SITE
PLANNING + DESIGN

LPS AMENDMENT

LOT 7 (No. 41) MARION WAY, GOOSEBERRY HILL

PREPARED FOR:
LISA + STEVEN MUELLER (LANDOWNER)

October 2017

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LOT 7 (No. 41) MARION WAY, GOOSEBERRY HILL CITY OF KALAMUNDA

LPS AMENDMENT

OCTOBER 2017

ISSUE 2A: FINAL

Prepared for:	**Lisa and Steven Mueller (Landowners)**
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Date:	Revision No:	Documents Revisions:	Issued To:	Author:	Reviewer:
22 Sep 2017	1A – Draft for Client review		Client	GG	TC
10 Oct 2017	2A – Final for lodgement		City of Kalamunda	GG	TC

ENDORSEMENT PAGE

This LPS Amendment is prepared under the provisions of the City of Kalamunda Local Planning Scheme No. 3

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

.....

Date

Signed for and on behalf of the Western Australian Planning Commission:

.....

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

..... Witness

.....

Date

.....

Date of Expiry

AMENDMENT PAGE

AMENDMENT NUMBER	SUMMARY OF THE AMENDMENT	AMENDMENT TYPE	DATE APPROVED BY THE WAPC

EXECUTIVE SUMMARY

This Local Planning Scheme ('LPS') amendment has been prepared on behalf of Lisa and Steven Mueller, the landowners of Lot 7 (No. 41) Marion Way, Gooseberry Hill (the 'Site'). This LPS Amendment proposes the rezoning of Lot 7 from 'Residential – R5' to 'Special Use (Aged Person's Dwellings)' with an applicable density of 'Residential – R12.5'.

The report addresses State and Local strategic planning framework requirements, and has been prepared in accordance with WAPC requirements.

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FIGURES

ATTACHMENTS

ABBREVIATIONS

Abbreviations used in this report are summarised below for ease of reference.

AAS	City of Kalamunda Aged Accommodation Strategy
Act	Planning and Development Act 2005
BAL	Bushfire Attack Level
BMP	Bushfire Management Plan
City	City of Kalamunda
Client	Mrs Lisa + Mr Steven Mueller
DBYD	Dial Before You Dig
Department	Department of Planning, Lands and Heritage
LGA	Local Government Area
LHS	City of Kalamunda Local Housing Strategy
LPS3	City of Kalamunda Local Planning Scheme No. 3
MRS	Metropolitan Region Scheme
SCA	Special Control Area
R Codes	State Planning Policy 3.1 – Residential Design Codes
SPP3.7	State Planning Policy 3.7 – Planning in Bushfire Prone Areas
Strategy	City of Kalamunda Local Planning Strategy
WAPC	Western Australian Planning Commission

1. INTRODUCTION

Lisa and Steven Mueller ('Client'), the landowners of Lot 7 (No. 41) Marion Way, Gooseberry Hill seek to initiate an amendment to the City of Kalamunda's Local Planning Scheme No. 3 ('LPS3') by:

- Rezoning Lot 7 (No. 41) Marion Way, Gooseberry Hill from 'Residential – R5' to 'Special Purpose Use (Aged Person's Dwellings)' with an applicable density of R12.5, as depicted on Attachment 2 – Scheme Amendment Map.
- Inserting additional text provisions into Schedule 4 – Special Use Zones.

The purpose of the proposed amendment to LPS3 is to facilitate the future subdivision and development of the Lot 7 for aged persons' dwellings.

This report provides background information on Lot 7 and the surrounding area, and addresses all town planning, environmental, servicing and other considerations relevant to Lot 7 and the proposed amendment to LPS3.

This report includes a description of the following matters:

- Location of Lot 7;
- Description of existing land use;
- Overview of relevant planning issues;
- Detailed explanation of the proposed amendment to LPS3; and
- Justification for the proposed amendment to LPS3.

2. SITE DESCRIPTION

2.1 LOCATION

Lot 7 is located within the municipality of the City of Kalamunda (the 'City'), approximately 18km east of the Perth central area. Refer Figure 1 – Location Plan.

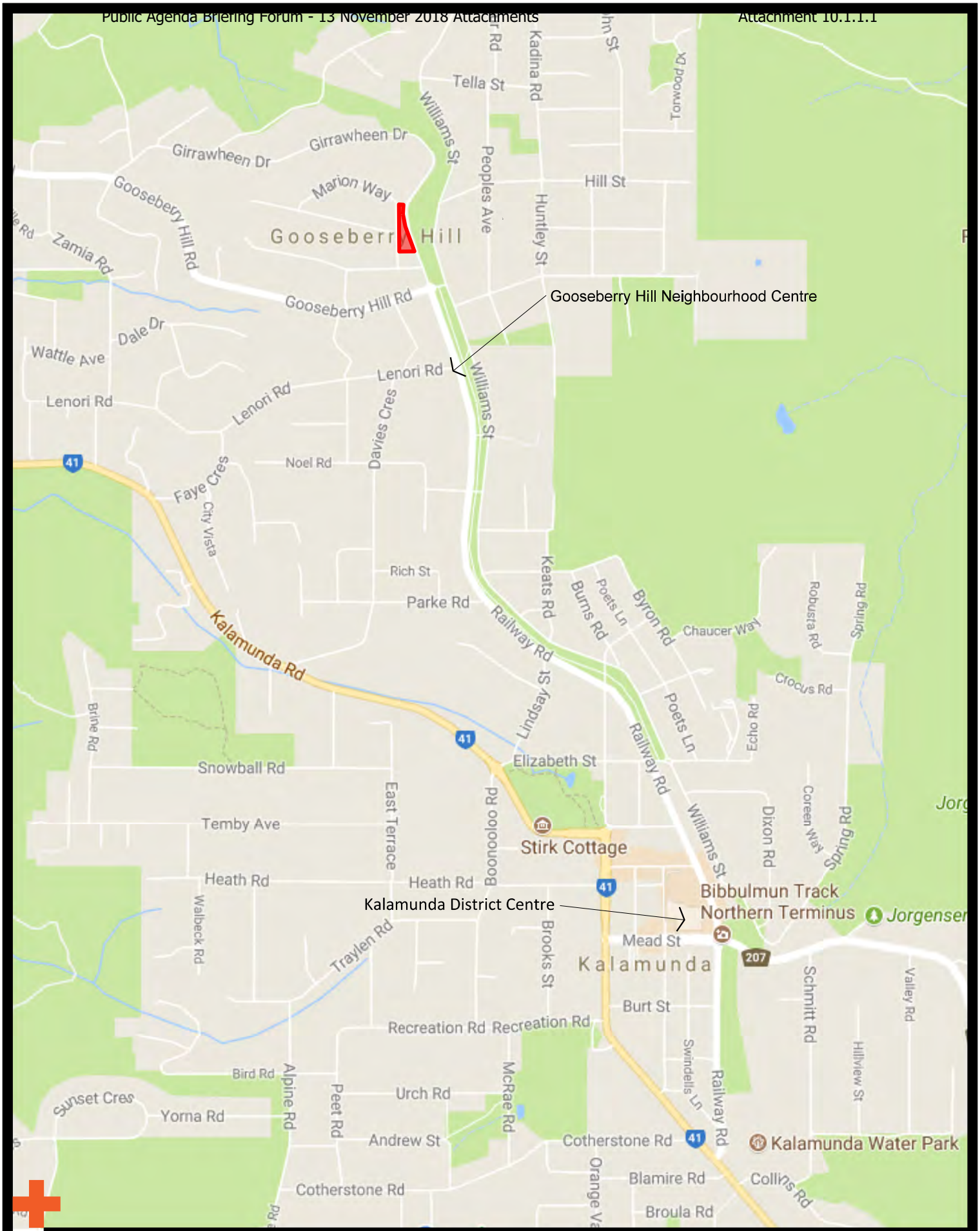
Lot 7 is located within the suburb of Gooseberry Hill, and is bound by Girrawheen Drive to the east, Marion Way to the west, and existing residential lots to the north and south. Access to Lot 7 is via Girrawheen Drive and Marion Way, both of which are sealed and gazetted roads.

