Pty Ltd (refer Appendix B) that identifies the projected traffic volumes and suggested road hierarchies. The report documents likely traffic generation associated within the proposed development, its impact on the internal and external road network, and public transport, walking and cycling requirements.

The Structure Plan area is bound by an established road network to the south and west, and vacant land to the east. Primary access to the Structure Plan area is proposed via an existing round-a-bout at the intersection of Ghostgum Avenue and Clementine Boulevard which provides connection south to Armadale Road and Jandakot Road to the north. Alternative access to Armadale Road (other than Ghostgum Avenue) would not be available until the central boulevard is connected through the landholdings to the east.

The modelling undertaken by Riley Consulting assumes 8 trips per residential lot. For the purposes of the modelling the Child Care Site is estimated to have up to 90 children at a rate of 4.2 trips per child, per day. The Seniors Living site is estimated to have 42 lots with estimated 3 trips per day per lot. Based on these assumptions the total Structure Plan area is estimated to generate 3,096 trips per day.

As a result of this assessment the proposed movement network, the following conclusions were made:

- The Structure Plan area is anticipated to generate approximately 3,096 vehicle trips per day;
- The road network accords with LN guidelines and will suitability accommodate future traffic generated within the Structure Plan area;
- The impact of predicted traffic voumes associated with development of the Structure Plan area will have an acceptable impact on roads in the vicinity;
- The modelling indicates that all roads within the Structure Plan area will carry less than 3,000vpd regardless of the access controls imposed to Armadale Road (left/in left/out or full access intersection); and
- No roads within the Structure Plan which require controlled access.

The internal street network is based on a modified grid format, providing a legible road hierarchy of laneways and access streets adjoining the east-west neighbourhood corridor. This layout facilitates vehicular, pedestrian and cyclist connections between Ghostgum Avenue and neighbouding landholdings to the east.

All roads have been designed not to carry more than 3,000vpd with a speed limit of 50kph therefore no restrictions to direct lot access is required.

All roads and intersection have been designed in accordance with the principles of *Liveable Neighbourhoods*.

A description of each of the proposed internal roads included in the Structure Plan area is provided herein.

4.0 design philosophy

Figure 17: Road Network Plan



4.9.1 Central Boulevard (Neighbourhood Connector B)

Given the importance of the east-west central boulevard as the key entry and exit point into the site from Ghostgum Avenue, significant consideration has informed its ultimate design. The central boulevard starts at a high point providing views down across the site and taking the form of a traditional treelined boulevard, flanked by Terrace Housing creating a distinctly urban setting. The boulevard then opens out to the linear park (POS A) and follows along the northern boundary where it reduces in width.

This road is identified in TDSP as 'Neighbourhood Connector B'. Traffic volumes on Neighbourhood Connector roads are predicted to be less than 5,000vpd, therefore no restrictions to direct lot access are required. The road will ultimately connect the landholding to the east, linking with future road network to provide alternative access to Armadale Road.

Raised intersection treatment for this boulevard is proposed at the two T-intersections. This is intended to encourage reduced vehicle speeds and promote this road within the hierarchy.

A 20m wide road reservation is proposed at the entrance of the development from Ghostgum Avenue, this will consist of two 3.7m trafficable roads, 2.4m central median, 2.1m-2.7m wide verge with 2.1m dual use path to one side (refer Figure 18).

Adjacent the linear POS the central Boulevard is 17m wide road reservation, which consists of 7.2m wide trafficable road, 2.5m embayment car parking and 2.1m dual use path where adjoining POS. A 2.7m verge and 1.5m footpath is proposed where adjoining residential (refer Figure 19).

