AMENDMENT NO. 17

TO THE

EAST WANNEROO CELL 2 (SINAGRA)

AGREED STRUCTURE PLAN NO. 4

This Amendment to the Agreed Structure Plan has been prepared under the provisions of the City of Wanneroo District Planning Scheme No. 2

RECORD OF AMENDMENTS MADE TO THE EAST WANNEROO CELL 2

AGREED STRUCTURE PLAN NO. 4

Amendment No.	Summary of the Amendment	Date approved by WAPC
17	Recodes Lot 9500 (2) Torrenova Way, Sinagra from R20 to R25. Modifies the road network within Lot 9500 and matches the updated road connections within Lot 20 (60) Vincent Street.	

AMENDMENT NO. 17 TO THE
EAST WANNEROO CELL 2 AGREED STRUCTURE PLAN NO. 4

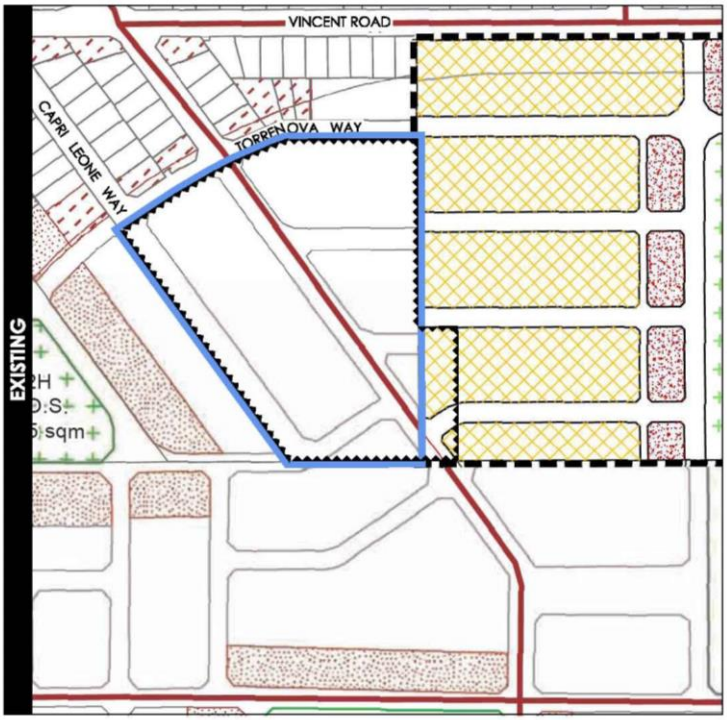
The City of Wanneroo, pursuant to its District Planning Scheme No. 2, hereby recommends to the Western Australian Planning Commission to approve the abovementioned amendment by:

1. Recodes Lot 9500 (2) Torrenova Way, Sinagra from R20 to R25.

2. Modifies the road network within Lot 9500 and matches the updated road connections within Lot 20 (60) Vincent Street.

East Wanneroo Cell 2 (Sinagra) - Agreed Structure Plan No. 4

Amendment No. 17



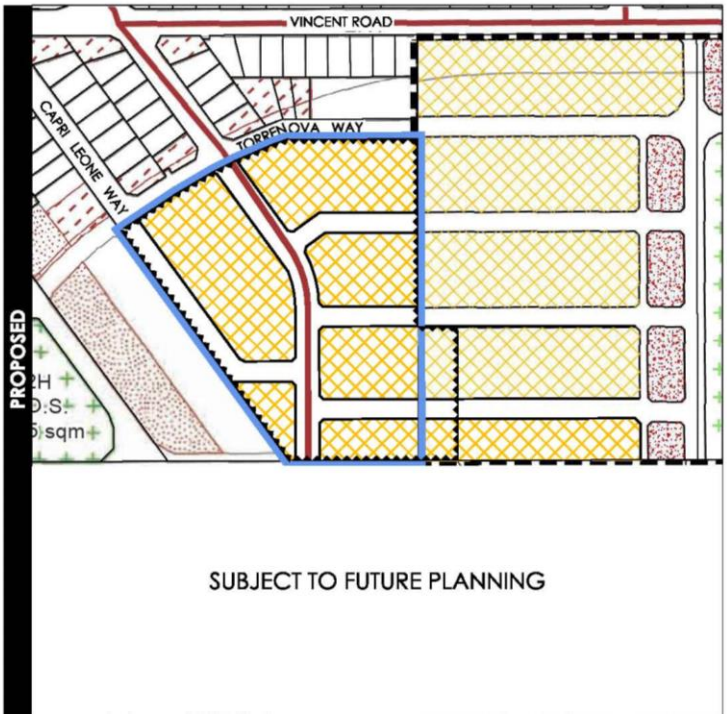


Figure 1 - Structure Plan Amendment

This Structure Plan Amendment is prepared under the provisions of the City of Wanneroo District Planning Scheme No. 2

IT IS CERTIFIED THAT THIS STRUCTURE PLAN AMENDMENT NO. 17 TO THE EAST WANNEROO CELL 2 AGREED STRUCTURE PLAN NO. 4

WAS APPROVED BY

RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON

……

Signed for and on behalf of the Western Australian Planning Commission

……

an officer of the Commission duly authorised by the Commission pursuant to section 24 of the *Planning and Development Act 2005* for that purpose, in the presence of:

……. Witness

…….. Date

…….. Date of Expiry

PART 2 - EXPLANATORY REPORT

AMENDMENT NO. 17 TO THE

EAST WANNEROO CELL 2 AGREED STRUCTURE PLAN NO. 4

1 INTRODUCTION

Taylor Burrell Barnett acts on behalf of Northland Development Pty Ltd in support of the proposed minor amendment to the East Wanneroo Cell 2 (Sinagra) Agreed Structure Plan No. 4 (ASP4) relating to Lot 9500 (2) Torrenova Way, Sinagra (subject land).

ASP4 was originally endorsed by the Western Australian Planning Commission (WAPC) on 30 June 2004, and has been subject to a number of modifications since its endorsement.

The proposed amendment is the outcome of further detailed planning for the subject land, and seeks to modify the density coding and road network as currently depicted on the ASP4 maps. The proposed amendment will provide for a more efficient use of the subject land and provide greater flexibility to deliver a range of lot sizes and dwelling types. The structure plan amendment will not have an adverse impact on the surrounding land uses or properties, and is consistent with orderly and proper planning.

This amendment is submitted with a concurrent request to the WAPC to lift the Urban Deferment and transfer the subject land to the Urban zone.

2 LAND DESCRIPTION

1.1 LOCATION

The ASP4 area is located within the metropolitan north-west corridor, approximately 23 kilometres north of Perth CBD in the City of Wanneroo local government area, within the growing locality of Sinagra.

The subject land is situated south of Vincent Road, bounded by Torrenova Way to the north, Benara Nurseries landholdings to the east, Ingham Enterprises poultry farm to the south and a residential property to the west. The land further north and east has been progressively developed for urban purposes, with a mix of low and medium density residential dwellings. The subject land is situated in close proximity to the Wanneroo town centre, which is approximately 850m from the land, immediately south of the ASP4 area.

A development buffer applies to the nearby Ingham's poultry farm, with the southern portion of the subject land situated within the 300m inner buffer precinct, and the northern portion within the 500m outer buffer precinct, measured from the poultry sheds. Subdivision and development within the buffer precinct is restricted until such a time as the poultry sheds have ceased to operate indefinitely, or it is demonstrated that any odour or other impacts can be ameliorated. As the Ingham's site was sold in recent years and the poultry farm in the process of being closed and relocated, it is anticipated the buffer will be removed from the ASP4 area in the foreseeable future.

1.2 AREA AND LAND USE

ASP4 covers an area of approximately 214ha and currently comprises a mix of residential dwellings, plant nurseries, tree plantations and rural enterprise properties.

The subject land comprises 3.9927ha and is currently vacant.

The subject land and immediately adjoining properties are identified for future residential development in accordance with ASP4, upon removal of the poultry farm buffer.

1.3 LEGAL DESCRIPTION AND OWNERSHIP

The legal description and ownership of the land subject to this amendment is outlined in **Table 1** below.

Table 1 – Legal Description and Ownership

LOT NUMBER	STREET ADDRESS	DEPOSITED PLAN	VOL/FOLIO	LAND OWNERSHIP
9500	2 Torrenova Way, Sinagra	49784	2641/132	SINAGRA, WINIFRED GLADYS

3 PROPOSED AMENDMENT

This amendment seeks to modify the current ASP4 Plan 1 "The Zoning Plan" by recoding the subject land from R20 to R25, and modifying the internal road network. As part of the modified road network, through road connections are proposed to integrate with the adjoining Lot 20 (60) Vincent Street and Lot 1665 (1040) Wanneroo Road, Sinagra. The proposed modifications are depicted in **Figure 1**.

No changes to Plan 2 "The Agreed Structure Plan" or the Part One text are proposed as part of this amendment. Until such a time as the poultry sheds within Lot 1040 Wanneroo Road cease to operate indefinitely, or it is demonstrated that the odour and/or other impacts associated with the poultry farm operations can be ameliorated, the subject land will remain within the 300m and 500m Buffer Precinct under ASP4.

4 JUSTIFICATION FOR PROPOSED AMENDMENT

The purpose of this amendment is to provide for the more efficient use of the subject land, and to provide greater flexibility to deliver a range of lot sizes and dwelling types. In support of this amendment, the indictive Concept Plan contained in **Appendix 1** has been prepared to demonstrate how the land may be subdivided in the future.

Density

The proposal to increase the density coding is consistent with and seeks to achieve the objectives of State and local strategic planning documents, which encourage increased densities in appropriate locations, housing diversity, adaptability, affordability and choice. The R25 coding of the land will allow for future residential development to occur in accordance with the City's Local Planning Policy 4.19: Medium Density Housing Standards (R-MD) Codes, once appropriate provisions are incorporated into ASP4. The application of these standards provides greater opportunity for flexibility to be applied when designing dwellings for smaller lots, to adequately respond to market pressures. These variations to the to the deemed-to-comply provisions of the R-Codes apply only to land coded R25 to R60.

The proposed R25 base density code for the subject land is consistent with Amendment 15 to ASP4 for the land immediately east of the subject land, and is appropriate in terms of the locational context of the land in an established residential area in relatively close proximity to a town centre.

Road Layout

The amended road layout will allow for a more coherent and logical design outcome for the subject land and adjoining properties, by regularising the street block layout and minimising the occurrence of irregularly shaped lots. The modifications to the road layout also reflect the reduced depth of lots achievable under the proposed R25 density coding. The proposed road network has been assessed from a traffic engineering perspective and found to be acceptable, as detailed further in section 3.5 below.

The road layout has been appropriately designed to integrate with the modified road layout for Lot 20 to the east, as proposed under Amendment 15. As depicted in the Structure Plan Amendment **Figure 1**, the southern east-west road connecting to Lot 20 has been straightened to remove the deviation shown on the Amendment 15 plans. The abutting street blocks have also been straightened and connected across Lots 20 and 9500 to create a logical grid pattern with enhanced permeability between the sites.

The north-south connection through the subject land has also been realigned to allow for the improved design outcome to be achieved. The Concept Plan contained in **Appendix 1** demonstrates how the subject land is able to integrate with the adjoining Lot 1665 to the south, once the poultry farm is closed and the land is ultimately developed for residential purposes.

The proposed modifications to the movement network and lot layout under this amendment have been designed in accordance with the relevant requirements of the WAPC's *Liveable Neighbourhoods* Elements 2 and 3. The well-considered layout is consistent with orderly and proper planning, will not result in any adverse impacts on the surrounding land uses or properties, and warrants adoption accordingly.

5 PLANNING FRAMEWORK

3.1 PLANNING AND DEVELOPMENT (LOCAL PLANNING SCHEMES) REGULATIONS 2015

Schedule 2 of the *Planning and Development (Local Planning Schemes) Regulations 2015* (the Regulations) sets out deemed provisions which apply state-wide to all local planning schemes. Within this, Part 4 deals with structure plans and clause 29 addresses amendments to structure plans.

This amendment to ASP4 has been prepared in accordance with the requirements of the Regulations.

3.2 STRATEGIC PLANNING FRAMEWORK

Directions 2031 and Beyond

Directions 2031 and Beyond (Directions 2031) is Western Australia's high-level spatial framework and strategic plan. The document provides a vision for future growth of the metropolitan Perth and Peel region, with the aim of achieving a pattern of growth which promotes a better balance between greenfield and infill development. A medium density 'Connected City' model is put forward as the preferred means to achieve a liveable, prosperous, accessible, sustainable and responsible city.

The subject land is located within the north-west sub-region as identified by Directions 2031, which is expected to supply 167,400 dwellings under the adopted 'Connected City' scenario, with the City of Wanneroo contributing 141,700 dwellings through the development of greenfield sites.

The proposed increase to the residential density applicable to the subject land will facilitate the provision of a range of housing and lot product within the site, contributing towards the City's dwelling target under Directions 2031.

Perth and Peel @ 3.5 million & North-West Sub-regional Framework

Perth and Peel @ 3.5 million is a suite of documents released by the WAPC in 2015 for the Perth and Peel metropolitan regions to identify:

- where future homes and jobs should be located;
- how to protect important environmental assets;
- how to best utilise existing and proposed infrastructure; and
- appropriate areas for greater infill development and residential density.

As part of this documentation, sub-regional planning frameworks have been prepared to guide future development. The frameworks build upon the principles of Directions 2031 and are the key instruments for achieving a more consolidated urban form. The subject land is included within the North-West Sub-regional Planning Framework, which identifies the subject land within a pocket of 'Urban Deferred' land surrounding the Ingham's poultry farm.

The minimum urban infill dwelling targets identified for the City of Wanneroo are 3,860 dwellings in 2021-2026 and 2,870 dwellings from 2026-31. This structure plan amendment and associated lifting of Urban Deferment request will assist in achieving the infill dwelling targets for the City of Wanneroo.

The subject land is identified in the Sub-regional Framework for development within the medium-long term (2022+). This timeframe is expected to coincide with the closure of the poultry farm, and removal of the associated development buffer. The proposed structure plan amendment and concurrent lifting of urban deferment will allow for the subdivision of the land to occur immediately upon removal of the poultry farm buffer, consistent with the expectations outlined in the Sub-regional Framework.

City of Wanneroo Local Housing Strategy – Local Planning Policy 3.1

The City's Local Planning Policy 3.1 – Local Housing Strategy Implementation (LPP3.1) provides the framework to guide the planning and development of increased housing density in the City's existing suburbs. The policy is divided into two parts, dealing with 'Housing Precincts' and 'Other Infill Development'. The subject land is not within an identified Housing Precinct under the Local Housing Strategy, and is therefore subject to the Other Infill Development provisions of the policy.

As this structure plan amendment seeks to increase the density of subject land, an assessment against the relevant matters of LPP3.1 is provided in **Table 2** below.

Table 2 – Assessment against LPP3.1 applicable policy provisions

LPP3.1 PROVISION	ASSESSMENT	COMPLIANCE
i) Is appropriate within the broader planning framework provided by the Structure Plan	The broader ASP4 area comprises a mix of R25, R30 and R40 coded land, with a small pocket of R10 coded land along the eastern interface with Special Rural zoned land. The proposed R25 coding of the subject land is consistent with the immediately adjoining land to the east, which is intended to be recoded to predominantly R25 via Amendment 15 to ASP4. The proposal is therefore appropriate within the broader planning framework provided by ASP4.	✓
ii) The criteria in Table 3 of the policy relating to infill development and increased density	Table 3 of LPP3.1 sets out the locational criteria for infill development and increased density, in terms of appropriate densities within a walkable catchment to activity centres and public transport, and relate to density increases of R40 and greater. As the proposal seeks to increase the density of the subject land to R25, the criteria under Table 3 is not considered to apply to this amendment. Notwithstanding, the subject land will be between 401-800m from the edge of the Wanneroo town centre once the pedestrian links are created through the subdivision/development of the adjoining land. The subject land would therefore be eligible for residential densities up to R40 in accordance with LPP3.1, however, the R25 density code is proposed to ensure future development provides a suitable transition from the town centre and is compatible with the surrounding lower density residential area.	✓
iii) The objectives and recommendations of the Local Housing Strategy	The proposal to increase the density of the subject land is consistent with State government policy to increase housing density within the existing urban footprint to meet infill targets. It will also contribute to housing affordability within the City, by allowing greater flexibility in the delivery of a variety of lot sizes and dwelling types. As mentioned above, the subject land is in close proximity to the Wanneroo town centre, and it is therefore appropriate for additional dwellings to be located within close proximity to this existing infrastructure and amenities. Based on this, the proposed density increase is considered to be entirely consistent with the objectives of the LHS.	✓

As demonstrated above, the proposal to increase the residential density coding of the subject land is consistent with the policy requirements of LPP3.1 and warrants approval accordingly.

3.3 STATUTORY PLANNING FRAMEWORK

Metropolitan Region Scheme

The subject land is zoned Urban Deferred under the Metropolitan Region Scheme (MRS). The majority of the surrounding area is zoned Urban and Urban Deferred.

A request to lift the Urban Deferred status of the subject land has been lodged concurrently with this structure plan amendment, as depicted in **Figure 2**. This process will allow for urban development to proceed immediately upon removal of the poultry farm buffer.

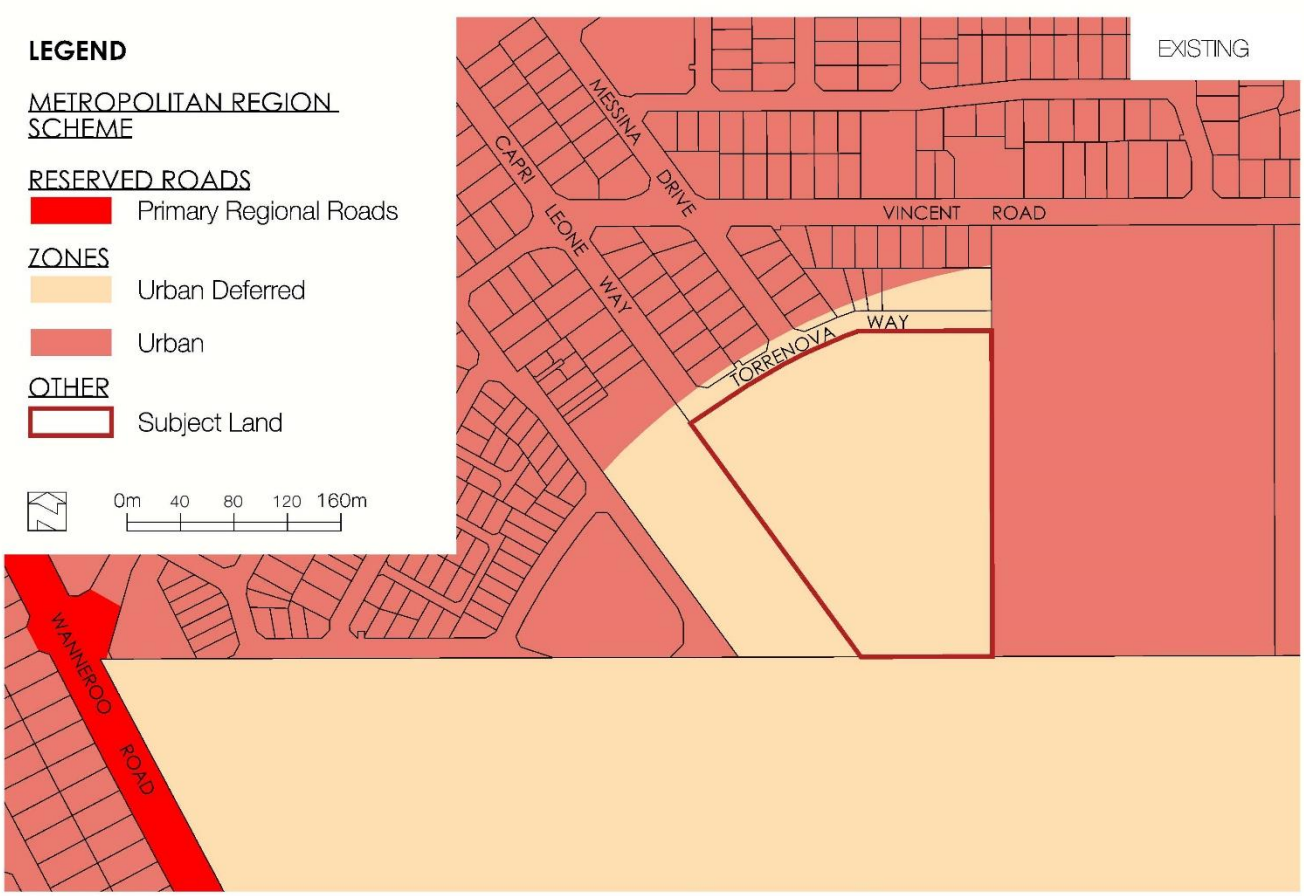


Figure 2 – MRS Rezoning

City of Wanneroo District Planning Scheme No. 2

The subject land is zoned Urban Development under the City of Wanneroo District Planning Scheme No. 2 (DPS2). As outlined under Clause 3.14 of DPS2, subdivision and development is to be carried out in accordance with an adopted Structure Plan.