2.2 CADASTRAL INFORMATION

Lot 7 has a total area of 3,499m^{2}and comprises of one land parcel, legally described as:

- Lot 7 on Diagram 26395; Certificate of Title 1246; Folio 877

The relevant Certificate of Title and Survey Plan is provided as an attachment to this submission.



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LOT 7 (NO. 41) MARION WAY, GOOSEBERRY HILL

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 7 Marion-5-001	DATE	: 4 October 2017	SCALE	: 1:15,000@A4

NOTE

Base data sourced from Google Maps.
Areas and dimensions shown are subject to final survey calculations.

LEIGHTON land development DRAFTING & visuals

SITE PLANNING + DESIGN

north 0 150 300 450 600m

LOCATION PLAN - FIGURE 1

3. SITE ANALYSIS

3.1 TOPOGRAPHY

Lot 7 is generally flat at approximately 140m above sea level.

3.2 EXISTING IMPROVEMENTS

Lot 7 currently comprises a single dwelling located towards the southern boundary. An unused and empty swimming pool is located in the south-western corner of Lot 7.

3.3 SURROUNDING LAND USES

Lot 7 is surrounded by existing 'Residential – R5' developments to the north, west and south. A thin strip of land running north-south (an old railway reserve – converted to a 'rail trail') to the east of Lot 7 is reserved 'Parks and Recreation'. Land to the east of the reserved land has been subdivided and developed consistent with its zoning of 'Residential – R10'.

The surrounding R5 residential lots generally range in size from approximately 2,000m^2 – 3,000m^2, while the R10 lots range from approximately 1,200m^2 - 1,600m^2.

The proposed amendment to LPS3 and rezoning of Lot 7 will facilitate the creation of more practical and usable lots than the current awkward linear shape of Lot 7, while providing for in a pattern of subdivision and development that is generally consistent with adjoining areas.

4. ENVIRONMENTAL CONSIDERATIONS

4.1 VEGETATION

Lot 7 is surrounded by established trees along the western boundary of the lot and within the road reserve abutting the eastern boundary. There is scattered vegetation across Lot 7, with primarily non-endemic species around the existing dwelling.

Lot 7 is situated within a broad 'Regional Ecological Linkage', as identified by the City's Local Biodiversity Strategy. This will be further discussed in Section 6.2.1.3. Refer Figure 2 – Site Plan.

4.2 WETLANDS

No wetland areas are relevant to Lot 7.

4.3 SITE CONTAMINATION

Lot 7 is not registered as a contaminated site on the Department of Environmental Regulation's Contaminated Site Database.

4.4 ACID SULPHATE SOILS

A review of Landgate's SLIP database indicates that there is no Acid Sulphate Soil risk associated with Lot 7.

4.5 HERITAGE

4.5.1 EUROPEAN HERITAGE

A review of the City's 'Municipal Inventory of Heritage Places' confirms that Lot 7 is not identified as a site of European heritage significance.

4.5.2 ABORIGINAL HERITAGE

A review of the Department of Planning, Lands and Heritage's 'Aboriginal Heritage Inquiry System' confirms that Lot 7 is not identified as a site of Aboriginal heritage significance.

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LOT 7 (NO. 41) MARION WAY, GOOSEBERRY HILL

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 7 Marion-5-002	DATE	: 4 October 2017	SCALE	: 1:750@A4

NOTE

Base data sourced from Water Corp.
Areas and dimensions shown are subject to final survey calculations.

LEIGHTON land development DRAFTING & visuals

LEGEND

SUBJECT LAND

SITE PLANNING + DESIGN

north

0 7.5 15 22.5 30m

SITE PLAN - FIGURE 2

5. SERVICING

5.1 SEWER

Lot 7 is not connected to a reticulated sewerage system.

Subdivision and development of Lot 7 would be subject to connection to on-site effluent disposal systems to the satisfaction of the City. The proposed R12.5 density is consistent with State planning and sewerage policy requirements for aged or dependent persons accommodation.

Preliminary site investigations confirm the suitability of Lot 7 in relation to soil permeability and land capability, with further detail to be provided at the time of subdivision and development.

5.2 WATER

Lot 7 has access to main water supply via Marion Way.

5.3 STORMWATER

As previously noted within Section 3.1 of this report, Lot 7 is generally level across the site.

Subdivision and development of Lot 7 in the manner facilitated by this amendment to LPS3 will not significantly alter current on-site stormwater arrangements.

5.4 ROADS

Lot 7 has a frontage to two (2) constructed and gazetted roads, with a 148.38m frontage to Girrawheen Drive and a 145.20m frontage to Marion Way.

5.5 GAS

Lot 7 has access to gas supply via Marion Way and Girrawheen Drive.

5.6 ELECTRICITY

Lot 7 has access to electricity supply via Marion Way.

5.7 TELECOMMUNICATION

Lot 7 has access to telecommunication infrastructure via Marion Way.