Figure 18: Neighbourhood Connector B Typical Cross Section (20m wide boulevard) (source: Emerge Associates)

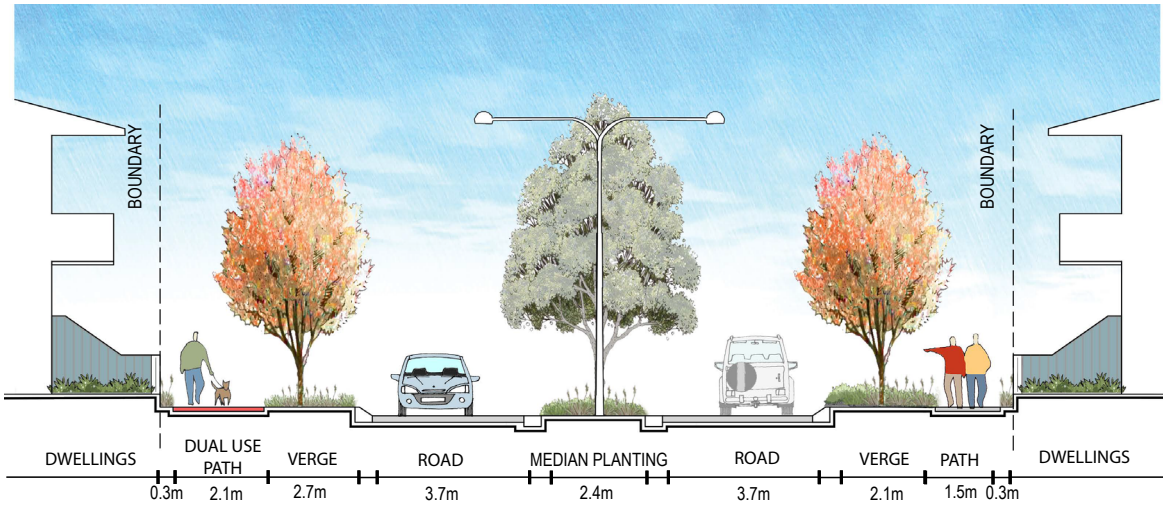
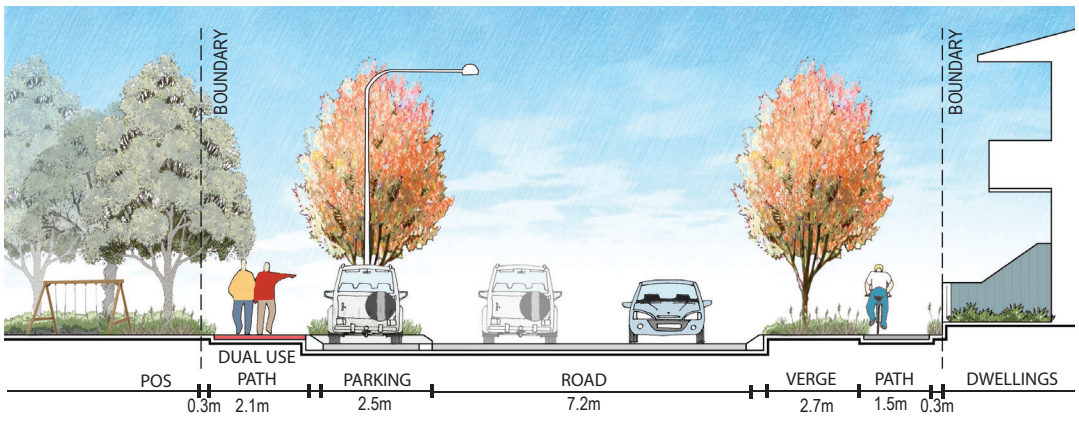


Figure 19: Neighbourhood Connector B Typical Cross Section (17m wide boulevard) (source: Emerge Associates)



4.9.2 Access Street C

The next highest order road within the hierarchy is identified as Access Street C. This street provides access to the proposed Child Care site and Seniors Living site to the west and provides interface with the Structure Plan boundary to the north and east. The estimated number of vehicles per day are below 3,000vpd. The aim of this road is to encourage 40kph traffic speeds to the local road network, whilst allowing for ample width for traffic to pass. Relatively frequent parking on both sides of the street provides speed control as a yield street.

A 20m road reservation is proposed adjacent to bushland to provide adequate separation distances to residential lots (refer Figures 20-22).

