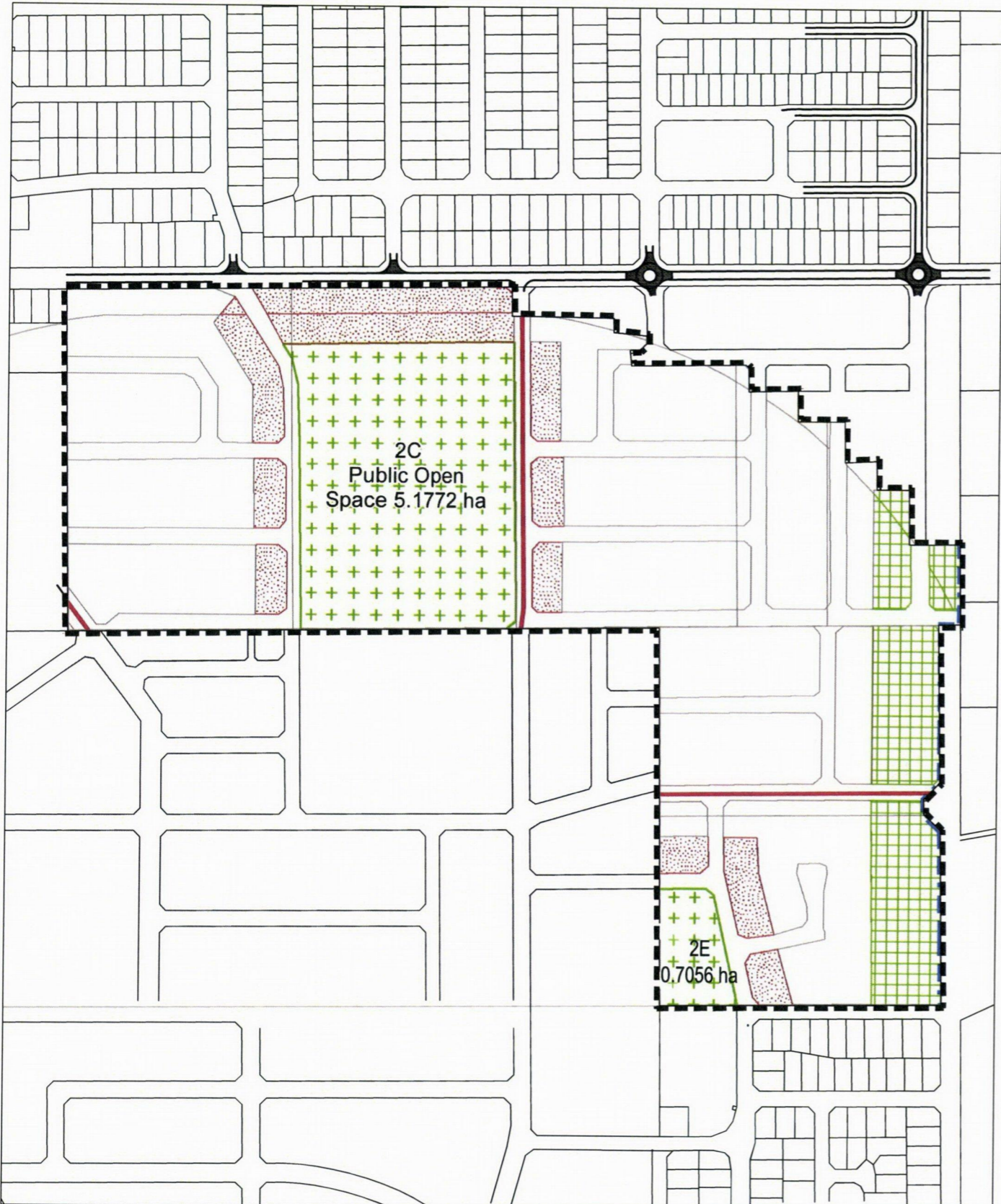
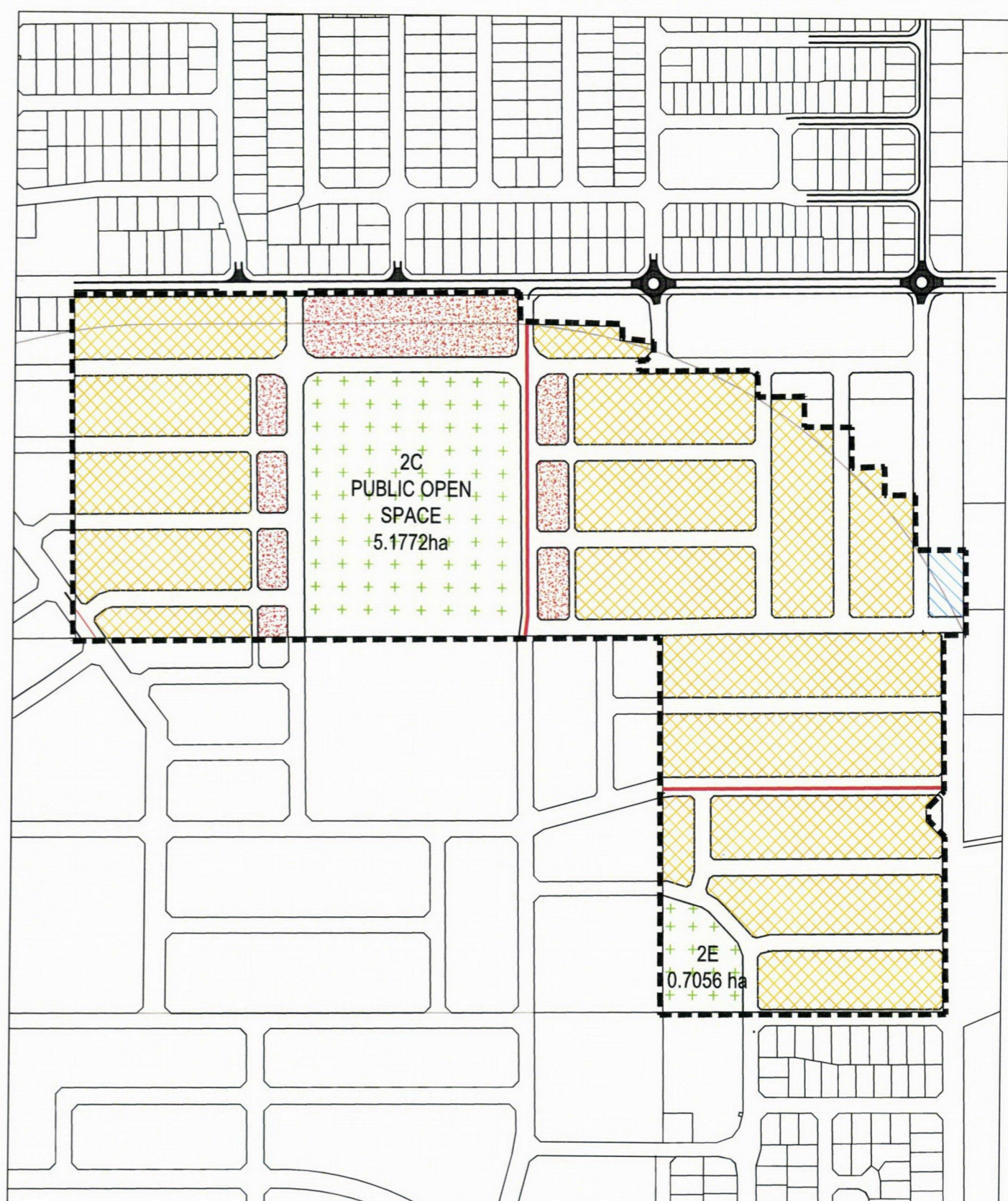


Appendix 1
Proposed Structure Plan Amendment
Plan 1: Zoning Plan



EXISTING



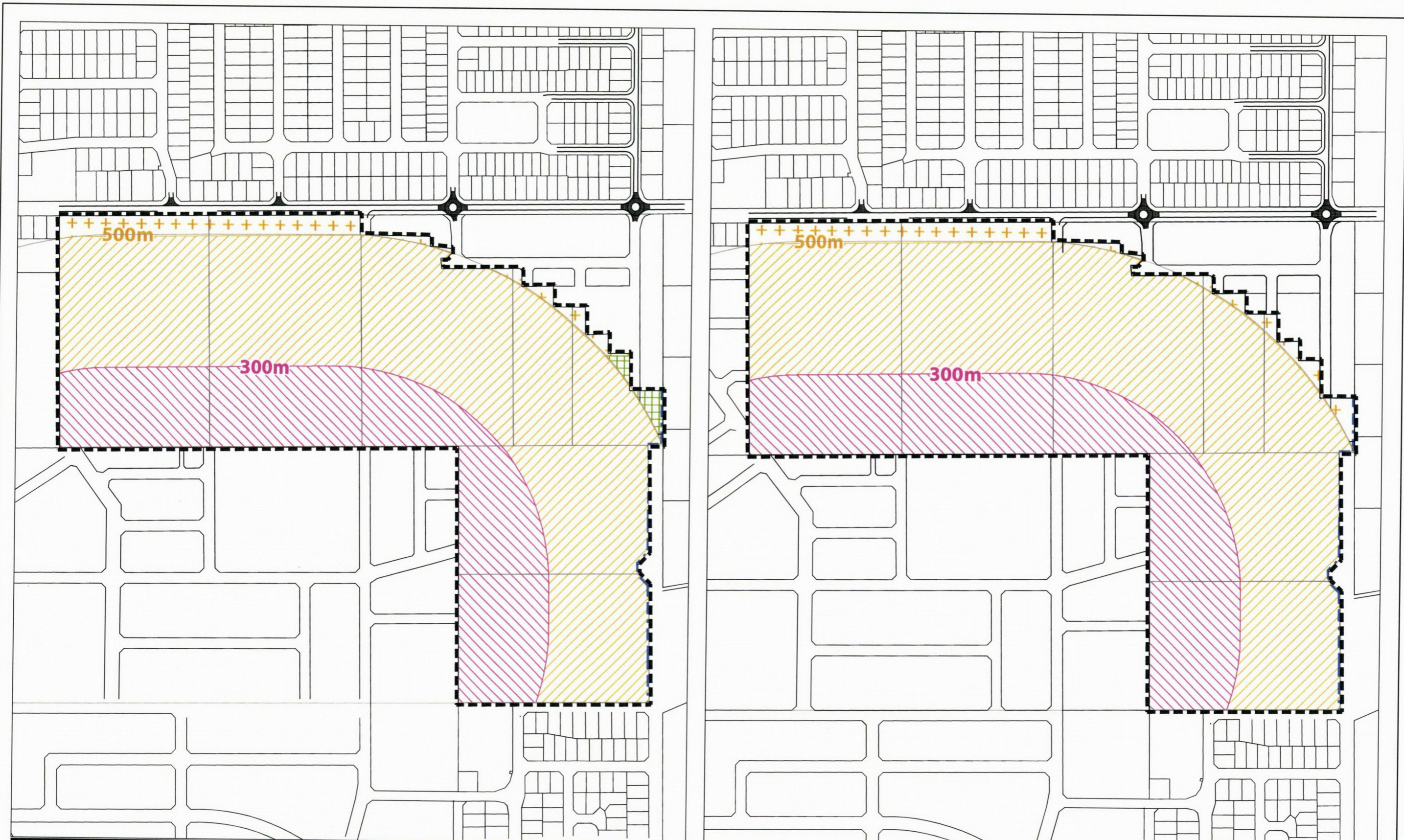
PROPOSED

LEGEND

Amendment Area	R25	Special Residential
Public Open Space	R40	
R10		



Appendix 2
Proposed Structure Plan Amendment
Plan 2: Agreed Structure Plan



LEGEND

Amendment Area	Residential Precinct
300m Buffer Precinct	Special Residential Precinct
500m Buffer Precinct	

EXISTING

PROPOSED

PLANNING SOLUTIONS | **PS**
URBAN & REGIONAL PLANNING

SCALE 1:5,000 @ A3
DATE 30 August 2017
FILE 170830 5038 Proposed Structure Plan Amendment Agreed Struct Plan 2.dwg
REVISION 1/DR/First Draft/08.08.2017



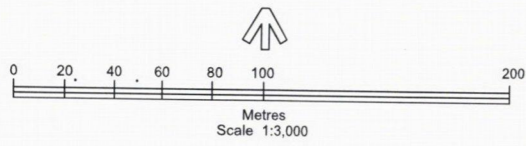
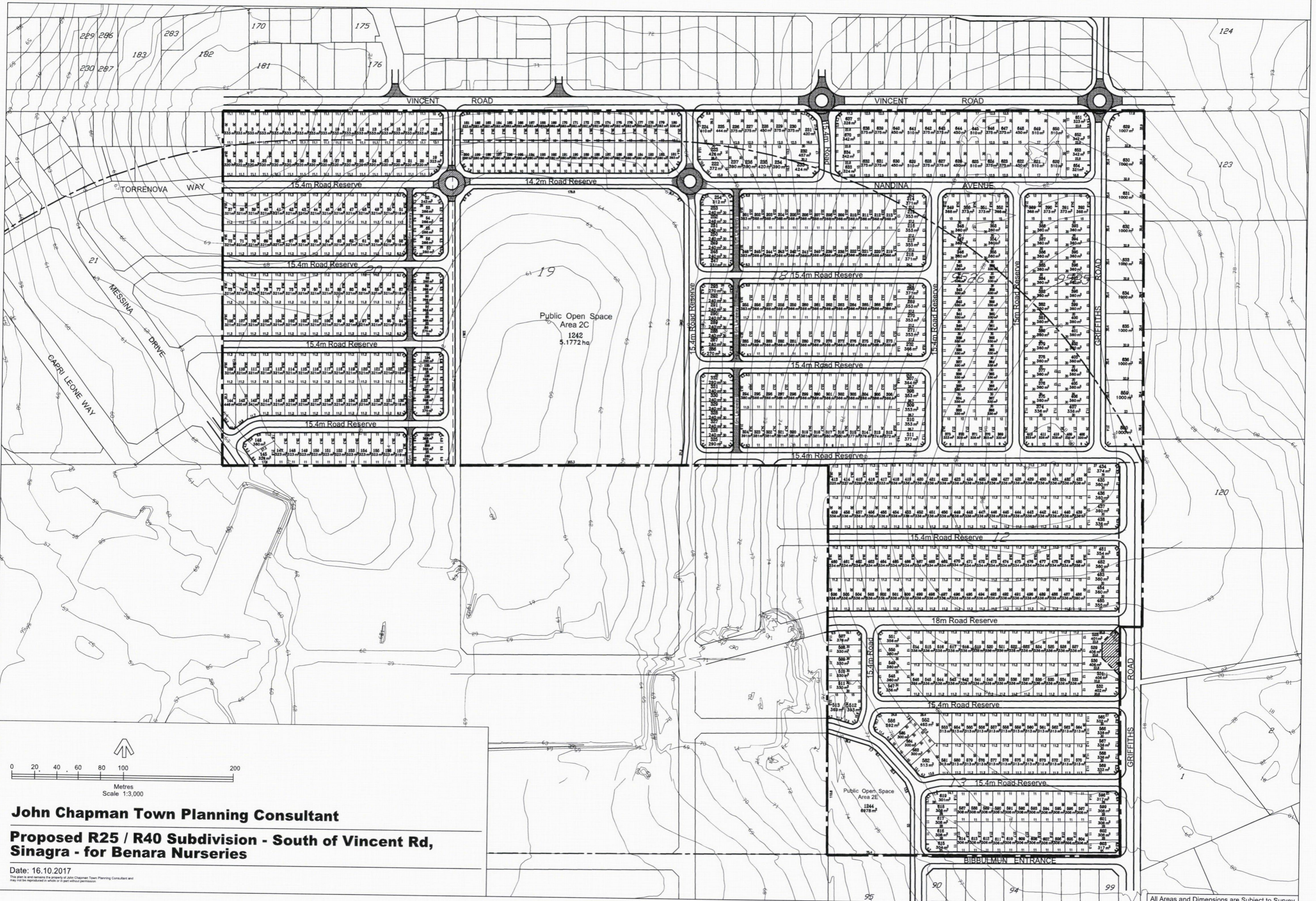
PROPOSED STRUCTURE PLAN AMENDMENT - AGREED STRUCTURE PLAN (PLAN 2)

LOTS 19 AND 20 (80 & 60) VINCENT ROAD, LOT 9529 (2) POLYGALA WAY, LOT 9530 (2) LOMANDRA RISE, LOT 9531 (20) NANDINA AVENUE, LOTS 12 AND 13 (51 & 39) GRIFFITHS ROAD, SINAGRA

DISCLAIMER: THIS DOCUMENT IS AND REMAINS THE PROPERTY OF PLANNING SOLUTIONS AND MAY NOT BE COPIED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF PLANNING SOLUTIONS. ALL AREAS, DISTANCES AND ANGLES ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

BASEPLAN SOURCE: EAST WANNEROO CEL 2 - ADOPTED STRUCTURE PLAN NO 4 (CITY OF WANNEROO)

Appendix 3 Subdivision Concept Plan



John Chapman Town Planning Consultant
Proposed R25 / R40 Subdivision - South of Vincent Rd, Sinagra - for Benara Nurseries

Date: 16.10.2017
 This plan and remains the property of John Chapman Town Planning Consultant and may not be reproduced in whole or in part without permission.