6. TOWN PLANNING CONSIDERATIONS

6.1 REGIONAL PLANNING FRAMEWORK

6.1.1 TOWARDS PERTH AND PEEL@3.5 MILLION

Towards Perth and Peel @ 3.5 Million (Perth and Peel @ 3.5) seeks a 47% and 53% split between infill and greenfield development respectively. The proposed amendment to LPS3 helps to achieve this 47% infill target.

Perth and Peel @ 3.5 also acknowledges challenges associated with Perth's aging population. By 2051 22% of Perth's population will be aged over 65, and Perth and Peel @ 3.5 identifies that *"there is a growing demand for housing in areas with convenient access to a range of services (particularly community and health) or for different styles of housing (for example, smaller dwellings which are easier to maintain)"*. Lot 7 is located within 500m of the Gooseberry Hill Neighbourhood ('Village') Centre which contains a delicatessen and a doctor, dental and natural medicine clinic. Lot 7 is also located within close proximity to the Kalamunda District Centre and is therefore ideally situated to provide Aged Person's Dwellings that have easy access to local convenience and health services.

6.1.2 NORTH-EAST SUB-REGIONAL PLANNING FRAMEWORK

Lot 7 is located within the north-west sub-region of Perth and Peel @ 3.5, which seeks to contain 49,000 infill developments by 2050. The amendment to LPS3 will help to achieve this objective by encouraging infill development within close proximity to a Neighbourhood Centre, while retaining the same character of development in the area.

6.1.3 METROPOLITAN REGION SCHEME

Lot 7 is zoned 'Urban' under the Metropolitan Region Scheme ('MRS').

6.1.4 STATE PLANNING POLICY 3.1 – RESIDENTIAL DESIGN CODES

The proposed amendment includes reference to an applicable density of 'Residential – R12.5'.

Clause C.1.4.i (p18) of SPP3.1 states *"for the purpose of an aged or dependent persons' dwelling or a single bedroom dwelling, Lot 7 area may be reduced by up to one third".* The table below details the (standard and aged person's) lot yield at various Residential Densities:

Coding	Minimum Lot Size		Average Lot Size		(Ave) Lots Permissible
	Standard	Aged Persons'	Standard	Aged Persons'	
R5	2,000m^2	1,320m^2	-	-	2
R10	875m^2	578m^2	1,000m^2	660m^2	5
R12.5	700m^2	462m^2	800m^2	528m^2	6

Previous liaison with the Department of Planning and City of Kalamunda acknowledged the general suitability of a R12.5 density as per a similar subdivision of five (5) Aged Persons' Dwellings on Saunders Road, Lesmurdie.

The Saunders Road site is zoned 'Special Use Zone' (SU 19) with an applicable residential density coding of R-12.5. A similar density is proposed for Lot 7.

6.1.5 STATE PLANNING POLICY 3.7 – PLANNING IN BUSHFIRE PRONE AREAS

Lot 7 is classified as a 'Bushfire Prone Area' on the Department of Fire and Emergency Services' 'Map of Bushfire Prone Areas', and is therefore the subject of State Planning Policy 3.7 – Planning in Bushfire Prone Areas ('SPP3.7').

A Bushfire Attack Level ('BAL') Assessment Report has been completed by Bushfire Prone Planning, with an assigned maximum BAL Level of 29 for all four (4) indicative lots. The BAL assessment therefore confirms that the site is accommodate subdivision and development in satisfying minimum BAL requirements as per SPP3.7.

Further technical information on the BAL Assessment is provided in Attachment 2.

6.1.6 DEVELOPMENT CONTROL POLICY 2.2 – RESIDENTIAL SUBDIVISION

The operational Development Control Policy 2.2 (DC 2.2) generally requires the provision of reticulated sewerage connection, however exemptions apply to:

"aged or dependent persons' accommodation which does not exceed a density of R12.5 and meets tests of need and site suitability."

DC 2.2 requirements will therefore be satisfied as part of subsequent subdivision, consistent with the proposed R12.5 density. Early indicative subdivision concept plans have considered how the subdivision of Lot 7 could be achieved, with four (4) Residential R12.5 lots able to be achieved, all in excess of 700m^2.

6.2 LOCAL PLANNING FRAMEWORK

6.2.1 LOCAL PLANNING STRATEGY

Aged accommodation was identified as the No. 1 'Key Strategic Issue' within the City's Local Planning Strategy ('Strategy'). The City recognises the *"urgent need to diversify the housing stock in all localities of the [City] to cater of more compact housing for older people so as to avoid making older members of the community leave the [City] to find suitable accommodation".*

The proposed amendment to LPS3 will facilitate the City's requirement to support a rapidly aging population. The City's Strategy states: *"by 2031, 1 in 3 people will be over 55… and more than half of them will be over 70 years of age. There is an urgent need to diversify housing stock… so as to avoid*

making older members of the community leave the [City]". The proposed LPS amendment will directly help in addressing these requirements.

The proposed amendment to LPS3 addresses other requirements of the Strategy by:

- Providing housing specifically for aged persons;
- Providing an alternative to surrounding large lots and diversification of housing stock; and
- Providing higher-density (but still separate) houses within 500m of the Gooseberry Hill Neighbourhood ('Village') Centre.

The proposed amendment to LPS3 facilitates alternative and more compact housing options specifically for Aged Persons' Dwellings in an area that is within 500m of a Neighbourhood Centre.

As well as providing for daily and medical needs, the Gooseberry Hill Neighbourhood Centre also contains several bus-stops for the 291, 296 and 297 services; thereby providing ready public transport options to future residents of Lot 7.

6.2.2 AGED ACCOMMODATION STRATEGY

The 'Aged Accommodation Strategy' ('AAS'), while now dated, specifically recognises the importance of providing option for 'aging in place'. In applying the principles of the AAS relative to updated 2016 Census data, a relevant picture of the current housing stock and demographic characteristics within Gooseberry Hill reveals that:

- 97% of dwellings with Gooseberry Hill are separate houses;
- 30% have 3 bedrooms and 60% have 4 bedrooms; and
- 40% of the population is over 55 years old (and are therefore unlikely to require these large family homes), and there is only an average of 2.6 people per house within the locality.

This illustrates a significant disconnect between the housing stock and the community characteristics of Gooseberry Hill. The AAS recognised this dilemma in 2008 and stated, *"the development of smaller dwellings and units will be essential to adequately [meet] the housing needs of the growing population of older people".*

It is noted that the population of over 55 year old residents in Gooseberry Hill has already increased significantly since the AAS was first released. In 2008 this demographic formed 33% of the local population, that has now risen to 39.6%, and this increased has already outstripped the AAS's 2031 forecast of 39.3%.