The road design includes a 20m wide reserve with 6.0m trafficable road, with 2.7m verge and 1.5m footpath where abutting the Child Care site (refer Figure 20).

A 6.0m wide pavement is proposed to encourage slow vehicle speeds. Where adjoining Bush Forever a 2.6m embayment car bay is proposed. A 2.7m verge and 1.5m footpath is proposed where adjoining residential (refer Figure 21 and Figure 22).

Figure 20: Access Street C Typical Cross Section (source: Emerge Associates)

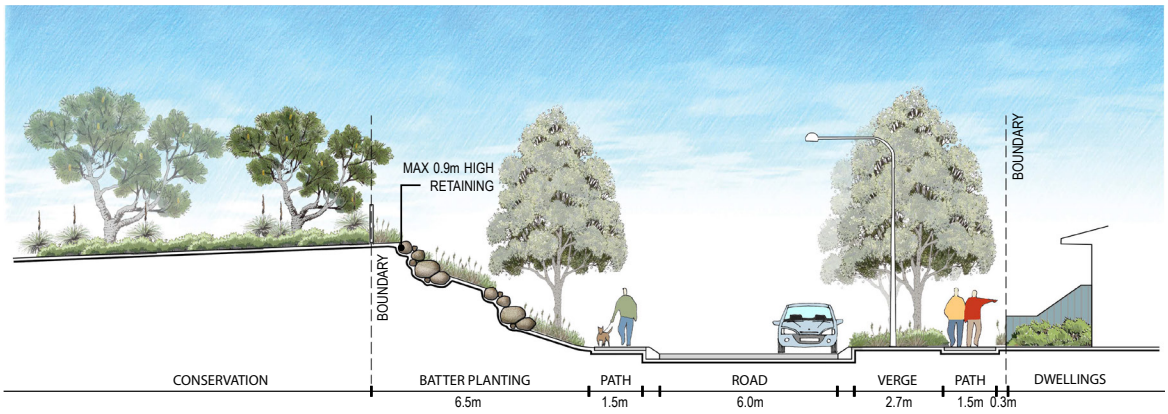


Figure 21: Access Street C Typical Cross Section (source: Emerge Associates)

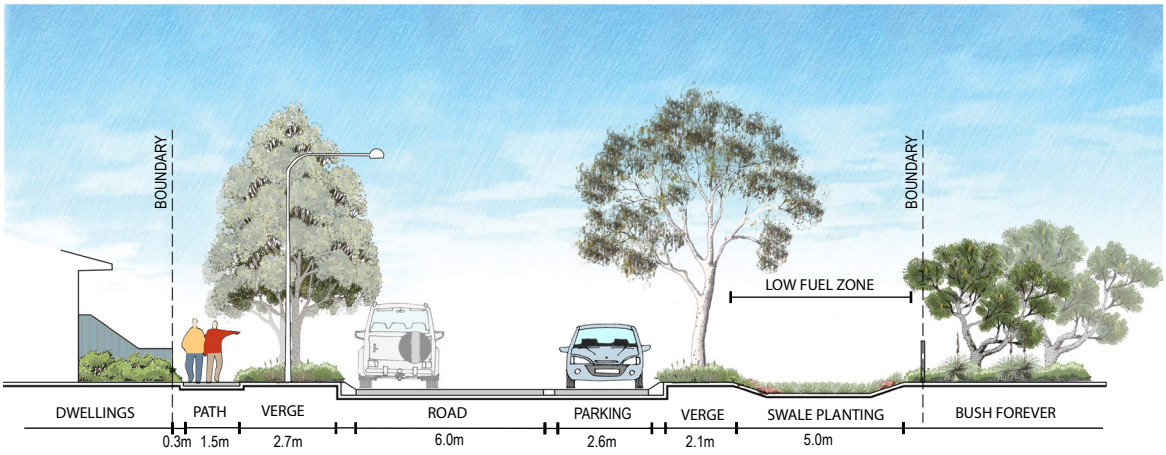
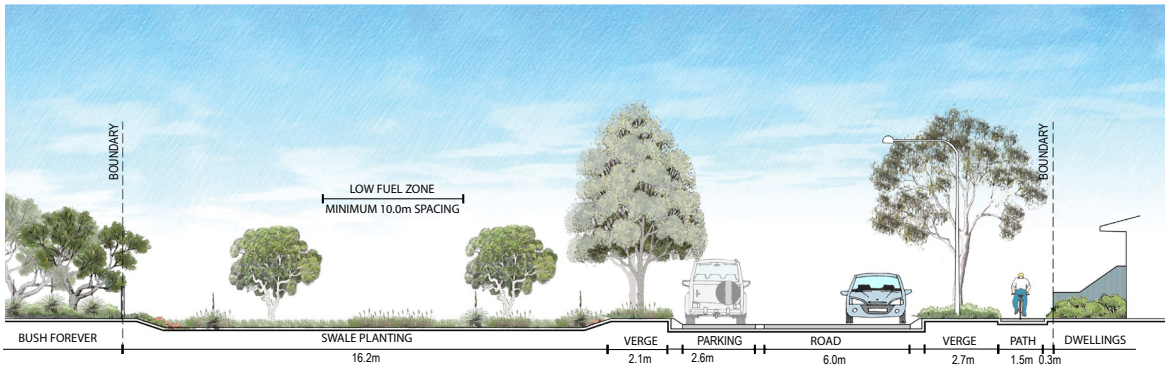