As required under the Regulations and DPS2, the approval of City and WAPC is sought for this amendment to ASP4.

3.4 BUSHFIRE

The intent of State Planning Policy 3.7 – Planning in Bushfire Prone Areas (SPP3.7) is to implement effective, risk-based land use planning and development to preserve life and reduce impact of bushfire on property and infrastructure. The accompanying Guidelines for Planning in Bushfire Prone Areas provide advice on how bushfire risk is to be addressed when planning, designing or assessing a planning proposal within a designated bushfire prone area.

The entirety of the subject land is designated as bushfire prone on the WA Map of Bushfire Prone Areas (DFES 2019). A Bushfire Management Plan (BMP), contained in **Appendix 2,** has been prepared by Strategen-JBS&G in order to address the policy requirements of SPP3.7. The BMP has been prepared in accordance with the Guidelines for Planning for Bushfire Prone Areas, which requires Structure Plans to be accompanied by a BMP that includes the results of a strategic level Bushfire Hazard Level (BHL) assessment.

Following development works, the subject land will be predominately cleared and classified as Moderate Hazard Level. The predominant bushfire hazard to the development is associated with the direct vegetation interface between proposed lots along the western boundary and Class A Forest vegetation within the adjoining lot. Development will need to be appropriately staged or Asset Protection Zones established to ensure that future habitable development can achieve BAL-29 or lower.

The BMP outlines the detailed information required for future BMPs required at subdivision and development application stages. The assessment concludes that the bushfire hazards within and adjacent to the subject land, and the associated bushfire risks, are readily manageable through standard management responses outlined in the Guidelines and Australian Standard AS 3959.

3.5 TRAFFIC

A Transport Impact Assessment (TIA), contained in **Appendix 3**, has been prepared by Move Consultants to determine the likely impacts associated with the proposed amendment on the boundary movement network, in terms of network traffic flows, safe and efficient access to and from the site, pedestrian and cycling facilities, and public transport.

The assessment confirms that the internal road network has been designed in an efficient permeable layout so as to allow for effective and safe ingress from and egress to the local road network for maximal efficient distribution of locally-generated traffic. All intersections internal to the subject lands will be basic priority-controlled T-intersections due to the relatively low traffic volumes.

The proposed public road network within the subject site area will typically consist of a minimum 6m seal which will accommodate both passenger vehicles and Council rubbish collection vehicles. Due to low anticipated volumes and direct frontage for the majority of the proposed dwellings, it is proposed that all of the internal local roads be classified as Access Road C, as per *Liveable Neighbourhoods* guidelines, with a minimum road reservation of 14m to 15m. Footpaths will be implemented on at least one side of the road and will connect to the future local road network to the east and north. No dedicated internal cycling facilities will be required and the established public transport services in the area will be sufficient to cater to the demands associated with the proposal.

Trip generation rates have been assessed based upon the proposed single residential dwelling land use across the site, and it has been estimated that the subject land would generate in the order of 670 vpd on a typical weekday, with approximately 53 vph (9 inbound and 44 outbound) and 71 vph (45 inbound and 26 outbound) vehicle trips during both the a.m. and p.m. weekday peak hours, respectively. The results of the assessment

indicate that the additional site-generated traffic can be accommodated within the practical road capacities of the public road network with a limited impact to the boundary road network with the majority of traffic destined to and originating from Pinjar Road and Wanneroo Road. The traffic is capable of being accommodated by the existing and future planned boundary road network.

In conclusion, based both on a review of the modelled total traffic assessment and observed traffic operations of the boundary road system, the anticipated site-generated traffic associated with the proposed amendment can be accommodated within the future practical capacities and functional road classifications of the boundary road network and that the design of the internal road network is safe, efficient and effective.

3.6 SERVICING

An Engineering Servicing Report has been prepared by Cossill & Webley Consulting Engineers to demonstrate how the land will be serviced with potable water, sewer, power and telecommunications for future residential development. The key observations and findings of the report are summarised below, with the full report contained in **Appendix 4**.

Geotechnical Conditions

Based on the natural topography, there is a significant elevation slope from the north-east (RL71) to the south-west (RL59) that will be earthworked to a form suitable for residential housing with earth retaining structures.

The regional geology of the area as characterised by the Geological Survey of Western Australia indicates the majority of the Site is generally characterised as Sand (S7) pale and olive-yellow, medium to course-grained. This sand profile generally comprises of well graded and free draining sand which is well suited for urbanisation.

Wastewater and Water Reticulation

The site is generally unconstrained with regards to the management of wastewater. The existing 300mm sewer main in Capri Leone Way will need to be extended south to a future DN225mm sewer consistent with Water Corporation's wastewater planning for the area.

The site is unconstrained with regards to the provision of reticulated potable water and can be serviced from the existing mains on Torrenova and Capri Leone Way.

Power

Power is currently available to the site from Western Power's existing network in Torrenova Way. It is anticipated these mains will be sufficient for staged development, with development of the entire site reinforced through future high voltage (HV) transformer and switchgear substations to be constructed from the future development to the south or upgrade of the existing transformer in Torrenova Way.

Gas Reticulation

Gas reticulation can be supplied to the subject site through existing high-pressure gas mains on Torrenova Way, Messina Drive and Capri Leone Way.

Telecommunications

The site sits within NBN's rollout coverage and fronts NBN's existing cable network. NBN pit and pipe infrastructure exists in the northern verge of Torrenova way and can be extended south to service the Site.

6 CONCLUSION

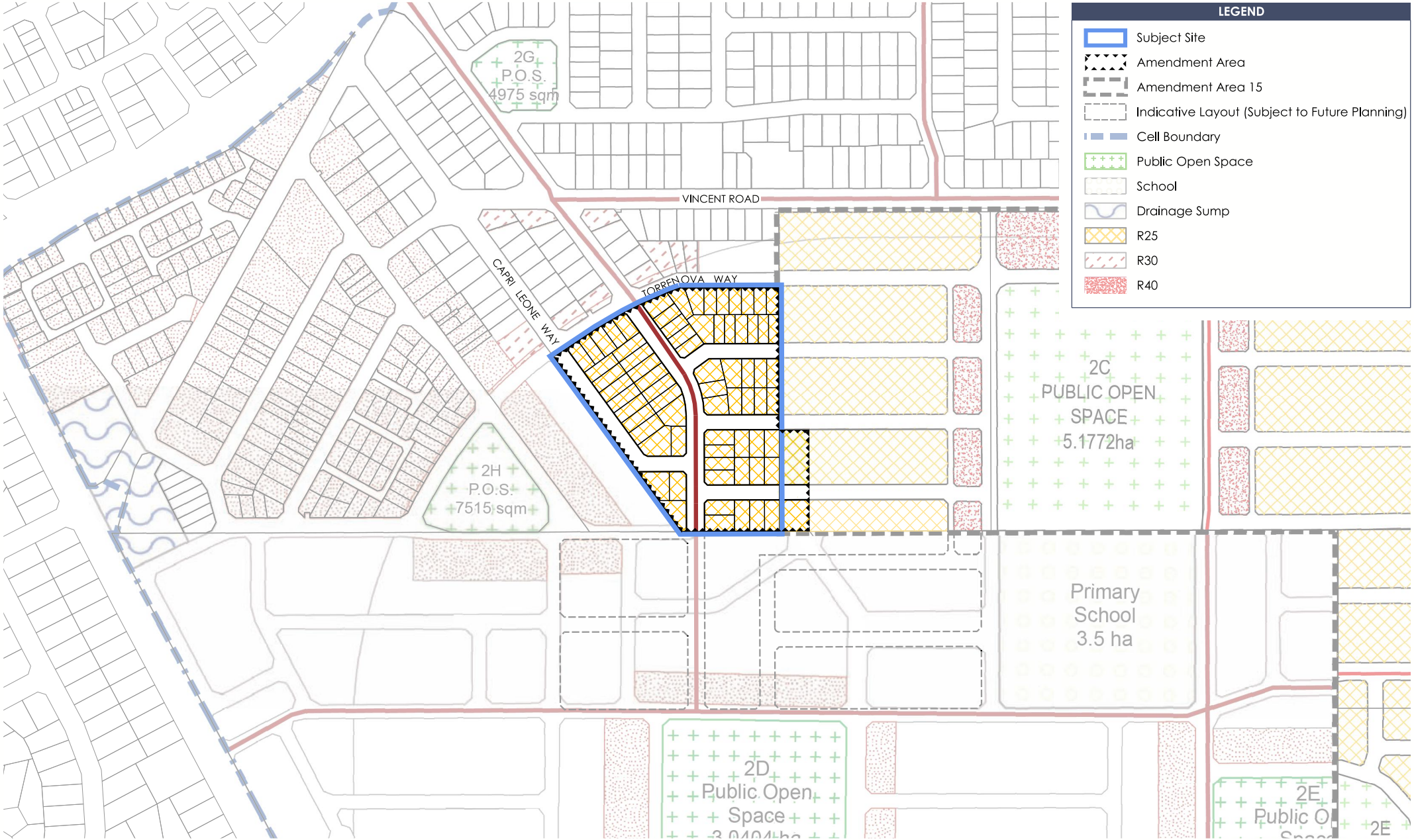
This amendment to ASP4 has been prepared with consideration given to the relevant planning framework and impacts on surrounding properties. The amendment seeks to increase the residential density of the subject land, and modify the internal road network to allow for an improved and more logical design outcome.

The amendment has been submitted concurrently with a request to the WAPC to lift the Urban Deferment of the property under the MRS. The purpose of these requests is to allow for the subdivision and development of the subject land to proceed without delay upon removal of the development buffer associated with the Ingham's poultry farm.

The proposal is consistent with objectives and requirements of the applicable statutory and strategic planning frameworks, at both the State and local level.

Having regard to the above, the City and WAPC are requested to support this amendment to ASP4.

APPENDIX 1
CONCEPT PLAN



CONCEPT PLAN

Lot 9500 Torrenova Way, Sinagra

A Northland Development Pty Ltd Project

DRAFT

0m 5 10 15m

s: 1:6000@A4
d: 04 September 2019
p: 19/049/005

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

APPENDIX 2
BUSHFIRE MANAGEMENT PLAN

Jardim Property

Bushfire Management Plan
(Scheme Amendment Application)

Lot 9500 (2) Torrenova Way
Sinagra

11 September 2019

57402 (Rev A)

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

www.jbsg.com.au

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Appendices

1. Proposal details

1.1 Background

Jardim Property (Jardim), is seeking to lodge an application to lift the current Urban Deferred zoning as well as submit a Structure Plan application to guide future subdivision development within Lot 9500 Torrenova Way (the project area), located in the City of Wanneroo. The Concept Plan (Figure 1.1) identifies:

- 70 residential lots
- development layout
- internal road layout

1.2 Site description

The project area is surrounded by (see Figure 1.2):

- Residential land use and Torrenova Way to the north
- Native vegetation and existing Ingham chicken farm (to be relocated) to the south
- Tree plantation to the east, to be developed as part of the Garden Park Heights residential development.
- Residential land use and Lake Joondalup to the west.

The project area is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2019; see Plate 1-1).

1.3 Purpose

This Bushfire Management Plan (BMP) has been prepared to address requirements under *Policy Measure 6.3 of State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015) and *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2017).

1.4 Other plans/reports

There are no known bushfire or environmental reports or assessments that have been prepared previously for the project area.

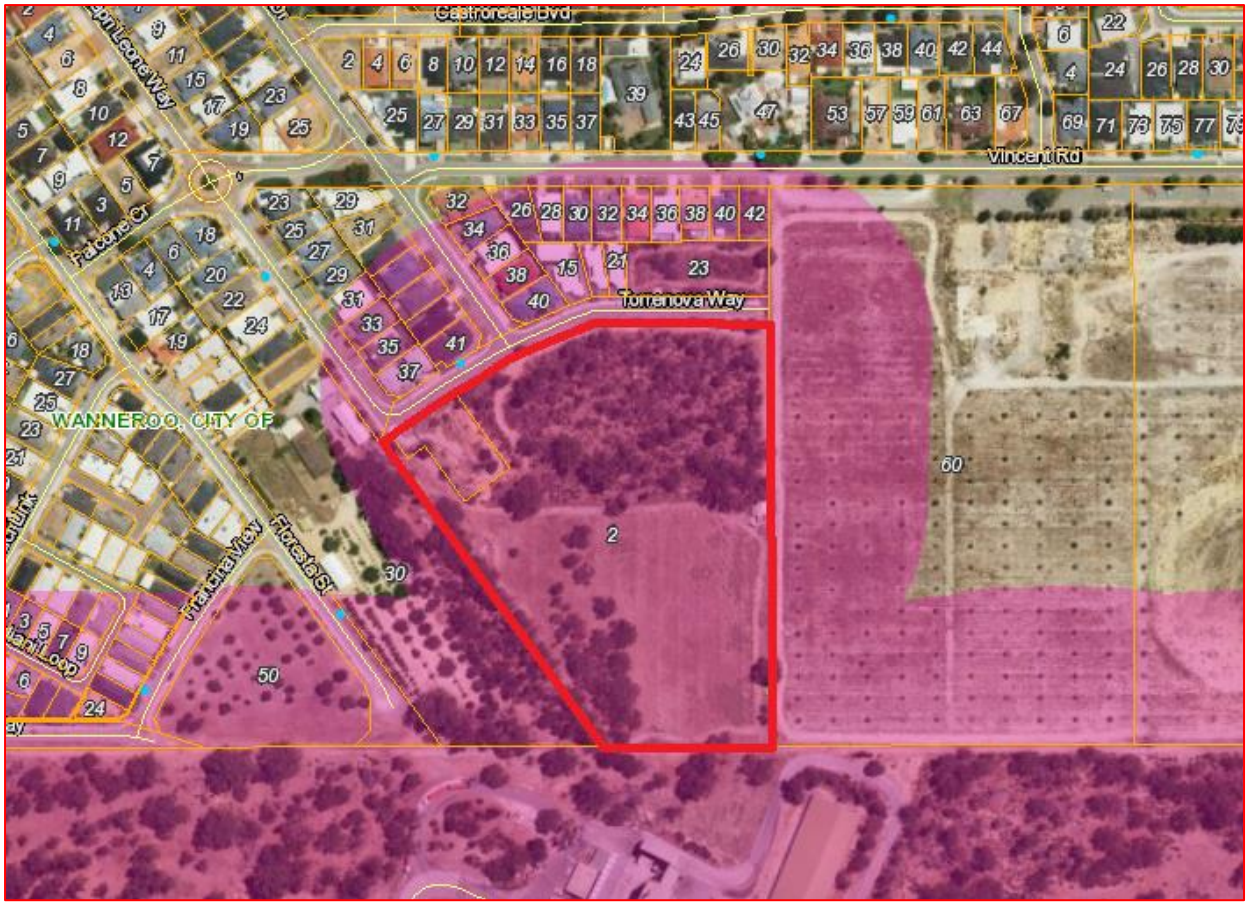


Plate 1-1: Map of Bush Fire Prone Areas (DFES 2019)

LEGEND

TOTAL APPLICATION AREA (3.9927ha)

LOT SUMMARY

LOT YIELD			LOT AREA	
Size	No. Lots	% Total Lots	Average Size	% of Total Area
234m² - 319m²	5	7.14%	305m²	5.26%
320m² - 449m²	51	72.86%	390m²	68.82%
450m² - 499m²	6	8.57%	476m²	9.86%
500m² - 549m²	3	4.29%	517m²	5.35%
550m² - 599m²	2	2.86%	568m²	3.92%
600m² - 699m²	2	2.86%	622m²	4.29%
700m² - 799m²	1	1.43%	722m²	2.49%
Total Number of Lots	70			

Minimum Lot Size 305m² | Average Lot Size 413m²
Maximum Lot Size 722m² | Total Lot Area 28973m²

CAPRI LEONE WAY
TORRENOVA WAY
(18m ROAD RESERVE)
(15.4m ROAD RESERVE)
(15m ROAD RESERVE)

Subdivision Concept Plan

LOT 9500 TORRENOVA WAY, SINAGRA
A JARDIM PROPERTY PROJECT

DRAFT

plan: E18/032/001B | designed: ME
date: 31/07/2018 | checked: PLANNER
projection: MGA94-50 | drawn: BR
scale: 1:1000@A3 | 1:500@A1
0 10 20m

Taylor Burrell Barnett Town Planning & Design
Level 7, 160 St Georges Terrace, Perth WA 6000
p: (08) 9226 4276 f: (08) 9322 7879 e: admin@tbbplanning.com.au

Legend:

- Project area
- Cadastral boundary
- Minor road
- Track

Scale 1:3,000 at A4

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57402

Client: Jardim

Version: A | Date: 05-Sep-2019

Drawn By: cthatcher | Checked By: JH

2 Torrenova Way Sinagra

PROJECT AREA

FIGURE 1.1

strategen JBS&G

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Jardim\57402 - 2 Torrenova Way, Sinagra\GIS\Maps\R01 Rev A\57402_01_1_ProjectArea.mxd
Image Reference: www.nearmap.com© - Imagery Date: 13 July 2019

2. Environmental considerations

2.1 Native vegetation - modification and clearing

A search of publicly available environmental data relating to the project area has been undertaken and is summarised in Table 2.1.

Table 2.1: Summary of environmental values

Environmental value	Present within or adjacent to the project area	Description
Environmentally Sensitive Area	N/A	The project area is not situated within an Environmentally Sensitive Area.
Swan Bioplan Regionally Significant Natural Area	N/A	N/A
Ecological linkages	N/A	The project area is situated within a Perth Regional Ecological Linkage.
Wetlands	N/A	There are no Geomorphic Wetlands mapped within the project area. The nearest wetland is approximately 900 m from the project area and is a Conservation Category Wetland.
Waterways	N/A	There are no waterways mapped within the project area.
Threatened Ecological Communities listed under the EPBC Act	Within and adjacent	EPBC listed 'Banksia Woodlands of the Swan Coastal Plain TEC' (Endangered) is mapped as likely to occur within the project area.
Threatened and priority flora	N/A	No Threatened or Priority flora are mapped as occurring within or adjacent to the project area.
Fauna habitat listed under the EPBC Act	Within and adjacent	Potential foraging habitat for EPBC listed 'Endangered' Carnaby's Cockatoo is mapped within and adjacent to the project area.
Threatened and priority fauna	Within	No Threatened fauna are mapped as occurring within or adjacent to the site. Potential habitat for Quenda (Priority 4) is mapped within and adjacent the project area.
Bush Forever Site	N/A	The project area is not situated within or adjacent to a Bush Forever site.
DBCA managed lands and lands and waters (includes legislated lands and waters and lands of interest)	N/A	The project area is not situated within or adjacent to DBCA Managed Lands and Waters.
Conservation covenants	N/A	N/A

Regional vegetation surveys and mapping of the Swan Coastal Plain indicates the project area and adjacent land is contained within the Karrakatta Complex – Central and South. This vegetation complex is described as:

- Predominantly open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri) and woodland of *Eucalyptus marginata* (Jarrah) - *Banksia* species.

It is assumed that all relevant State and Commonwealth environmental approvals will be obtained by the developer as required.

2.2 Revegetation / Landscape Plans

The full extent of native vegetation to be retained within the project area will be determined at future planning stages through the allocation of POS and the development of a Landscape Plan.

3. Bushfire assessment results

3.1 Assessment inputs

3.1.1 Vegetation classification

Strategen-JBS&G assessed classified vegetation and exclusions within 150 m of the project area through on-ground verification on 22 August 2019 in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* ([AS 3959]; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016). Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix A.

3.1.2 Effective slope

Strategen-JBS&G assessed effective slope under classified vegetation through on-ground verification on 22 August 2019 in accordance with AS 3959. Results were cross-referenced with DPIRD 2m contour data and are depicted in Table 3.1, Table 3.2 and Figure 3.1.

3.1.3 Pre-development inputs

A summary of the assessed pre-development classified vegetation, exclusions and effective slope within the assessment area are listed in Table 3.1 and illustrated in Figure 3.1.