The proposed amendment to LPS3 and subsequent subdivision and development of Lot 7 directly satisfies aging in place objectives and responds to the requirement for 'essential smaller dwellings' in order to *"adequately [meet] the housing needs of the growing population of older people".*

6.2.3 LOCAL HOUSING STRATEGY

The City prepared a Local Housing Strategy ('LHS') in 2014 to *"[Set] out a strategy for meeting the future housing needs of [the City of Kalamunda's] community, and for managing the character and amenity of existing residential areas"*.

In relation to aged persons' dwellings as discussed within the LHS, Milton Park on Williams Road is the only Aged Person's Accommodation existing within the suburb, and there are no development opportunities identified within Gooseberry Hill, despite the high proportion of residents over 55 years of age and the desire of residents to age in place.

This minor rezoning will help to address demand in the immediate area, and will provide the option for local residents to remain in Gooseberry Hill without impacting the local amenity of the suburb.

6.2.4 LOCAL BIODIVERSITY STRATEGY

The City's 'Local Biodiversity Strategy' identifies Lot 7 as within a 'Regional Ecological Linkage' that aims to "*Retain and protect viable natural areas that occur within regional linkages and wildlife corridors. Where practicable, enhance natural areas which form linkages. Aim to create opportunities to add linkages to maintain and improve biodiversity values*".

The proposed amendment to LPS3 and the subsequent subdivision of Lot 7 will retain established vegetation within Lot 7 along the eastern boundary, and within the northern portion of Lot 7 (as per the indicative subdivision plan). It should be noted that the established vegetation on the western side of Lot 7 is within the road reservation, and its retention and maintenance is therefore the responsibility of the City. While a significant portion of vegetation on Lot 7 are introduced species, minimal disturbance of the existing vegetation will help to maintain the ecological value of Lot 7 as part of a wildlife corridor and Regional Ecological Linkage, as identified by the City's Local Biodiversity Strategy.

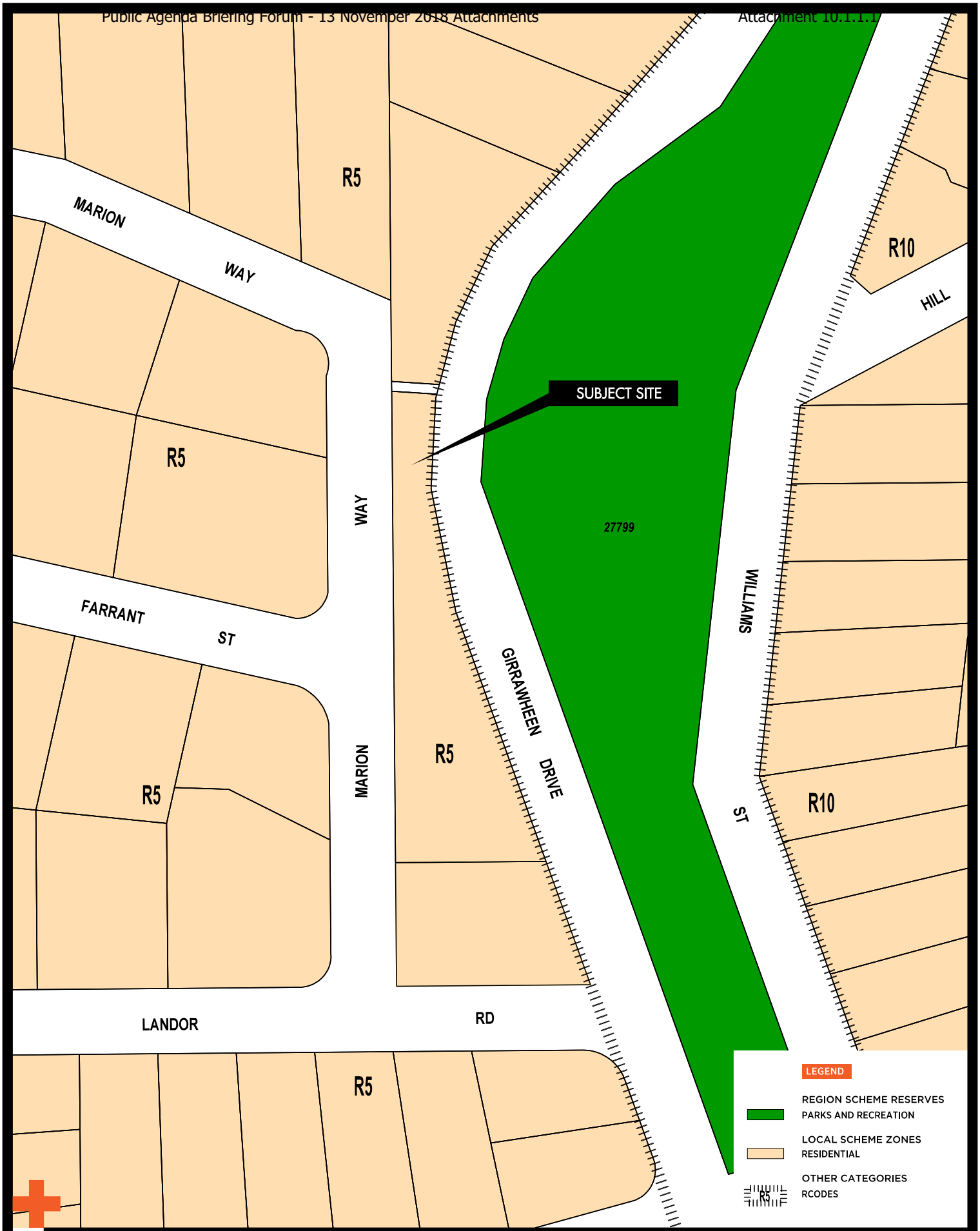
6.2.5 LOCAL PLANNING SCHEME

6.2.5.1 ZONING

Lot 7 is currently zoned 'Residential – R5' under the LPS3. Refer Figure 3 – Current LPS Zoning Plan.