Figure 22: Access Street C Typical Cross Section (source: Emerge Associates)



4.9.3 Access Street D

This is the most used road design within the Structure Plan. These quiet residential street provide frontage to residential properties. Staggered on-street parking on both sides of the street provides speed control.

The road design includes a 15m wide reserve with 6.0m trafficable road, with 4.5m verge and 2.0m footpath to one side (refer Figure 20).

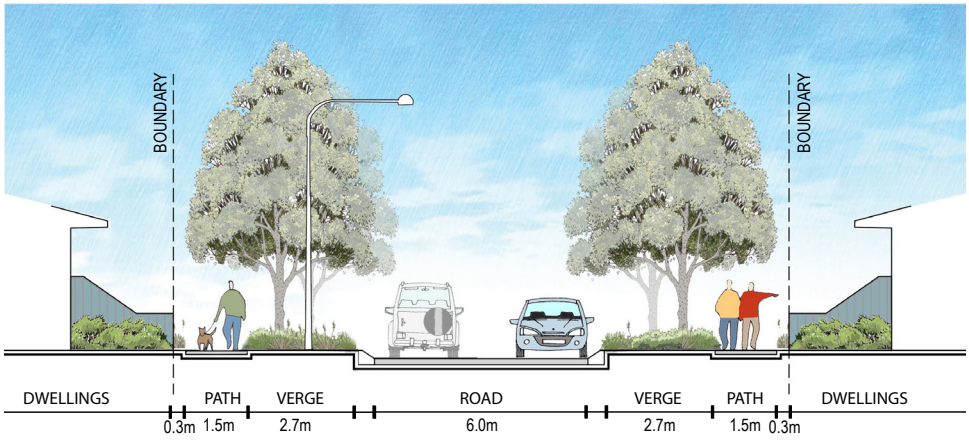
4.9.4 Laneways

There are several laneways proposed to provide access for rear loaded lots. These lots are located fronting the central boulevard (Neighbourhood Connector B) and POS. These laneways are proposed to be 6.0m in width and will carry an estimated 170 vehicles per day.