Table 3.1: Pre-development vegetation classifications/exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Flat/upslope (0°)	
2	Class G Grassland	Downslope >0–5°	
3	Class A Forest	Downslope >0–5°	
4	Excluded – Clause 2.2.3.2 [a]	N/A	Vegetation >100m from project area
5	Class B Woodland	Flat/upslope (0°)	
6	Excluded – Clause 2.2.3.2 [a]	N/A	Nursery vegetation >100m from project area
7	Class G Grassland	Flat/upslope (0°)	
8	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	
9	Class A Forest	Downslope >0–5°	
10	Class G Grassland	Downslope >0–5°	
11	Class A Forest	Downslope >0–5°	
12	Class G Grassland	Downslope >0–5°	Unmanaged drainage

3.1.4 Post-development inputs

A summary of the potential post-development classified vegetation, exclusions and effective slope within the assessment area are listed in Table 3.2 and illustrated in Figure 3.2.

The post-development vegetation classifications for all land external to the project area are expected to remain the same as for the pre-development classifications. If external vegetation is altered prior to future planning stages, the change in vegetation condition is to be captured through a future BHL assessment or BAL contour map assessment.

Table 3.2: Post-development vegetation classifications/exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Flat/upslope (0°)	
2	Class G Grassland	Downslope >0–5°	
3	Class A Forest	Downslope >0–5°	
4	Excluded – Clause 2.2.3.2 [a]	N/A	
5	Class B Woodland	Flat/upslope (0°)	
6	Excluded – Clause 2.2.3.2 [a]	N/A	Nursery, vegetation >100m from project area

7	Class G Grassland	Flat/upslope (0°)	
8	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	
9	Class A Forest	Downslope >0–5°	
10	Class G Grassland	Downslope >0–5°	
11	Class A Forest	Downslope >0–5°	
12	Area to be modified to non-vegetated (Excluded – Clause 2.2.3.2 [e]) and/or low threat (Excluded – Clause 2.2.3.2 [f]) state	N/A	Project area to be developed

Legend:

- Project area
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Photo point locations
- Topographic contours (mAHD)
- Minor road
- Track

Vegetation classification

- Class A Forest
- Class B Woodland
- Class G Grassland
- Clause 2.2.3.2 (a)
- Clause 2.2.3.2 (e) & (f)

Scale 1:3,000 at A4 — 0 25 50 metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57402

Client: Jardim

Version: A | Date: 11-Sep-2019

Drawn By: cthatcher | Checked By: JH

2 Torrenova Way Sinagra

PRE-DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

FIGURE 3.1

strategen JBS&G

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Jardim\57402 - 2 Torrenova Way, Sinagra\GIS\Maps\R01 Rev A\57402_03_1_PreDev_VegClass.mxd
Image Reference: www.nearmap.com© - Imagery Date: 13 July 2019

Legend:

- Project area
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Photo point locations
- Topographic contours (mAHD)
- Minor road
- Track

Vegetation classification

- Class A Forest
- Class B Woodland
- Class G Grassland
- Clause 2.2.3.2 (a)
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state

Scale 1:3,000 at A4	0 25 50 metres
Coord. Sys. GDA 1994 MGA Zone 50	
Job No: 57402	
Client: Jardim	
Version: A	Date: 11-Sep-2019
Drawn By: cthatcher	Checked By: JH

2 Torrenova Way Sinagra

POST-DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

FIGURE 3.2

strategen JBS&G

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Jardim\57402 - 2 Torrenova Way, Sinagra\GIS\Maps\R01 Rev A\57402_03_2_PostDev_VegClass.mxd
Image Reference: www.nearmap.com© - Imagery Date: 13 July 2019

3.2 Assessment outputs

3.2.1 Bushfire Hazard Level (BHL) assessment

Pre and post-development vegetation extents have been assigned a bushfire hazard level in accordance with the methodology detailed in Appendix Two of the Guidelines as outlined in Table 3.3.

Table 3.3: Bushfire hazard levels and characteristics

Bushfire hazard level	Characteristics*
Extreme	• Class A Forest • Class B Woodland (05) • Class D Scrub • Any classified vegetation with a greater than 10° slope.
Moderate	• Class B Low woodland (07) • Class C Shrubland • Class E Mallee/Mulga • Class G Grassland, including sown pasture and crops • Class G Grassland: Open woodland (06), Low open woodland (08), Open shrubland (09) • Vegetation that has a low hazard level but is within 100 metres of vegetation classified as a moderate or extreme hazard, is to adopt a moderate hazard level.
Low	• Low threat vegetation may include areas of maintained lawns, golf courses, public recreation reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks • Managed grassland in a minimal fuel condition (insufficient fuel is available to significantly increase the severity of the bushfire attack). For example, short-cropped grass to a nominal height of 100 millimetre • Non-vegetated areas including waterways, roads, footpaths, buildings and rock outcrops.
*Vegetation classifications from AS 3959-2018 Table 2.3.	

3.2.1.1 Pre-development

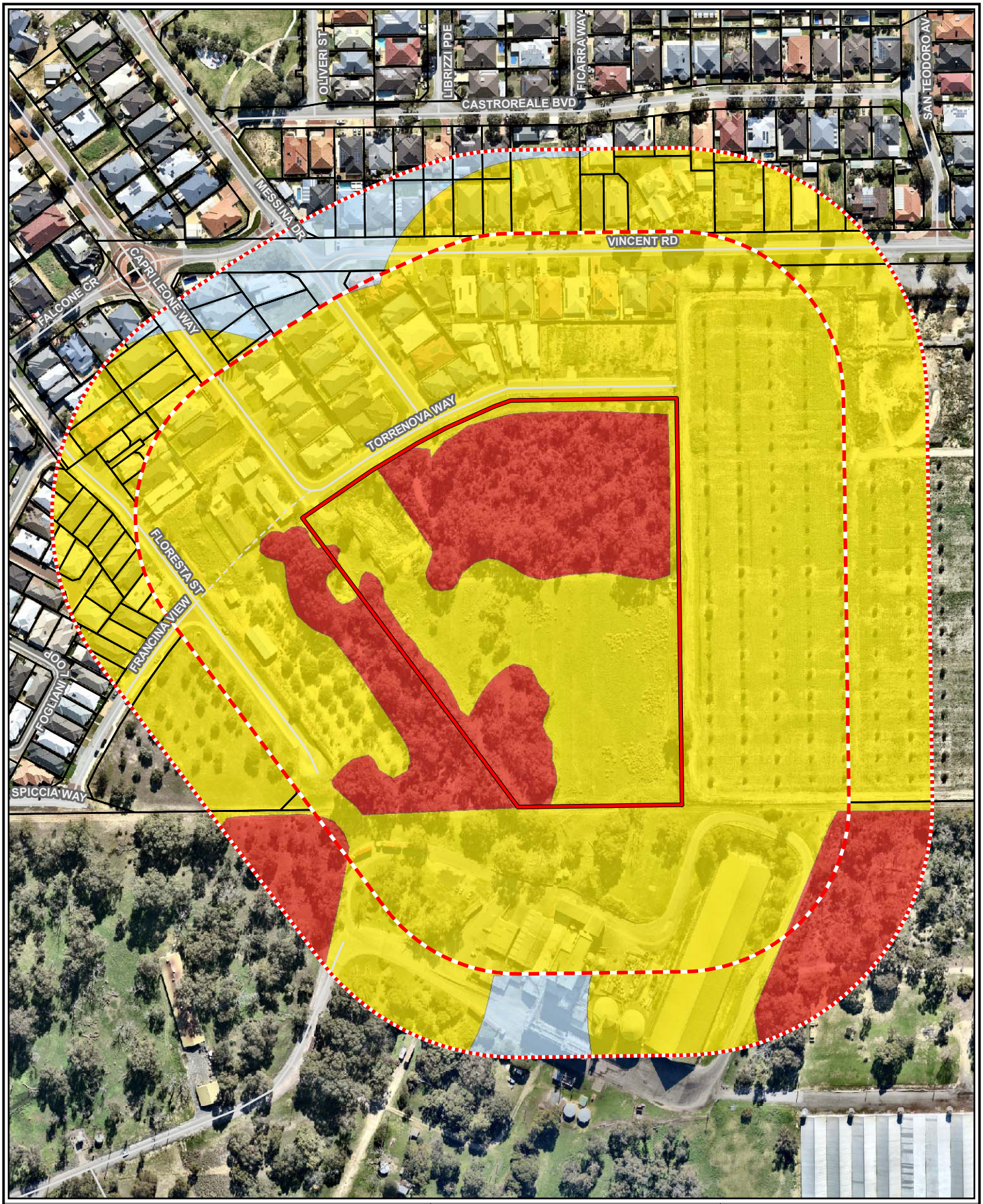
Strategen-JBS&G has mapped the pre-development bushfire hazard levels within the project area and adjacent 150 m wide assessment area. The bushfire hazard levels have been assessed on the basis of the vegetation discussed in Section 3.1.3 (i.e. the current pre-development extent of vegetation within and surrounding the project area).

The pre-development BHL assessment (refer to Figure 3.3) shows that based on the existing vegetation, the project area contains land with Moderate and Extreme bushfire hazard levels.

3.2.1.2 Post-development

Strategen-JBS&G has mapped the potential post-development bushfire hazard levels to demonstrate that the future bushfire hazard levels will be acceptable for future development to occur within the project area. The bushfire hazard levels have been assigned on the basis of the vegetation discussed in Section 3.1.4 and the future expected vegetation extent within and surrounding the project area.

The post-development BHL assessment (refer to Figure 3.4) demonstrates that all future habitable development will be located on land with either a Low or Moderate bushfire hazard level.



Legend:

- Project area
- 100m assessment area
- 150m assessment area
- Cadastral boundary

Hazard level

- Extreme
- Moderate
- Low

- Minor road
- Track

Scale 1:3,000 at A4

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57402

Client: Jardim

Version: A | Date: 10-Sep-2019

Drawn By: cthatcher | Checked By: JH

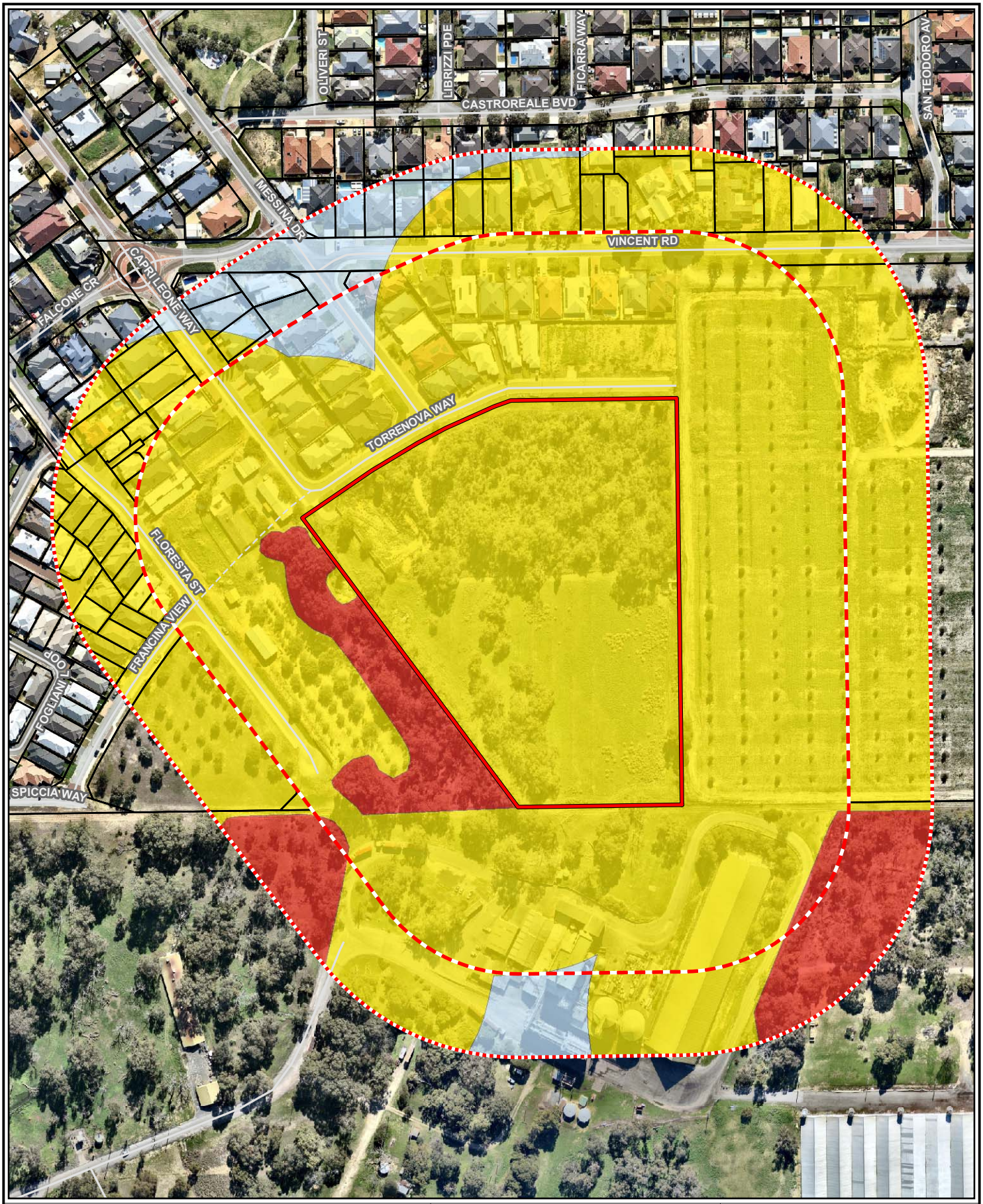
2 Torrenova Way Sinagra

PRE-DEVELOPMENT BHL ASSESSMENT

FIGURE 3.3

strategen JBS&G

File Name: W:\Projects\1)Open\Jardim\57402 - 2 Torrenova Way, Sinagra\GIS\Maps\R01 Rev A\57402_03_3_PreDev_BHL.mxd
Image Reference: www.nearmap.com© - Imagery Date: 13 July 2019



Legend:

- Project area
- 100m assessment area
- 150m assessment area

Hazard level

- Extreme
- Moderate
- Low

- Cadastral boundary
- Minor road
- Track

Scale 1:3,000 at A4 (0 25 50 metres)		**2 Torrenova Way Sinagra**
Coord. Sys. GDA 1994 MGA Zone 50		**POST-DEVELOPMENT BHL ASSESSMENT**
Job No: 57402		
Client: Jardim		**FIGURE 3.4**
Version: A	Date: 10-Sep-2019	strategen JBS&G
Drawn By: cthatcher	Checked By: JH	

File Name: W:\Projects\1)Open\Jardim\57402 - 2 Torrenova Way, Sinagra\GIS\Maps\R01 Rev A\57402_03_4_PostDev_BHL.mxd
Image Reference: www.nearmap.com© - Imagery Date: 13 July 2019

4. Identification of bushfire hazard issues

4.1 Bushfire context

The project area is predominantly surrounded by existing urban development in the form of roads, commercial precincts and low threat managed landscaping that do not pose a bushfire threat.

The greatest bushfire threat to the proposed development is from a fire originating to the south of the project area, within dense native vegetation within Hulse Park. A fire originating in this location has the potential to spread into the surrounding vegetation around the existing Ingham chicken farm and impact the project area.

Vegetation within this area is a mixture of Class B - Woodland and managed vegetation which is located immediately adjacent to the southern boundary of the of the subject lot. The presence of the existing Ingham facility and managed vegetation breaks up the vegetation and provides for separation that would prevent long fire runs impacting the Project area. Considering this, it is accepted that there is still potential for ember attack and possible ignition of surrounding vegetation.

There is potential for fire development to be supported within the existing Benara nursey to the east of the project area. This area consists of a mixture of managed land and unmanaged grassland, separation if provided by an existing 3-metre-wide firebreak. It is anticipated that any potential bushfire impact coming from this area would be moderate and not pose a significant threat to the project area.

Strategen-JBS&G consider that the bushfire risk to the proposed development posed by these hazards can be managed through standard application of acceptable solutions under the Guidelines, as well as through a direct bushfire suppression response if required. Bushfire mitigation strategies applicable to the proposed development are addressed in Section 5 of this BMP.

4.2 Bushfire hazard issues

Examination of the Structure Plan concept; pre and post-development bushfire hazard levels and consideration of future surrounding land use has identified the following bushfire hazard issues to be considered at future planning stages:

1. A direct vegetation interface exists between proposed lots along the western boundary and Class A Forest vegetation within the unmanaged vegetation. It is understood that this area will be subject to development which will remove the vegetation along this interface. Development of the lots along this interface will need to be staged and not titled until the adjacent vegetation has been removed to ensure that future habitable development can achieve BAL-29 or lower. If development is not staged an external APZ will need to be established. The dimensions of this APZ will be determined at be determined at future planning stages
2. The eastern boundary of the Project area is currently subject to BAL impact due to adjacent grassland vegetation. The existing firebreak provides sufficient separation to ensure a BAL rating of BAL-29 or lower is realised, this firebreak is required to be maintained under the City of Wanneroo Firebreak Notice. Furthermore, this area is zoned urban and is part of the Garden Parks Heights residential development area. It is anticipated that all classified vegetation will be removed as part of this development and that the road connections between the developments will be established.
3. The concept design makes provisions for future road connections to the east and south which results in five temporary dead-end roads if development of Lot 9500 occurs prior to surrounding development. To ensure that occupants and firefighters are able to turn around safely within the project area, compliant temporary cul-de-sac heads are to be provided if no connections into adjacent developments are established. The temporary dead-end roads are relatively short and

serve to provide for future enhanced access and are therefore not considered to be prohibitive to development.

4. The Concept Plan does not include any POS or drainage areas at this stage. If these are included at future planning stages, potential APZ setbacks are to be considered for habitable development to achieve BAL–29. Setback distances will be determined at future planning stages (i.e. subdivision) through the development of a Landscaping Plan.

Based on the above, Strategen-JBS&G considers the bushfire hazards within and adjacent to project area and the associated bushfire risks are readily manageable through standard management responses outlined in the Guidelines and AS 3959. These responses will be factored into proposed development as early as possible at all stages of the planning process to ensure a suitable, compliant and effective bushfire management outcome is achieved for protection of future life, property and environmental assets.

5. Assessment against the bushfire protection criteria

5.1 Compliance table

An acceptable solutions assessment against the bushfire protection criteria is provided in Table 5.1.

Table 5.1: Compliance with the bushfire protection criteria of the Guidelines

Bushfire protection criteria	Method of compliance Acceptable solutions	Proposed bushfire management strategies
Element 1: Location	A1.1 Development location	The post-development BHL assessment (Figure 3.4) identifies that on completion of development, all developable land will comprise either a Low or Moderate bushfire hazard level.
Element 2: Siting and design	A2.1 Asset Protection Zone	APZs sufficient to achieve BAL—29 will be implemented, if required, to ensure all lots are subject to BAL-29 or lower. The required APZs are to be identified at future planning stages based on future subdivision/development design and following a BAL contour assessment. APZs to be implemented and maintained in accordance with Schedule 1 of the Guidelines (Appendix B) and the City's Firebreak and Fuel Hazard Reduction Notice (see Appendix E).
Element 3: Vehicular access	A3.1 Two access routes	On completion of the development, the existing public road network and proposed public internal roads will provide all occupants with the option of travelling to more than two different destinations, as follows: • Travel along Messina Drive to Pinjar Road allowing for travel south west to Wanneroo Road and north to Joondalup Drive; • Travel along Vincent Road in an easterly direction onto Garden Park Drive that allows for travel to both the north and south vi In this regard, the proposed development is provided with at least/more than two access routes which meets and exceeds the requirements of Acceptable Solution A3.1.
	A3.2 Public road	All public roads are to be constructed to relevant technical requirements under the Guidelines (see Appendix C).
	A3.3 Cul-de-sac (including a dead-end-road)	No permanent Cul-de-sac's are proposed; however, it is noted that several internal roads are reliant on connections being established into adjoining developments. If these connections are not in place before development of the lots, then temporary cul-de-sacs will be required to remove dead-end-road roads. Temporary cul-de-sacs, less than 200m long, are to be constructed to relevant technical requirements under the Guidelines (see Appendix C).
	A3.4 Battle-axe	N/A – no battle-axes are proposed as part of the development and the project area is not serviced by an existing battle-axe. However, given the early planning stage, if any battle-axes become necessary, they will be constructed to the relevant technical requirements under the Guidelines (see Appendix C).
	A3.5 Private driveway longer than 50 m	N/A – the proposed lots are of size where all future habitable development will be located within 50 m of a public road.
	A3.6 Emergency access way	N/A – based on the conceptual development design, the proposed development would not require Emergency Access Ways (EAWs) to provide through access to a public road.
	A3.7 Fire service access routes (perimeter roads)	N/A – based on the conceptual development design, the proposed development would not require fire service access routes (FSARs) to achieve access within and around the perimeter of the project area.
	A3.8 Firebreak width	Each stage of development is required to comply with the requirements of Acceptable Solution A3.8 and the annual City of Wanneroo Firebreak Notice as amended (refer to Appendix E).