All Areas and Dimensions are Subject to Survey

Appendix 4
Bushfire Management Plan

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Lots 12 and 13 Griffiths Road, Lots 18, 19 and 20 Vincent Road, and Lots 9525, 9526 and 9528 Viola Approach, Sinagra

Suburb: Sinagra

State: WA

P/code: 6065

Local government area: City of Wanneroo

Description of the planning proposal: Residential Subdivision

BMP Plan / Reference Number: BNU17316.01

Version: 0

Date of Issue: 25/08/2017

Client / Business Name: Benara Nurseries

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Strategic planning proposal (including rezoning applications)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Minor development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
High risk land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vulnerable land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Linden Wears	Level 2	BPAD19809	31/08/2017
Company		Contact No.	
Strategen Environmental		9380 3100	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner



Date 25/08/2017



intelligent outcomes | respected experience

Bushfire Management Plan

Structure Plan Amendment: East Wanneroo Cell 4 (Sinagra)

Prepared for
Benara Nurseries Pty Ltd
by Strategen

August 2017



Bushfire Management Plan

Structure Plan Amendment: East Wanneroo Cell 4 (Sinagra)

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 1, 50 Subiaco Square Road Subiaco WA 6008
ACN: 056 190 419

August 2017

Limitations

Scope of services

This report ("the report") has been prepared by Strategen Environmental Consultants Pty Ltd (Strategen) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen has also not attempted to determine whether any material matter has been omitted from the data. Strategen will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen. The making of any assumption does not imply that Strategen has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Client: Benara Nurseries Pty Ltd

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	Rev A	For review by client	C Turner / Z Cockerill (BPAD37803)	Electronic (email)	22/08/2017
Final Report	Rev 0	For submission	C Turner / L Wears (BPAD19809)	Electronic (email)	28/08/2017

Filename: BNU17316_01 R001 Rev 0 - 28 August 2017

Table of contents

1. Introduction	1
1.1 Background	1
1.2 Purpose of the BMP	1
2. Spatial consideration of bushfire threat	5
2.1 Existing site characteristics	5
2.1.1 Location	5
2.1.2 Assets	5
2.1.3 Access	5
2.1.4 Water and power supply	5
2.2 Existing fire environment	7
2.2.1 Vegetation class	7
2.2.2 Effective slope	7
2.3 BAL contour assessment	9
2.3.1 Fire Danger Index	9
2.3.2 Vegetation class	9
2.3.3 Effective slope	9
2.3.4 Distance between proposed development areas and the classified vegetation	9
2.3.5 BAL calculation	10
2.4 Identification of bushfire hazard issues	12
3. Bushfire management measures	14
3.1 Asset Protection Zone (APZ)	14
3.2 Fuel management	15
3.3 Building construction standards and BAL compliance	15
3.4 Vehicular access	16
3.5 Reticulated water supply	16
3.6 Additional measures	17
4. Proposal compliance and justification	18
5. Implementation and enforcement	21
5.1 Document review and update	22
6. References	23

List of tables

Table 1. Minimum required separation distances	9
Table 2: Method 1 BAL calculation	11
Table 3: Vehicular access technical requirements	16
Table 4: Acceptable solutions assessment against bushfire protection criteria	19
Table 5: Bushfire compliance table	21

List of figures

Figure 1: Proposed Structure Plan Amendment	3
Figure 2: Site overview	6
Figure 3: Pre-development vegetation class and effective slope	8
Figure 4: BAL contour map	13

List of appendices

Appendix 1 Site photographs
Appendix 2 City of Wanneroo annual firebreak notice

1. Introduction

1.1 Background

Benara Nurseries (the proponent) is proposing a Structure Plan amendment for their landholding south of Vincent Road, Sinagra (hereon referred to as the project area). The Structure Plan proposes to create approximately 650 residential lots ranging in size from 260 m²–1007 m², as well as two Public Open Space (POS) areas (Figure 1). The Structure Plan amendment relates to Cell 4 of the existing East Wanneroo (Sinagra) Structure Plan and proposes to increase base density code to R25 and modify road patterns.

Parts of the project area are designated as bushfire prone on the WA *Map of Bush Fire Prone Areas* (DFES 2017). As a result, Strategen has prepared this Bushfire Management Plan (BMP) to address the following information requirements triggered by the proposed Structure Plan amendment under *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7; WAPC 2015), namely Policy Measure 6.3:

- where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the subject site, in accordance with *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines; WAPC 2017) – refer to Section 2.3 and Figure 4
- identification of any bushfire hazard issues arising from the BAL contour map – refer to Section 2.4
- clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages – refer to Section 4 and Table 4.

This BMP has been prepared in accordance with the Guidelines and addresses the above requirements to satisfy SPP 3.7.

1.2 Purpose of the BMP

The purpose of this BMP is to provide guidance on how to plan for and manage the bushfire risk to future life and property assets of the project area through incorporation of a range of bushfire management measures into early planning design and future construction. The BMP outlines how future on-site assets can be protected during the summer months when the threat from bushfire is at its peak. This is particularly relevant when existing fire appliances in the area may be unable to offer an immediate emergency suppression response; therefore, development planning and design should aim to provide mitigation strategies that protect future life and property from bushfire as a priority.

This page is intentionally blank

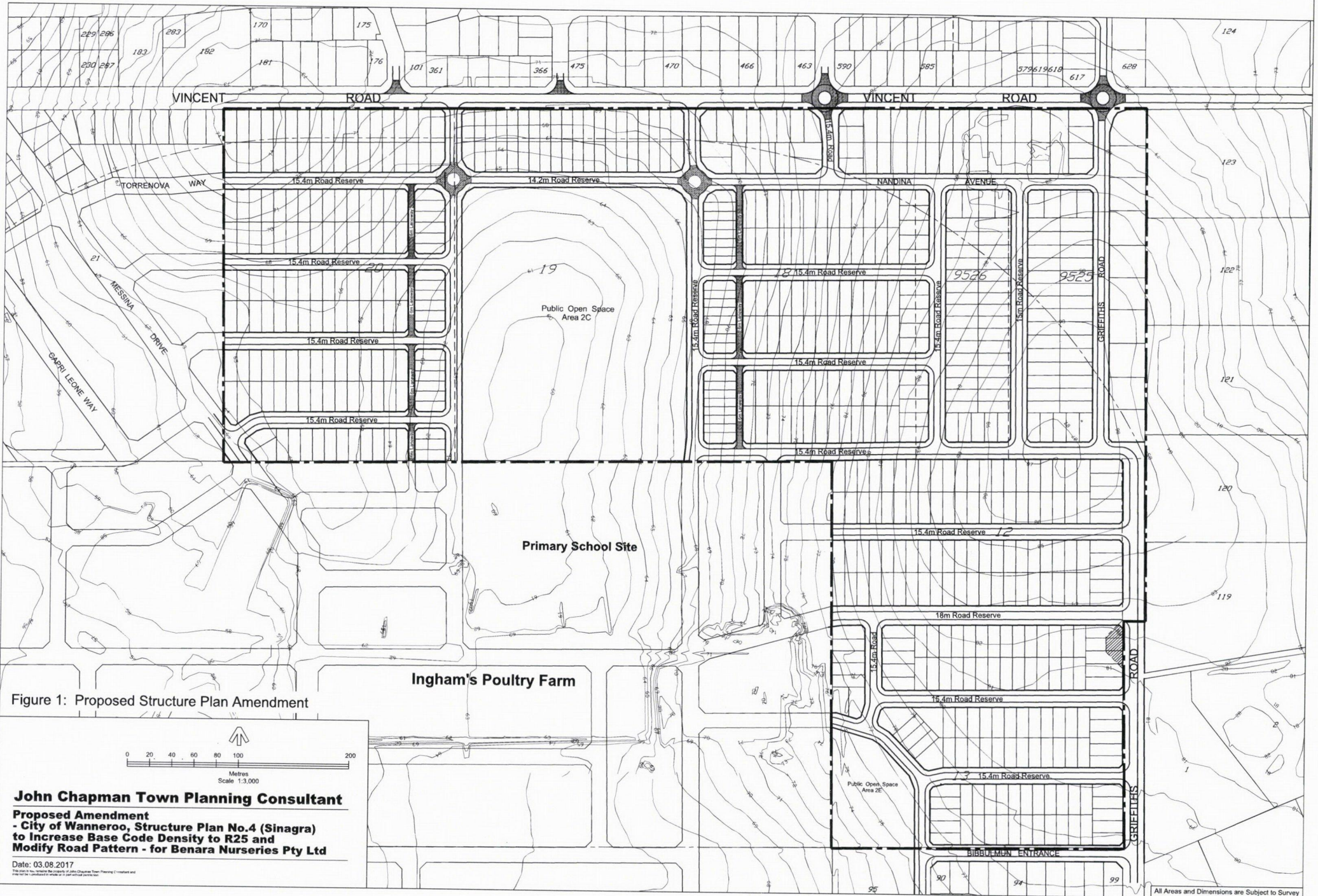
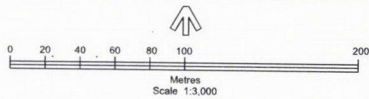


Figure 1: Proposed Structure Plan Amendment



John Chapman Town Planning Consultant
Proposed Amendment
- City of Wanneroo, Structure Plan No.4 (Sinagra)
to Increase Base Code Density to R25 and
Modify Road Pattern - for Benara Nurseries Pty Ltd

Date: 03.08.2017
This plan is the property of John Chapman Town Planning Consultant and may not be used for any other purpose.

All Areas and Dimensions are Subject to Survey

This page is intentionally blank

2. Spatial consideration of bushfire threat

2.1 Existing site characteristics

2.1.1 Location

The project area comprises Lots 12 and 13 Griffiths Road, Lots 18, 19 and 20 Vincent Road, and Lots 9525, 9526 and 9528 Viola Approach, Sinagra in the City of Wanneroo, which form part of the East Wanneroo Cell 4 (Sinagra) Structure Plan. The project area is bound by the following, as depicted in Figure 2:

- Vincent Road and residential properties to the north
- residential properties and vacant land zoned 'Urban Deferred' under the MRS to the west
- Ingham's Poultry Farm (Lot 1665) and bushland (Lot 9000) zoned 'Urban Deferred' under the MRS, and existing residential development to the south
- rural residential properties to the east.

2.1.2 Assets

The northern portion of the project area is currently occupied by a managed olive tree plantation, while the south-eastern portion contains nursery infrastructure including a large shed, greenhouses and water tanks which are owned and operated by Benara Nurseries.

Development of the project area will significantly increase the critical life and property assets of the site by intensifying the number of inhabitants, visitors and built assets across the project area.

There are no significant environmental values contained on-site as a result of the existing land use.

2.1.3 Access

The project area is accessible via four existing roads, including:

- Vincent Road to the north
- Griffiths Road and Bibbulmun Entrance to the south
- Torrenova Way to the west.

In addition, the project area is currently traversed via a network of compacted dirt roads and firebreaks.

2.1.4 Water and power supply

Reticulated water supply and underground power supply is available to the project area.



Figure 2: Site overview

Scale 1:7,000 at A4
 0 70 140 210 Metres
 Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 21/08/2017
 Author: JCrute
 Source:

Legend
 [Red Outline] Project site
 [White Outline] Cadastre



Path: Q:\Consult\2017\BNU\BNU17316\ArcMap_documents\BNU17316_G002_RevB.mxd

2.2 Existing fire environment

2.2.1 Vegetation class

Pre-development vegetation class has been assessed in accordance with *AS 3959–2009 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2009). This involved on-ground verification of vegetation class within the project area and adjacent 150 m as per conditions at time of assessment on 20 July 2017. The pre-development vegetation class extent is depicted in Figure 3, along with the location and direction of site photographs to provide validation of the various vegetation classes and exclusions identified. Site photographs are contained in Appendix 1.

No classified vegetation occurs within the project area with all areas considered either non-vegetated (cleared hardstand, greenhouses and sheds), or managed (spaced olive trees with mowed grass understorey) in accordance with Clauses 2.2.3.2 (e) and (f) of AS3959 respectively.

Classified vegetation situated within 150 m of the project area consists of:

- Class B woodland within areas zoned 'Urban Deferred' west and south of the project area, and within 'Rural' zoned landholdings southeast of the project area
- Class G grassland within areas zoned 'Urban Deferred' west and south of the project area, and within 'Rural' zoned landholdings east of the project area.

As outlined in Section 2.1.3, adjacent future residential development areas (zoned 'Urban Deferred') are expected to be developed concurrently with the project area; therefore, classified vegetation west and south of the site is expected to be removed or managed to facilitate development of these areas. Notwithstanding this, temporary setbacks to this vegetation will be in place to ensure development is not located in areas subject to a rating of BAL-40 or BAL-FZ, which will ensure that affected lots are temporarily quarantined until such a time that the bushfire hazard is removed. These management measures are further discussed in Section 3.

All other land within 150 m of the project area was identified to be excluded from classification under the following AS 3959 exclusion clauses:

1. Clause 2.2.3.2 (e) non-vegetated areas including, constructed roads and pathways (i.e. sealed surfaces) and buildings.
2. Clause 2.2.3.2 (f) low threat managed vegetation including road verges, cleared vacant managed land and low threat landscaped areas.

2.2.2 Effective slope

The slope under classified vegetation to the southeast and west of the project area is considered flat or upslope relative to the proposed lots. The slope beneath vegetation to the south of the project area within Lot 1665 (Ingham's Poultry Farm) and Lot 9000, and to the east of the project area within rural lots, is down-slope at an angle of >0–5 degrees relative to the proposed lots. The effective slope is annotated for these areas on Figure 3.

The information above summarises the slope characteristics under the classified vegetation to inform the BAL assessment outlined in Section 2.3 and depicted in Figure 4.

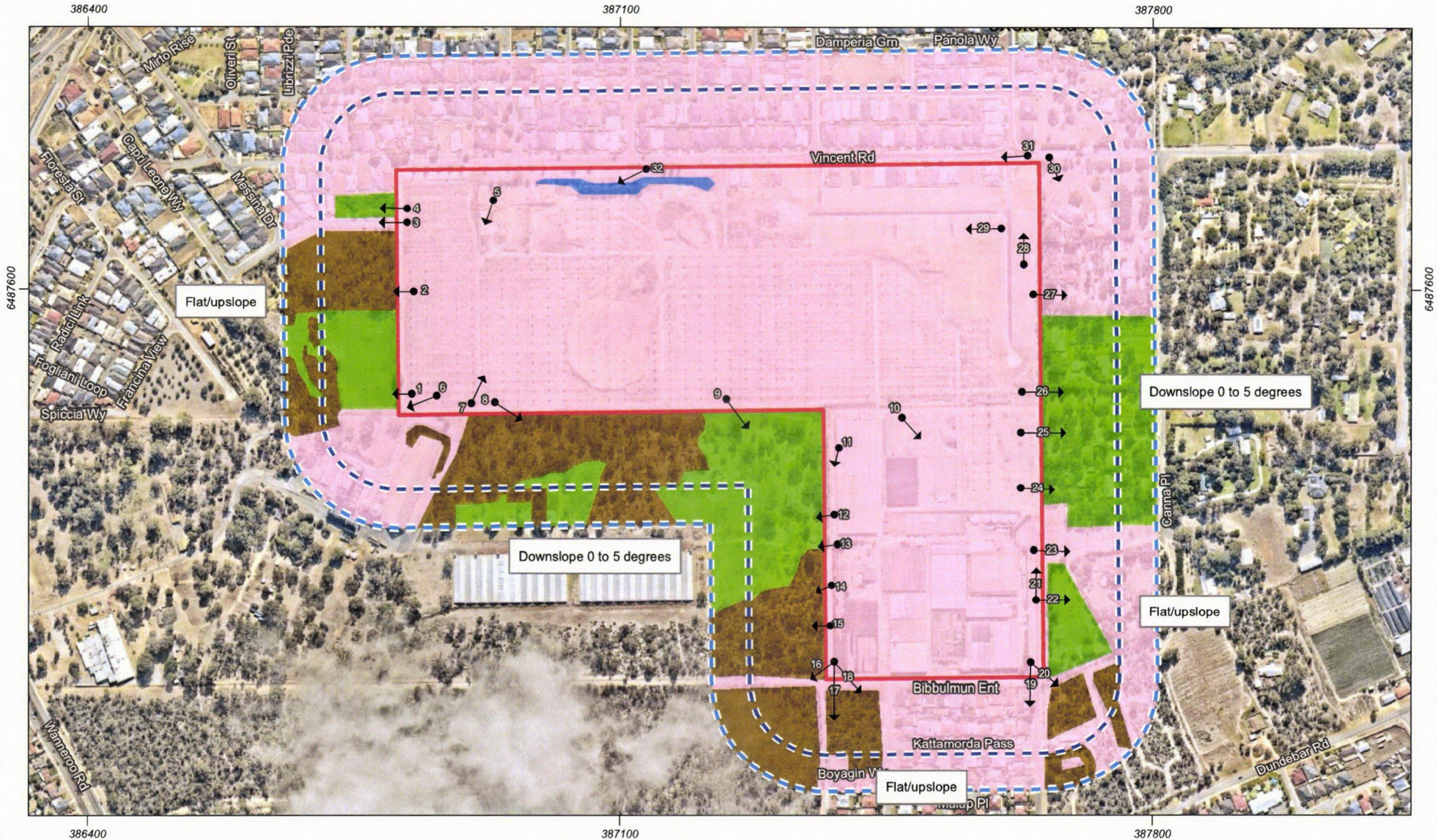
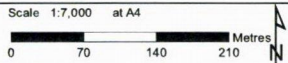


Figure 3: Pre-development vegetation classification and effective slope



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 21/08/2017
 Author: JCrute
 Source:

Legend

- Photo location
- ▭ Project site
- ▭ 100m
- ▭ 150m
- ▭ Classified vegetation
 - ▭ Class B Woodland
 - ▭ Class G Grassland
- ▭ Excluded under clause (b)
- ▭ Excluded under clause (e) and (f)



Path: Q:\Consult\2017\BNU\BNU17316\ArcMap_documents\BNU17316_G003_RevB.mxd

2.3 BAL contour assessment

Since classified vegetation has been confirmed to occur within 100 m of the project area, a BAL assessment and application of AS 3959 is required to inform future building location, design and construction requirements. A Method 1 BAL assessment for the site has been undertaken and is outlined in the following subsections, with the resulting BAL contours depicted in Figure 4.