4.9.5 Cycle and Pedestrian Movement

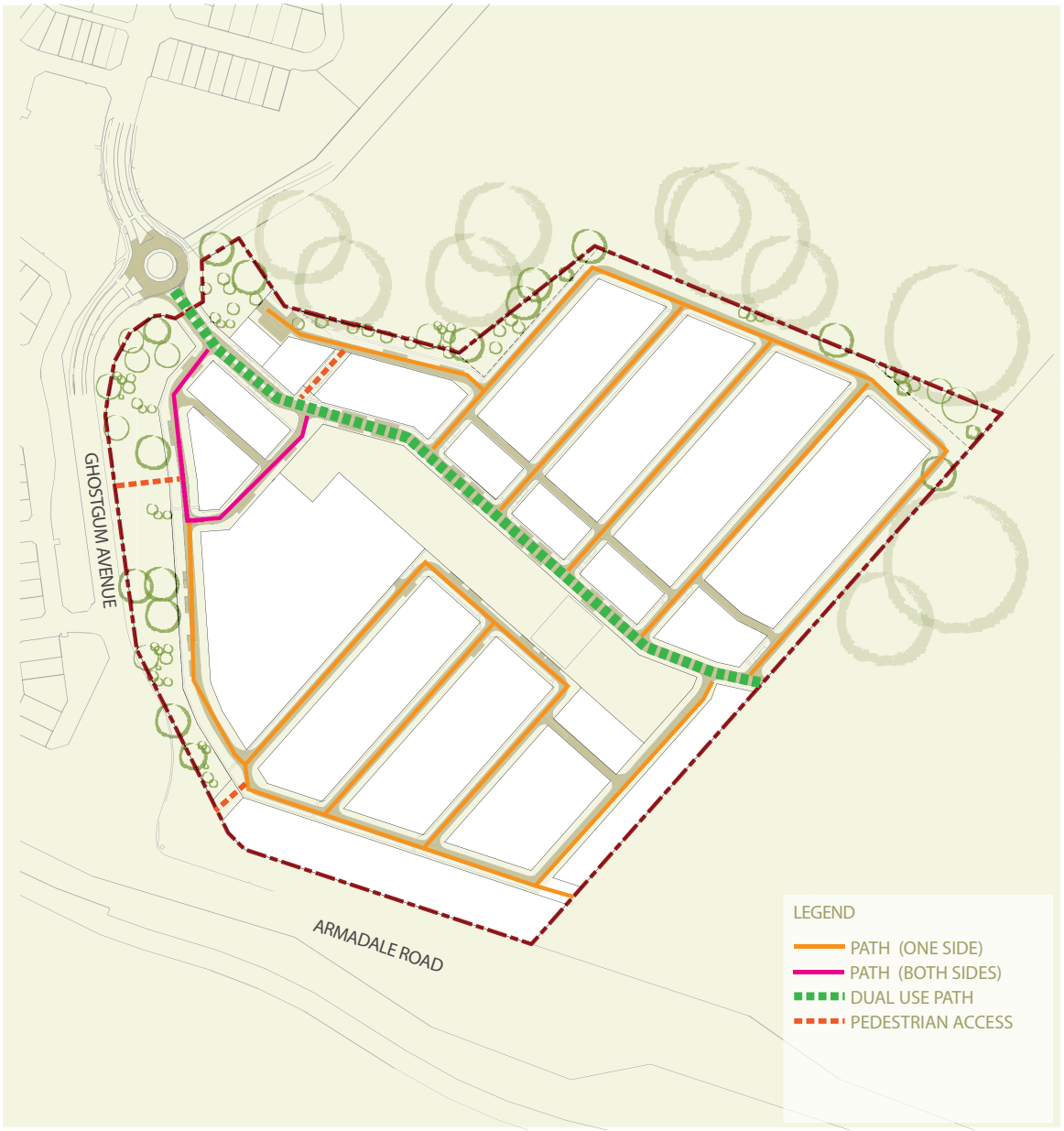
All roads have low traffic volumes therefore no pedestrian crossings are proposed. The central boulevard (Neighbourhood Connector B) will incorporate a Dual Use Path cycle and footpath. The Access Street C providing access to the Child Care and Seniors Living Sites will provide a footpath on both sides. The other Access Street D will incorporate a footpath to one side (Refer to Figure 24).