		On completion of the development, firebreak requirements will be dependent on the Firebreak Notice category assigned by the City of Wanneroo as follows: • Category 2 (Urban Residential and Industrial Commercial) – firebreaks not required for land less than 2,024 m^2 • Category 6 & 7 (Rural-residential) – 3 m wide by 5 m high firebreaks required. During staged development, 3 m wide by 4 m high perimeter firebreaks are to be installed immediately inside all boundaries of balance lots in accordance with the requirements of the existing Category 6 firebreak classification.
Element 4: Water	A4.1 Reticulated areas	The proposed development will be connected to reticulated water supply via surrounding development in accordance with Water Corporations Design Standard 63 requirements.
	A4.2 Non-reticulated areas	N/A – the proposed subdivision is going to be provided with a compliant reticulated supply.
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	N/A – the proposed subdivision is located within an existing reticulated area.

6. Responsibilities for implementation and management of the bushfire measures

This BMP has been prepared as a strategic guide to demonstrate how development compliance will be delivered at future planning stages in accordance with the Guidelines. Aside from the preparation of future BMPs to accompany future subdivision and development applications where appropriate, there are no further items to implement, enforce or review at this strategic stage of the planning process.

Future BMPs prepared for subsequent subdivision and development applications are to meet the relevant commitments outlined in this strategic level BMP, address the relevant requirements of SPP 3.7 (i.e. Policy Measures 6.4 and 6.5 respectively) and demonstrate in detail how the proposed development will incorporate the relevant acceptable solutions or meet the performance requirements of the Guidelines. Future BMPs are to include the following detailed information:

- proposed lot layout, including any public open space (POS) and drainage areas;
- detailed landscaping design/plans in regard to POS and drainage areas, if required;
- post development classified vegetation extent and effective slope;
- BAL contour map demonstrating that proposed development areas will achieve BAL–29 or lower (may require designation of building envelopes);
- width and alignment of compliant APZs/setbacks, if required;
- confirmation of how bushfire management will be addressed during development staging;
- vehicular access provisions, including demonstration that a minimum of two access routes will be achieved for each stage of development in accordance with Acceptable Solution A3.1;
- water supply provisions with regards to reticulated water;
- provisions for notification on Title for any future lots with a rating of BAL–12.5 or greater as a condition of subdivision;
- compliance requirements with the current City of Wanneroo annual firebreak notice;
- construction of Class 1, 2, 3 or associated 10a buildings in accordance with AS 3959 to the assessed BAL rating;
- requirements for BMP/BAL compliance reports as conditions of subdivision;
- compliance with performance principles of the bushfire protection criteria;
- proposed implementation and audit program outlining all measures requiring implementation and the appropriate timing and responsibilities for implementation.

On the basis of the information contained in this BMP, Strategen-JBS&G considers the bushfire hazards within and adjacent to the project area and the associated bushfire risks are manageable through standard management responses outlined in the Guidelines and AS 3959. Strategen-JBS&G considers that on implementation of the proposed management measures, the project area will be able to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959.

Appendix A Vegetation plot photos and description

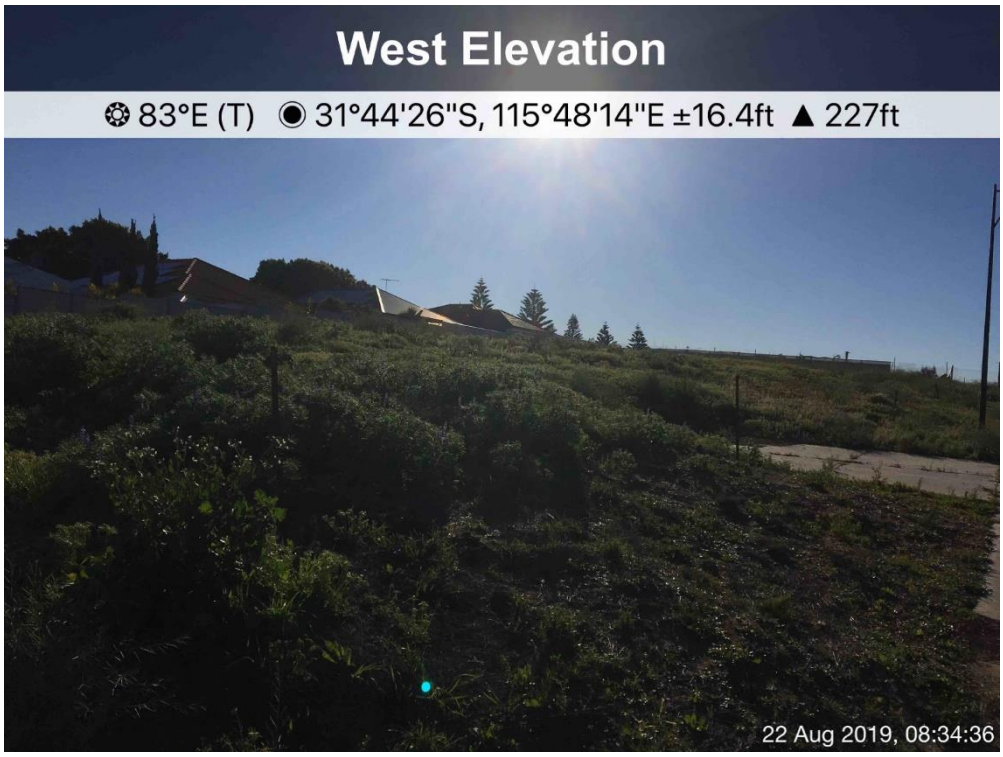


Photo ID: 1a

Plot number		Plot 1
Vegetation classification	**Pre-development**	Class G Grassland
	Post-development	Class G Grassland
Description / justification		Grassland greater than 100 mm in height

Photo ID: 2a

Photo ID: 2a

Plot number		Plot 2
Vegetation classification	**Pre-development**	Class G Grassland
	Post-development	Class G Grassland
Description / justification		Grassland greater than 100 mm in height

Photo ID: 3a

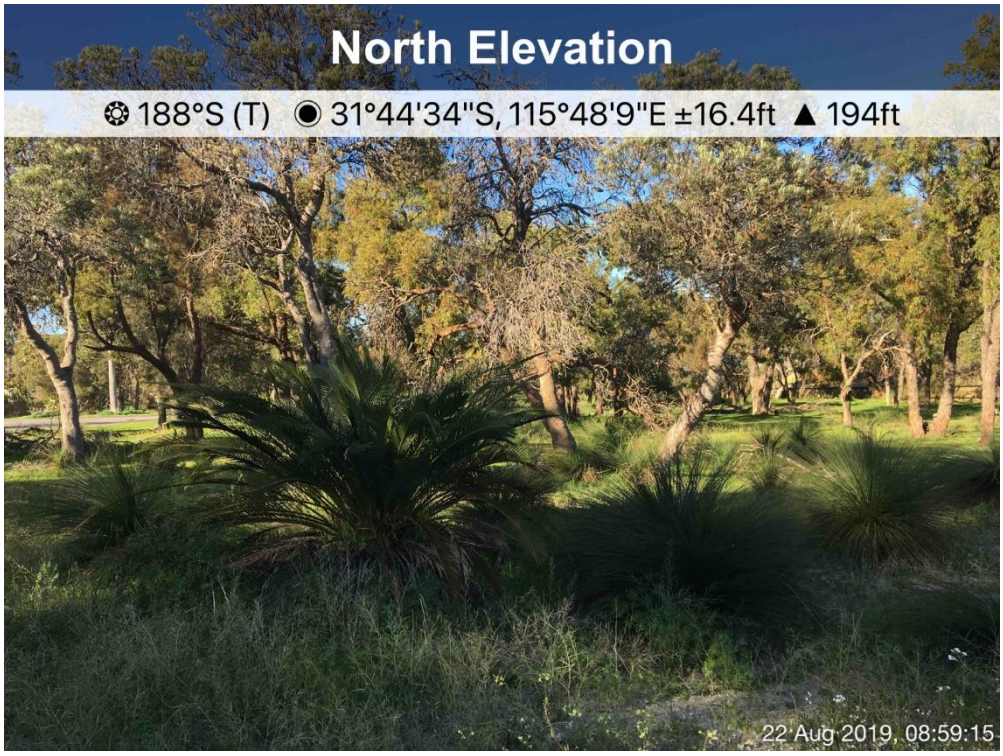


Photo ID: 3a

Plot number		Plot 3
Vegetation classification	**Pre-development**	Class A Forest
	Post-development	Class A Forest
Description / justification		Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 3a

Plot number		Plot 7
Vegetation classification	**Pre-development**	Class A Forest
	Post-development	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification		Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)

Photo ID: 6a

Plot number		Plot 6
Vegetation classification	**Pre-development**	Excluded – Clause 2.2.3.2 [a]
	Post-development	Excluded – Clause 2.2.3.2 [a]
Description / justification		Vegetation greater than 100 m from project area.

Photo ID: 7a

Plot number		Plot 7
Vegetation classification	**Pre-development**	Class G Grassland
	Post-development	Class G Grassland
Description / justification		Grassland greater than 100 mm in height

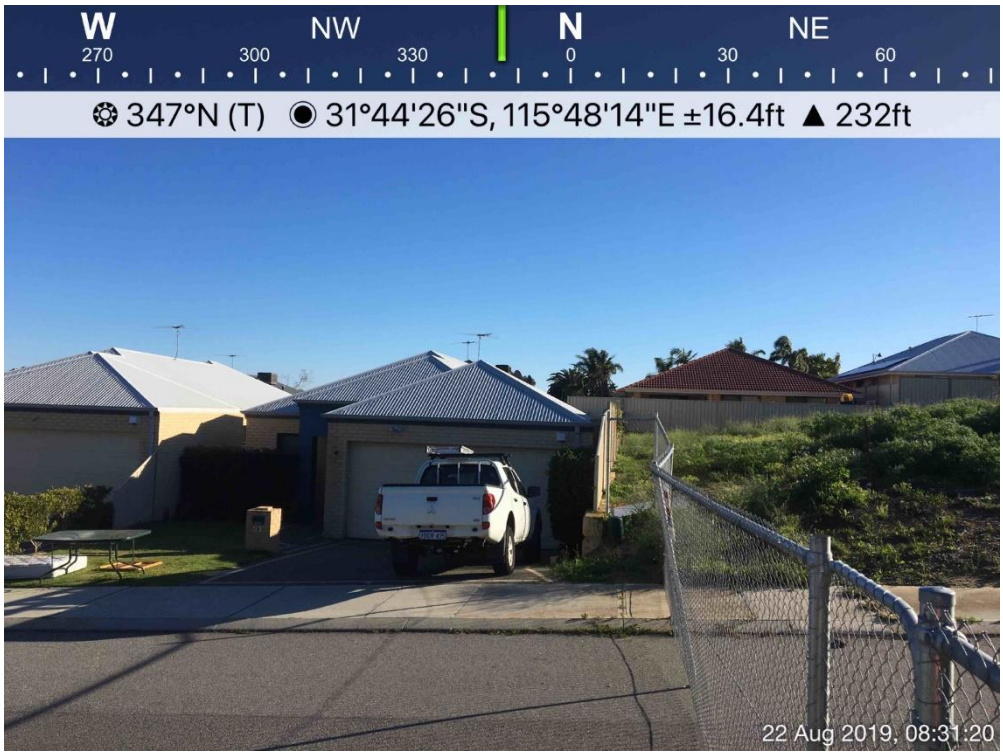


Photo ID: 8a

Photo ID: 8b

Plot number		Plot 8
Vegetation classification	**Pre-development**	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
	Post-development	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification		Low threat cultivated gardens and maintained lawns within surrounding properties and non-vegetated areas including roads, footpaths, driveways and building footprints

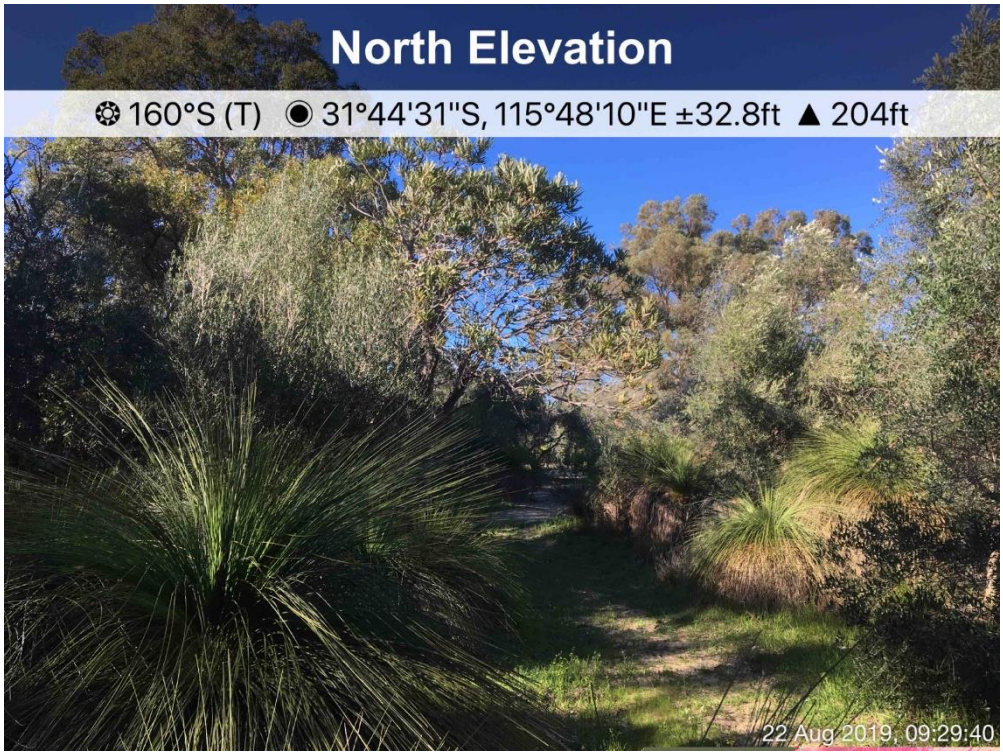


Photo ID: 3a

Plot number		Plot 9
Vegetation classification	**Pre-development**	Class A Forest
	Post-development	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification		Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)

Photo ID: 3a

Plot number		Plot 10
Vegetation classification	**Pre-development**	Class G Grassland
	Post-development	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification		Grassland at maturity, greater than 100 mm in height

Photo ID: 11a

Photo ID: 11b

Plot number		Plot 11
Vegetation classification	**Pre-development**	Class A Forest
	Post-development	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification		Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)

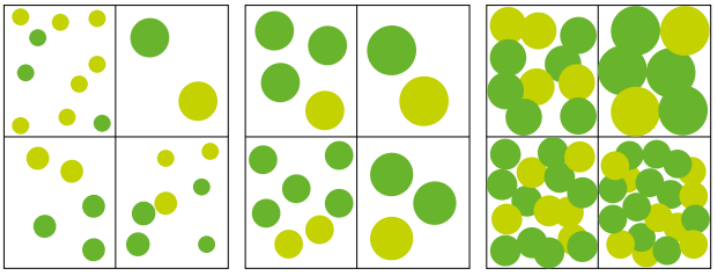
Photo ID: 3a

Plot number		Plot 12
Vegetation classification	**Pre-development**	Class G Grassland
	Post-development	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification		Grassland greater than 100 mm in height

Appendix B APZ standards (Schedule 1; the Guidelines, WAPC 2017)

Schedule 1: Standards for Asset Protection Zones

- **Fences:** within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- **Objects:** within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.
- **Fine Fuel load:** combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
- **Trees (> 5 metres in height):** trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy.

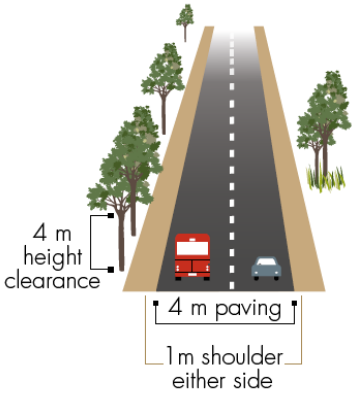


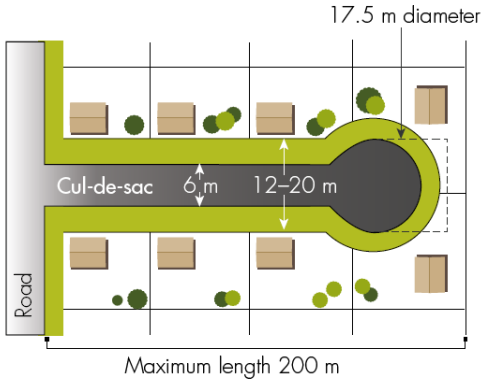
- **Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height):** can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.
- **Grass:** should be managed to maintain a height of 100 millimetres or less.

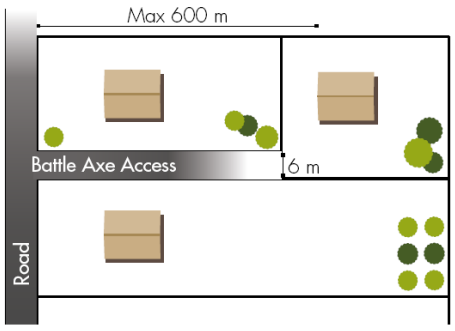
Appendix C Water technical standards (the Guidelines, WAPC 2017)

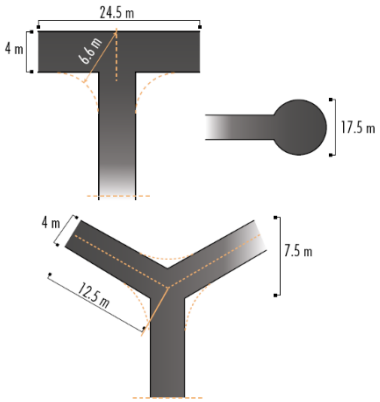
Reticulated areas	
Acceptable solution A4.1	The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.
Explanatory note E4.1	Water supply authorities in Western Australia include the Water Corporation, Aqwest and the Busselton Water Board. The Water Corporation's 'No. 63 Water Reticulation Standard' is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities' conditions apply.

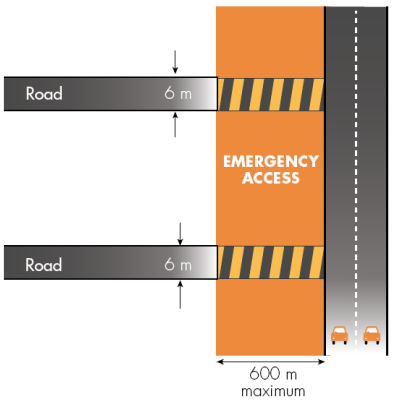
Appendix D Vehicular access technical standards (the Guidelines, WAPC 2017)

Public roads	
Acceptable solution A3.2	A public road is to meet the requirements in Table 1, Column 1.
Explanatory note E3.2	Trafficable surface: Widths quoted for access routes refer to the width of the trafficable surface. A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metre wide paving one metre wide constructed road shoulders. In special circumstances, where eight lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of 90 metres may be provided subject to the approval of both the local government and Department of Fire and Emergency Services. Public road design: All roads should allow for two-way traffic to allow conventional two-wheel drive vehicles and fire appliances to travel safely on them. 

Cul-de-sac (including a dead-end road)	
Acceptable solution A3.3	A cul-de-sac and/ or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/ or will need to be demonstrated by the proponent), the following requirements are to be achieved: • Requirements in Table 1, Column 2 • Maximum length: 200 metres (if public emergency access is provided between cul-de-sac heads maximum length can be increased to 600 metres provided no more than eight lots are serviced and the emergency access way is no more than 600 metres) • Turn-around area requirements, including a minimum 17.5 metre diameter head.
Explanatory note E3.3	In bushfire prone areas, a cul-de-sac subdivision layout is not favoured because they do not provide access in different directions for residents. In some instances it may be possible to provide an emergency access way between cul-de-sac heads to a maximum distance of 600 metres, so as to achieve two-way access. Such links must be provided as right of ways or public access easements in gross to ensure accessibility to the public and fire services during an emergency. A cul-de-sac in a bushfire prone area is to connect to a public road that allows for travel in two directions in order to address Acceptable Solution A3.1. 

Battle-axe	
Acceptable solution A3.4	Battle-axe access leg should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) all of the following requirements are to be achieved: • Requirements in Table 1, Column 3 • Maximum length: 600 metres • Minimum width: six metres.
Explanatory note E3.4	In bushfire prone areas, lots with battle-axe access legs should be avoided because they often do not provide two-way access and egress for residents and may be easily blocked by falling trees or debris. In some instances, however; it may be appropriate for battle-axe access to be used to overcome specific site constraints. Where used, they should comply with the minimum standards for private driveways. Passing bays should be provided at 200 metre intervals along battle-axe access legs to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres. Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at house sites and at 500 metre intervals along the access leg. 