2.3.1 Fire Danger Index

A blanket rating of FDI 80 is adopted for Western Australian environments, as outlined in AS 3959 and endorsed by Australasian Fire and Emergency Service Authorities Council.

2.3.2 Vegetation class

Pre-and post-development vegetation classes and exclusions are discussed in Section 2.2.1. BAL contours are based on the extent of classified vegetation remaining after the development is complete, which under a conservative scenario may consist of Class B woodland and Class G grassland retained within surrounding 'Urban Deferred' areas to the west and south and within surrounding 'Rural' areas to the east.

As outlined previously, classified vegetation within 'Urban Deferred' areas west and south of the site is expected to be removed or managed at the time of development of the project area. However, BAL contours determined through the BAL assessment in this BMP are based on the current 'worst case' scenario including all existing classified vegetation external to the site.

2.3.3 Effective slope

Effective slope is described in Section 2.2.2 (Figure 3) and consists of:

- slope under classified vegetation to the southeast and west of the project area is considered flat or up-slope relative to the proposed lots
- slope beneath vegetation to the south of the project area within Lot 1665 (Ingham's Poultry Farm) and Lot 9000, and within rural lots to the east of the project area, is down-slope at an angle of >0–5 degrees relative to the proposed lots.

2.3.4 Distance between proposed development areas and the classified vegetation

The minimum required separation distances between proposed development and the post-development classified vegetation to achieve the necessary compliance with a BAL–29 rating or lower, are outlined below in Table 1.

Table 1. Minimum required separation distances

AS3959 vegetation class	Effective slope	Required separation distances
Class B woodland	Up-slope/flat	14 m
	Down-slope >0 to 5 degrees	17 m
Class G grassland	Up-slope/flat	8 m
	Down-slope >0 to 5 degrees	9 m

These separation distances will form the Asset Protection Zones (APZs) for the site and can be achieved through a combination of managed POS, perimeter roads and minor building setbacks where required. Temporary APZs will be applied where necessary to ensure classified vegetation to the west and south of the site does not result in lots being exposed to BAL–40 or above. Temporary APZs will effectively result in the quarantining of lots until such a time that the bushfire hazard is removed or managed to a low threat standard in accordance with AS3959.

2.3.5 BAL calculation

A Method 1 BAL calculation has been undertaken to determine BAL contours for the project area in accordance with AS 3959 methodology. The assessed BALs give an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed lots and subsequently inform the standard of building construction required for proposed buildings to potentially withstand such impacts. Land located greater than 100 m from classified vegetation maintains a rating of BAL-Low, where there is insufficient risk to warrant an increase in the building construction standard, as adopted by Method 1 BAL assessment procedure.

BAL contour assessment results are outlined in Table 2 and depicted in Figure 4.

Table 2: Method 1 BAL calculation

Vegetation class	Effective slope	BAL contours (separation distance)	BAL rating	Comment
Class B woodland	Flat land (0 degrees)	<10 m	BAL-FZ	No residential development is proposed in this area
		10-<14 m	BAL-40	No residential development is proposed in this area
		14-<20 m	BAL-29	No residential development is proposed in this area
		20-<29 m	BAL-19	Residential development is proposed in this area
		29-<100 m	BAL-12.5	Residential development is proposed in this area
Class B woodland	Down-slope 0-5 degrees	<13 m	BAL-FZ	Residential development is proposed in this area; however, lots will be quarantined and temporary APZs will be provided until hazard removed
		13-<17 m	BAL-40	Residential development is proposed in this area; however, lots will be quarantined and temporary APZs will be provided until hazard removed
		17-<25 m	BAL-29	Residential development is proposed in this area; however, lots will be quarantined and temporary APZs will be provided until hazard removed
		25-<35 m	BAL-19	Residential development is proposed in this area; however, lots will be quarantined and temporary APZs will be provided until hazard removed
		35-<100 m	BAL-12.5	Residential development is proposed in this area
Class G grassland	Flat land (0 degrees)	<6 m	BAL-FZ	No residential development is proposed in this area
		6-<8 m	BAL-40	No residential development is proposed in this area
		8-<12 m	BAL-29	Residential development is proposed in this area; however, hazard is considered temporary and may be removed prior to subdivision
		12-17 m	BAL-19	Residential development is proposed in this area; however, hazard is considered temporary and may be removed prior to subdivision
		17-<50 m	BAL-12.5	Residential development is proposed in this area
Class G grassland	Down-slope 0-5 degrees	<7 m	BAL-FZ	No residential development is proposed in this area
		7-<9 m	BAL-40	No residential development is proposed in this area
		9-<14 m	BAL-29	Residential development is proposed in this area
		14-<20 m	BAL-19	Residential development is proposed in this area
		20-<50 m	BAL-12.5	Residential development is proposed in this area

2.4 Identification of bushfire hazard issues

Considerable urban residential development has been constructed to the north of the project area which has resulted in removal of much of the pre-development vegetation extent that would have originally occupied the locality.

Due to the presence of intact grassland and woodland vegetation to the south of the site, there is a potential bushfire risk from a southerly direction. However, this risk is likely to be temporary and bushfire fuels are expected to be reduced and/or managed to facilitate future residential development.

Grass fuels within rural residential properties to the east of the site pose a permanent potential bushfire threat to the project area. However, given the presence of Canna Place east of the site and the apparent management of many of these rural properties in the broader area, the expected fire run adjacent to the site would be approximately 150 m within unmanaged rural lots immediately east of the site. Therefore, the project area is not considered to be exposed to any significant landscape scale bushfire risk.

Based on the above information, Strategen recommends that subdivision design incorporate suitable levels of defensible space and access provisions to defend against potential localised bushfires. Management measures for the development are outlined in Section 3 and summarised in Section 5. As discussed above, there is no significant landscape scale bushfire risk in proximity to the project area. Following provision of these development design measures, Strategen considers the bushfire risk and associated hazards are readily manageable in accordance with standard Guideline acceptable solutions.

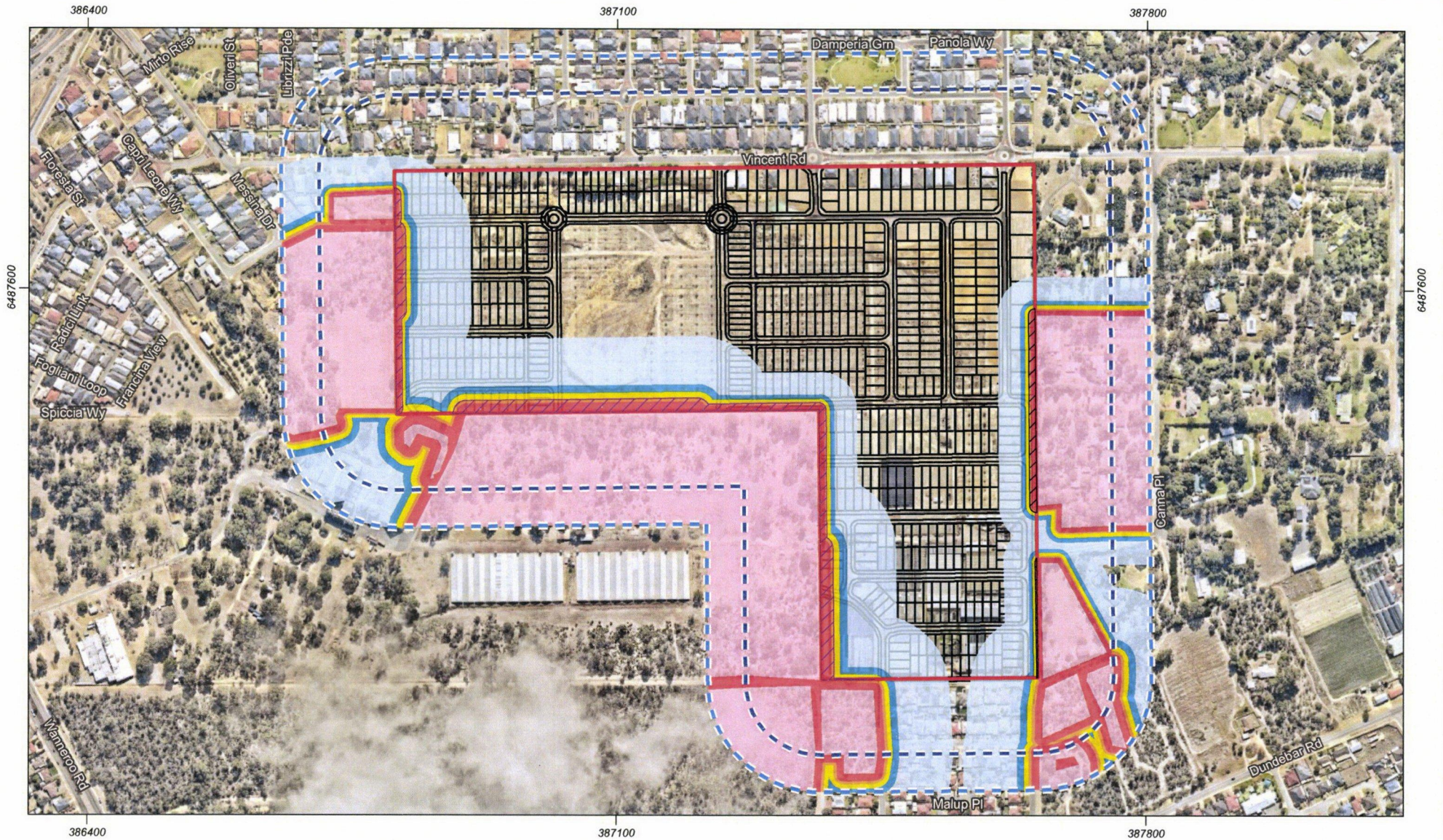


Figure 4: Bushfire Management Plan

Scale 1:7,000 at A4
 0 70 140 210 Metres
 Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 22/08/2017
 Author: JCrute
 Source:

Legend

— Subdivision layout
 [Red Outline] Project site

Assessment area
 [Dashed Blue Line] 100m
 [Dashed Blue Line] 150m

[Pink Box] Classified vegetation
 [Hatched Box] Permanent APZ
 [Hatched Box] Temporary APZ

BAL contours
 [Red Box] BAL FZ
 [Orange Box] BAL 40
 [Yellow Box] BAL 29
 [Blue Box] BAL 19
 [Light Blue Box] BAL 12.5



3. Bushfire management measures

This section outlines the bushfire management measures that will be adopted to ensure Guideline compliance and a manageable level of bushfire risk is achieved for proposed development within the project area. The management actions recommended are directly referred to in the bushfire compliance table outlined in Table 5 to assist with implementation, enforcement and auditing of all works.

3.1 Asset Protection Zone (APZ)

Method 1 BAL assessment has confirmed BAL-29 or lower can be achieved for all proposed development within the project area in accordance with acceptable solution A1.1 of the Guidelines through the provision of temporary setbacks to vegetation within future residential areas and permanent setbacks to grassland within 'Rural' landholdings east of the site. The BAL ratings assessed for proposed development rely on the separation distances being maintained between proposed dwellings and the surrounding classified vegetation extent until such a time that the hazard is removed or managed in accordance with AS3959.

These separation distances make up the APZs for the site in accordance with acceptable solution A2.1 of the Guidelines and comprise a combination of:

- perimeter roads
- low threat landscaped areas and turf areas including the two POS areas
- minor building setbacks where required for relevant lots to ensure the full extent of the APZ is established and building construction is avoided in areas of BAL-FZ and BAL-40 (building setbacks will be required for several lots along the north-eastern extent of the project area to ensure BAL-29 or lower is achieved).

Management Action BMP 1a

Maintain the APZ road reserves (including road verges) in a low fuel state through slashing of understorey grasses and weeds to a height of less than 100 mm on a regular and ongoing basis. This relates to all proposed roads, as well as the current management regime of existing roads.

Management Action BMP 1b

Maintain APZ POS areas on a regular and ongoing basis at a fuel load less than 2 t/ha and at a density consistent with Clause 2.2.3.2 (f) of AS 3959-2009.

Management Action BMP 1c

Implement the necessary building setbacks where required for relevant lots to ensure the full extent of the APZ is established and building construction is avoided in areas of BAL-FZ and BAL-40.

Management Action BMP 1d

In the event that classified vegetation has not been cleared or managed (in accordance with Clause 2.2.3.2 (f) of AS959) within lots to the west and south of the site at the time of development of the project area, provide (and maintain to APZ standard) temporary setbacks to quarantine affected lots and ensure development is not subject to a rating of BAL-40 or higher.

3.2 Fuel management

The BAL contours assessed in this BMP rely on areas of low threat, managed vegetation (excluded from classification) being maintained on a regular and ongoing basis all year round.

Public open space areas

Landscaping plans are yet to be developed for the two POS areas within the project, however POS areas will be consistent with a low fuel state and will be managed on a regular and ongoing basis at a fuel load less than 2 t/ha. A turfed, managed oval is proposed for the larger, central POS area. Consequently, the post-development vegetation within the POS areas has been classified as low threat in accordance with Clauses 2.2.3.2 (e) and (f) of AS 3959–2009. Management of the POS areas will be undertaken by the proponent for the maintenance period, after which time CoW take on the responsibility.

Management Action BMP 2a

Maintain POS areas on a regular and ongoing basis at a fuel load less than 2 t/ha and at a density consistent with Clause 2.2.3.2 (f) of AS 3959–2009.

Management Action BMP 2b

Maintain all cleared vacant land in a low fuel state through slashing of grasses and weeds to a height of less than 100 mm on a regular basis until such time that the land is developed on (developer prior to lot sale, future landowner thereafter).

Management Action BMP 2c

Maintain road reserves in a low fuel state through slashing of grasses and weeds to a height of less than 100 mm on a regular and ongoing basis. Management of the internal road reserves will be undertaken by the proponent for the maintenance period, after which time the CoW take on the responsibility.

Management Action BMP 2d

Ensure compliance with the CoW firebreak notice. Firebreaks are to be maintained from 15 November until April the following year. For land greater than 2000m², a 3 m wide and 3 m high firebreak is to be maintained immediately within the property boundary with vegetation no greater than 20 mm in height over the entire area of the firebreak.

3.3 Building construction standards and BAL compliance

BAL contours have been derived for the project area through AS 3959 Method 1 BAL assessment, as outlined in Table 2 and Figure 4. These indicative BALs rely on Management Actions BMP 1a, 1b, 1c, 1d, 2a, 2b, 2c and 2d being implemented. However, reassessment of the BAL should be undertaken to confirm individual lot BAL ratings in order to properly inform the building design and construction process.

Management Action BMP 3a

Undertake a BAL compliance check post-completion of all subdivisional works (accredited bushfire practitioner on behalf of developer). This will enable BAL certificates to be prepared prior to lot sale and included up-front as part of the contract of sale for individual lots to ensure future lot purchasers have confirmation of the BAL rating as part of the lot sale process. The BAL certificates would be valid for a 12-month period for use to support individual lot building permit applications. This BAL compliance procedure is consistent with Section 4.2 of the Guidelines.

Management Action BMP 3b

Construct buildings in accordance with AS 3959 and the assessed BAL, as outlined through BAL compliance or reassessment at the building permit stage (future landowners).

3.4 Vehicular access

The proposed vehicular access network will provide through access to the existing surrounding public road network via Vincent Road to the north, Griffiths Road to the south and Torrenova Way to the west. This will ensure a minimum of two different access routes are provided at all times; thereby meeting compliance with acceptable solution A3.1.

The proposed internal road system provides an interconnected network which will provide multiple connections to future roads within residential development areas to the west and south of the site. All proposed public roads will be constructed to meet technical requirements of the Guidelines (refer to Table 3) in accordance with acceptable solution A3.2. In the event that development of the project area occurs prior to development to the west and south, temporary internal roads (emergency access ways) will ensure that no 'dead ends' are created, or alternatively, temporary cul-de-sacs will be provided which are constructed in accordance with the technical requirements Guidelines (refer to Table 3); thereby meeting compliance with acceptable solutions of Performance Principle P3.

No battle-axe blocks, private driveways longer than 50 m, fire service access routes, or residential lots greater than 0.5 ha (with the exception of two managed POS areas with perimeter roads) are proposed or required as part of this development. Therefore, acceptable solutions A3.4, A3.5, A3.7 and A3.8 are not applicable in this instance.

Table 3: Vehicular access technical requirements

Technical requirement	Public road	Cul-de-sac	Emergency access way
Minimum trafficable surface (m)	6*	6	6*
Horizontal distance (m)	6	6	6
Vertical clearance (m)	4.5	N/A	4.5
Maximum grade <50 m	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5	8.5

*Refer to E3.2 Public roads: Trafficable surface

Source: WAPC 2017

Management Action BMP 4a

Construct all new permanent and temporary internal roads (emergency access ways) and cul-de-sac in accordance with subdivision approval and technical requirements of the Guidelines (developer).