Figure 23: Access Street D Typical Cross Section (source: Emerge)



4.0 design philosophy

Figure 24: Path Network Plan



4.10 Water Management

A Local Water Management Strategy has been prepared by RPS Group (refer Appendix C).

The site has been divided into four catchments for stormwater drainage. Two catchments will drain into a dedicated drainage basin within the central linear POS (POS A), with the other two basins draining to a roadside swale located along the northern perimetre of the Structure Plan, abutting the Bush Forever site.

The dedicated drainage basin in the central linear POS (POS A) will incorporate two tiers. Runoff from the 15mm event and the 20% AEP will be detained within a lower tier, events greater than this, up to and including the 1% AEP will be detained with the upper tier. The basin will be underlain with a subsoil drainage system to ensure that the basin is free draining. The subsoil under the basin will have an RL of 27.70m AHD, providing a 500mm clearance to the basin. The subsoil drains will also underlie the whole central POS (POS A), which drains to the Atwell Drain under Armadale Road.

A pipe and pit system within the internal road network will be used to convey stormwater up to and including 20% AEP events generated from impervious road surfaces and lots less than 300m². The stormwater will be directed to either a biofiltration basin located in the central linear POS (POTS A) or a biofiltration roadside swale located along the northern boundary of the Structure Plan, with gross pollutant traps installed prior to discharge to the basin and swale.

During major drainage events, greater than 20% AEP up to and including the 1% AEP will be conveyed via overland flow paths along the road either to the dedicated drainage basin or the road swale.

Strategies that will be applied to ensure minimal impact to ground water resources include:

- All lots will be connected to reticulated sewer;
- Implementation of WSUD principles including at-source infiltration of up to and including 15mm rainfall events using biofiltration, with plant species selected based on their ability to remove nutrients and contaminants from the soil profile;
- The use of soil amendment in biofiltration areas;
- The use of gross pollutant traps at stormwater drainage pipe discharge points, to minimise pollutants entering biofiltration areas;
- Minimising and controlling fertilizer and pesticide application rates applied to the site through appropriate plant selection, and operation and maintenance procedures during and post-development;
- Encouraging home purchasers to use native plants for landscaping to reduce fertilizer and pesticide use;
- Monitoring groundwater quality leaving the site to verify that pre-development water quality is at a minimum maintained or improved; and
- Regular street sweeping during and post-construction.

To comply with the provisions contained in Better Urban Water Management, an Urban Water Management Plan(s) are required to be prepared at subdivision stage, including preparation of detailed landscaping plans (species selection and treatments), and detailed design drawings.

4.11 Bushfire Hazard

The Structure Plan area is identified as a Bush Fire Prone Area under the state-wide Map of Bush Fire Prone Areas as such a Bushfire Management Plan (BMP), has been prepared by Strategen JBS&G (refer Appendix D). This BMP has been prepared in accordance with the *State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP3.7), the Guidelines for Planning in Bushfire Prone Areas and Australian Standard 3959-2009 Construction of buildings in bushfire prone areas* (AS 3959).

The need for management of bushfire to future residential lots is largely a result of native vegetation retained within the Conservation POS along the western boundary and proximity of Bush Forever site to the north which cannot be cleared or landscaped to a low threat state.

The 20m road interface provides separation to the proposed residential lot boundaries. This separation distance will be further increased through implementation of setback requirements in Local Development Plans to ensure all lots can achieve a rating of BAL-19 or lower.

The BAL impact from the east is considered temporary given the future urban development of adjacent landholdings. This can be addressed through development staging and temporary quarantining of affected lots as required until such time that the adjacent hazard is removed.

The current road network only provides for a single entry/exit between the site and Ghostgum Avenue, until the landholdings to the east are developed providing alternative access to Armadale Road. To address this a Pedestrian Access Way (PAW) will be utilised to provide an alternative emergency access to Ghostgum Avenue.

The outcomes of the Bushfire Management Plan indicate that the bushfire protection performance criteria outlined within the Guidelines can be achieved with most lots likely to achieve a BAL rating of BAL-19, BAL-12.5 or BAL-Low.