The objectives of the 'Residential' zone is to:

- *Provide primarily for single residential development whilst allowing for a range of residential densities in order to encourage a wide choice of housing types within the [City].*
- *To give consideration to grouped dwelling developments if Lot 7 is near amenities and can be integrated into the single residential environment.*
- *To facilitate a range of accommodation styles and densities to cater for all community groups inclusive of elderly, young people in transition and the handicapped. Such accommodation is supported where it is appropriately situated in proximity to other services and facilities.*



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LOT 7 (NO. 41) MARION WAY, GOOSEBERRY HILL

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 7 Marion-5-003	DATE	: 11 September 2017	SCALE	: 1:1,500@A4

NOTE

Base data sourced from Water Corp.
Areas and dimensions shown are subject to final survey calculations.

LEIGHTON land development DRAFTING & visuals

SITE PLANNING + DESIGN

north 0 15 30 45 60m

CURRENT LPS ZONING PLAN - FIGURE 3

- *To encourage the retention of remnant vegetation.*

6.2.5.2 SPECIAL CONTROL AREA

Lot 7 classified as a 'Bushfire Prone Area' by the Department of Fire and Emergency Services' Map of Bushfire Prone Areas, as discussed in Section 6.1.3.2. Pursuant to this classification, Lot 7 is situated within the 'Bushfire Prone Area' Special Control Area ('SCA') under LPS3.

The objectives of the 'Bushfire Prone Area' SCA is to:

- *Identify land that is bushfire prone by reason of it being subject to, or likely to be subject to, a bushfire hazard;*
- *Ensure that development within a Bushfire Prone Area is effectively designed in accordance with AS3959 to address the level of bushfire hazard applying to the land;*
- *Facilitate improved strategic planning for bushfires and more effective bushfire risk management; and*
- *Implement the requirements under State Planning Policy 3.4 and the Planning for Bushfire Protection Guidelines.*

Clause 6.7.4 (p68) of LPS3 specifies the development requirements within the Bushfire Prone Area. Any development within this SCA will therefore need to satisfy City requirements and comply with relevant bushfire management requirements. This matter will be addressed in more detail through the subdivision and development process.

7. DESCRIPTION + JUSTIFICATION FOR THE PROPOSED SCHEME AMENDMENT

7.1 PROPOSED REZONING

This amendment to LPS3 proposes the rezoning of Lot 7 from 'Residential – R5' to 'Special Purpose Use (Aged Person's Dwellings)' with an applicable density of 'Residential – R12.5'.

The amendment proposed to 'Schedule 4 – Special Use Zones' is detailed below:

NO	DESCRIPTION OF LAND	SPECIAL USE	CONDITIONS
SU 20	Lot 7 (No. 41) Marion Way, Gooseberry Hill	Aged Persons Dwellings	(a) The following Uses are not permitted unless specific approval is granted by the Council 'A' Aged Persons Dwellings. (b) The residential density of the Aged Persons Dwellings is R12.5. All development shall accord with the requirements of the Residential Design Codes for Special Purpose Dwellings. (c) The effluent disposal system is to be provided to the satisfaction of the Health Department of WA.

7.2 PURPOSE OF AMENDMENT

The purpose of the amendment to LPS3 is to provide for appropriate development of Lot 7 for Aged Persons' Dwellings, consistent with the site's location close to services and amenities and consistent with the City's strategic planning framework objectives.

The use of the land will continue as a residential land use, while providing for a broader range of housing options in a manner consistent with the prevailing character of the area.

7.3 SUITABILITY OF PROPOSED USE

The proposed rezoning of Lot 7 is consistent with the locality and proposes residential use generally consistent with its current zoning under LPS3. The amendment to LPS3 will enable Lot 7 to ultimately be subdivided and developed for Aged Persons' Dwellings, consistent with State and Local strategic objectives.

8. CONCLUSION

Pursuant to Section 75 of the Planning and Development Act 2005 ('Act'), we request Council adopt an amendment to the LPS3 by:

- Rezoning Lot 7 (No. 41) Marion Way, Gooseberry Hill from 'Residential – R5' to 'Special Purpose Use (Aged Person's Dwellings)' with an applicable density of R12.5, as depicted on Attachment 2 – Scheme Amendment Map.

- Inserting additional text provisions into Schedule 4 – Special Use Zones.

The amendment to LPS3 will enable future subdivision and development of Lot 7 consistent with State and Local strategy objectives with respect to increased diversity of housing options.

The amendment to LPS3 will have no impact on the amenity of the locality and addresses all onsite requirements in relation to land capability and bushfire management.

In light of the above, the amendment to LPS3 is considered to be consistent with orderly and proper planning.

ATTACHMENT INDEX

BUSHFIRE ATTACK LEVEL ASSESSMENT REPORT

SCHEME AMENDMENT MAP

1. BUSHFIRE ATTACK LEVEL ASSESSMENT REPORT

Prepared by: Bushfire Prone Planning

Reference: 169041

Dated: August 2017

BPP Group Pty Ltd | ABN: 39 166 551 784
1/42 Victoria Street Midland WA 6056
PO Box 3489 Midland WA 6936
08 6477 1144 | admin@bushfireprone.com.au

Bushfire Attack Level Assessment Report (Development Application)

Includes:

- BAL Assessment and BAL Contour Map

Location: Lot 7 (#41) Marion Way, Gooseberry Hill

City of Kalamunda

Project Number:	169041
Assessment Date:	1 August 2017
Report Date:	3 August 2017

Contents

Appendices – Advisory Information Only

1. Report and BPAD Accredited Practitioner Details

BAL DA Template v1.1 ©2017 BPP Group Pty Ltd

Report Version	Submitted to	Submitted Date
v1.0	Landowner	11-Aug-17
Report Version	**Amendment Record**	**Submitted Date**
v1.1	Amended building locations	15-Aug-17
v1.2	Amend name of local authority	27-Sep-17

Assessor & Author	Bushfire Planning and Design (BPAD) Accreditation		Signature
Ian Macleod	Level 1 BAL Assessor	BPAD39131	

BPP Group Pty Ltd t/a Bushfire Prone Planning ACN: 39 166 551 784

Reviewed and Approved	Bushfire Planning and Design (BPAD) Accreditation		Signature
Kathy Nastov	Level 3 Bushfire Planning and Design Practitioner	BPAD27794	

BPP Group Pty Ltd t/a Bushfire Prone Planning ACN: 39 166 551 784

Reliance on the assessment and determination of the Bushfire Attack Level contained in this report should not extend beyond a period of 12 months from the date of issue of the report. If this report was issued more than 12 months ago, it is recommended that the validity of the determination be confirmed with the Accredited Practitioner and where required an updated report issued.