3.5 Reticulated water supply

All proposed lots will be provided a reticulated water supply through extension of existing services from adjacent urban development. The reticulated system will ensure an all year-round supply of water is provided for each lot to meet minimum domestic and emergency water supply requirements to comply with Guideline acceptable solution A4.1.

A network of hydrants will also be provided along the internal road network at locations which meet relevant water supply authority and DFES requirements, in particular the Water Corporation Design Standard DS 63 'Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250'. This standard will guide construction of the internal reticulated water supply system and fire hydrant network, including spacing and positioning of fire hydrants so that the maximum distance between a hydrant and the rear of a building envelope (or in the absence of a building envelope, the rear of the lot) shall be 120 m and the hydrants shall be no more than 200 m apart.

Management Action BMP 5a

Provide a reticulated water supply for all proposed residential lots, as well as a network of hydrants, which meet relevant water authority, DFES and any CoW technical requirements (developer).

3.6 Additional measures

Strategen makes the following additional recommendations to inform ongoing stages of development:

Management Action BMP 6a

Where relevant, a notification pursuant to Section 165 of the *Planning and Development Act 2005* is to be placed on the certificates of title of proposed lots with a BAL rating of 12.5 or above, advising of the existence of a hazard or other factor (relevant authority). The notification is to state as follows:

This land is subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land.

Management Action BMP 6b

All parties are to comply with the current CoW annual firebreak notice (Appendix 2).

Management Action BMP 6c

Reassessment of the BAL to inform individual building permit applications may be required at the discretion of the CoW or if any changes occur to proposed development design and/or vegetation class extent which may result in a different BAL rating being applied (developer prior to lot sale, future landowner thereafter).

4. Proposal compliance and justification

Proposed development within the project area is required to comply with SPP 3.7 under the following policy measures:

6.2 Strategic planning proposals, subdivision and development applications

- a) Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.
- b) Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a) applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.
- c) This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.

6.3 Information to accompany strategic planning proposals

Any strategic planning proposals to which policy measure 6.3 applies is to be accompanied by the following information in accordance with the Guidelines:

- a) (i) the results of a BHL assessment determining the applicable hazard level(s) across the subject land, in accordance with the methodology set out in the Guidelines. BHL assessments should be prepared by an accredited Bushfire Planning Practitioner; or
- a) (ii) where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the subject site, in accordance with the Guidelines. The BAL Contour Map should be prepared by an accredited Bushfire Planning Practitioner; and
- b) the identification of any bushfire hazard issues arising from the relevant assessment; and
- c) clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages.

Implementation of this BMP is expected to meet the following objectives of SPP 3.7:

- 5.1 Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.
- 5.2 Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.
- 5.3 Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications consider bushfire protection requirements and include specified bushfire protection measures.
- 5.4 Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.

In response to the above requirements of SPP 3.7, the bushfire management measures, as outlined in Section 3, have been devised for the proposed development in accordance with acceptable solutions of the Guidelines to meet compliance with bushfire protection criteria. An 'acceptable solutions' assessment is provided in Table 4 to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

Table 4: Acceptable solutions assessment against bushfire protection criteria

Bushfire protection criteria	Intent	Acceptable solutions	Proposed bushfire management measures	Compliance statement
Element 1: Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.	<u>A1.1 Development location</u> The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL-29 or below.	Refer to Section 3.1, which demonstrates that all future development will avoid areas of BAL-FZ and BAL-40 and a rating of BAL-29 or lower can be achieved.	The measures proposed are considered to comply and meet the intent of Element 1 Location.
Element 2: Siting and design of development	To ensure that the siting and design of development minimises the level of bushfire impact.	<u>A2.1 Asset Protection Zone (APZ)</u> Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements: <ul style="list-style-type: none"> Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29) in all circumstances Location: the APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes) Management: the APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' (see Guidelines Schedule 1). 	Refer to Section 3.1, which demonstrates that all lots will be provided a suitably sized APZ to ensure a rating of BAL-29 or lower can be achieved.	The measures proposed are considered to comply and meet the intent of Element 2 Siting and design of development.
Element 3: Vehicular access	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.	<u>A3.1 Two access routes</u> Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions. <u>A3.2 Public road</u> A public road is to meet the requirements in Table 4 Column 1 of the Guidelines. <u>A3.3 Cul-de-sac (including a dead-end-road)</u> 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), detailed requirements will need to be achieved as per Table 4 Column 2 of the Guidelines.	Refer to Section 3.4, which demonstrates that the proposed public access network will provide at least two different vehicular access routes for the proposed development at all times. Refer to Section 3.4, which demonstrates that the proposed public access network will meet technical requirements of the Guidelines. Refer to Section 3.4, which demonstrates any temporary proposed cul-de-sacs will meet technical requirements of the Guidelines.	The measures proposed are considered to comply and meet the intent of Element 3 Vehicular access.

		<p>A3.4 Battle-axe Battle-axe access legs should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will need to be achieved as per Table 4 Column 3 of the Guidelines.</p>	<p>N/A No battle axes are proposed as part of the development.</p>	
		<p>A3.5 Private driveway longer than 50 m A private driveway is to meet detailed requirements as per Table 4 Column 3 of the Guidelines.</p>	<p>N/A No private driveways longer than 50 m are proposed as part of the development.</p>	
		<p>A3.6 Emergency access way 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 detailed requirements as per Table 4 Column 4 of the Guidelines.</p>	<p>Refer to Section 3.4, which demonstrates any temporary proposed emergency access way will meet technical requirements of the Guidelines.</p>	
		<p>A3.7 Fire service access routes (perimeter roads) 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 detailed requirements as per Table 4 Column 5 of the Guidelines.</p>	<p>N/A No fire service access routes are required as part of the development.</p>	
		<p>A3.8 Firebreak width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government.</p>	<p>N/A No firebreaks are required as part of the development.</p>	
<p>Element 4: Water</p>	<p>To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.</p>	<p>A4.1 Reticulated areas 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.</p>	<p>Refer to Section 3.5, which demonstrates that all proposed lots will be provided a reticulated water supply and network of hydrants in accordance with local water authority, CoW and DFES requirements.</p>	<p>The measures proposed are considered to comply and meet the intent of Element 4 Water.</p>
		<p>A4.2 Non-reticulated areas Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet detailed requirements (refer to the Guidelines for detailed requirements for non-reticulated areas).</p>	<p>N/A The proposed development will not occur within a non-reticulated area.</p>	
		<p>A4.3 Individual lots within non-reticulated areas (only for use if creating 1 additional lot and cannot be applied cumulatively) Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10 000 litres.</p>	<p>N/A The proposed development will not occur within a non-reticulated area.</p>	

5. Implementation and enforcement

Implementation of the BMP applies to the developer, prospective landowners and CoW to ensure bushfire management measures are adopted and implemented on an ongoing basis. A bushfire compliance table is provided in Table 5 to drive implementation of all bushfire management works associated with this BMP.

Table 5: Bushfire compliance table

Reference	Action	Timing	Responsibility
BMP 1a (refer to Section 3.1)	Maintain APZ reserves (including road verges) in a low fuel state	As per current maintenance regime	City of Wanneroo
BMP 1b (refer to Section 3.1)	Maintain APZ POS areas at a fuel load less than 2 t/ha and at a density consistent with Clause 2.2.3.2 (f) of AS 3959-2009	Ongoing all year round	Proponent during maintenance period, City of Wanneroo onwards
BMP 1c (refer to Section 3.1)	Where required, implement the necessary building setbacks for relevant lots	At building construction	Future landowners
BMP 1d (refer to Section 3.1)	Provide (and maintain to APZ standard) temporary setbacks to ensure development is not subject to a rating of BAL-40 or higher	Until such time that adjacent temporary hazards are removed	Proponent
BMP 2a (refer to Section 3.2)	Maintain POS areas at a fuel load less than 2 t/ha and at a density consistent with Clause 2.2.3.2 (f) of AS 3959-2009	Ongoing all year round	Proponent during maintenance period, City of Wanneroo onwards
BMP 2b (refer to Section 3.2)	Maintain cleared vacant land in a low fuel state	Ongoing all year round until such time that the land is developed on	Proponent prior to lot sale, landowner thereafter.
BMP 2c (refer to Section 3.2)	Maintain road reserves in a low fuel state	Ongoing all year round	Proponent during maintenance period (internal road network only), City of Wanneroo onwards (as per current maintenance regime for existing roads)
BMP 2d (refer to Section 3.2)	Ensure compliance with the CoW firebreak notice including firebreak maintenance where relevant	Ongoing all year round	Proponent prior to sale, landowner thereafter
BMP 3a (refer to Section 3.3)	Undertake BAL compliance check	Post-completion subdivisional works and prior to lot title	Accredited bushfire planning practitioner on behalf of the developer
BMP 3b (refer to Section 3.3)	Construct buildings in accordance with AS 3959 and the assessed BAL	At building construction	Future landowners
BMP 4a (refer to Section 3.4)	Construct all new internal roads and any temporary cul-de-sacs/EAWs in accordance with subdivision approval and technical requirements of the Guidelines	During subdivisional works	Proponent
BMP 5a (refer to Section 3.5)	Provide a reticulated water supply and network of hydrants in accordance with subdivision approval and water authority, DFES and City technical requirements	During subdivisional works	Proponent
BMP 6a (refer to Section 3.6)	Where relevant, place notification on the certificates of title for proposed lots with a BAL rating of 12.5 or above	At creation of title	Relevant authority

Reference	Action	Timing	Responsibility
BMP 6b (refer to Section 3.6)	Comply with the City of Wanneroo annual firebreak notice (refer to Appendix 2)	Ongoing all year round	All parties
BMP 6c (refer to Section 3.6)	Reassess BALs for individual lots	At the discretion of the City prior to building construction if development design or vegetation class extent is modified from that outlined in this BMP	Developer prior to lot sale, future landowners thereafter

5.1 Document review and update

This BMP will be updated as required in response to any significant changes in development design and/or the classified vegetation extent to ensure bushfire management responses for proposed development are consistent with on-ground conditions. The developer will be responsible for updating and revising the BMP until such time that the development is complete.

6. References

- Department of Fire and Emergency Services (DFES) 2017, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from:
<http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx>, [5/04/2017].
- Standards Australia (SA) 2009, *Australian Standard AS 3959–2009 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*, Western Australian Planning Commission, Perth.

Appendix 1
Site photographs

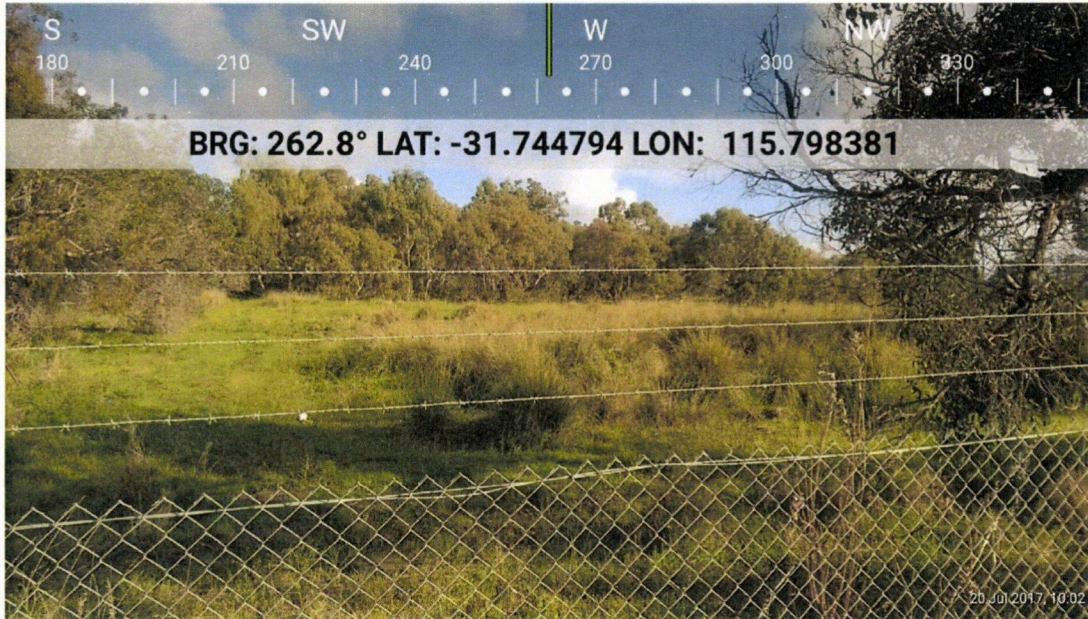


Photo Point 1: Class G grassland in foreground, Class B woodland in background, west of the project area



Photo Point 2: Class B woodland to the west of the project area



Photo Point 3: Area west of the project area excluded under Clause 2.2.3.2(e) of AS3959

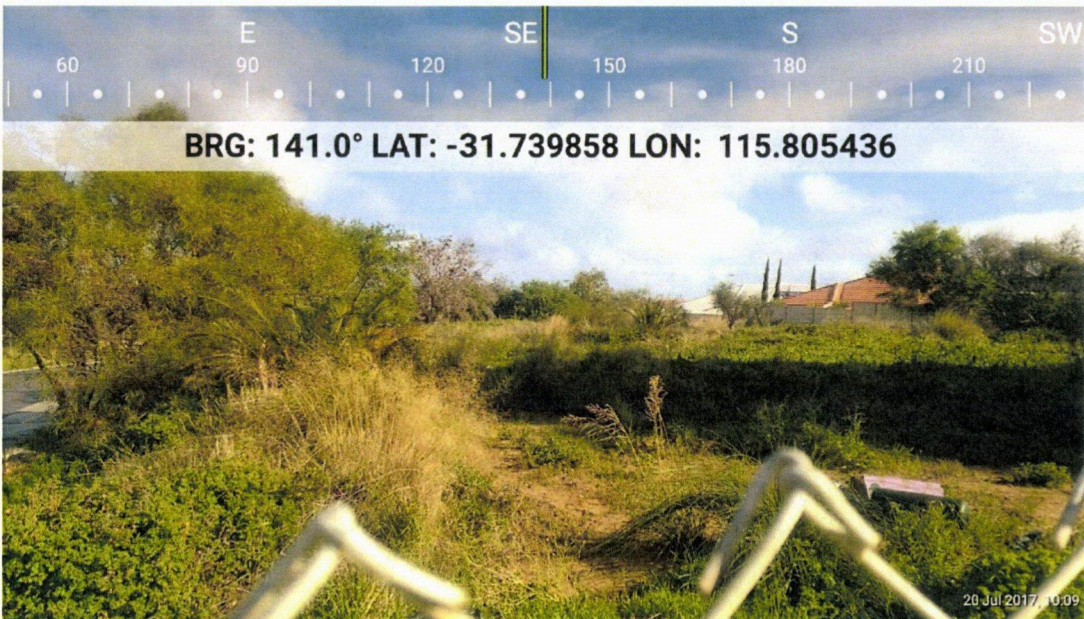


Photo Point 4: Class G grassland to the west of the project area



Photo Point 5: Managed areas within the project area excluded under Clause 2.2.3.2(f) of AS3959. Some minor winter regrowth is present.

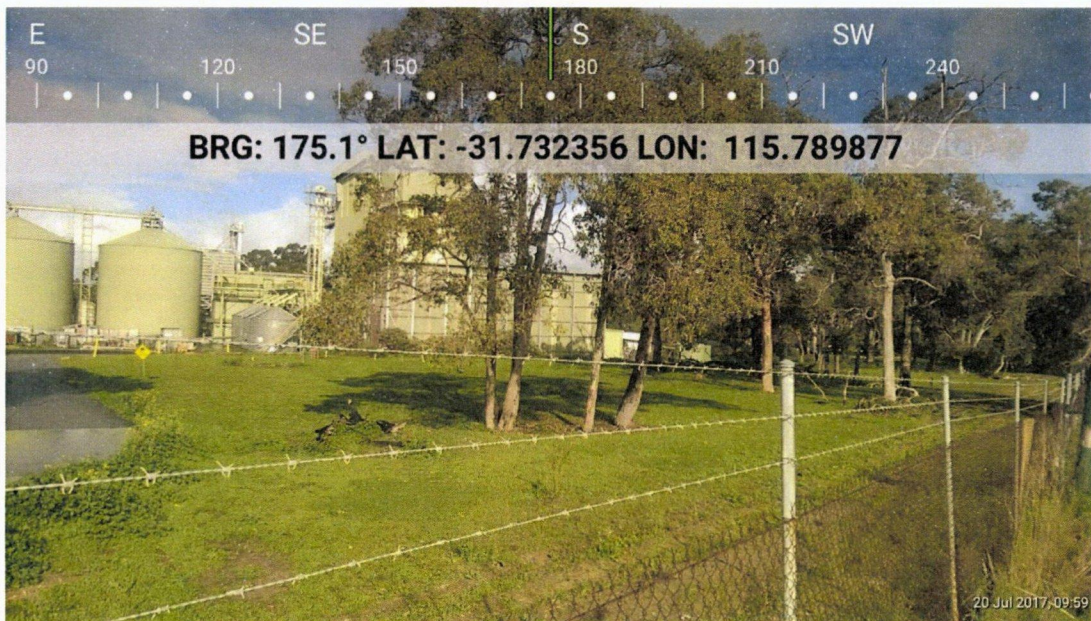
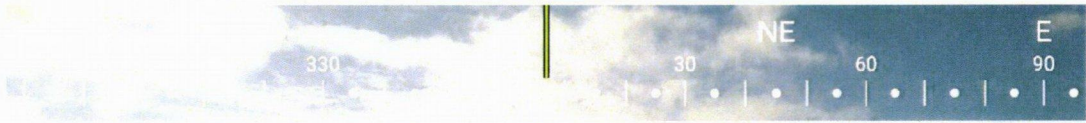


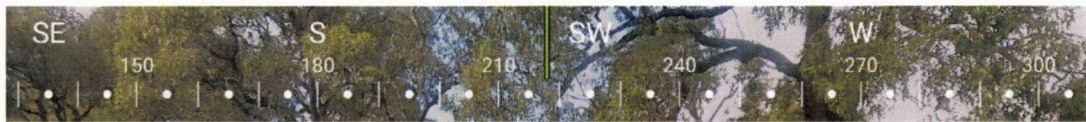
Photo Point 6: Managed areas excluded under Clause 2.2.3.2(f) of AS3959, to the south-west of the project area.