Private driveway longer than 50 metres	
Acceptable solution A3.5	A private driveway is to meet all of the following requirements: • Requirements in Table 1, Column 3 • Required where a house site is more than 50 metres from a public road • Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres) • Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house • Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes • All-weather surface (i.e. compacted gravel, limestone or sealed).
Explanatory note E3.5	For a driveway shorter than 50 metres, fire appliances typically operate from the street frontage however where the distance exceeds 50 metres, then fire appliances will need to gain access along the driveway in order to defend the property during a bushfire. Where house sites are more than 50 metres from a public road, access to individual houses and turnaround areas should be available for both conventional two-wheel drive vehicles of residents and type 3.4 fire appliances. Turn-around areas should be located within 50 metres of a house. Passing bays should be available where driveways are longer than 200 metres and turn-around areas in driveways that are longer than 500 metres. Circular and loop driveway designs may also be considered. These criteria should be addressed through subdivision design. Passing bays should be provided at 200 metre intervals along private driveways to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres. Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at the house sites and at 500 metre intervals along the driveway. 

Emergency access way	
Acceptable solution A3.6	An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet all of the following requirements: • Requirements in Table 1, Column 4 • No further than 600 metres from a public road • Provided as right of way or public access easement in gross to ensure accessibility to the public and fire services during an emergency • Must be signposted.
Explanatory note E3.6	An emergency access way is not a preferred option however may be used to link up with roads to allow alternative access and egress during emergencies where traffic flow designs do not allow for two-way access. Such access should be provided as a right-of-way or easement in gross to ensure accessibility to the public and fire emergency services during an emergency. The access should comply with minimum standards for a public road and should be signposted. Where gates are used to control traffic flow during non-emergency periods, these must not be locked. Emergency access ways are to be no longer than 600 metres and must be adequately signposted where they adjoin public roads. Where an emergency access way is constructed on private land, a right of way or easement in gross is to be established. 

Fire service access routes (perimeter roads)	
Acceptable solution A3.7	Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for firefighting purposes. Fire service access routes are to meet the following requirements: • Requirements in Table 1, Column 5 • Provided as right of ways or public access easements in gross to ensure accessibility to the public and fire services during an emergency • Surface: all-weather (i.e. compacted gravel, limestone or sealed) • Dead end roads are not permitted • Turn-around areas designed to accommodate type 3.4 appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) • No further than 600 metres from a public road • Allow for two-way traffic • Must be signposted.
Explanatory note E3.7	Fire service access routes should be established to separate bushfire prone areas from developed areas, and to provide access within and around the edge of subdivisions and related development. Fire service access is used during bushfire suppression operations but can also be used for fire prevention work. Fire service access routes should: • Link up with the road network at regular intervals - the development and road network forms part of the fire service access system • Be adequately signposted

Fire service access routes (perimeter roads)	
	• Allow for two-way traffic - that is, two fire appliances must be able to safely pass each other • Have an all-weather surface (i.e. compacted gravel, limestone or sealed) • Have erosion control measures in place. Driveways may be used as part of the designated fire service access system, provided they meet the minimum standard for fire service access routes. It is beneficial to link the fire service access routes with individual driveways to allow quick access to properties and houses during fire emergencies. Where gates are used, these should be wide enough to accommodate type 3.4 fire appliances (minimum width of 3.6m) with the design and construction to be approved by the relevant local government. Gates on fire service access routes may be locked to restrict access provided that a common key system is used and such keys are made available for fire appliances and designated fire officers within the local government area and/or surrounding district. Gates should be installed where fences cross fire service access routes. Management and access arrangements should be in place to ensure that the maintenance of fire service access routes will occur in the long term after an area has been subdivided. A number of options can be used to achieve this, including but not limited to: • Individual property owners being responsible for maintaining fire service access routes where these fall on their property • Providing such access as a right-of-way or easement in gross to ensure accessibility to fire services during an emergency; and/or • A levy system administered by local government to cover the cost of maintaining fire service access routes. Such arrangements should be documented in the relevant planning application (such as a structure plan, subdivision plan or development plan) and should be agreed to by local government.

Technical requirement	1	2	3	4	5
	Public road	Cul-de-sac	Private driveway longer than 50 m	Emergency access way	Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal distance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 m	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5	8.5	8.5	8.5
* Refer to E3.2 Public roads: Trafficable surface					

Appendix E City of Wanneroo Firebreak Notice (2019-20)

Protect your home and property from bushfires

NOTICE TO ALL OWNERS OR OCCUPIERS OF LAND IN THE DISTRICT OF THE CITY OF WANNEROO REGARDING FIREBREAKS.

The City of Wanneroo hereby gives notice pursuant to Section 33 of the **Bush Fires Act 1954** to all owners or occupiers of land in its district that they are required on or before 15 November, or within 14 days of becoming the owner or occupier of the land if that occurs after the 15 November, to annually plough, cultivate, scarify, or otherwise clear firebreaks as specified in this Notice and thereafter up to, and including the 30 April, annually, to maintain the firebreaks clear of flammable matter.

1. Land having an area of 2000m2 or more
A firebreak not less than 3 metres wide and 3 metres high immediately inside and around all external boundaries of the land must be cleared.

2. Land having an area of less than 2000m²
A firebreak not less than 2 metres wide and 2 metres high immediately inside and around all external boundaries of the land must be cleared.

3. Buildings
A firebreak not less than 3 metres wide immediately around all external walls of every building must be cleared. Whenever a firebreak is cleared by burning the provisions of the Act and Regulations made thereunder must be observed. If pursuant to Item (2) of this Notice, mowing or slashing is carried out the height of vegetation thereafter must not exceed, as far as is reasonably practicable, 20mm over the entire area of the firebreak. The use of chemicals is subject to all restrictions imposed by the Department of Agriculture. Attention is drawn to the Flammable Liquids Regulations made under the Explosives and Dangerous Goods Act 1961,which requires a site on which flammable liquid is stored to be totally cleared of all flammable material for a minimum distance of 5 metres surrounding the site.

If it is considered to be impracticable for any reason to comply with the provisions of this Notice, application may be made not later than the 1st day of November annually to the Council or its authorised officer for permission to provide alternative fire protection measures. If permission is not granted the requirements of this Notice must be complied with.

Penalty
An owner or occupier of land who fails or neglects in any respect to comply with the requirements of this Notice is liable to a maximum fine of $5,000.

DATES TO REMEMBER

- **Firebreaks must be cleared by 15 November (AND KEPT CLEAR UNTIL APRIL 30)**
- **Burning permits required all year round**
- **Burning prohibited between 1 December to 31 March**

When and how to obtain a fire permit

Permits are available from the City of Wanneroo at the following locations:

WANNEROO ANIMAL CARE CENTRE
Located at the rear of the Ashby Operations Centre, 1204 Wanneroo Road, Ashby
The City's Rangers / Fire Control Officers are available to issue permits 7 days a week* from 4pm - 6pm
*Except Good Friday

CITY OF WANNEROO CIVIC CENTRE
23 Dundebar Road, Wanneroo
The City's Fire Control Officers / Permit Issuing Officers are available to issue permits Monday to Friday 9am - 4pm

TWO ROCKS VOLUNTEER FIRE BRIGADE
Captain / Fire Control Officer
Seatrees Estate,Two Rocks
Please phone 0427 026 000 before attending

NEED ADVICE?
Further advice about how to protect your home, constructing firebreaks, and when and how to burn off, is available from the City of Wanneroo during office hours on 9405 5000.

City of Wanneroo
23 Dundebar Road, Wanneroo, WA 6065
Locked Bag 1, Wanneroo, WA 6946
T : (08) 9405 5000 F : (08) 9405 5499
After Hours : 1300 13 83 93
E : enquiries@wanneroo.wa.gov.au
wanneroo.wa.gov.au

PROTECT YOUR HOME AND PROPERTY FROM BUSHFIRES

City of Wanneroo

Keeping your home safe from fire

There are a number of ways you can help keep your home safe from fire:

- Install smoke detectors in your home
- Clear vegetation away from the walls of your home
- Clear all rubbish and flammable material from around your home to create a 20 metre circle of safety
- Store firewood, timber, petrol, and kerosene well away from your home
- Prior to summer, clean all leaves and debris from your gutters
- Don't have flammable trees such as conifers near buildings
- Have branches trimmed that overhang the house or powerlines
- Fit wire insect screens or shutters to windows and glass doors

If a firebreak is impractical along your boundary for environmental or other reasons notify the City of Wanneroo by 1 October to obtain permission to install firebreaks in alternative positions, or of a different nature.

ALTERNATIVE METHODS OF REDUCING FIRE HAZARDS ON VACANT LAND

- For urban land less than 2000m^2, if mowing or slashing is carried out, the height of the vegetation must not exceed, as far as is reasonably practical, 20mm over the entire area of the firebreak
- The use of chemicals is subject to all restrictions imposed by the Department of Agriculture
- Mulching • Disposal at an authorised rubbish tip site

When and how to burn

NO BURNING FROM 1 DECEMBER - 31 MARCH

Burning off - that is, bush/running fire including grass, on any land is totally prohibited between 1 December and 31 March. Fire permits for burning material other than garden rubbish are required all year round.

A person in control of the fire must stay with the fire until it is completely extinguished.

GARDEN RUBBISH AND REFUSE

The burning of garden refuse is permitted between the hours of 6pm and 11pm, provided the fire danger rating is not VERY HIGH, SEVERE, EXTREME or CATASTROPHIC or a TOTAL FIRE BAN has been declared.

Fire danger rating signs are located at the following locations:

• Corner of Joondalup Drive and Wanneroo Road
• Wanneroo Road, south of the Yanchep Beach Road turn off
• Wanneroo Road, Carabooda • Marmion Avenue, Jindalee
• Neaves Road, Mariginiup • Old Yanchep Road, Pinjar
• Gnangara Road, Landsdale • Country Side Drive, Two Rocks

Other points to remember when burning garden refuse and rubbish are:

- All bush and flammable material must be thoroughly cleared within two metres of all points of the site of the fire
- The material must be on the ground, and be no more than one metre wide and one metre high

Only one heap may be burnt at any one time Incinerators may be used providing:

- The incinerator is properly constructed and designed to prevent the escape of sparks of burning material
- The incinerator is situated not less than two metres away from a building or fence
- An area of two metres surrounding the incinerator is clear of all flammable material

BARBECUES

Only gas or electric barbecues may be lit during VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger rating or declared TOTAL FIRE BAN. The lighting of solid fuel barbecues is not permitted on these days.

SMOKE NUISANCES

City of Wanneroo residents are advised to be mindful of smoke issues associated with any burning that they conduct. Steps should be taken to avoid undue smoke impact to neighbours and adjacent roads. Smoke across roadways can severely impact motorists' visibility and therefore road safety. Issues of smoke nuisance are regulated by the Waste Avoidance and Resource Recovery Act 2007.

CAMPFIRES

Campfires must not be lit on VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger days or declared TOTAL FIRE BAN. A person must remain in attendance at the site during the whole time the fire is burning. The user must extinguish the fire using water or earth before leaving the area.

Hints for safer burning

- Don't light a fire on a hot or windy day
- Don't burn more than you can control
- Let your neighbours know you'll be burning material
- Make sure smoke and sparks will not affect your neighbour's washing or enter open windows
- Cut or rake long grass around trees, building and fences before burning
- Burn against the wind
- On a sloping block, burn from the top down
- Keep a hose or spray pack at hand to dampen down fierce fires
- If in doubt, don't burn material yourself - call the Volunteer Fire Brigade
- Stay with the fire until it is completely extinguished
- Where possible, don't burn any closer than 20 metres from your home or other buildings

Penalties

Under the Bush Fires Act 1954, failing to comply with regulations can result in a fine ranging from $250 to $250,000 or imprisonment.

Failure to maintain 2/3 metre firebreak as per firebreak order	$250
Offence relating to lighting fire in the open air	$250
Setting fire to bush during prohibited burning times	$250
Failure of occupier to extinguish bush fire	$250

Major offences result in Court action with fines ranging from $250 to $250,000 or imprisonment for 14 years.

THE BIGGEST PENALTY OF ALL

The biggest penalty of all would be losing your loved ones or home to fire. Please ensure you, your family and your home are kept safe by taking the necessary precautions.

Special rural and residential land

Owners and occupiers of special rural and special residential land should be aware of their responsibilities to take bush fire prevention measures, while ensuring they do not contravene Town Planning Scheme provisions which control the removal of vegetation in Special Residential and Special Rural Zones.

These special rural zones were created in areas of natural flora, and the Scheme recognises the importance of preserving the natural environment in these areas. Anyone found cutting down, lopping or damaging trees in these areas without City approval may be guilty of an offence.

However, bush fire prevention, including the installation of firebreaks, is essential regardless of the zoning of the land.

Below are some guidelines for installing firebreaks in special rural zones to prevent bush fires, while minimising damage to the natural environment.

- A 3 metre wide and 3 metre high firebreak should be cleared around the perimeter of special rural or special residential lots
- These firebreaks need not be strictly around the perimeter, but may deviate according to the flora
- The firebreak does not have to be ploughed but can instead be created by clearing and removing all flammable material
- Care should be taken to avoid damaging or removing significant trees and shrubs
- Avoid the build up of undergrowth and leaf litter

7. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

Strategen-JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by Strategen-JBS&G, and should not be relied upon by other parties, who should make their own enquires.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, Strategen-JBS&G reserves the right to review the report in the context of the additional information.

8. References

Department of Fire and Emergency Services (DFES) 2019, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: https://maps.slip.wa.gov.au/landgate/bushfireprone/,.

Department of Planning (DoP) 2016, *Visual guide for bushfire risk assessment in Western Australia*, Department of Planning, Perth.

Standards Australia (SA) 2018, Australian Standard *AS 3959–2018 Construction of Buildings in Bushfire-prone Areas*, Standards Australia, Sydney.

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2017, *Guidelines for Planning in Bushfire Prone Areas*, Version 1.3 August 2017, Western Australian Planning Commission, Perth.

Document Distribution

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Rev 0					

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APPENDIX 3
TRANSPORT IMPACT ASSESSMENT

Proposed Structure Plan Amendment

Lot 9500, Torrenova Way, Sinagra

TRANSPORT IMPACT ASSESSMENT

FINAL REPORT – V2

Prepared for: Jardim Property.

Prepared by: Move Consultants

Move consultants
Moving People Moving Commerce
P.O. BOX 525
APPLECROSS WA
AUSTRALIA 6953
P: +61 434 189 788
Abn 14 102 899 517
e-mail: heidi.herget@moveconsultants.com.au
www.moveconsultants.com.au

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DOCUMENT ISSUE AUTHORISATION

Issue	Rev	Date	Description	Checked	Approved
1	0	13/09/19	FINAL	JL	HH
2	1	16/09/19	REV	JL	HH

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1. SUMMARY

This Transport Impact Assessment has been prepared to support an amendment to the *East Wanneroo Cell No. 2 – Adopted Structure Plan No. 4* for the lands located at Lot 9500, Torrenova Way, Sinagra in the city of Wanneroo.

This assessment has been prepared by Move Consultants to support the amendment to the Local Structure Plan and outlines the likely impacts associated with the proposed Structure Plan on the boundary movement network – namely network traffic flows, safe and efficient access to and from the lands, pedestrian and cycling facilities and public transport.

The proposed land uses within the subject lands comprise 70 single family residential dwellings laid out in a permeable local road network to be served by local access points to Torrenova Way along the northern boundary of the lands and via the future boundary road network to the south and east of the lands namely through an extension of Spiccia Way to the east and via future connections through Lots 60 and 80, Vincent Road.

Two intersections with the south side of Torrenova Way are proposed including the southern connection to the existing Torrenova Way/Capri Leone Way and the Torrenova Way/Messina Drive intersection. The external access points will provide direct access to the established road network to the north and east of the lands. The internal road network has been designed in an efficient permeable layout so as to allow for effective and safe ingress from and egress to the local road network for maximal efficient distribution of locally-generated traffic.

The proposed amendment to the LSP is attached in Appendix A.

The internal road network is to consist of a series of an efficient orthogonally arranged internal access road providing direct access to all of the proposed residential dwellings. This proposed internal road network has been designed in a permeable grid fashion to allow for maximal efficient distribution of site-generated traffic.

This assessment has been prepared in a format suitable for submission to the City of Wanneroo as well as the Department of Transport, Main Roads Western Australia, the Public Transport Authority and the Western Australian Planning Commission. This assessment has been prepared in accordance with the WAPC Guidelines for *Transport Assessment – Volume 2: Structure Plans* and the City of Wanneroo's *District Planning Scheme No. 2* and other relevant district planning policies (*East Wanneroo Cell 2 – Approved Structure Plan No. 4).*

Trip generation rates were applied using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, *10th Edition* The category chosen for the assessment was *Single Family Dwelling (Category 210)* for the proposed land uses within the structure plan area. Based upon the proposed land uses, it has therefore been estimated that the subject lands would generate in the order of 670 vpd on a typical weekday, with approximately 53 vph (9 inbound and 44 outbound) and 71 vph (45 inbound and 26 outbound) vehicle trips during both the a.m. and p.m. weekday peak hours, respectively.

The results of the assessment indicate that the additional site-generated traffic associated with the subject lands can be accommodated within the practical road capacities of the public road network with a limited impact to the boundary road network with the majority of traffic destined to and originating from Pinjar Road and Wanneroo Road. The traffic generated by the subject lands was not significant enough to warrant additional detailed intersection analysis, as noted in Table 6.1 of the Austroads *Guide to Traffic Management: Part 3 – Traffic Studies and Analysis* with no safety or operational issues expected.

As a result, the subject lands-generated traffic associated with the proposal can be accommodated by the existing and future planned boundary road network with no major road improvements required. While it is recognised that internal private local road traffic volumes along the internal road network are relatively low, in order to minimise conflict and maximise safety within the proposed development, Local Area Traffic Management measures may be implemented. Details relating to line marking, intersection control and local area traffic management measures will be addressed during the detailed development stages of the project.

Details associated with the design of any required intersection treatments and modifications to the primary road network will be identified and concept designs will be prepared during the detailed subdivision stages of the development, in consultation with the City of Wanneroo. All intersections internal to the subject lands will be basic priority-controlled T-intersections due to the relatively low traffic volumes.

The proposed public road network within the subject site area will typically consist of a minimum 6m seal which will accommodate both passenger vehicles and Council rubbish collection vehicles. Due to low anticipated volumes and direct frontage for the majority of the proposed dwellings, it is proposed that all of the internal local roads be classified as *Access Road C*, as per Liveable Neighbourhoods Guidelines, with a minimum road reservation of 14 to 15m. Footpaths will be implemented on at least one side of the road and will connect to the future local road network to the east and north. No dedicated internal cycling facilities will be required and the established public transport services in the area will be sufficient to cater to the demands associated with the proposal.

Footpaths will be implemented on at least one side of all local roads internal to the subdivision and will connect to existing established infrastructure within the Sinagra Urban cell. No internal dedicated cycling facilities will be required.

The proposed future urban development within the structure plan area is not likely to generate any traffic noise or vibration issues.

In conclusion, it should be noted that based both on a review of the modelled total traffic assessment and observed traffic operations of the boundary road system, the anticipated site-generated traffic associated with the proposed structure plan can be accommodated within the future practical capacities and functional road classifications of the boundary road network and that the design of the internal road network is safe, efficient and effective. A review of the overall movement network proposal indicated that no specific safety or operational issues have been identified which would impact the risk profile.

2. INTRODUCTION AND BACKGROUND

2.1. OBJECTIVE

Move Consultants has been commissioned to prepare a Transport Impact Assessment for the proposed lifting of urban deferment and Structure Plan Amendment associated with Lot 9500, Torrenova Way, Sinagra in the City of Wanneroo located within the south-eastern quadrant of Wanneroo Road and Pinjar Road. Existing residential development abuts the subject lands to the north, south and west with existing market gardens in place due east of the lands.

2.2. TRANSPORT STATEMENT OBJECTIVE

This Transport Assessment outlines the expected impacts to the movement network within and external to the proposed structure plan on road network flows, safe and efficient access to and from the subject lands, pedestrian and cycling facilities and local amenity and safety. As part of the assessment, Move Consultants has considered the likely vehicular traffic demands associated with future urban development within the LSP area as well as potential impacts to the rest of the existing and planned movement network.

The assessment considers aspects associated with:

- Traffic generation and impacts to the existing and future base traffic volumes;
- Integration with the surrounding land uses;
- Use of public and other transport modes such as walking, cycling and public transport; and
- Safety and access issues.