Disclaimer *The measures contained in this Bushfire Risk Assessment/Management Report are considered to be minimum standards and they do not guarantee that a building will not be damaged in a bushfire. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions. Additionally, the achievement of and level of implementation of bushfire management measures will depend, among other things, on the actions of the landowners or occupiers over which Bushfire Prone Planning has no control.*

All surveys, forecasts, projections and recommendations made in this report associated with the project are made in good faith on the basis of information available to Bushfire Prone Planning at the time. All maps included herein are indicative in nature and are not to be used for accurate calculations.

Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences (whether or not due to the negligence of their consultants, their servants or agents) arising out of the services provided by their consultants.

2. Subject Site and Proposed Building or Works

Is the development site in an area identified on the current 'Map of Bushfire Prone Areas' (DFES) as being subject to bushfire?			
Yes			
Subject Lot size (m^2)	3499 m^2	**Building Class (BCA)**	Class 1a
Description of Primary Building or Works			
Construction of a new single houses or ancillary dwellings			
Description of Associated Structure (Class 10a building or deck)			
N/A		**Attached or Adjacent Structure?**	N/A

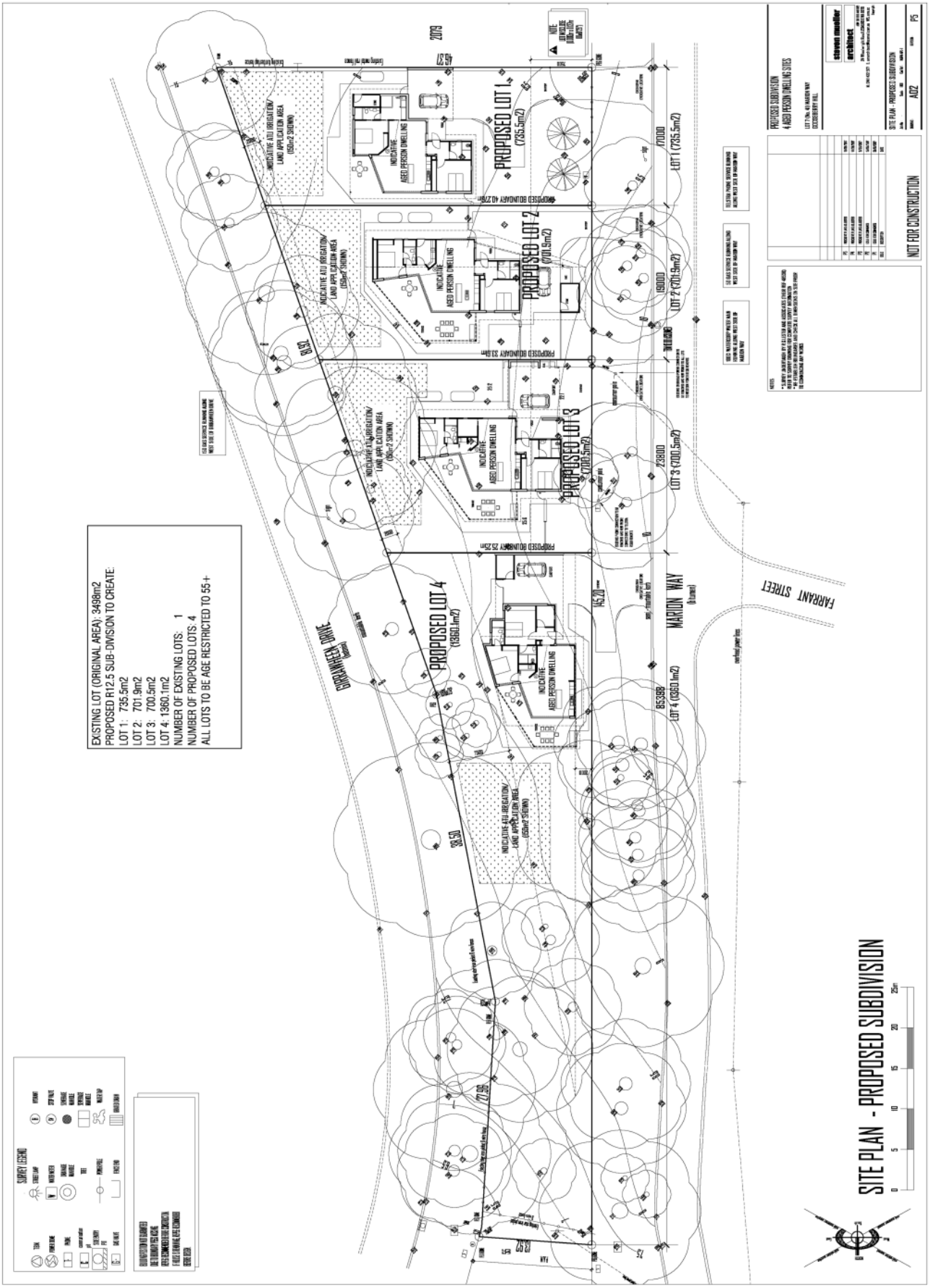
Determination of the Requirement for the Proposed Associated Structure to be Subject to the Bushfire Construction Standards of AS3959-2009