BRG: 7.1° LAT: -31.732251 LON: 115.787288



Photo Point 7: Excluded land under Clause 2.2.3.2 (f) of AS 3959 within the project area, existing firebreak is evident on right.



BRG: 217.0° LAT: -31.740142 LON: 115.811412



Photo Point 8: Class B woodland vegetation to the south of the project area

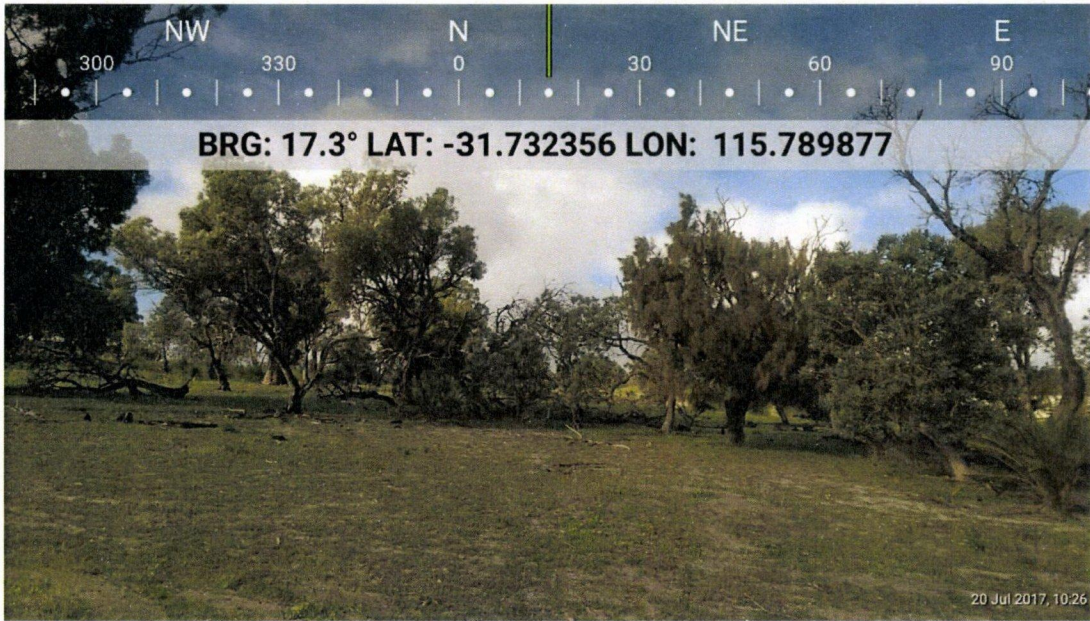


Photo Point 9: Class G grassland to the south of the project area



Photo Point 10: Excluded land under Clause 2.2.3.2 (e) of AS 3959 within the project area



Photo Point 11: Excluded row of trees under Clause 2.2.3.2 (f) of AS 3959 within the project area

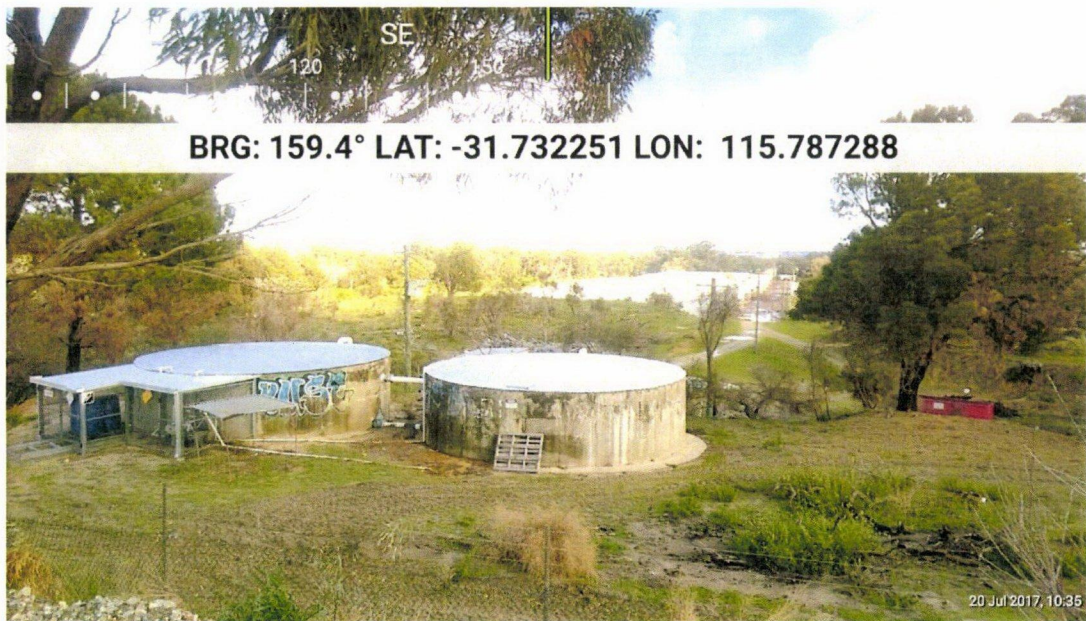


Photo Point 12: Class G grassland to the south of the project area



Photo Point 13: Class G grassland to the south of the project area on left, excluded areas under Clause 2.2.3.2 (e) and (f) of AS 3959 on right



Photo Point 14: Class B woodland to south of project area



Photo Point 15: Class B woodland to south of project area



Photo Point 16: Class B woodland to the south project area in background, firebreaks to the right excluded under Clause 2.2.3.2 (e) and (f)



Photo Point 17: Class B woodland to the south project area in background, managed parkland excluded under Clause 2.2.3.2 and (f) of AS3959



Photo Point 18: Managed parkland excluded land under Clause 2.2.3.2 (e) and (f) of AS 3959 to the south of the project area



Photo Point 19: Excluded land under Clause 2.2.3.2 (e) and (f) of AS 3959 to the south-east of the project area

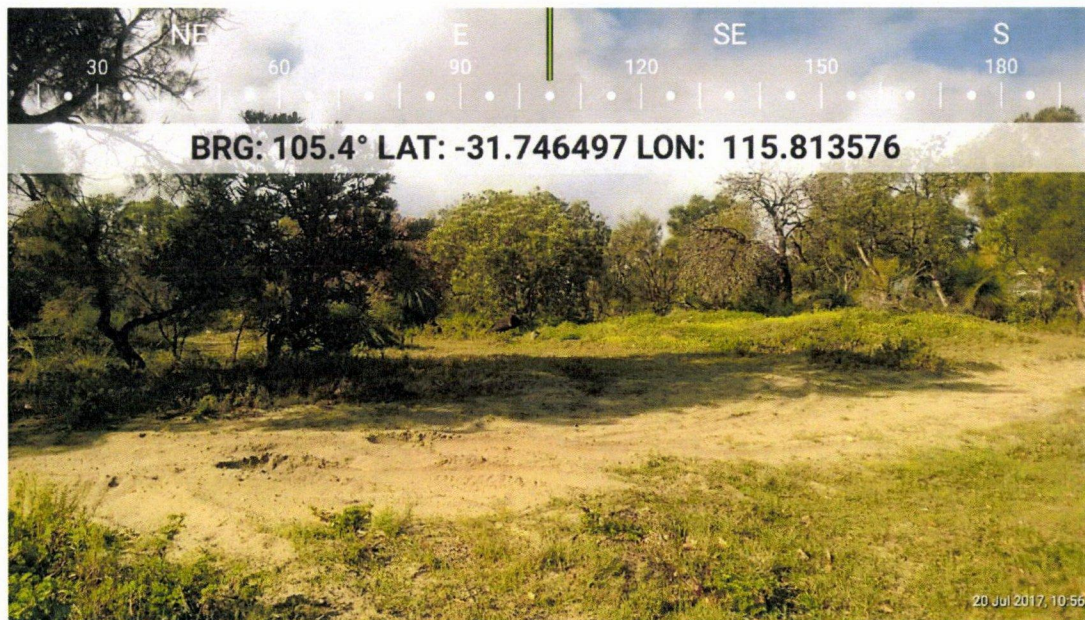


Photo Point 20: Class G grassland in the foreground, Class B woodland in the background, to the south-east of the project area



Photo Point 21: Excluded land under Clause 2.2.3.2 (e) and (f) of AS 3959 (on left and in centre) to the east of the project area



Photo Point 22: Class G grassland to the east of the project area, single row of trees in foreground would not significantly influence fire behaviour and therefore Class G grassland considered dominant vegetation class



Photo Point 23: Excluded land under Clause 2.2.3.2 (f) of AS 3959 to the east of the project area with some minor winter regrowth evident



Photo Point 24: Class G grassland to the east of the project area



Photo Point 25: Class G grassland to the east of the project area

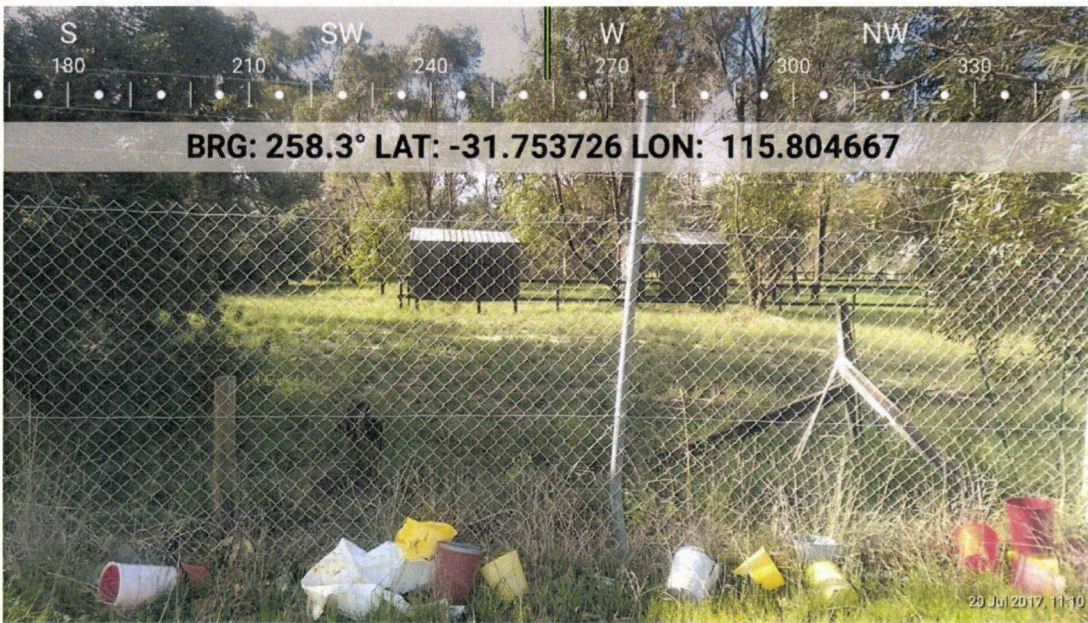


Photo Point 26: Class G grassland to the east of the project area



Photo Point 27: Excluded land under Clause 2.2.3.2 (f) of AS 3959 to the east of the project area



Photo Point 28: Excluded land under Clause 2.2.3.2 (e) of AS 3959 within the project area



Photo Point 29: Excluded land under Clause 2.2.3.2 (e) of AS 3959 within the project area



Photo Point 30: Excluded land under Clause 2.2.3.2 (f) of AS 3959 to the north-east of the project area

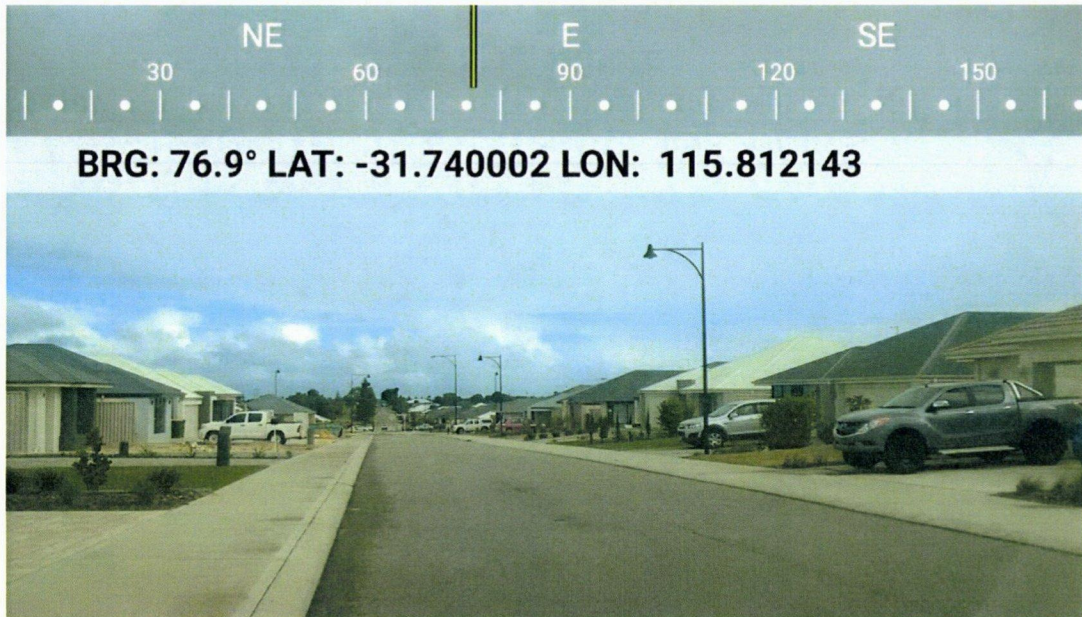


Photo Point 31: Excluded land under Clause 2.2.3.2 (e) and (f) of AS 3959 to the north of the project area



Photo Point 32: Excluded land under Clause 2.2.3.2 (b) of AS 3959 within the project area

Appendix 2
City of Wanneroo annual firebreak
notice

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

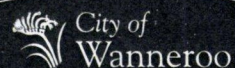
Located at the rear of the Ashby Operations Centre, 1204 Wanneroo Road, Ashby
The City's Rangers / Fire Control Officers are available to issue permits 7 days a week* from 4pm - 6pm
*Except Good Friday

CITY OF WANNEROO CIVIC CENTRE

23 Dundeebar Road, Wanneroo
The City's Fire Control Officers / Permit Issuing Officers are available to issue permits Monday to Friday 9am - 4pm

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.





23 Dundeebar Road, Wanneroo, WA 6065
Locked Bag 1, Wanneroo, WA 6946

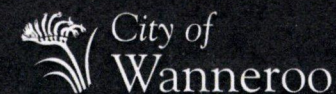
T : (08) 9405 5000 F : (08) 9405 5499

After Hours : 1300 13 83 93

E : enquiries@wanneroo.wa.gov.au

wanneroo.wa.gov.au  

PROTECT YOUR HOME
AND PROPERTY FROM
BUSHFIRES



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 2000m², 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 Yancheop Beach Road turn off
- Wanneroo Road, Carabooda • Marmion Avenue, Jindalee
- Neaves Road, Mariginiup • Old Yancheop Road, Pinjar
- Gngangara 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

Appendix 5 Traffic Impact Assessment



East Wanneroo Cell 2, Sinagra Proposed ASP4 Amendment

Transport Impact Assessment

PREPARED FOR:
Vincent Road Developments Pty
Ltd

September 2017

Document history and status

Author	Revision	Approved by	Date	Revision type
V Baltic	r01	B Bordbar	29/08/2017	Draft
V Baltic	r01a	B Bordbar	7/09/2017	Final

File name:	t17.009.vb.r01a.docx
Author:	Vladimir Baltic
Project manager:	Behnam Bordbar
Client:	Vincent Road Developments Pty Ltd
Project:	Proposed ASP4 Amendment
Document revision:	r01a
Project number:	t17.009

Copyright in all drawings, reports, specifications, calculations and other documents provided by the Consultant in connection with the Project shall remain the property of the Consultant.

The Client alone shall have a license to use the documents referred to above for the purpose of completing the Project, but the Client shall not use, or make copies of, such documents in connection with any work not included in the Project, unless written approval is obtained from the Consultant or otherwise agreed through a separate contract.