2.3. SITE LOCATION

Figure 1 shows the metropolitan context of the site and Figure 2 shows the local context of the site.

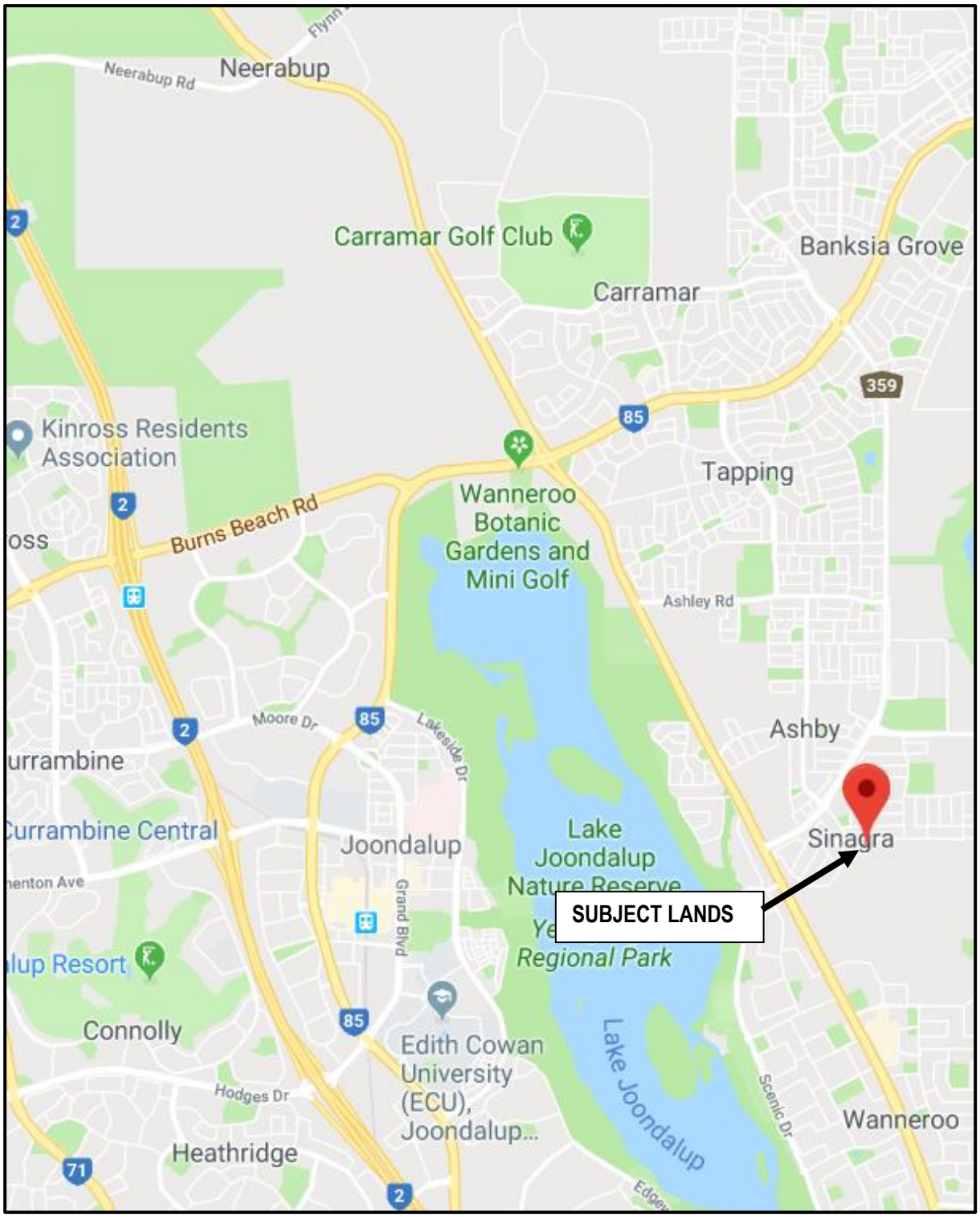


Figure 1: Metropolitan Context

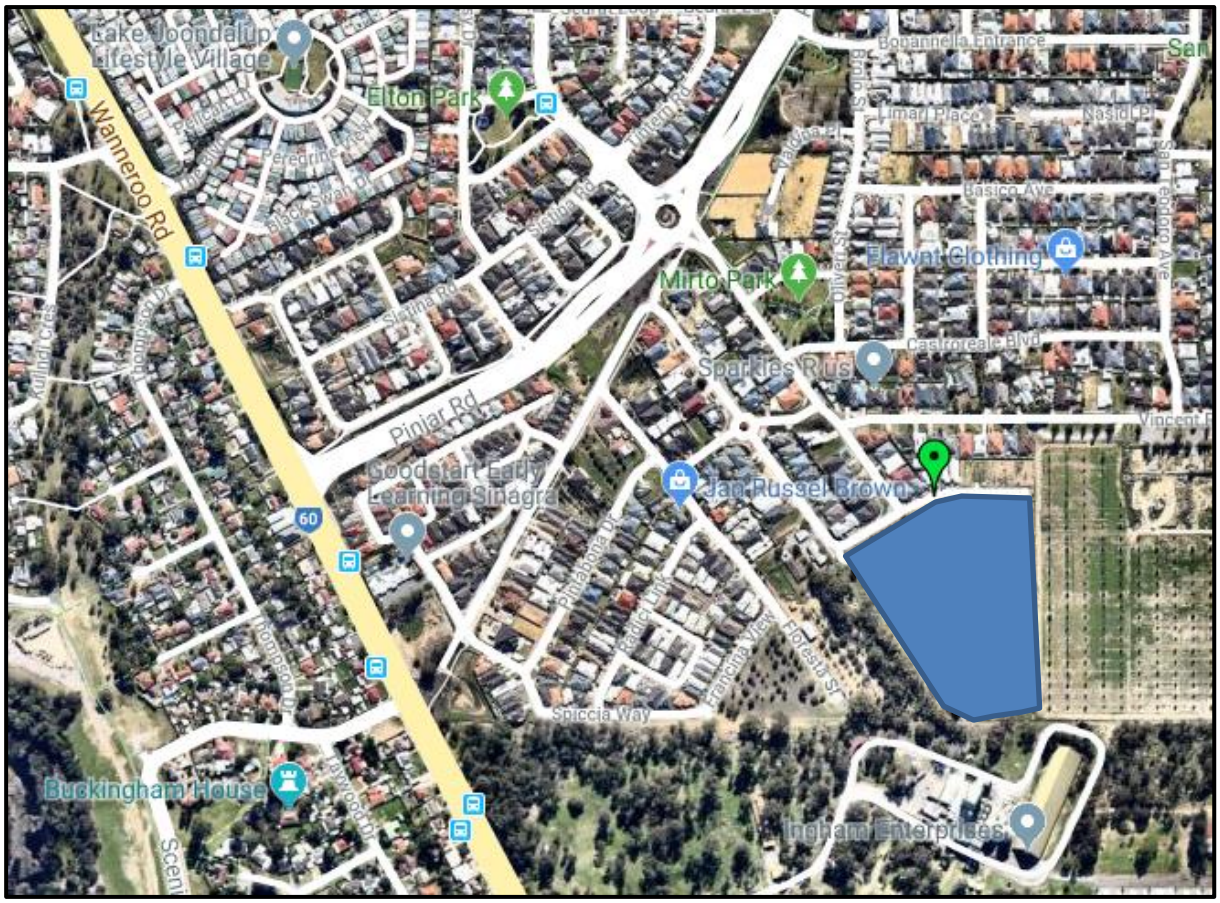


Figure 2: Metropolitan Context

2.4. SURROUNDING MAJOR ATTRACTORS AND GENERATORS

The Wanneroo City Centre precinct is located approximately 800m due south of the subject land with the Joondalup City Centre located approximately 3.5km due west of the lands. Wanneroo Road is located close to the western boundary of the lands and provides direct access to Burns Beach Road in the north and Ocean Reef Road to the south to access the Mitchell Freeway. Pinjar Road is located to the north of the site.

3. EXISTING TRANSPORT NETWORK

The subject lands are located on the south side of Torrenova Way, east of Wanneroo Road and south of Pinjar Road in the City of Wanneroo. The subject lands are located approximately 800m north of the Wanneroo City Centre and within the south-eastern quadrant of the Wanneroo Road/Pinjar Road intersection.

3.1. ROAD NETWORK

Wanneroo Road Highway has been classified as a Primary Distributor road, under the Main Roads Western Australia Functional Road Hierarchy, and has been defined *as "…[providing] for major regional and inter-regional traffic movement and carry large volumes of generally fast-moving traffic with some roads [designated] as strategic freight routes, with all designated as National or State roads and managed by Main Roads Western Australia."* It has been constructed as a dual divided carriageway to the west of the lands a 4 to 5m fixed central median. Wanneroo Road operates under a posted speed limit of 60kph in the vicinity of the site and is owned, operated and maintained by Main Roads WA. The most recent available traffic volumes for Wanneroo Road in the vicinity of the site are in the order of 26,000 vpd north of Pinjar Road (MRWA, 2014/15) and 30,200 vpd south of Pinjar Road (MRWA, 2018/19). The practical road capacity of the road is in the order of 35,000 vpd.

Pinjar Road has been classified as a District Distributor A road to the north of lands under the Main Roads Western Australia Functional Road Hierarchy and has been defined as roads which *"… carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These roads are likely to be truck routes and provide only limited access to adjoining property and are managed by Local Government."* .It has been constructed as a dual divided carriageway to the west of the lands with a raised fixed central median. Pinjar Road operates under a posted speed limit of 60kph in the vicinity of the site and is owned, operated and maintained by the City of Wanneroo. The most recent available traffic volumes for Pinjar Road in the vicinity of the site are in the order of 13,200 vpd east of Wanneroo Road (MRWA, 2018/19). Pinjar Road is also designated as an *Other Regional Road* or *Blue Road* in the *Metropolitan Region Scheme.* The practical road capacity is in the order of 20,000 to 25,000 vpd.

Messina Drive and Carosa Road to the north of the site and Vincent Road to the east of the site have been classified as Local Distributor roads under the Main Roads Western Australia Functional Road Hierarchy and are roads which have been defined as those which *"…carry traffic within a cell and link District Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks and are managed by Local Government."* These roads have been constructed to a single wide undivided carriageway standard with a posted speed limit of 50kph and are owned, operated and maintained by the City of Wanneroo with the roads carrying in the order of 1,000 to 2,000 vpd. The practical capacity of these roads is in the order of 5,000 to 7,000 vpd.

Capri Leone Way, Falcone Crescent and Torrenova Way have been classified as Access Roads under the Main Roads Functional Road Hierarchy which are designed as roads which *"…provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly and are managed by Local Government."* These roads have been constructed to a single wide undivided carriageway standard with a posted speed limit of 50kph and are owned, operated and maintained by the City of Wanneroo. Capri Leone Drive and Falcone Crescent carries in the order of 1,200 vpd and Torrenova Way currently carries in the order of less than 250 vpd. The practical road capacities of these roads are in the order of 3,000 vpd.

The intersection of Wanneroo Road/Pinjar Road is a signalised intersection with dedicated left- and right-turning pockets in place on the Pinjar Road approach; left-turning pocket on the Wanneroo Road southbound approach; and right-turning pocket on the Wanneroo Road northbound approach. The intersection of Pinjar Road/Messina Drive/Carosa Road has been constructed as a roundabout intersection with dual circulating lanes on the Pinjar Road approaches and single circulating lanes on the Messina Drive and Carosa Road approaches. The intersection of Capri Leone Way/Falcone Crescent has been constructed as a single circulating roundabout.

Figure 3 shows the local road network abutting the subject site in the context of the Main Roads Western Australia Functional Road Hierarchy.

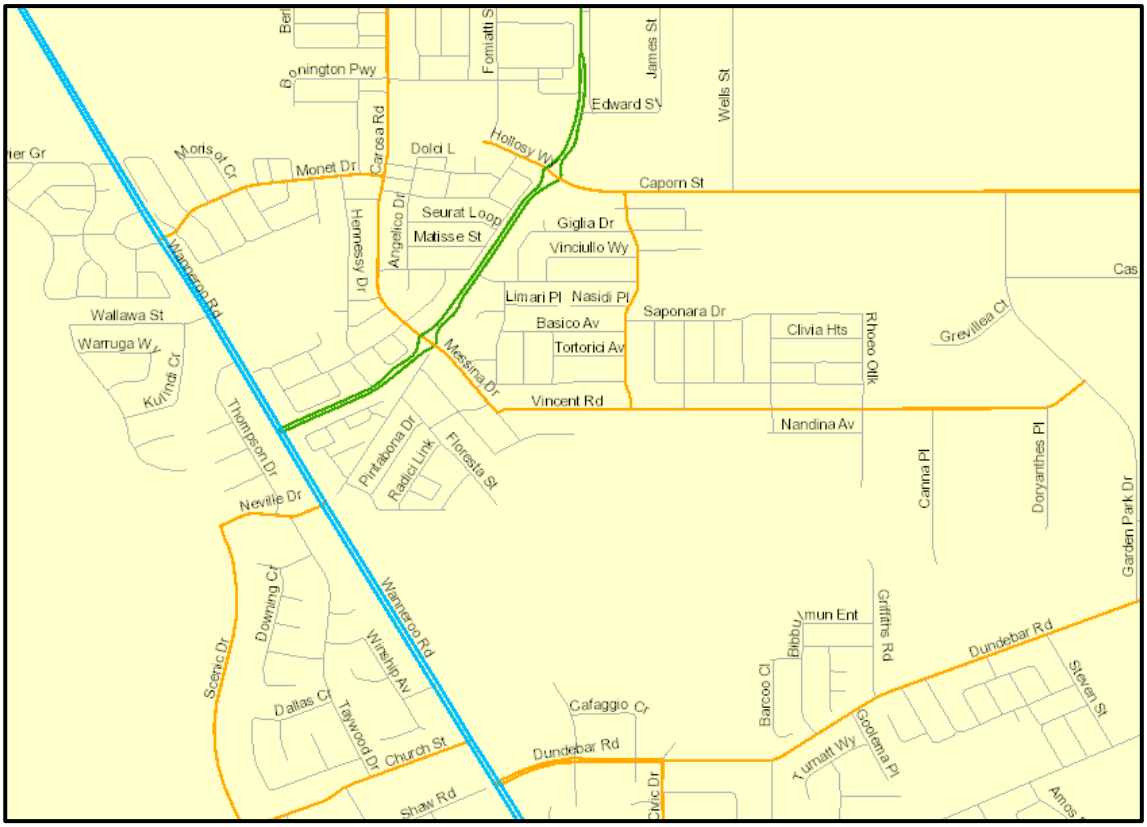


Figure 3: Metropolitan Functional Road Hierarchy

3.2. EXISTING PUBLIC TRANSPORT NETWORK

Local line haul bus services serve the area in close walking distance to the subject lands on Carosa Road to the north of Pinjar Road (Route 467 – Whitfords Station- Joondalup Station via Pearsall, Hocking and Ashby) and on Wanneroo Road (Route 468Whitfords Station-Joondalup Station via Wanneroo Road) to the south-west of the site. These bus services directly connect to the Northern Suburbs Railway lines at both Whitfords and Joondalup Railway Stations. Line haul bus services operate frequencies of 10 to 15-minute services during peak periods and 30-minute services during off-peak periods. Figure 4 shows the existing public transport services in the area.

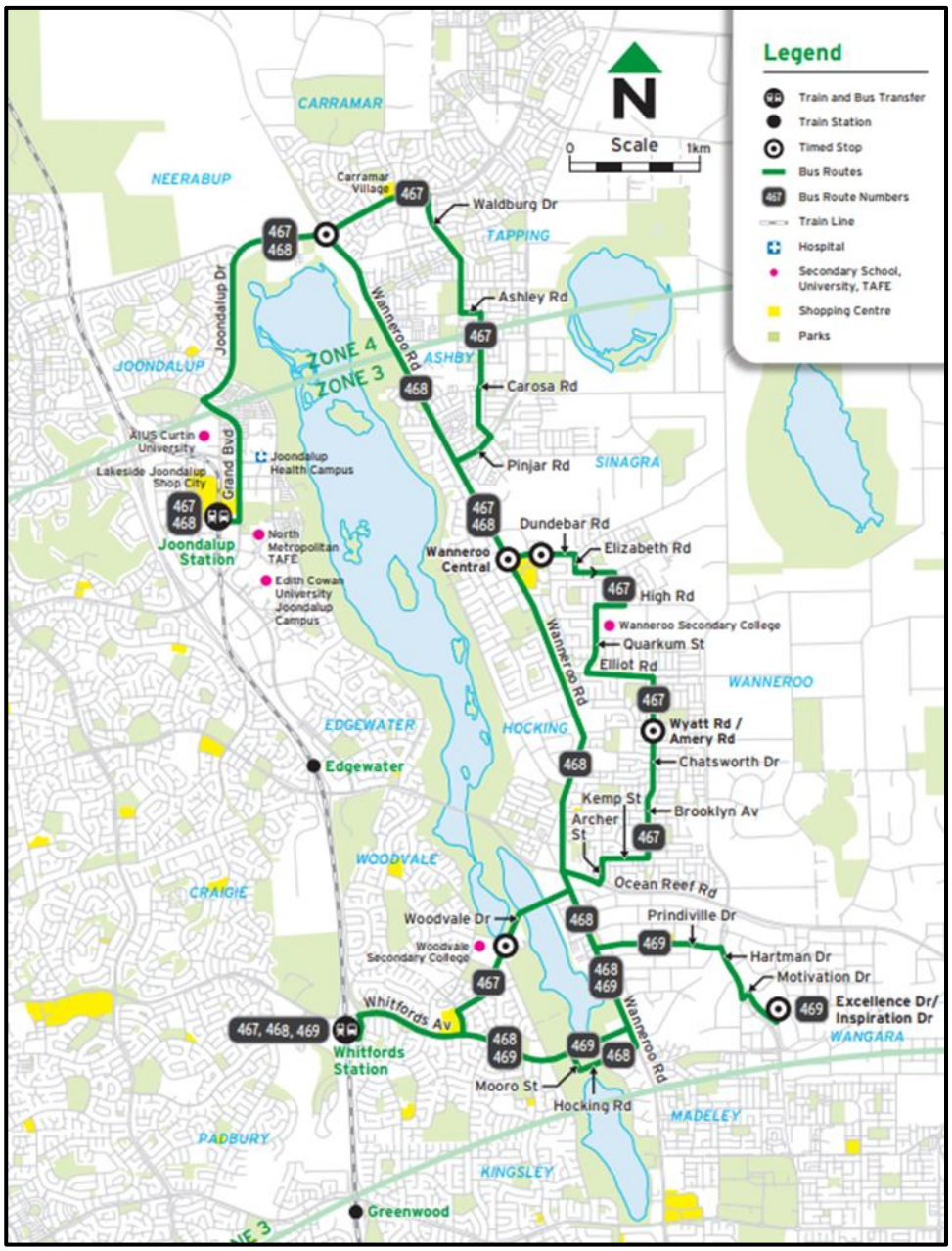


Figure 4: Public Transport Services

3.3. EXISTING PEDESTRIAN AND CYCLING NETWORK

There are shared paths in place on the east side of Capri Leone Way and north side of Vincent Road to the immediate north and north-west of the site as well on the east side of Wanneroo Road to the west of the site. A Bicycle Boulevard or Safe Active Street is in place on Santa Rosalita Vista and dedicated on-road cycle lanes on both sides of Pinjar Road.

Footpaths are in place on the north side of Torrenova Way.

Figure 5 illustrates the pedestrian and cycling infrastructure in the area.