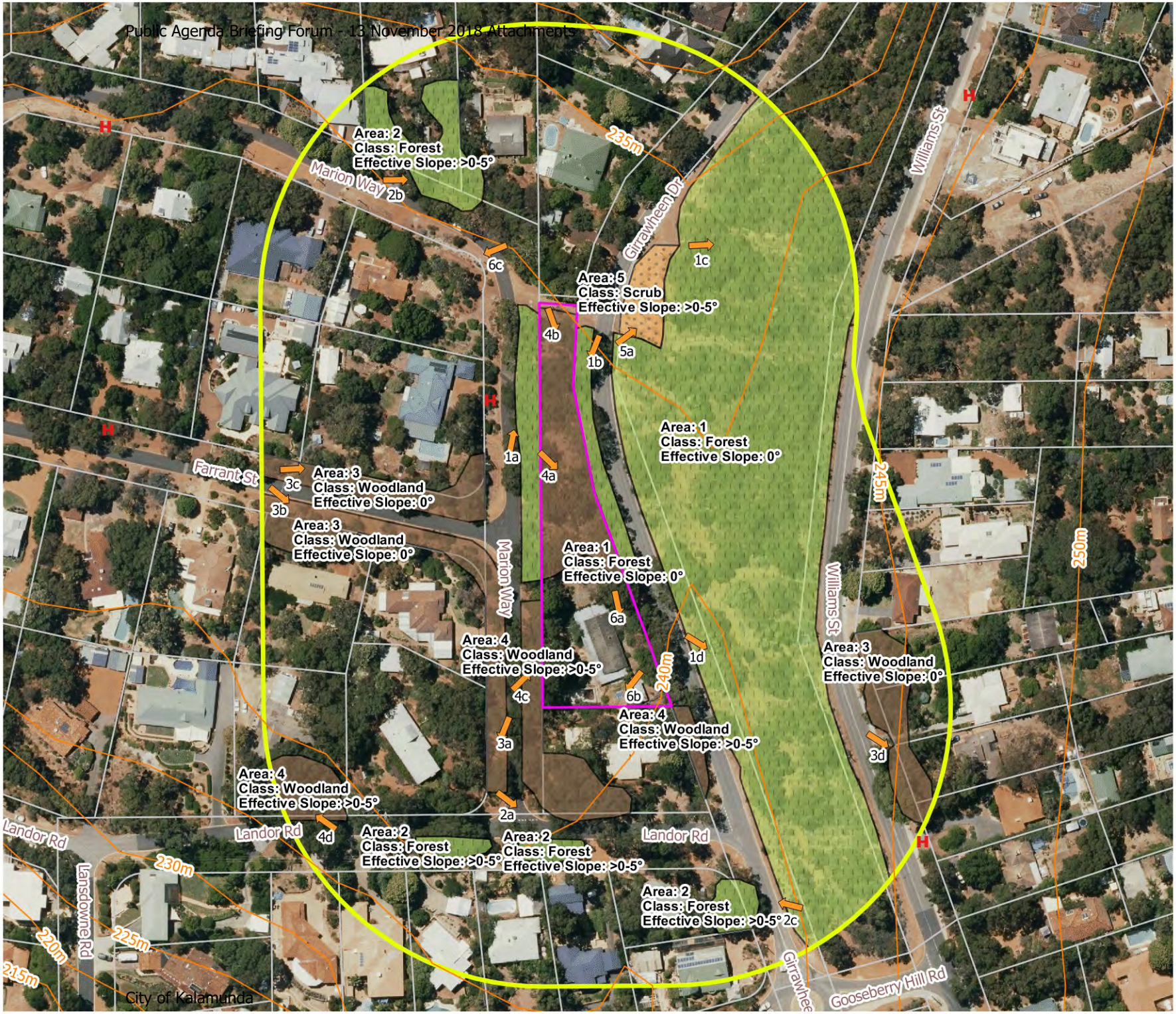
The proposed associated structure will be assessed as per the specifications set out in AS3959-2009 s3.2.1 and s3.2.3 to determine its 'separation' status with respect to the primary building (a Class 1, 2 or 3 building) or another Class 10a building or deck that is required to comply with AS3959-2009.

The associated structure will be assessed as being 'separated' if the separation is provided by either a fire-resistant wall or a distance not less than 6 metres;

Assessed Separation Status:	N/A
Is a BAL Assessment Required?	N/A
Are the Associated Building and Primary Building to be Assessed as a Single Building?	N/A
Are the Bushfire Construction Standards of AS3959-2009 to Apply?	N/A
Local Government Requirement: Irrespective of meeting the AS3959-2009 definition of 'separation', the relevant local government can require the proposed associated structure to have a BAL assessment and the application of bushfire construction standards. Does this apply?	N/A

Site Plan (plans/drawings relied upon to determine the bushfire attack level)





Site Assessment Map

Lot 7 (#41) Marion Way Gooseberry Hill

Legend

- Photos
- Hydrants
- Elevation (m)
- Lot Boundary
- 100 Metre Buffer
- Cadastral

Classifed Vegetation

- Forest
- Woodland
- Scrub

Assessment Date: 1 Aug 2017
Prepared by: Ian Macleod
Accreditation Level: 1
Accreditation No: BPAD39131
Expiry: Nov 2017
Aerial Photo: Metro Central Feb 2017 Mosaic
Map Compiled by: Ian Macleod

N

0 20 40 60 80 m

Meters (A4)

Coordinate System:
GDA 94 : MGA 50 Map Projection

BUSHFIRE PRONE PLANNING

Site Assessment Map Enlargement

3. Vegetation Classification and Ground Slope Determination

The vegetation identification and classification has been conducted in accordance with AS 3959-2009 s2.2.3 and the Visual Guide for Bushfire Risk Assessment in WA (DoP February 2016).

The vegetation structure has been assessed as it will be in its mature state (rather than what might be observed on the day). Areas of modified vegetation are assessed as they will be in their natural unmodified state (unless maintained in a permanently low threat, minimal fuel condition, satisfying AS 3959 s2.2.3.2(f). Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its revegetated mature state.

When more than one vegetation type is present each type is identified separately with the worst-case scenario being applied as the classification. The predominant vegetation is not necessarily the worst-case scenario.

Representative photos of each vegetation area and associated descriptions and comments are included. The areas of classified vegetation with the potential to determine the Bushfire Attack Level are defined on the site assessment map.

All Vegetation Within 100 metres of the Site / Proposed Development			
Vegetation Area	Identified Types (AS3959) or Description if 'Excluded'	Applied Classification	Effective Slope Under Classified Vegetation (degrees)
1	Forest A-03	Class A Forest	0
2	Forest A-03	Class A Forest	>0-5
3	Woodland B-05	Class B Woodland	0
4	Woodland B-05	Class B Woodland	>0-5
5	Open Scrub D-14	Class D Scrub	>0-5
-	Managed Gardens	Excluded AS3959-2009 2.2.3.2 (f)	N/A