TABLE OF CONTENTS

1.0	SUMMARY	1
2.0	INTRODUCTION AND BACKGROUND	2
3.0	PROPOSED STRUCTURE PLAN AMENDMENT	4
4.0	EXISTING SITUATION.....	5
4.1	EXISTING LAND USES.....	5
4.2	EXISTING ROAD NETWORK.....	5
4.3	PUBLIC TRANSPORT.....	6
4.4	PEDESTRIAN AND CYCLIST FACILITIES	7
4.5	CHANGES TO SURROUNDING ROAD NETWORK.....	7
4.6	PUBLIC TRANSPORT NETWORK PLANNING	8
5.0	PROPOSED INTERNAL TRANSPORT NETWORK	9
5.1	ROAD HIERARCHY.....	9
5.2	PEDESTRIAN & CYCLIST FACILITIES.....	9
5.3	PUBLIC TRANSPORT.....	9
6.0	INTEGRATION WITH SURROUNDING AREA.....	10
7.0	ANALYSIS OF THE TRANSPORT NETWORK.....	11
7.1	ASSESSMENT PERIOD.....	11
7.2	TRAFFIC GENERATION AND DISTRIBUTION	11
7.3	TRIP DISTRIBUTION.....	11
7.4	DAILY TRAFFIC VOLUMES	12
7.5	ROADS AND INTERSECTIONS	14
7.5.1	ROADS ASSESSMENT.....	14
7.5.2	INTERSECTION ANALYSIS.....	15
8.0	CONCLUSIONS.....	17

**Appendix A. Proposed Subdivision Plan for former Benara Nurseries site –
Concept**

Appendix B. East Wanneroo Cell 2 – Agreed Structure Plan No. 4, Sinagra

REPORT FIGURES

Figure 1: Subject site.....	2
Figure 2: Subject site within MRS context.....	3
Figure 3: Existing bus routes (source: Transperth).....	6
Figure 4. Bike map (source: Department of Transport).....	7
Figure 5: Daily traffic flows forecast for existing ASP4 scenario	12
Figure 6: Daily traffic flows forecast for proposed ASP4 amendment.....	13
Figure 7: Resultant daily traffic impact due to proposed ASP4 amendment	14

REPORT TABLES

Table 1: Trip distribution of traffic generated by proposed subdivision.....	12
Table 2: Traffic impacts from subject site – Total Amended ASP4 area	15
Table 3: Traffic volume thresholds for detailed intersection analysis	16

1.0 Summary

This Transport Impact Assessment (TIA) has been prepared for the proposed East Wanneroo Cell 2 Adopted Structure Plan 4 Amendment to support proposed change in residential density for multiple lots located south of Vincent Road in Sinagra, City of Wanneroo. The proposal entails changes in density coding from currently approved R20 to R25 in the WAPC's *Metropolitan Region Scheme*.

The *Transport Impact Assessment Guidelines (WAPC, Vol 2 – Planning Schemes, Structure Plans and Activity Centre Plans, August 2016)* states that a supporting transport assessment is to be prepared for all scheme amendments, structure plans and activity centre plans. Accordingly, this Transport Impact Assessment addresses the transport implications of the proposal.

The density recoding proposal will result in creation of additional 120 residential lots over the subject site which comprises parts or complete portion of Lots 12 and 13 Griffiths Road and Lots 18, 19, 9525 and 9526 Vincent Road. The proposal also includes revisions to the planned road network to improve its efficiency and legibility.

2.0 Introduction and Background

This Transport Impact Assessment (hereafter TIA) has been prepared by Transcore on behalf of Vincent Road Development Pty Ltd with regard to the proposed East Wanneroo Cell 2 Adopted Structure Plan 4 amendment and proposed residential density recoding from R20 to R25 over a number of lots south of Vincent Road in Sinagra, City of Wanneroo.

The subject site comprises Lots 12 and 13 Griffiths Road and Lots 18, 19, 9525 and 9526 Vincent Road, which are situated south of Vincent Road and west of Griffins Road as shown in **Figure 1**. The subject site used to accommodate Benara Nurseries horticultural operation; however, at present, the subject land is largely vacant. The total combined area of the site is approximately 39ha.

The subject site is situated centrally within the East Wanneroo Cell 2 – Adopted Structure Plan No.4 Sinagra (hereafter EWC2 ASP4). A copy of EWC2 ASP4 plan is attached in **Appendix B**. The subject site is designed to interface with the existing EWC2 ASP road network and take access from the following roads: Vincent Road, Messina Drive and Griffiths Road (extension).

According to the plan provided to Transcore the subject land, once recoded from R20 to R25, is proposed to accommodate a residential subdivision with a total yield of 654 lots.



Figure 1: Subject site

This TIA evaluates the traffic volumes that will be generated within, or attracted to, the subject area and assesses the traffic impact of the proposal on the surrounding road network.

The location of the subject site in its regional context within the *Metropolitan Region Scheme (MRS)* is illustrated in **Figure 2**.

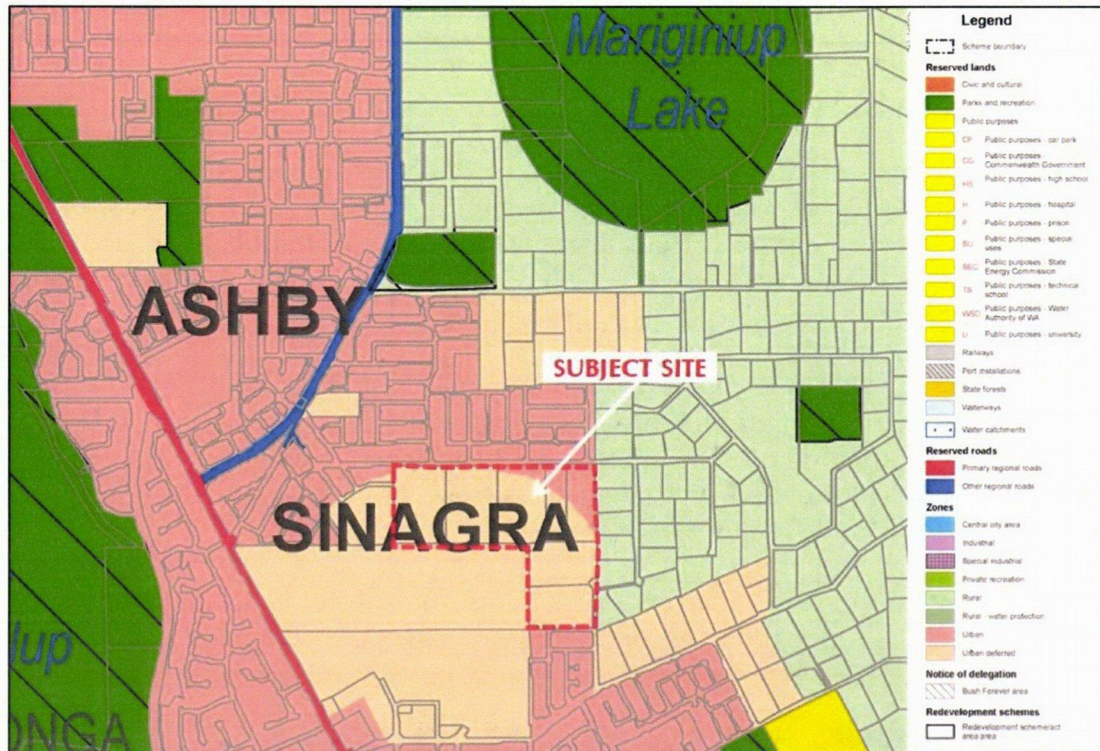


Figure 2: Subject site within MRS context

The MRS plan shows subject site being zoned as “Urban” and “Urban Deferred”. The MRS plan also indicates that Pinjar Road is classified as an *Other Regional Road* (Blue Road). All roads surrounding the subject site are local roads under care and control of City of Wanneroo.

A large portion of subject site is currently being affected by the existing 500m buffer from the existing Inghams Poultry Farm effectively sterilising this land for any residential development at this time. However, it is considered that the poultry farm may cease operation in not too distant future removing the existing restriction on development of adjacent affected land.

3.0 Proposed Structure Plan Amendment

The proposal entails recoding of R20 portion of EWC2 ASP4 to R25 resulting in creation of additional 120 residential lots Lots 12 and 13 Griffiths Road and Lots 18, 19, 9525 and 9526 Vincent Road. The proposal involves the relocation of the various R coding within the subject area and the deletion of the R20 coding from the subject area.

The recoding proposal will create a more efficient structure plan through increase in density and reduction in dedicated drainage requirements with some modification of existing road network at this locality to facilitate better integration of existing and future developments. With the proposed recoding, the total residential yield within the affected area will increase from (formerly planned) 534 residential lots to new 654 lots.

The subject land is located centrally within EWC2 ASP4 area and is designed to interface with the existing road network within the immediate vicinity. The proposal includes the minor adjustment to existing and partial realignment of some previously planned roads to facilitate better integration and more legible road system. The subject site will achieve its external connectivity predominantly via Vincent Road to the north, Messina Drive to the northwest and (extended) Griffiths Road to the east and south although subject site will also connect to other minor roads as well. On a regional level, Vincent Road/Messina Drive provide connection to Pinjar Road (major district-level road), Cordyline Entrance (through future subdivision to the north) and will provide connection to Caporn Street while Griffiths Road provides connection through to Dundebur Road, both being important district-level roads.

The proposed concept subdivision plan assumes existing Griffiths Road (currently cul-de-sac at the northern end) would extend further north to connect to Vincent Road.

Refer concept subdivision plan provided in **Appendix A** for more details.

4.0 Existing Situation

The former Benara Nurseries site occupies approximately 39ha and is bound by Vincent Road along the north perimeter, (extended) Griffiths Road to the east, Bibbulmun Entrance to the south and west to the Torrenova Way cul-de-sac in Sinagra. The site is located approximately 900m northeast of Wanneroo town centre and about 1km to the southwest of Mariginiup Lake.

4.1 Existing Land Uses

The subject site presently accommodates family owned and operated horticultural business, Benara Nurseries, which used to specialise in the growing and supply of wholesale native and exotic plants. This operation occupies most of the site with several commercial buildings situated at the southern part of the site. The areas to the east of the subject site are predominantly of rural character with rural residential estates, while the areas to the north, northwest and south are urbanised. A poultry farm is presently located immediately to the southwest of subject site halting any further residential development within the 500m buffer radius.

The Ashby Neighbourhood Centre is located approximately 800m to the northwest at the corner of Pinjar Road/Hollosy Way/Caporn Street intersection while Wanneroo town centre is situated approximately 900m to the southwest.

4.2 Existing Road Network

Vincent Road is an east-west road which connects Messina Drive at the west with Garden Park Drive at the east. It is constructed as a single carriageway, two-lane road with a shared path along northern side (between Messina Drive and Rhoeo Outlook). West of Cordyline Entrance it entails a default built-up area speed limit of 50km/h which increases to 60km/h east of this road. According to the Main Roads WA *Metropolitan Functional Road Hierarchy* document, Vincent Road is classified as a *Local Distributor* road.

Based on February 2014 traffic counts provided by City of Wanneroo Vincent Road, west of San Teodoro Avenue, carried about 1,065vpd on a regular weekday with AM and PM peaks recording 70vph and 76vph, respectively.

Messina Drive, is also constructed as a 7.2m wide single-carriageway road with pedestrian path along eastern side. It operates under a default built-up area speed limit of 50km/h. According to the Main Roads WA *Metropolitan Functional Road Hierarchy* document, Messina Drive is classified as a *Local Distributor* road.

Based on February 2011 traffic counts provided by City of Wanneroo Messina Drive, south of Castoreale Avenue, carried about 1,960vpd on a regular weekday with AM and PM peaks recording 170vph and 181vph, respectively.

Griffiths Road, is a single carriageway, two-lane road approximately 7m wide and is cul-de-saced about 420m north of Dundobar Road. It is classified as an Access Road and operates under a default built-up area speed limit of 50km/h.

There are no available traffic counts for Griffiths Road.

Vincent Road forms a simple priority-controlled T-intersection with Messina Drive and Garden Park Drive. Griffiths Road forms a priority-controlled T-intersection with Dundobar Road.

4.3 Public Transport

The subject site including the existing residential development in the immediate vicinity have limited access to public transport network at present. The nearest pair of bus stops to subject site are located on Carosa Road and Wanneroo Road some 650m and 75m as-crow-flies to the west of the subject site. The map of existing public transport services within the locality is provided in **Figure 3**.

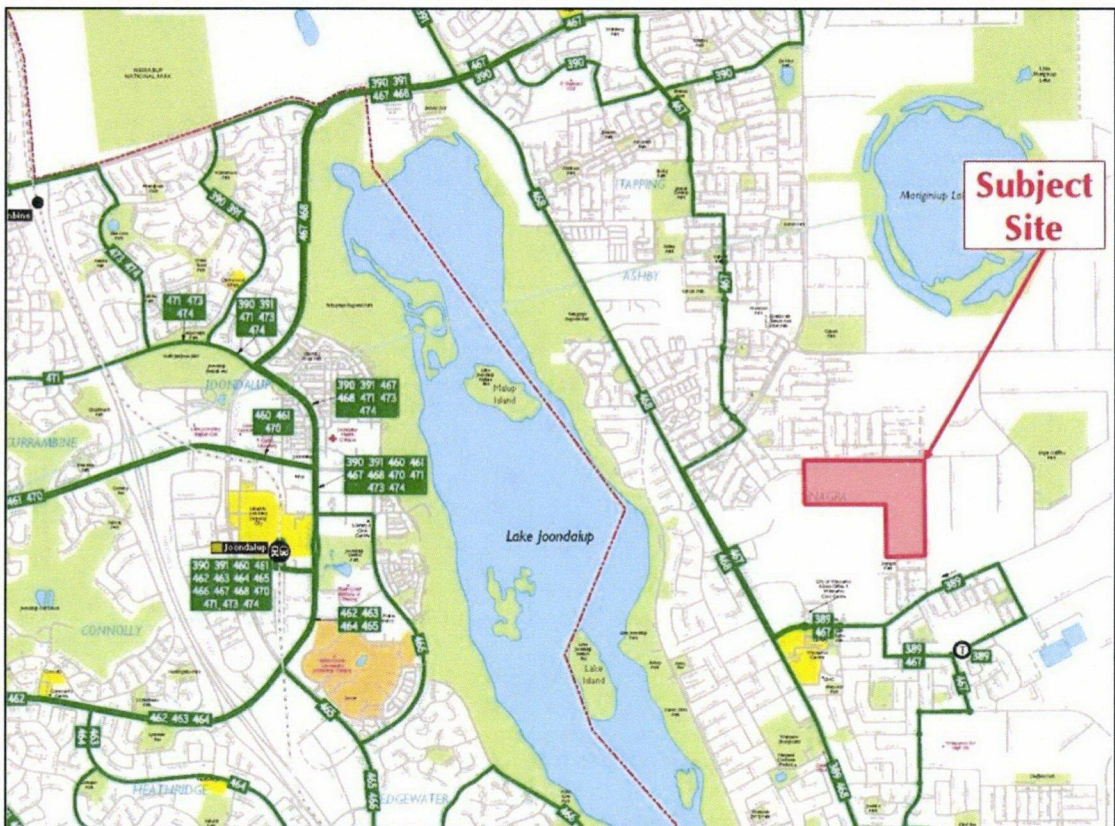


Figure 3: Existing bus routes (source: Transperth)

4.4 Pedestrian and Cyclist Facilities

Pedestrian connectivity to the subject site is available via the existing external path network comprising paved paths on surrounding residential roads to the north of the subject site, specifically Vincent Road and Messina Drive, that link up with the path system along Pinjar Road/Wanneroo Road. A pedestrian path is in place along Griffiths Road which connects to the path/shared path network along Dundobar Road.

Bike access to the site is provided directly via shared path links along the north site via Griffith Road identified as “good road riding environment” connecting to Wanneroo town centre via Dundobar Road. The Department of Transport’s *Perth Bike Map* series (see **Figure 4**) shows available pedestrian and cyclist routes to the site.



Figure 4. Bike map (source: Department of Transport)

4.5 Changes to Surrounding Road Network

As part of the development proposal, some of the planned but not yet constructed internal EWC2 ASP4 roads are proposed to be re-aligned to better connect to the existing road system surrounding the subject site. Also, Griffiths Road is proposed to extend further north from its termination point and connect to Vincent Road at the north end with slight realignment of the northern section to connect at Rheo Outlook roundabout.

4.6 Public Transport Network Planning

At this stage, no new public transport option in form of bus services are planned or justified for the area. However, subject to further urbanisation of the locality the Public Transport Authority (PTA) is likely to investigate appropriate public transport services for the locality.

5.0 Proposed Internal Transport Network

5.1 Road Hierarchy

Based on the road design principles contained within the WAPC *Liveable Neighbourhoods* publication (2009) for road classification and the estimated total traffic generation of the subject site all internal subdivision roads are likely to be classified as *Access Street B* and *Access Streets D*.

It is anticipated that with the full development of the EWC2 ASP4 area the internal east-west road skirting future primary school site along southern perimeter and Griffiths Road may qualify for *Local Distributor* status.

5.2 Pedestrian & Cyclist Facilities

In accordance with the WAPC *Liveable Neighbourhoods* principles paths would be required on at least one side of all lower order access streets. Shared paths on the other side of *Access Street C* and on roads surrounding the primary school site may be required to improve cyclist access to the school and secure connection to the external shared path along Dundobar Road and Wanneroo Road. Vincent Road already facilitates cyclist connection to Pinjar Road via Messina Drive.

Shared paths on internal subdivision roads would not be mandatory as daily traffic forecast for all *Access Street D* roads would be such that cyclists can share the carriageways with cars.

5.3 Public Transport

The existing bus services at this locality are noted in section 4.3 of this report. It is expected that once the population within the locality has reached critical levels PTA will investigate public transport service for the locality.

6.0 Integration with Surrounding Area

The proposed amendment application for recoding of R20 portion of EWC2 ASP4 to R25 would result in increase of residential lot yield by approximately 120 lots at the subject site. The EWC2 ASP4 road network is proposed to undergo minor modifications to ensure better interface with the existing road system bordering the subject site.