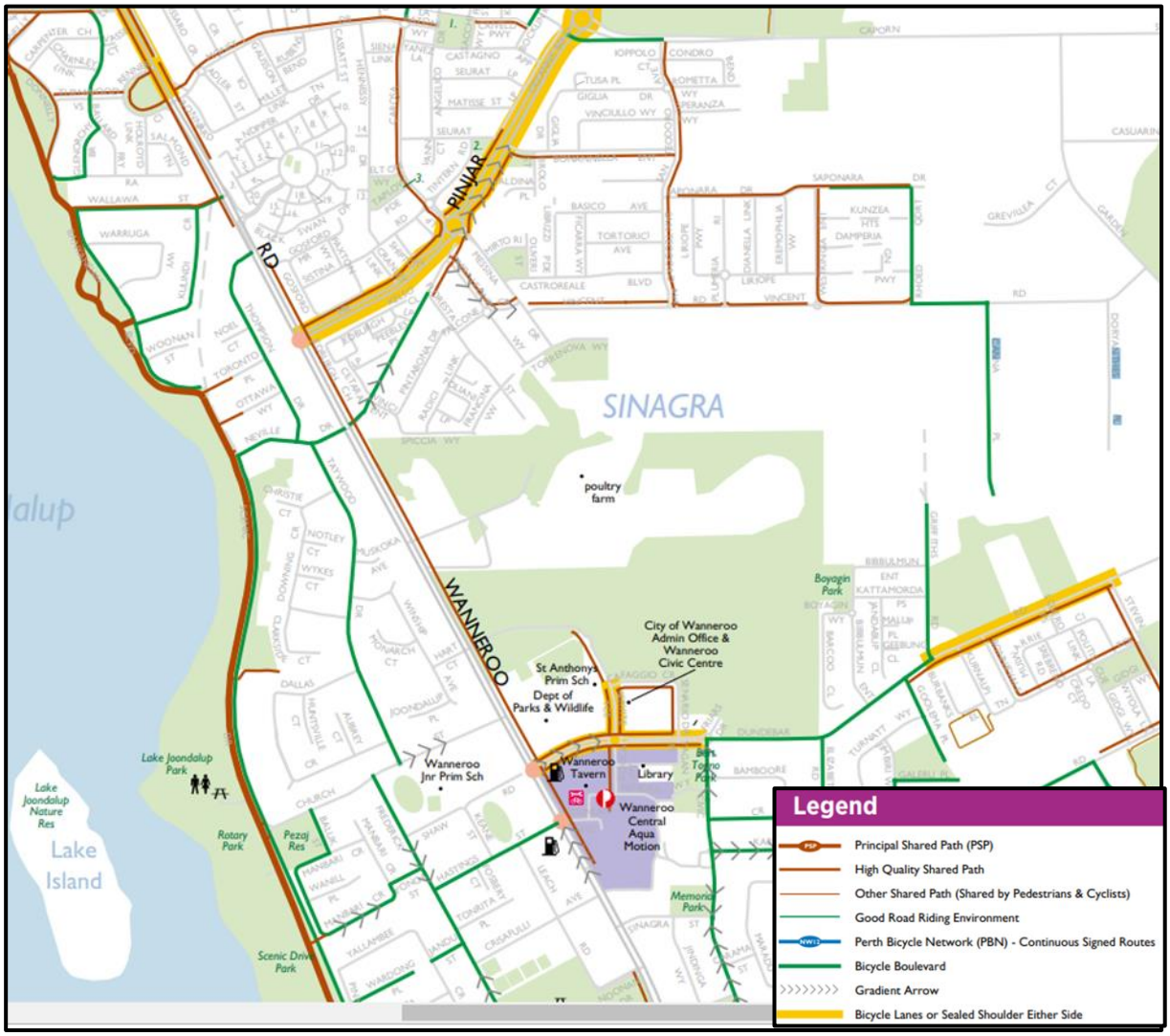


Figure 5: Pedestrian and Cycling Network

4. AMENDED STRUCTURE PLAN PROPOSAL

The proposed land uses within the subject lands comprise 70 single family residential dwellings laid out in a permeable local road network to be served by local access points to Torrenova Way along the northern boundary of the lands and via the future boundary road network to the south and east of the lands namely through an extension of Spiccia Way to the east via future east-west connections through Lots 60 and 80, Vincent Road as well as extensions of Capri Leone Way and Messina Drive south into the subject lands.

The proposed local structure plan is attached in Appendix A.

No direct access is proposed via Vincent Road.

The internal road network is to consist of a series of an efficient orthogonally arranged internal access road providing direct access to all of the proposed residential dwellings. This proposed internal road network has been designed in a permeable grid fashion to allow for maximal efficient distribution of site-generated traffic.

This assessment has been prepared in a format suitable for submission to the City of Wanneroo as well as the Department of Transport, Main Roads Western Australia, the Public Transport Authority and the Western Australian Planning Commission. This assessment has been prepared in accordance with the WAPC *Guidelines for Transport Assessment – Volume 2: Structure Plans* and the City of *Wanneroo's District Planning Scheme No. 2* and other relevant district planning policies.

5. CHANGES TO EXTERNAL TRANSPORT NETWORKS

No changes to the boundary road network are proposed except for localised truncations at future road connections.

6. TRANSPORT ANALYSIS

In order to assess the potential traffic impacts associated with the proposed uses detailed on the site plan on the boundary road network, a traffic generation and distribution exercise was undertaken. The aim of this exercise was to establish the anticipated traffic volumes which would be generated from the proposed development of the site in order to quantify the effect that the additional traffic has on the boundary road network, specifically on the operations of the nearby intersections.

6.1. ASSESSMENT PERIOD

The time periods chosen for assessment have been based upon full development of the lands under a 2031 traffic demand scenario.

6.2. TRIP GENERATION

Trip generation rates were applied using the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition*. The category chosen for the assessment was *Single Family Dwelling (Category 210)* for the proposed land uses within the structure plan area.

Based upon the proposed land uses, it has therefore been estimated that the subject lands would generate in the order of 670 vpd on a typical weekday, with approximately 53 vph (9 inbound and 44 outbound) and 71 vph (45 inbound and 26 outbound) vehicle trips during both the a.m. and p.m. weekday peak hours, respectively.

6.3. TRIP DISTRIBUTION AND ASSIGNMENT

Based on the layout and connectivity of the surrounding road network, the spatial distribution of abutting land uses, existing travel patterns on the boundary road network and future road infrastructure upgrades, the following assumptions have been made for the distribution of the site-generated traffic:

- 40% of the trips to and from the north via the extension of Capri Leone Way;
- 60% of trips to and from the north via the extension of Messina Drive;
- 70% of trips to and from the west, north and south via Wanneroo Road/Pinjar Road;
- 25% to and from the east via Pinjar Road; and
- 5% of trips to and from the east via Vincent Road.

The following results illustrate the total anticipated daily traffic volumes on the boundary road network after the proposed development of the subject lands. The additional site-generated traffic associated with the subject lands can be accommodated within the practical road capacities of the public road network with a limited impact to the existing local road network within the broader Sinagra Cell with the majority of traffic destined to and originating from Pinjar Road and Wanneroo Road. Figure 6 shows the assigned volumes to the internal road network with an allowance for indicative background traffic.

Capri Leone Way:

- Daily: +268 vehicle trips
- A.M. Peak Hour: +21 vehicle trips
- P.M. Peak Hour: +28 vehicle trips

Messina Drive:

- Daily: +402 vehicle trips
- A.M. Peak Hour: +32 vehicle trips
- P.M. Peak Hour: +43 vehicle trips

Pinjar Road (West):

- Daily: +469 vehicle trips
- A.M. Peak Hour: +37 vehicle trips
- P.M. Peak Hour: +50 vehicle trips

Pinjar Road (East):

- Daily: +168 vehicle trips
- A.M. Peak Hour: +13 vehicle trips
- P.M. Peak Hour: +18 vehicle trips

Wanneroo Road:

- Daily: +469 vehicle trips
- A.M. Peak Hour: +37 vehicle trips
- P.M. Peak Hour: +50 vehicle trips

Vincent Road (East):

- Daily: +34 vehicle trips
- A.M. Peak Hour: +3 vehicle trips
- P.M. Peak Hour: +4 vehicle trips

Torrenova Way:

- Daily: +670 vehicle trips
- A.M. Peak Hour: +53 vehicle trips
- P.M. Peak Hour: +71 vehicle trips

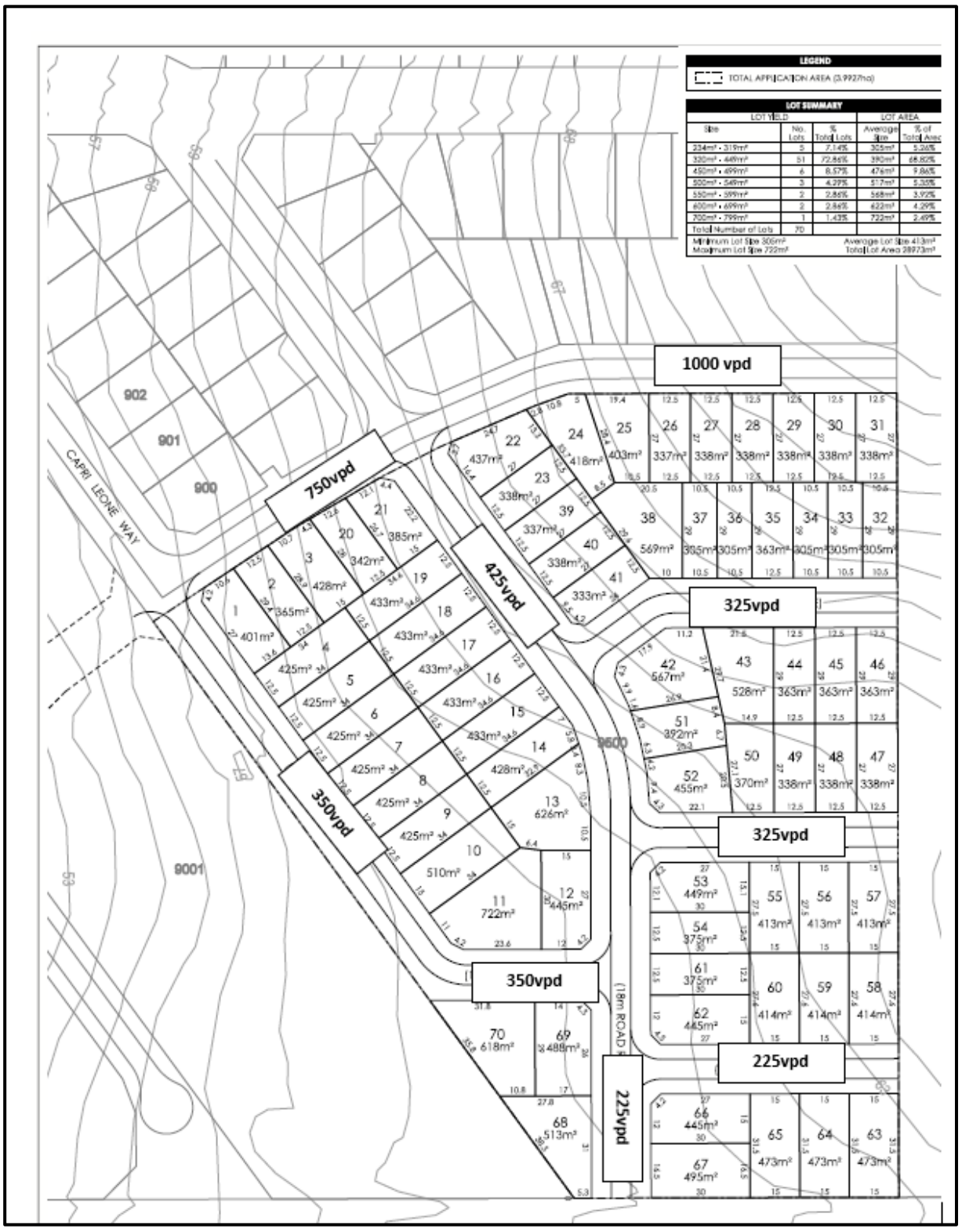


Figure 6: Structure Plan Daily Traffic Volumes

Based upon a review of the anticipated site-generated distribution, the subject lands-generated traffic associated with the proposal can be accommodated by the existing and future planned boundary road network with no major road improvements required with each of the internal roads assigned an *Access Road* classification with a maximum practical capacity of 3,000 vpd. Any changes/upgrades to external traffic controls or intersection layouts internal to the Sinagra cell will be address as part of the subdivision approval and detailed design process.

No improvements or upgrades will be required at the higher order intersections or boundary roads such as Wanneroo Road and Pinjar Road will be required to accommodate the proposed LSP.

7. ROADS AND INTERSECTION ROAD NETWORK

7.1. INTERNAL TRANSPORT NETWORKS

All intersections internal to the subject lands will be basic priority-controlled T-intersections due to the relatively low traffic volumes with the two external connections to Torrenova Way along the northern boundary of the site likely to be operated as 4-way intersection with Give Way Control on the north-south approaches to Torrenova Way.

While it is recognised that internal private local road traffic volumes along the internal road network are relatively low, in order to minimise conflict and maximise safety within the proposed development, Local Area Traffic Management measures may be implemented. Details relating to line marking, intersection control and local area traffic management measures will be addressed during the detailed development stages of the project.

7.2 REVIEW OF INTERNAL ROAD RESERVATIONS, SERVICE AND DELIVERY ARRANGEMENTS AND CAR PARKING

The proposed public road network within the subject site area will typically consist of a minimum 6m seal which will accommodate both passenger vehicles and Council rubbish collection vehicles. Due to low anticipated volumes and direct frontage for the majority of the proposed dwellings, it is proposed that all of the internal local roads be classified as *Access Road C*, as per *Liveable Neighbourhoods Guidelines,* with a minimum road reservation of 15 to 15m. Figure 7 illustrates a typical road cross-section within the internal road network.

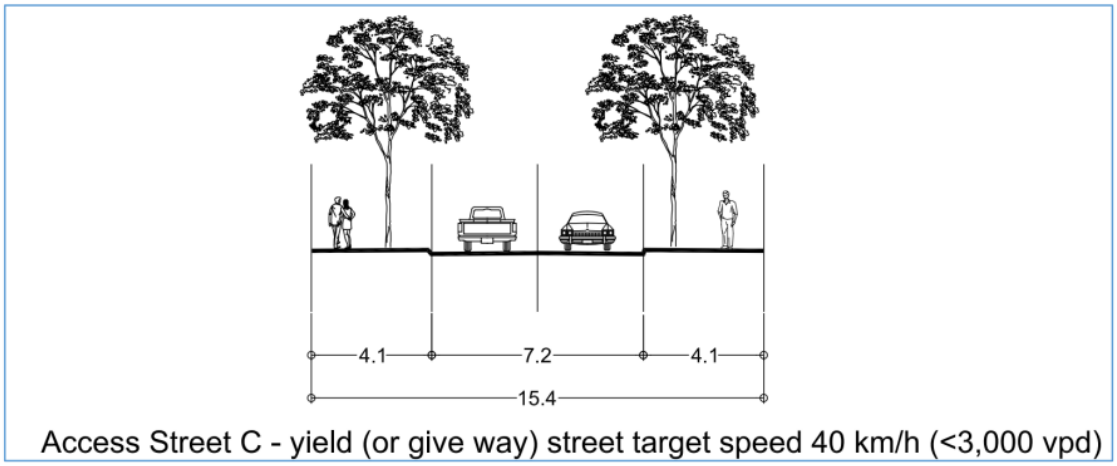


Figure 7: Access Street C (Liveable Neighbourhoods) – Typical Cross-Section

7.3 INTERSECTION ANALYSIS

Internal peak hour volumes within the structure plan area are generally very low and will result in a negligible impact to the external boundary road network. Warrants for additional detailed analysis derived from Austroads *Guide to Traffic Management – Part 3: Traffic Studies and Analysis*, were applied and it was determined that no intersections required detailed analysis. Peak hour traffic volumes have been assumed to be approximately 10% of predicated daily traffic volumes.

7.4. PEDESTRIAN AND CYCLING TREATMENTS

Footpaths will be implemented on at least one side of all local roads within the subdivision and will connect to the established pedestrian and cycling infrastructure. No dedicated internal dedicated cycling facilities will be required.

7.5. PUBLIC TRANSPORT FACILITIES

No additional public transport services will be triggered by development within the amended LSP.

7.6. SAFETY ISSUES

A review of the crash history on the adjacent established road network for the 5-year reporting period 2014-18 indicates a very low rate of crashes on the local road network within the Sinagra Cell to the immediate north, west and east of the lands with no crashes recorded on Torrenova Way either at the intersections with Capri Leone Way or Messina Drive The relatively low volumes of local traffic which will utilise these intersections and local roads during weekday peak periods do not trigger warrants for upgrades. An extremely low incidence of crashes along the mid-block frontage of the local roads indicates that the risk profile will not be impact with the additional traffic generated by the subject lands.

7.7. NOISE AND WASTE MANAGEMENT

The proposed development is not likely to generate any unacceptable traffic noise or vibration.

A brief review of the internal road layout indicates that Council rubbish collection vehicles can enter and exit the development using the proposed permeable local road network. Details relating to the waste management arrangements associated with the development will be addressed directly with Council.

8. CONCLUSIONS

Move Consultants has been commissioned to prepare a Transport Impact Assessment for the proposed lifting of urban deferment and Structure Plan Amendment associated with Lot 9500, Torrenova Way, Sinagra in the City of Wanneroo located within the south-eastern quadrant of Wanneroo Road and Pinjar Road. Existing residential development abuts the subject lands to the north, south and west with existing market gardens in place due east of the lands.

The proposed land uses within the subject lands comprise 70 single family residential dwellings laid out in a permeable local road network to be served by local access points to Torrenova Way along the northern boundary of the lands and via the future boundary road network to the south and east of the lands namely through an extension of Spiccia Way to the east via future east-west connections through Lots 60 and 80, Vincent Road as well as extensions of Capri Leone Way and Messina Drive south into the subject lands. No direct access is proposed via Vincent Road.

The proposed local structure plan is attached in Appendix A.

The internal road network is to consist of a series of an efficient orthogonally arranged internal access road providing direct access to all of the proposed residential dwellings. This proposed internal road network has been designed in a permeable grid fashion to allow for maximal efficient distribution of site-generated traffic.

Based upon the proposed land uses, it has therefore been estimated that the subject lands would generate in the order of 670 vpd on a typical weekday, with approximately 53 vph (9 inbound and 44 outbound) and 71 vph (45 inbound and 26 outbound) vehicle trips during both the a.m. and p.m. weekday peak hours, respectively. The anticipated traffic generated by the lands can be accommodated within the practical capacities of the proposed internal and the established external boundary road network.

A review of the crash history on the adjacent established road network for the 5-year reporting period 2014-18 indicates a very low rate of crashes on the local road network within the Sinagra Cell to the immediate north, west and east of the lands with no crashes recorded on Torrenova Way either at the intersections with Capri Leone Way or Messina Drive The relatively low volumes of local traffic which will utilise these intersections and local roads during weekday peak periods do not trigger warrants for upgrades. An extremely low incidence of crashes along the mid-block frontage of the local roads indicates that the risk profile will not be impact with the additional traffic generated by the subject lands.

While it is recognised that internal private local road traffic volumes along the internal road network are relatively low, in order to minimise conflict and maximise safety within the proposed development, Local Area Traffic Management measures may be implemented. Details relating to line marking, intersection control and local area traffic management measures will be addressed during the detailed development stages of the project.

Details associated with the design of any required intersection treatments and modifications to the primary road network will be identified and concept designs will be prepared during the detailed subdivision stages of the development, in consultation with the City of Wanneroo.

The proposed public road network within the subject site area will typically consist of a minimum 6m seal which will accommodate both passenger vehicles and Council rubbish collection vehicles. Due to low anticipated volumes and direct frontage for the majority of the proposed dwellings, it is proposed that all of the internal local roads be classified as *Access Road C*, as per Liveable Neighbourhoods Guidelines, with a minimum road reservation of 14 to 15m. Footpaths will be implemented on at least one side of the road and will connect to the future local road network to the east and north. No dedicated internal cycling facilities will be required and the established public transport services in the area will be sufficient to cater to the demands associated with the proposal.

In conclusion, it should be noted that based both on a review of the modelled total traffic assessment and observed traffic operations of the boundary road system, the anticipated site-generated traffic associated with the proposed structure plan can be accommodated within the future practical capacities and functional road classifications of the boundary road network and that the design of the internal road network is safe, efficient and effective.

APPENDIX A – PROPOSED AMENDED STRUCTURE PLAN


LEGEND
TOTAL APPLICATION AREA (3.992Ha)
LOT SUMMARY
LOT YIELD
LOT AREA
Site
No. Lots
% Total Lots
Average Size
% of Total Area
Total Number of Lots 70
Minimum Lot Size 305m²
Maximum Lot Size 722m²
Average Lot Size 413m²
Total Lot Area 28973m²
TORRENOVA WAY
CAPRI LEONE WAY
(18m ROAD RESERVE)
(15.4m ROAD RESERVE)
(15m ROAD RESERVE)
902
901
900
9001
9500
Subdivision Concept Plan
LOT 9500 TORRENOVA WAY, SINAGRA
A JARDIM PROPERTY PROJECT
DRAFT
TAYLOR BURRELL BARNETT

APPENDIX 4
ENGINEERING SERVICING REPORT

Cossill & Webley
CONSULTING ENGINEERS

Lot 9500 Torrenova Way Sinagra
Jardim Property Group
Engineering Servicing Report
13th September 2019

Level 2, 431 Roberts Road,
Subiaco WA 6008.
PO Box 680 Subiaco, WA 6904

T (08) 9422 5800
E admin@cosweb.com.au
W cosweb.com.au

1. Executive Summary

General

Cossill & Webley Consulting Engineers (CW) have been engaged by Jardim Property Group to provide an Engineering Servicing Report to demonstrate how the land will be serviced with potable water, sewer, power and telecommunications for residential development.