4.12 Landscaping Strategy

A Landscaping Strategy and Concept Plan has been prepared by Emerge Associates which outlines the landscape principles and theming for the Structure Plan (refer Appendix E).

4.12.1 Central Linear (POS A)

The theme behind the Central Linear POS will focus on:

- Community gathering;
- Wellness and mindfulness;
- Whole of family fitness; and
- Intergenerational interaction – mixing young children with retirees.

A Community Hub is proposed at the western end of the Central Linear POS, located on axial vista views from the entry road off Ghostgum Avenue, as the focal point when entering the estate, symbolising the heart of the community.

The eastern side of the POS will include plantings of predominantly native waterwise species. Select exotic trees will be placed at key locations within POS areas to denote different user spaces within the POS and provides shade. An interconnected path will link user areas and provide safe and direct access. Playgrounds and shelter nodes will provide opportunities for community gatherings and informal recreation.

4.12.2 Entry POS (POS B)

The location of the POS flanking the single entry into the site provides an opportunity for grand entry statements in the form of signage and/or sculptural public art elements.

Taking advantage of the sites topography, the areas of POS will be at a high point providing views over the development to the east and beyond to the Darling Range.

This area of POS provides a logical connection to the existing open space network of the adjacent Calleya development.

Where levels permit, existing trees will be retained to provide these two POS areas with instant shade amenity.

4.12.3 Framing POS (POS C)

An area of POS is proposed along the project's west and south-west boundary which interfaces with the existing Ghostgum Avenue. This POS includes a Conservation area which retains a patch of high quality Banksia Woodland and the rare and endangered Spider Orchid. This area is proposed to be fenced with no landscaping works proposed.

A pedestrian link through the POS will be created on an existing cleared track to pedestrian access from the site to Ghostgum Avenue and Armadale Road footpath network. The level difference along this ridge line ranges from 1.0m up to 3.0m in height above the development. To address this interfac, stepped retaining is required and is proposed to be either limestone or granite boulder walling.

4.0 design philosophy

4.12.4 Street Trees & Streetscapes

Street trees will consist of a mix of exotic, Australian native and West Australian native species, planted in a way which will define the road hierarchy. On verge areas immediately adjacent Bush Forever or Conservation POS areas only Swan Coastal Plain native trees will be used.The installation of street trees will occur at the completion of civil engineering works, prior to the construction of dwellings. Street trees will be allocated at a rate of one tree per lot.

Due to the site's former land uses resulting in a generally degraded site state, there are no significant trees worthy of retention in road reserves.







4.13 Services and Infrastructure

An Engineering Servicing Report has been prepared by Cossill & Webley (refer Appendix F) to progress the proposed LSP. The report concludes that no major issues preclude the development of the LSP area.

4.13.1 Sewer

The site forms part of the Water Corporation Banjup waste water reticulation system. The site is connected via gravity sewer that has been constructed as part of the Calleya development. The sewer pipes discharge to an existing Waste Water Pumping Station (WWPS) located west of the site, within the Calleya development. Water Corporation is monitoring the flows to the WWPS and any upgrades required to accommodate increased flows from future development will be funded by Water Corporation as part of their Capital Investment Program.

4.13.2 Water Reticulation

Water Corporation have advised construction of DN500 water main from the south of the site via Tapper and Armadale Roads is planned. A DN375 water distribution main loop is proposed to be construction following extension of the DN500 main to Armadale Road. Water Corporation has indicated that all water headworks items will be funded under the Capital Investment Program and brought on as demand increases progressively in the area.

The initial stages of development may be required to be serviced via a connection to the existing DN150 reticulated main located in Clementine Boulevard.

4.13.3 Power

The Western Power Network Capacity Mapping Tool forecasts the network will have 10-15MVA remaining capacity in the future. If approximately 370 new dwellings are developed with a power draw of 4.7kVA per dwelling, the total power requirement for the residential development is approximately 1.74MVA, well within the network forecast capacity.