A primary school is proposed centrally within the EWC2 ASP4 area, immediately southwest of the subject site. The location of the school is ideal to serve the proposed residential development. Routes to and from the school would be via internal subdivision roads without the need to take district-level roads to travel between the subject site and the school.

Once fully developed Ashby Village Neighbourhood Centre, located about 500m northwest of the subject site and Wanneroo town centre area to the southwest, would represent convenient and easily accessible retail/commercial nodes to serve the subject subdivision.

7.0 Analysis of the Transport Network

7.1 Assessment Period

For this Transport Impact Assessment, year 2031 has been selected as the assessment year in accordance with WAPC *Transport Impact Assessment Guidelines*. It is anticipated that by this time the existing poultry farm would cease its operation removing the existing restriction on development of adjacent land.

7.2 Traffic generation and distribution

The traffic volume that will be generated by the subject site based on the original R20 coding and for the proposed R25 density scenario has been estimated using trip generation rates derived from the Roads and Traffic Authority of New South Wales *Guide to Traffic Generating Developments (2013)*. A trip rate of 8 vehicle trips per day (vpd) per dwelling were adopted in this case.

Accordingly, it is estimated that the whole of the subject site would generate approximately 4,270 total daily trips (both inbound and outbound) under original EWC2 ASP4 coding and approximately 5,230 total daily trips with the proposed EWC2 ASP4 amendment.

Hence, the result of the proposed R20 to R25 recoding is generation of additional 960vpd. As the proposed land uses for the subject site are exclusively residential it is anticipated that vast majority of trips would be external to the subdivision. Approximately 400vpd would be attracted to the future primary school (internal trips) with the balance being trips external to the subdivision.

7.3 Trip Distribution

The distribution of trips from the subject site is based on the layout of adjacent local and district-level road network as well as major education, retail, recreational, employment and social attractors. The external distribution of trips to and from the subject site is summarised in **Table 1**.

Table 1: Trip distribution of traffic generated by proposed subdivision

Traffic Distribution Direction	Proportion (%)
Vincent Road (west)	25%
Vincent Road (east)	10%
Messina Drive (west)	5%
Future Southern East-West Subdivision Road (west)	15%
San Teodoro Avenue (north)	10%
Cordyline Entrance (north)	5%
Future Southern Subdivision Road (south)	10%
Griffiths Road	20%
Total	100%

7.4 Daily Traffic Volumes

The forecast traffic volumes for the key EWC2 ASP4 subdivision roads for current ASP4 scenario and amended ASP4 proposal with higher density are illustrated in **Figure 5** and **Figure 6**, respectively.

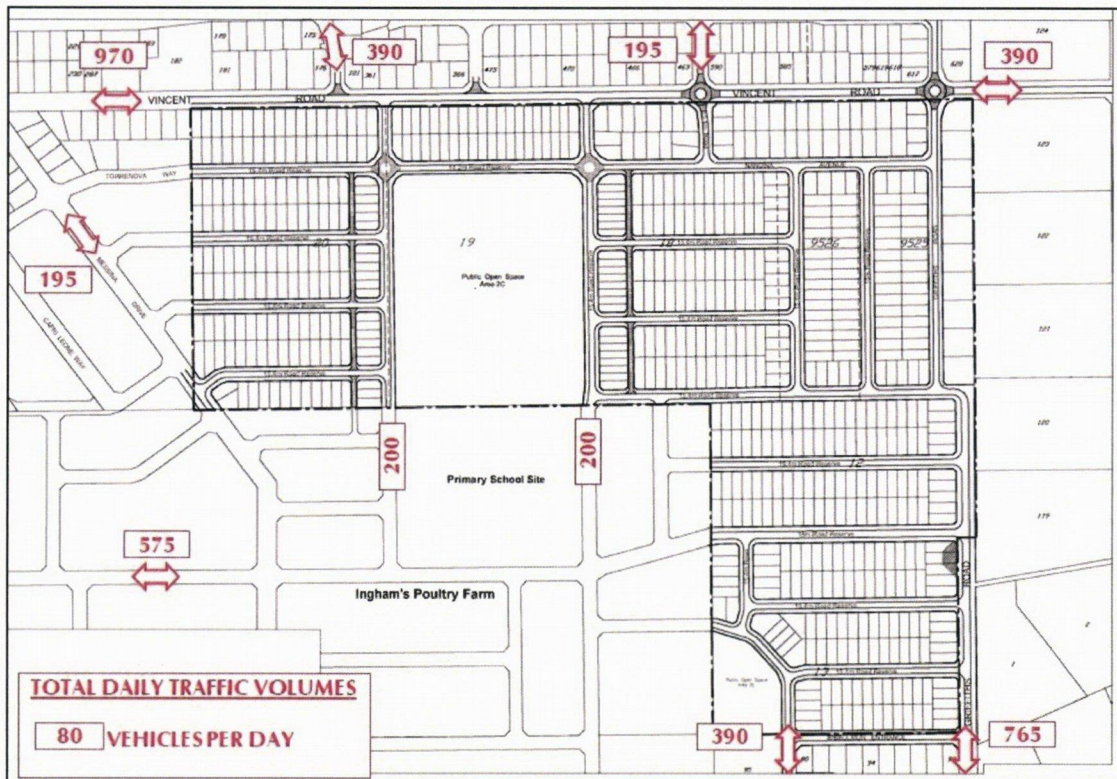


Figure 5: Daily traffic flows forecast for existing ASP4 scenario

It should be noted that the amended ASP4 subdivision layout is used as a base for both existing ASP4 and amended ASP4 scenarios background only for consistency purpose. It should also be noted that the existing ASP4 scenario shows only external traffic footprint of the ASP4 scheme (i.e. anticipated traffic volumes from the subject

site onto adjacent road network) while the amended ASP4 scenario also includes traffic forecasts on some internal roads.

The central position of the subject site within the ASP4 and proximity to two key district-level roads (Wanneroo Road and Pinjar Road) provides for a multitude of access and egress routes to and from the site. This in return results in balanced distribution of traffic generated from and attracted to the subject site spreading the traffic load and impact evenly across surrounding structure plan road network.

As such, although the subject site is expected to ultimately generate over 5,200vpd daily trips as a result of the the proposed ASP4 amendment, some 920vpd more than in current ASP4 planning, the distribution of traffic load helps minimise the level of impact on affected adjacent roads.

Hence, as a result of the proposed increase in density the subject site will generate between 45vpd and 240vpd of additional traffic (daily trips) on individual roads. Refer **Figure 7** for more details.

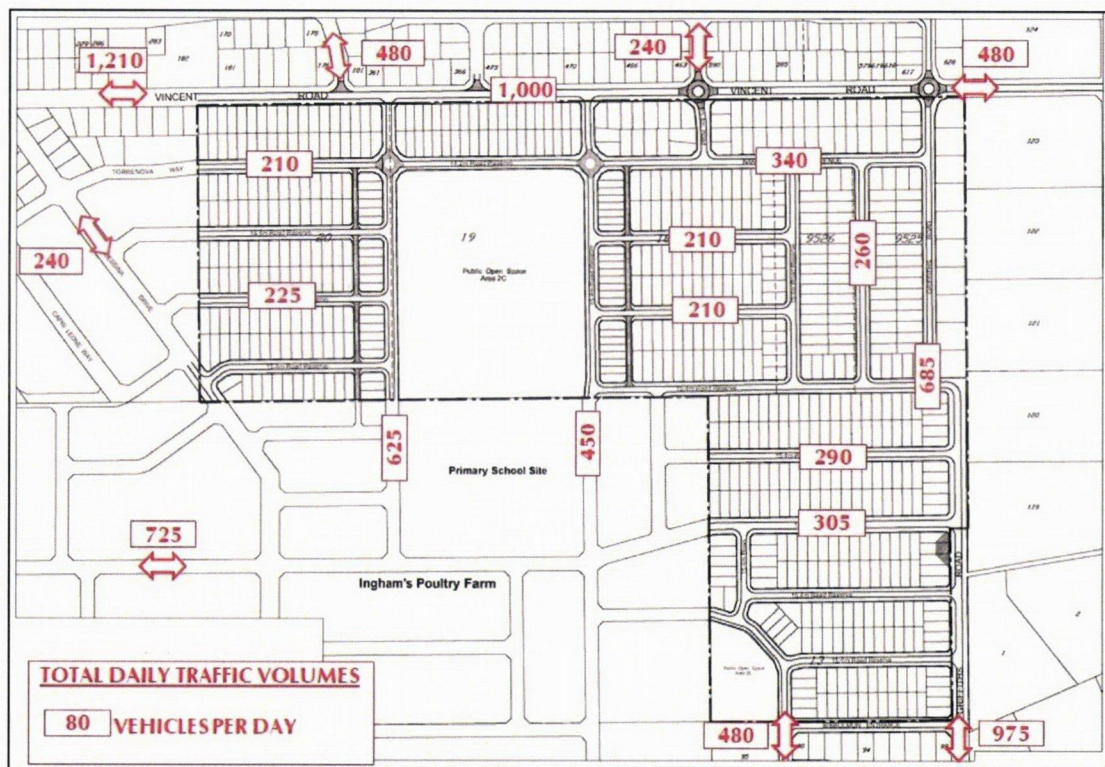


Figure 6: Daily traffic flows forecast for proposed ASP4 amendment

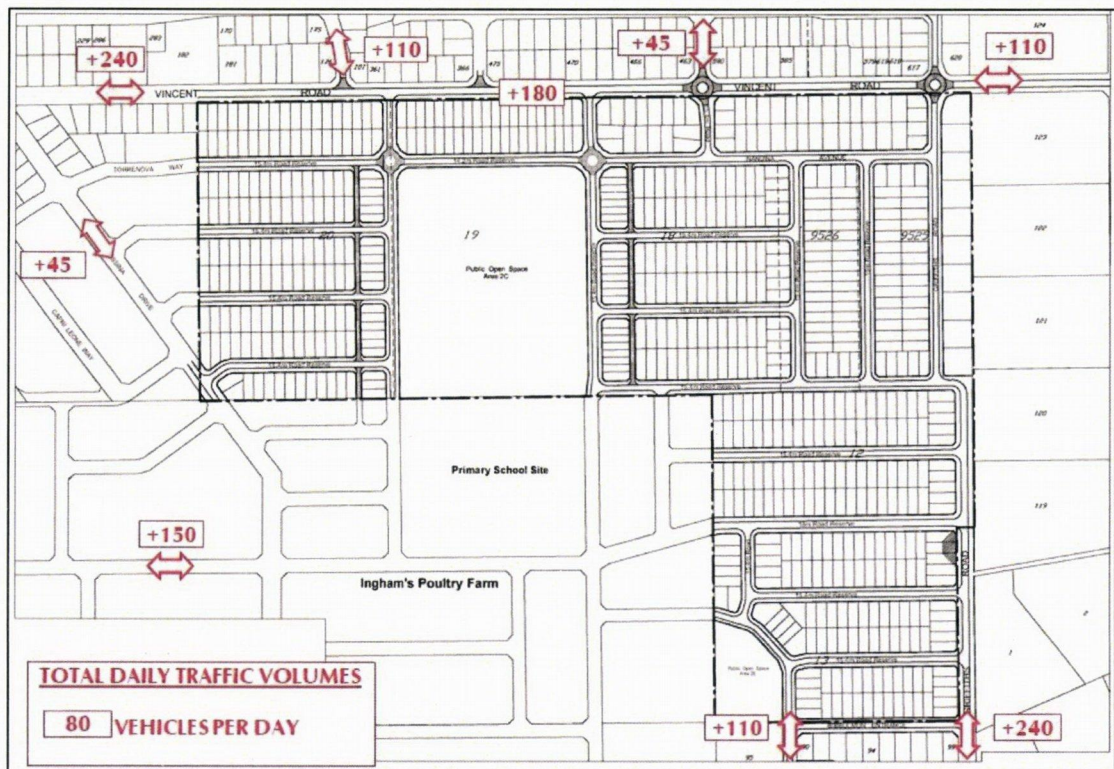


Figure 7: Resultant daily traffic impact due to proposed ASP4 amendment

7.5 Roads and Intersections

7.5.1 Roads Assessment

The anticipated road network hierarchy for the proposed amendment of the subdivision at the subject site is discussed in section 5.1 of this Transport Impact Assessment.

The desirable daily volume thresholds for *Access Street B* and *Access Street D* is 3,000vpd and 1,000vpd, respectively. As such it is expected that the anticipated road hierarchy for the residential subdivision would have more than sufficient capacity to accommodate the forecast daily traffic flows on internal subdivision roads.

As previously discussed, the subject site's internal road network is designed to interface with the existing road network serving the residential areas to the immediate west and south. The level of traffic expected to flow from the subject site onto surrounding road network is expected to be relatively low due to its spread over a number of directions which results in reduction in the level of impact on each individual road.

The expected additional traffic, as a result of the proposed change in coding from R20 to R25 and the subsequent increase in lot yield at the subject site, on other surrounding residential roads is manageable and would not have a significant impact on their operation.

The estimated level of traffic impact from the subject site on adjacent road network is illustrated in **Table 2**. The historical traffic volumes for the relevant roads sourced from City of Wanneroo have been factored up to approximate future volumes.

Table 2: Traffic impacts from subject site – Total Amended ASP4 area

Road	2031 volumes ¹	+ASP4	Total Post
Garden Park Drive (S of Caporn St)	1,165vpd	+110vpd	1,275vpd
Garden Park Drive (S of Vincent Rd)	2,365vpd	+280vpd	2,645vpd
Messina Drive (S of Castoreale Blvd)	2,350vpd	+1,450vpd	3,800pd
Vincent Road (W of San Teodoro Ave)	1,165vpd	+1,210vpd	2,375vpd

With the proposed ASP4 amendment implemented Messina Drive daily traffic volumes are expected to increase to just under 4,000vpd. The maximum desirable total daily traffic volume threshold for *Local Distributors* in an urban built up area is 6,000vpd and as such the forecast post development daily traffic volumes are comfortably within the intended range.

Similarly, Vincent Road is expected to ultimately carry up to 2,400vpd which is again well within the intended total daily traffic volume threshold for *Local Distributors* in an urban built up area.

Garden Park Drive traffic volumes are within the *Access Road* threshold for built up area of 3,000vpd.

The traffic increases on remainder of adjacent roads is relatively low indicating no significant level of impact should be expected.

Accordingly, it is concluded that the proposed change in density from R20 to R25 within EWC2 ASP4 area would not undermine the operation of existing local road network.

7.5.2 Intersection Analysis

Table 2.4 from AUSTRROADS “*Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings*” illustrates the traffic volume thresholds above which a detailed intersection capacity assessment is required.

It is typically assumed that typical peak hour traffic represents approximately 10% of the daily traffic volume. As hourly traffic volumes through intersections are well below the indicative thresholds shown in **Table 3**, it is confirmed that uninterrupted traffic flow conditions can be expected at all key internal subdivision intersections.

¹ Estimation based on factored up historical counts sourced from CoW

Table 3: Traffic volume thresholds for detailed intersection analysis

Major Road type	Major Road Flow (vph ²)	Minor Road Flow (vph)
Two-lane	400	250
	500	200
	650	100
Four-lane	1,000	100
	1,500	50
	2,000	25

Similarly, none of the remainder of internal structure plan intersections are expected to accommodate traffic volumes anywhere near the thresholds that would trigger the need to undertake detailed capacity assessment and as such it is expected that all internal EWC2 ASP4 structure plan intersections should continue to operate at a satisfactory level.

It is therefore concluded that the existing intersection layouts provide for good operational conditions and sufficient capacity to accommodate the post development traffic flows as a result of proposed increase in density.

² vph – vehicles per hour, typically represent 10% of total daily traffic volume

8.0 Conclusions

The proposed amendment of EWC2 ASP4 relating to change in density from R20 to R25 is expected to yield additional 120 residential lots within the former Benara Nurseries site located south of Vincent Road in Sinagra, City of Wanneroo.