The Site is located on Torrenova Way in the suburb of Sinagra in City of Wanneroo. The Site is bounded by Benara Nurseries to the east, private landholding to the west and the Ingham Enterprises Poultry Farm to the south. The Site is within the adopted Structure Plan No 4 – East Wanneroo Cell 2.

This report provides the current infrastructure provision and strategies for servicing the Site area as communicated to CW by the relevant regulatory and servicing authorities.

The key observations and findings of this report are as summarised below.

Geotechnical Conditions

Based on the natural topography, there is a significant elevation slope from the north-east (RL71) to the south-west (RL59) that will be earthworked to a form suitable for residential housing with earth retaining structures.

The regional geology of the area as characterized by the Geological Survey of Western Australia indicates the majority of the Site is generally characterised as Sand (S7) pale and olive-yellow, medium to course-grained. This sand profile generally comprises of well graded and free draining sand which is well suited for urbanization.

Road Infrastructure

Vehicular access to the Site is currently available from Torrenova Way and will be further improved via extensions of existing Messina Drive and Capri Leone Way.

All roads and footpaths within the development will need to be constructed in accordance with *Liveable Neighbourhoods* and the City of Wanneroo standards.

Wastewater and Water Reticulation

The Site is generally unconstrained with regards to the management of wastewater. The existing 300mm sewer main in Capri Leone Way will need to be extended south to a future DN225mm sewer consistent with Water Corporation's wastewater planning for the area.

The Site is unconstrained with regards to the provision of reticulated potable water and can be serviced from the existing mains on Torrenova and Capri Leone Way.

Power

Power is currently available to the Site from Western Power's existing network in Torrenova Way. It is anticipated these mains will have sufficient for staged development, with development of the entire site reinforced through future high voltage (HV) transformer and switchgear substations to be constructed from the future development to the south or upgrade of the existing Transformer in Torrenova Way.

Gas Reticulation

Gas reticulation can be supplied to the proposed development through existing high-pressure gas mains on Torrenova Way, Messina Drive and Capri Leone Way.

Telecommunications

The Site sits within NBN's rollout coverage and fronts NBN's existing cable network. NBN pit and pipe infrastructure exists in the northern verge of Torrenova way and can be extended south to service the Site.

2. General

The Site is located approximately 30 km north-west of the Perth CBD within the suburb of Sinagra in the City of Wanneroo, West Australia and is approximately 4.0 hectares. The Site is within the adopted Structure Plan No 4 – East Wanneroo Cell 2. Taylor Burrell Barnett has completed a development concept across the site which reflects a total lot yield of 70 (Ref 19/049/005_SUBC).

The Site is bound by Torrenova Way to the north, Benara Nurseries to the east, Ingham Enterprises Poultry Farm to the south and a private landholding to the west. A drainage sump exists at the north-western corner of the site and is expected to be decommissioned as part of the development.

Figure 1 – Aerial Photography (Nearmap – 13 July 2019)

3. Geology and Landform

The Geological Survey of Western Australia Perth Metropolitan Region Soils Maps (Figure 2) indicates the majority of the Site is generally characterised as Sand (S_7) pale and olive-yellow, medium to course-grained. This soil type is well suited to urbanisation, and is generally very permeable, allowing for the on-site disposal of runoff from newly created roads and lots.

The Site is suitable for residential development and expected to achieve Class A site classification according to AS2870-2011 following the completion of earthworks to the finished levels. Groundwater is not expected to be encountered within 20m+ of the existing surface based on Perth Groundwater Atlas maximum groundwater levels.

Based on these soil conditions it is expected stormwater can be readily managed via infiltration into the natural ground.

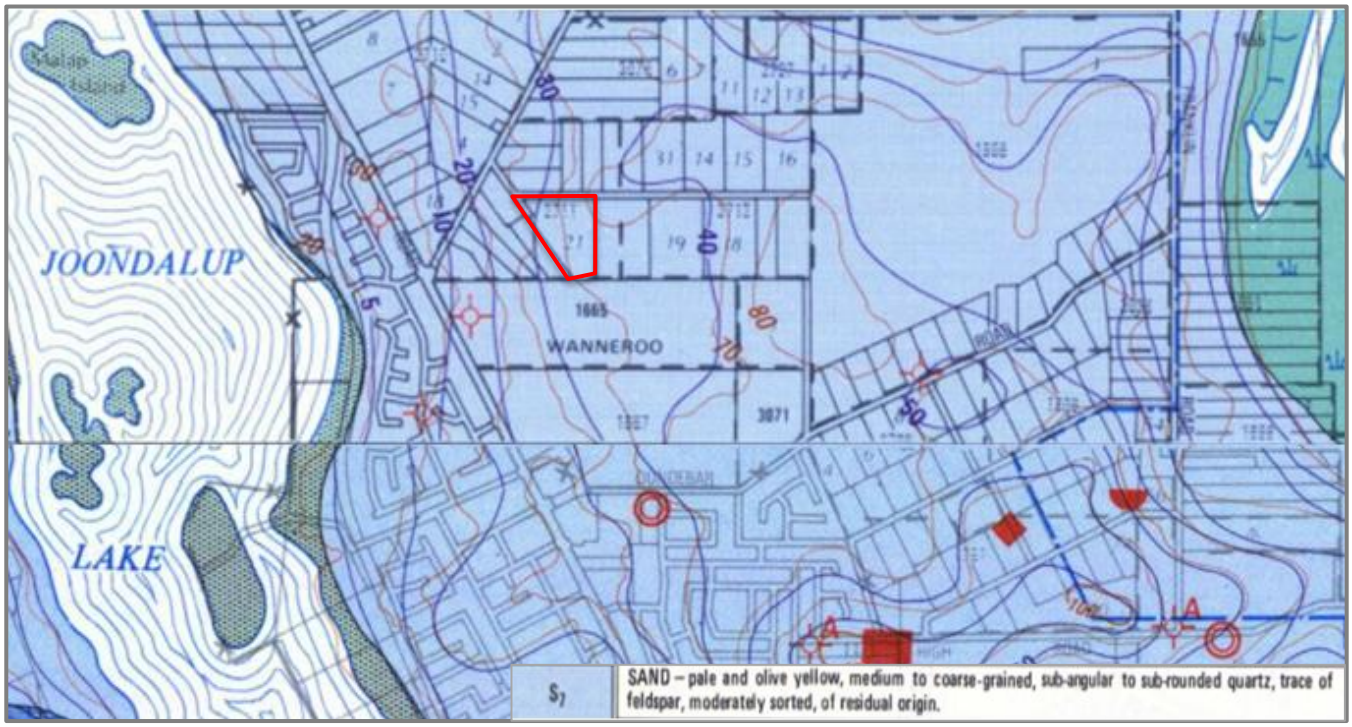


Figure 2 - Geotechnical Information (Geological Survey of WA)

Figure 3- Elevation Contours - 1m Intervals (Department of Water / MNG Access 2019)

4. Topography

The Site ranges in elevation from RL71 m in the north-east to RL59 m at the south-west based on existing surface information from Department of Water topographical contours shown in figure 3.

Earthworks will be carried out to grade roads through the development and create level lots suitable for residential housing. Earth retaining structures such as mass limestone retaining walls are expected to be required to address the elevation difference across the site.

5. Groundwater

A desktop review of the Department of Waters' Perth Groundwater Atlas indicates the Historical Maximum Groundwater Levels vary from RL 36m AHD at the eastern boundary of the site to RL 34m AHD at the western boundary, as presented in below in Figure 4. Given the natural ground levels are substantially higher than this, it is anticipated that groundwater levels will have no impact to development of the Site.

Figure 4 - Ground Water Contours (Department of Water / MNG Access 2019)

6. Contamination and Acid Sulphate Soils

A desktop review of the Department of Environment and Conservation's ASS Risk Map for the South Metropolitan Region for potential for acid sulphates soils (ASS) indicates the Site is classified as having no known risk of ASS potential.

7. Stormwater Collection and Management

The Site comprises of free draining sand with significant cover to groundwater. The stormwater management strategy for the site will therefore revolve around stormwater runoff infiltration into the ground as close to the source as possible and will mainly comprise of stormwater disposal within lots through soakwells.

A pit and pipe network to serviced proposed roads will be designed in compliance with the City of Wanneroo's drainage design standards. As no public open spaces are proposed within the Site, it is anticipated the site pit and pipe collector network will be an extension of the City's existing network and discharge into existing or proposed outlets in accordance with the overarching drainage catchments for the area.

8. Roadworks and Footpaths

The planning layout across the Site incorporates the extension of Capri Leone Way, Messina Drive and key linkages to future surrounding roads. Proposed road cross-sections will be designed to cater for utility services on standard verge alignments, street trees and where appropriate, off-street and on-street cycling lanes in accordance with the overall pedestrian and cycling network.

The engineering design of roads will be carried out to comply with the Liveable Neighbourhoods recommendations for design speeds and sight distances. Roadworks will generally consist of kerbed and asphalted pavements.

Footpaths will be provided in accordance with *Liveable Neighbourhoods* and the City of Wanneroo standards and will consist of one path in every road and dual-use paths in Neighbourhood Connector roads.

9. Wastewater

The Site is located within the Water Corporation's Neerabup sewer district and can be serviced from the existing pipe system. The existing 300mm dia sewer in Capri Leone Way will be extended south-east along with Capri Leone Way, and reduce to a 225mm dia. main consistent with Water Corporation's wastewater planning for this catchment.

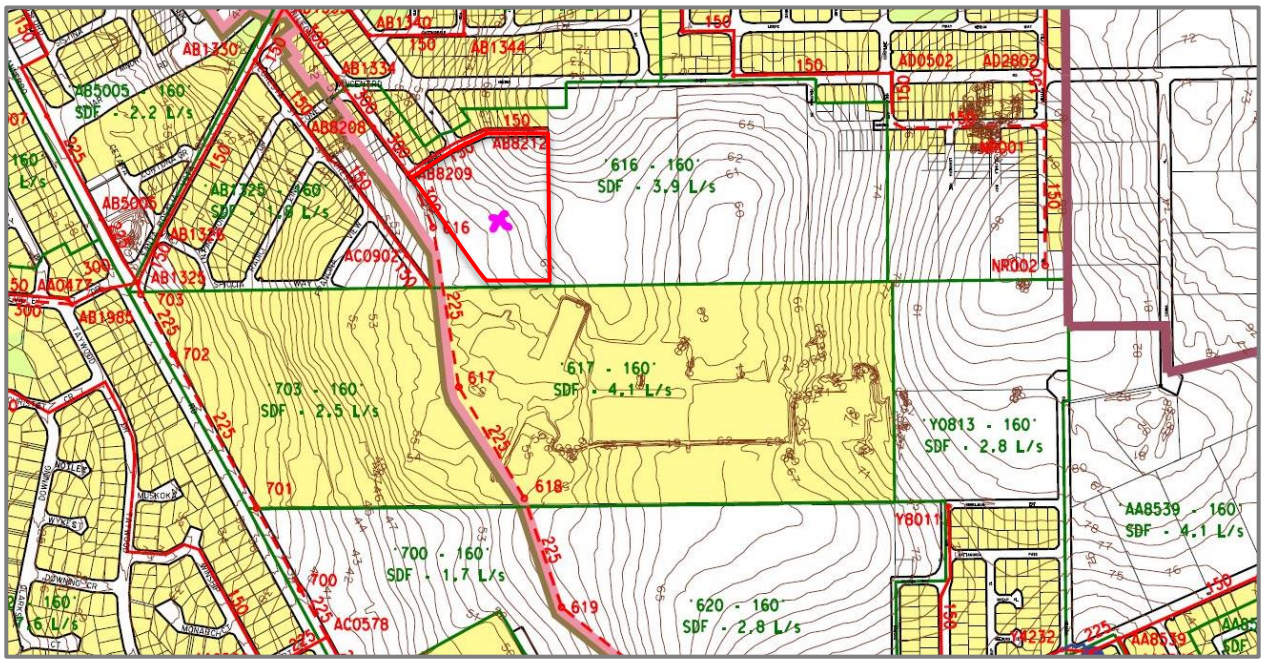


Figure 5 – Conceptual Long Term Wastewater Scheme Planning (Water Corporation, 2019)

10. Water Reticulation

The Site falls within Water Corporation's Wanneroo Reservoir catchment (Figure 6) and can be serviced from the existing 100mm and 200mm dia. mains on Torrenova and Capri Leone Way. Parts of the north-east corner of the site above RL65m AHD are identified to sit within and be serviced through the Wanneroo High-Level scheme consistent with Water Corporation's overall planning for the area.

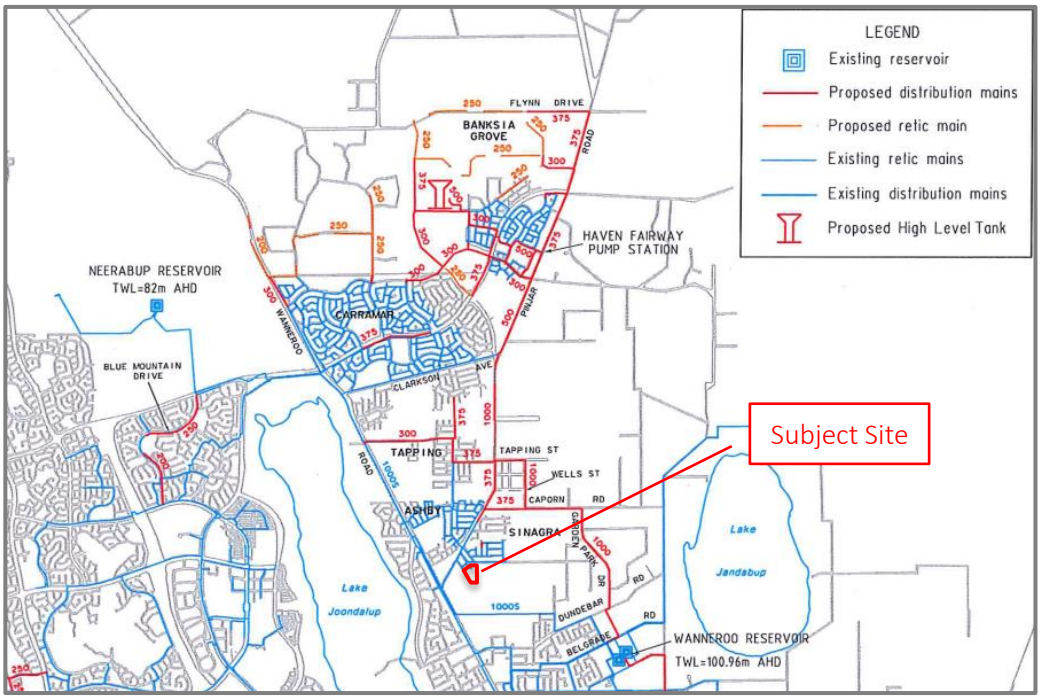


Figure 6 – Conceptual Long Term Water Scheme Planning (Water Corporation, 2016)

Figure 7 - Location of Existing Water Infrastructure (Water Corporation 2019)

11. Underground Power

Western Power's Network Mapping Tool confirms there is 5-10MVa capacity available in the network. Based on a power demand of 4.7kVa per dwelling, the total power requirement for residential development is approximately 0.33MVa, well within the available remaining capacity.

Low voltage cables exist in the northern side of Torrenova Way and connect to existing Switchgear and Transformer substations depicted in Figure 8 below. The existing transformer has sufficient capacity to service approximately 80% of the proposed development. The balance of the project will be serviced through either an upgrade of the existing 500 kVA transformer to 630 kVA or as part of network reinforcement upgrades from future development of the Ingham Enterprises Poultry Farm to the south.

Figure 8 - Existing Power Infrastructure (Wester Power May 2017)

12. Gas Reticulation

High pressure 110 PE and 63PE gas reticulation mains exist in Capri Leone Way, Messina Drive and Torrenova Way which can be extended to supply the proposed development. Gas reticulation will be supplied and funded by ATCO Gas and installed by the Contractor concurrent with other service installation.

13. Communications

The Site is within NBN's coverage map and can be serviced with high speed broadband for greenfield developments. NBN services exist in Torrenova Way and significant backhaul infrastructure upgrades are not expected to be required.

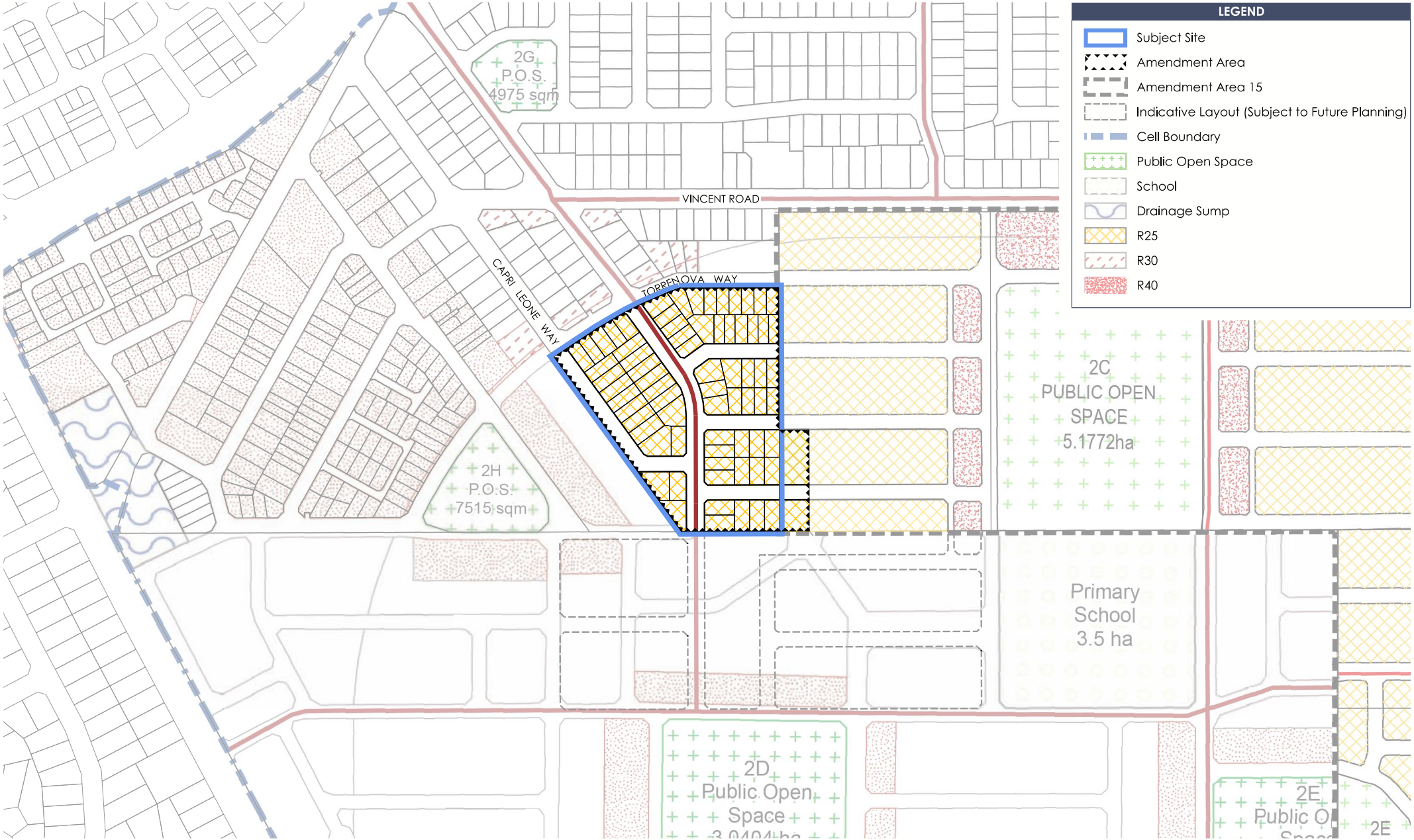
14. Conclusion

Based on Cossill & Webley's assessment of the Site, the Site is readily serviceable as it is frontal to existing development and utilities on Torrenova Way. Existing services can be easily extended to service the proposed urban residential development of the Site.

There are no engineering impediments to the development, although co-ordination and co-operation with the relevant Service Authorities will be required as the development progresses.

Appendix 1 – Subdivision Concept Plan

Taylor Burrell Barnett Concept Plan - Ref 19-049-005_SUBC dated 4.09.19 (70 lots)



CONCEPT PLAN

Lot 9500 Torrenova Way, Sinagra

A Northland Development Pty Ltd Project

DRAFT

0m 5 10 15m

s: 1:6000@A4
d: 04 September 2019
p: 19/049/005

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