The site will require a minimum 3 transformers and 2 switchgears to service the site, with all power to be underground. It is not anticipated any off-site headwork upgrades will be required.

4.13.4 Gas

ATCO gas has indicated the existing gas network has adequate capacity to service the ultimate demand of the site. Connecting to the existing high pressure gas main will require a high pressure regulator to be installed and boring underneath Armadale Road to facilitate servicing the site.

4.13.5 Telecommunications

The site is within NBN Co's fibre network footprint and can be serviced with optic fibre under the NBN roll-out scheme for greenfield developments. The developer is required to provide pit and pipe infrastructure which is handed to NBN upon completion, the nearest connection point to the network is located within 650m and has adequate capacity to service the site.

Alternative telecommunication providers could also be considered to service the site.

4.14 Acoustic

A Noise Assessment has been prepared by Lloyd George Acoustic (refer Appendix G) to address the potential noise impacts from traffic noise generated from Armadale Road and aircraft noise being located within the Frame Area of Jandakot airport.

4.14.1 Road Traffic Noise

The objectives of *State Planning Policy 5.4 Road and Rail Noise* (SPP 5.4) are to achieve:

- Indoor noise levels specified for noise-sensitive areas (e.g. bedrooms and living rooms of house and school classrooms); and
- A reasonable degree of acoustic amenity for outdoor living areas on each residential lot.

Predictions are made at heights of 1.4m above ground level for single storey and 4.2m for double storey houses. The results of the noise indicate the predicted noise levels for outdoor noise targets will be exceeded. The following two mitigation options, being a combination of noise barriers and façade treatments are recommended.

With no boundary walls, future noise levels are predicted to be above the outdoor noise target. To achieve the outdoor noise target at proposed residence will require noise walls in excess of 5.0m in height, which is not considered reasonable or practical. As such, a combination of noise walls and architectural upgrades is proposed in order to achieve the indoor noise targets.

All lots affected will require notifications on titles as per SPP 5.4.

4.14.2 Aircraft Noise

The subject site is located outside of the 20 ANEF contour, but within Frame Area. There are no specific noise mitigation requirements *under State Planning Policy 5.3 Land Use Planning in the Vicinity of Jandakot Airport* (SPP 5.3), however the following is required:

- A notification on title stating the property is situated in the vicinity of Jandakot Airport and is currently affected, or may be affected in the future by aircraft noise. Noise exposure levels are likely to increased in the future as a result of increased in the aircraft using the airport, changes in the aircraft type or other operational changes; and
- Residents should be aware that thicker glass will perform better acoustically as will awning/casement style windows in comparison to sliding windows. The benefit of such windows will require them to be closed and as such, forced ventilation can be considered. These noise controls are not mandatory but for advice only.

4.15 Staging

The staging will commence in the from the western portion of the site, with access provided via Ghostgum Avenue. The staging will progress in easterly direction, firstly towards the northern of then site then towards the south (refer Figure 25)

Figure 25: Indicative Staging Plan



5.0 conclusion

The Treeby Local Structure Plan will facilitate the development of a diverse range of residential lots complemented by a high quality and accessible public open spaces and interconnected road network, consistent with the stratetigic planning context relating to the Treeby locality.

It is expected that the Structure Plan will accommodate 324 lots, primarily consisting of Terrace Lots, Small Affordable Lots, Traditional Lots and Transitional Lots, facilitating a population of approximately 1,023 people. Future residents will be well serviced by the internal road and public open space network and the availability of local retail, employment and educational facilities in close proximity to the subject site.

The Structure Plan responds to State density targets established in *Liveable Neighbourhoods* by providing 35 dwellings per site hectare, and *Perth and Peel @ 3.5 million* South Metropolitan Sub Regional Framework by providing a density of 19 dwellings per net site hectare.

The Structure Plan also addresses a range of higher order strategic planning objectives outlined in the Treeby District Structure Plan, in providing road connections, public open spaces and residential development.

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