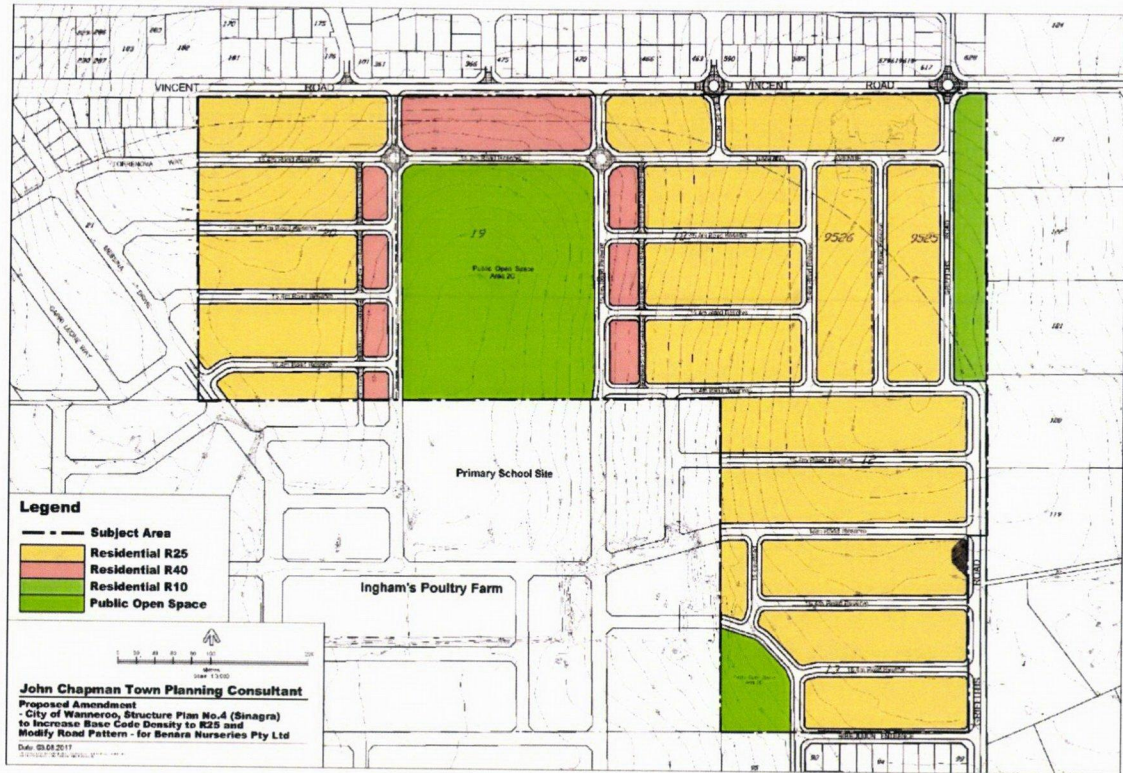
In line with the original EWC2 ASP4 plan total daily trip generation within the subject site is estimated to be in order of 4,270 vehicle trips per day (both ins and outs). As a result of the proposed recoding application, the subject site now estimated to generate additional 920vpd, resulting in total site traffic generation of 5,230vpd.

Due to its central location within EWC2 ASP4, the anticipated additional traffic generated by the subject site will be distributed over the adjacent road network in such a way that the impacts on local surrounding roads will be manageable and well within the capacity of the network. The existing road network within the locality has sufficient capacity to accommodate the anticipated traffic from the subject site with no requirement for upgrades.

The road layout and pedestrian/cyclist facilities will be designed in such a way to facilitate seamless integration with the surrounding road system. This would warrant some minor modifications to the planned EWC2 ASP4 road network; however, the effect of these changes is expected to improve the land use and road network efficiency and result in in more legible road system.

Appendix A

PROPOSED SUBDIVISION PLAN FOR FORMER BENARA NURSERIES SITE – CONCEPT

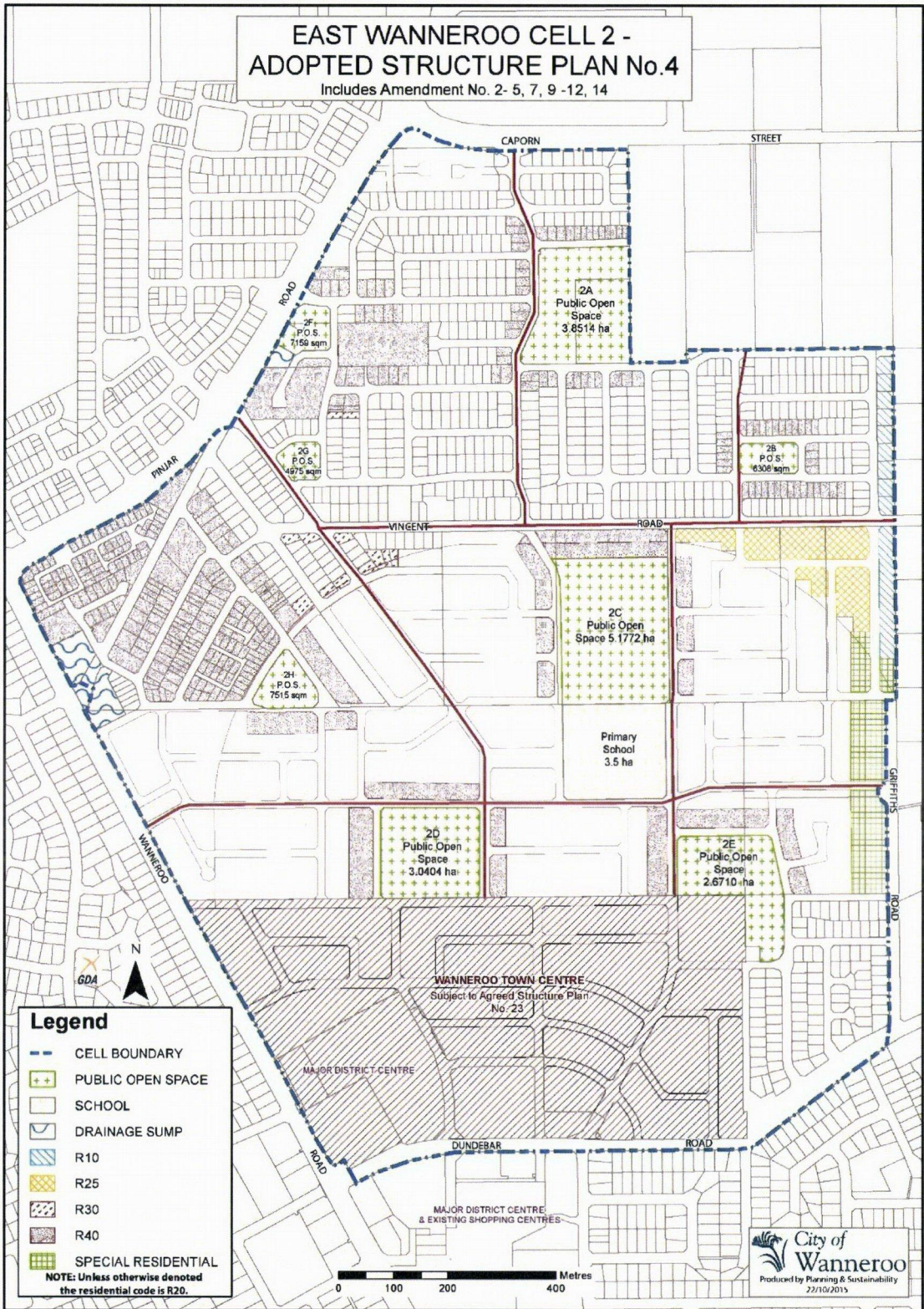


Appendix B

EAST WANNEROO CELL 2 – AGREED STRUCTURE PLAN No. 4, SINAGRA

EAST WANNEROO CELL 2 - ADOPTED STRUCTURE PLAN No.4

Includes Amendment No. 2- 5, 7, 9 -12, 14



Appendix 6
Engineering Services Report



DEVELOPMENT
ENGINEERING
CONSULTANTS

Telephone: (08) 9481 1900

Facsimile: (08) 9481 1700

Suite 3, Ground Floor

The Atrium 123A Colin Street

West Perth WA 6005

Our Ref: PRO 1144

South of Vincent Rd to Griffiths
Rd

Development ServeReport Aug
2017.doc

VINCENT ROAD, SINAGRA

PROPOSED URBAN DEVELOPMENT SOUTH OF VINCENT ROAD

ENGINEERING SERVICES REPORT.

1. General:

The subject site in the district of Sinagra of the City of Wanneroo abuts existing residential subdivisions to the west, north and east and the south east to Bibbulmun Entrance, with the Ingham Chicken site abutting the land on the southern boundary and south eastern boundary. It is located immediately south of Vincent Rd, west of Griffiths Rd and east of the future Messina Drive north of Inghams. The site has previously been used as a plant nursery, and includes existing irrigation and work sheds.

It is proposed to develop the land as a mixed urban development encompassing R10, R25 and R40 residential lots. Some 600 lots will be developed. All lots will be fully serviced, including the R10 lots along the eastern boundary.

This report covers existing and proposed services plus proposals for earthworks, retaining walls, roads, drainage, groundwater, water supply, power supply, gas, telecommunications and sewerage, as required for current urban development standards.

2. Executive Summary

The land the subject of this report is located on the south side of Vincent Rd, Sinagra, of the City of Wanneroo. It is some 700 metres east of Wanneroo Rd. It is accessed from Vincent Rd on the north, Griffiths Rd on the north-east and Bibbulmun Entrance on the south.

The land along the southern boundary is occupied by the Ingham Chicken Hatchery, which has been responsible for an odour buffer across the land. It is believed this facility and associated buffer will be removed in the near future.

Subject to standard development conditions, the land can be fully developed as an urban subdivision.

The land, which is fully cleared encompasses some 33.2 hectares, has until recently been used by the owner/ proponent as a plant nursery, and storage sheds.

The basic land form is a free draining south and west facing saddle slope between two ridges, varying in elevation from RL 74m AHD at the north- west corner on Vincent Rd on the west and RL 79m AHD on Vincent Rd on the east, down to RL 60m AHD centrally along the southern

boundary. The highest point on the land is at RL 87m AHD on Griffiths Rd halfway down the eastern boundary.

The Environmental Geology map of the Geological Survey of Western Australia classifies this site as generally “S7” Sand derived from Tamala Limestone, which soil type is considered “suitable for urbanization”. Their current process is listed as “ground water recharge”. It has excellent water infiltration capability.

The land can be connected to all services, either by extension and upgrading from existing infrastructure, or by provision of new infrastructure as set out below. Power and telephone services already pass along the site frontage.

Vincent Rd is constructed as a good quality urban road, sealed and kerbed. Griffiths Rd north is a recently constructed urban road, and Griffith Road south is sealed but not drained along the site frontage. Bibbulmun Entrance along the southern boundary of the site is a fully sealed and kerbed urban road and includes all services.

There is a Water Corporation 1000mm trunk water main constructed along the northern verge of Bibbulmun Entrance from Griffiths Rd south, which continues west through the Ingham site.

The Water Corporation sewer and water planning shows this land being connected to sewer by gravity to the existing system, and they advise that water supply is available up to a height of RL 95m AHD. The land high point at RL87m AHD is therefore within their servicing capacity.

3. Site

The site is located on the southern side of Vincent Rd, and abuts existing serviced urban lots to the west, north, east and south.

The site is composed of free draining deep sands, which allow stormwater to infiltrate with ease. The slope on the site, generally falling at a grade of 1 in 15 from east to west will mean that extensive retaining will be required in order to present level building lots.

Vincent Rd, which forms the main access to the site, is adjacent to the site along the northern boundary. It is a well-constructed urban road in good condition, with an 8 metre wide bitumen seal with kerbing and piped drainage. A recent subdivision has been done on the north east corner of the site, which has brought services to the threshold of the proposed new development.

The geology of the land is described by the Environmental Geology Map of the Geological Survey of WA, as being “S7 being sand derived from Tamala Limestone”. This soil type is described as being “suitable for urbanization”. Its current process is groundwater recharge. The geotechnical evidence from the adjacent developments shows no Karstic formations in this area.

The site is connected to underground telephone and power.

All of the site is cleared, although demolition of sheds, underground services and irrigation will be required. It has a minimum clearance to the groundwater level of 21 metres, meaning that there will be no issue with site infiltration of stormwater drainage or fill.

4. Development Proposal

It is proposed to develop the land as an anticipated mix of some 600 single residential and unit sites at densities of R10, R25 and R40, with all normal services, with links to abutting developments (existing and proposed) for sewer, water, power, roads, gas and telephone services with all drainage to be retained on site, using best management practices.

The Water Corporation has advised that the land can be serviced from existing infrastructure. The whole of the land is within the Corporation's Wanneroo High Level water supply area, and the land can be connected to existing sewers, although some extension for connection may be required off-site for the northern catchment.

The development will entail earthworks to provide level, free draining building blocks with extensive medium height retaining walls, given the sloping site.

Drainage will be effected by site soakage in a series of landscaped drainage swale basins located within POS in line with current practice. The proposed basins will contain the 1 in 100 year storm run off.

Geotechnical site investigations will be carried out as required when the development proceeds.

5. Earthworks & Retaining Walls

Because of the sloping nature of the site, overall earthworks will be required to provide level building blocks, thus necessitating extensive low and medium height retaining walls. The average slope across the land is 1 in 15.

All retaining walls will be subject to Council building approval.

Earthworks on site will entail removal of topsoil, cut and fill. No importation of sand fill is envisaged.

6. Roads & Footpaths.

All roads will be constructed to City of Wanneroo standards and approval, including kerbing and piped drainage, plus provision of footpaths as required.

Footpaths will be generally installed on all roads, with Vincent Rd having both a footpath and a Dual Use Path installed to match the existing situation.

7. Drainage

The site will be self-contained as far as storm-water drainage is concerned. Vincent Rd abutting the site will be drained into the new development facilities.

The site falls into three drainage catchments, and it is anticipated that they will drain into new shallow landscaped infiltration basins to be located within the POS areas, to Council approval.

These basins will accommodate storm flows from roads up to and including the 1 in 100 year storm.

The soil characteristics of the site will allow site soakage, based on the geology and the depth to groundwater. The depth to ground water is estimated to be a minimum of 21 metres below the lowest ground level, according to the 1997 Ground Water Atlas.

8. Groundwater

The 1997 issue of the Department of Water (DoW) Groundwater Atlas, which shows the highest groundwater contour level, has site groundwater contours rising from RL 39m AHD along the western boundary of the site, up to RL 41.3m AHD along the eastern boundary of the site at Griffiths Rd.

Site levels vary from RL 60m AHD midway along the southern boundary of the site, up to RL 87m AHD midway along the eastern boundary of the site.

These levels indicate a minimum of 21 metres above the highest known groundwater contour.

9. Power

It appears that sufficient power supply exists in the area to supply the development.

The existing aerial service lines inside the site servicing the irrigation and sheds will be removed as part of the development, as will the aerial power line along that part of Griffiths Rd which serves the sheds, including the pole top transformer. All new works will be located underground as required by the WAPC conditions of subdivision.

Maintenance of power to occupied homes will be a priority during subdivision construction.

All internal power reticulation lines and transformer installations will be constructed at the cost of the developer. Transformer and Switch Station sites will be determined at the detailed subdivision design stage.

10. Water Supply

There is a 1000mm trunk water main along Bibbulmun Entrance, which then continues west to Wanneroo Rd within the neighboring Ingham Chicken site. This main cannot be connected to, and is not expected to cause any interruption to this development, other than being fully protected during sewer connections across it to the new lots fronting the existing Bibbulmun Entrance.

Water Corporation has advised that the whole of the land can be serviced from existing infrastructure up to RL 95m AHD, which is well above the site maximum ground level of RL 87m AHD. Some areas within the site, specifically on the western third of the site, where the land falls below RL 64m AHD, will be carefully earthworked (principally to allow a shallower sewer connection through a ridge), to lift low blocks to a minimum of RL 63 AHD, so that the whole development will be served from the high level supply.

To service the development, existing mains will be extended from existing abutting roads, but principally from Vincent Rd, Griffiths Rd and Bibbulmun Entrance.

Internal mains will be constructed to Water Corporation design requirements, including provision of hydrants, valves etc.

11. Sewer

The site is not currently connected to sewer. Overall sewer planning for this area shows it falls into two gravity catchments; the major one being the northern area abutting the northern Ingham Chicken site, which will connect to a 300mm trunk sewer west of the site, and a smaller south eastern catchment abutting the eastern boundary of the Ingham site, which will connect to an existing main in Bibbulmun Entrance.

Northern Catchment;

The 300mm trunk sewer at present is some 350 metres north west of the site at the end of the constructed portion of Capri Leone Way and the corner of Torrenova Way. This will need to be constructed through private land along the planned road reserves to the northern boundary of the Ingham site, from which point a 150mm main will need to be extended east to the south west corner of this development site.

In order for this 150mm sewer to service the land on the eastern side of the Proposed POS, which has a low point at RL 60m AHD, it will need to be extended through the western ridge of the site

at an approximate invert level of RL 58m AHD, which is some 6 metres deep at the western boundary of the site. Representation of this requirement to Water Corporation is needed to ensure this happens, as it will be constructed by the neighboring landholder/ developer.

The internal site ridge will be cut down to approximately RL 64 so that the sewer is not more than 6 metres deep. The sewer then needs to be constructed eastwards across the POS within an easement to be granted by the City of Wanneroo at minimum depth. It is planned to fill this portion of the POS to allow for a level playing field at RL 62m AHD during the earthworks stage of the development, which will then provide proper cover to the sewer.

South-Eastern Catchment;

This catchment will discharge directly into the existing sewer located at the north-western end of Bibbulmun Entrance. Some connections across Bibbulmun Entrance will need to be made to the new lots fronting it on the northern boundary. Such crossings also need to cross the existing 1000mm trunk water main located along the northern verge of Bibbulmun.

Sewer works will also be required along Griffiths Rd north of Bibbulmun, where a sealed road is built to rural standard just to service the proponent's storage and work sheds. This sewer will need to be constructed alongside an existing 200mm water main.

12. Telephone & NBN

Telstra services exist in the area along Vincent Rd and the abutting developments. These services will be extended to service this proposed development. Some upgrading may be required. If Telstra is to be the servicing authority, Telstra normally requires twelve months' notice of development starting to ascertain any upgrading requirements.

In accordance with recent requirements, the developer is required to install NBN "pipe and pit" to allow for future installation of cables for the NBN. The design of the "pipe & pit" is the responsibility of the developer, and will be designed in conjunction with the underground power network, and installed during the construction phase of the development.

13. Gas

Gas mains are installed in Vincent Rd and the abutting developments, and can be extended to the site. It is the current system that the developer provides trenching and ATCO Gas installs the pipework.



DEVELOPMENT ENGINEERING CONSULTANTS PTY LTD

THIS REPORT IS DATED 30 AUGUST 2017.