Vegetation Area 1 **Classification Applied:** Class A Forest

Assessment Comment: Street verges, Marris, dryandrah, some grass trees

Photo ID: 1a **Photo ID: 1b**

Vegetation Area 1 **Classification Applied:** Class A Forest

Assessment Comment: Marris, dryandrah, grass trees, scrub

Photo ID: 1c **Photo ID: 1d**

Vegetation Area 2 **Classification Applied:** Class A Forest

Assessment Comment: Marris, grass trees, scrub, shrubs

Photo ID: 2a **Photo ID: 2b**

Vegetation Area 2 **Classification Applied:** Class A Forest

Assessment Comment: Marris, scrub, shrubs

Photo ID: 2c

Vegetation Area 3 **Classification Applied:** Class B Woodland

Assessment Comment: Street verges, Some Marris, scrub, grassy understorey

Photo ID: 3a

Photo ID: 3b

Vegetation Area 3 **Classification Applied:** Class B Woodland

Assessment Comment: Street verges, some eucalypts, scrub, grassy understorey

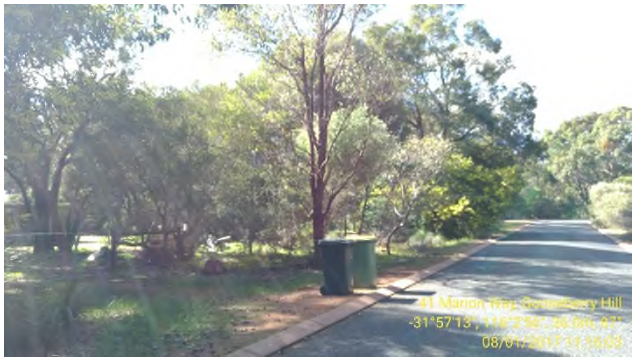


Photo ID: 3c

Photo ID: 3d

Vegetation Area 4 **Classification Applied:** Class B Woodland

Assessment Comment: Onsite, Marris, grass trees, grassy understorey, partly managed

Photo ID: 4a

Photo ID: 4b

Vegetation Area 4 **Classification Applied:** Class B Woodland

Assessment Comment: Marris, grassy understorey

Photo ID: 4c

Photo ID: 4d

Vegetation Area 5 **Classification Applied:** Class D Scrub

Assessment Comment: Revegetation, shrubs, scrub

Photo ID: 5a

Vegetation Area **Classification Applied:** Excluded AS3959-2009 2.2.3.2 (f)

Assessment Comment: Managed gardens

Photo ID: 6a

Photo ID: 6b

Vegetation Area 6 **Classification Applied:** Excluded AS3959-2009 2.2.3.2 (f)

Assessment Comment: Managed gardens

Photo ID: 6c

4. Bushfire Attack Level (BAL) Assessment – BAL Contour Map

Bushfire Prone Planning's BAL Contour Map Guide

Description and Purpose of the BAL Contour Map ('Guidelines')

A Bushfire Attack Level (BAL) Contour Map identifies land suitable and unsuitable for development and guides the location of buildings within a development site. The BAL Contour Map is a scale map of a development site (which can include proposed or an existing lot layout), which identifies indicative BAL ratings across the development site and within the immediate surrounding area. The map illustrates potential bushfire attack levels and radiant heat impacts in relation to any classified vegetation that will remain within 100 metres of the assessment area once development is constructed i.e. when the land has been cleared and all the subdivision works have been undertaken. It needs to take into account any vegetation that will remain or will be introduced when the works are complete (source: *WAPC Factsheet "BAL Contour Maps" Version 2 January 2016*).

BAL Contour Map Interpretation

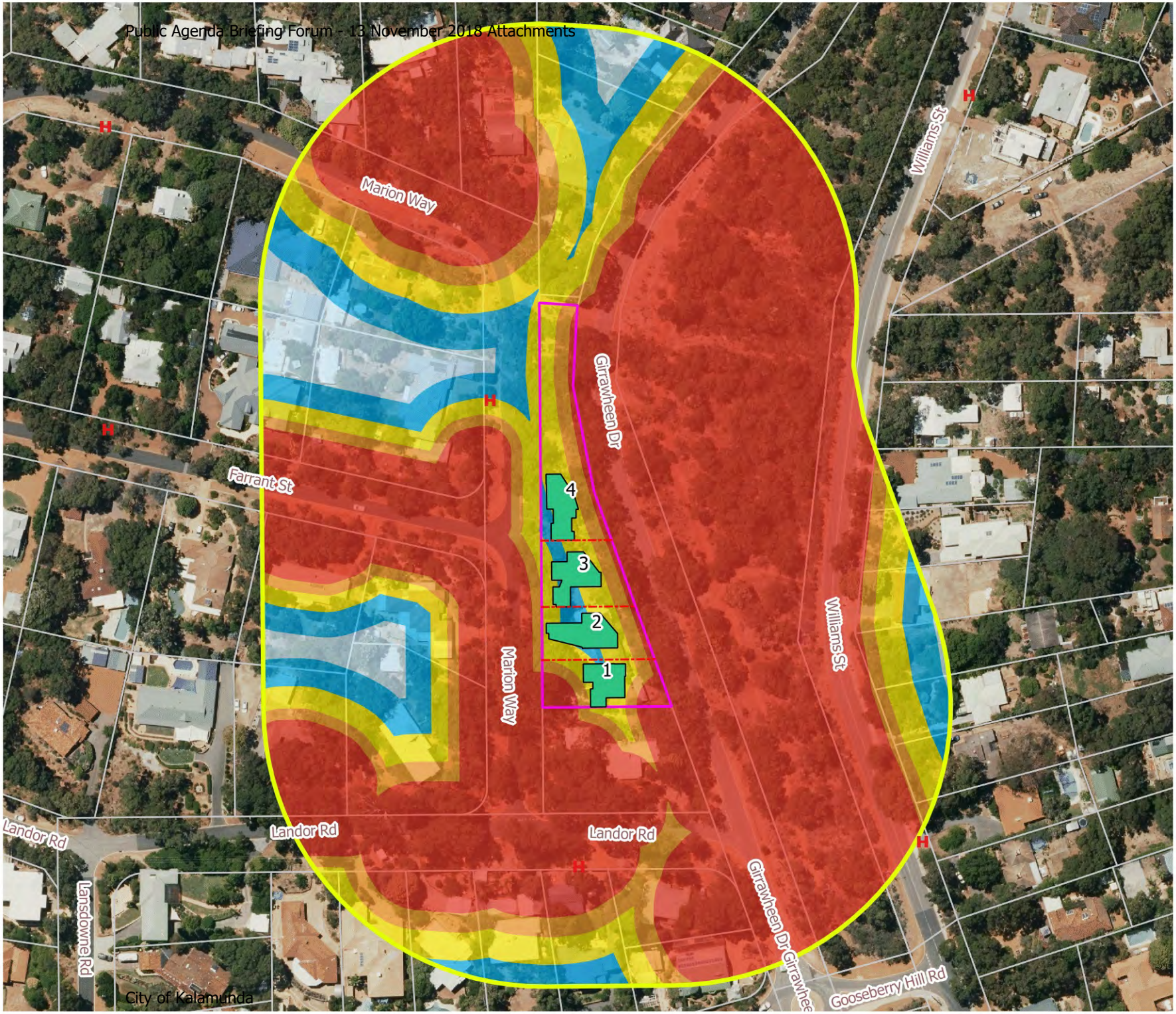
The contour map will present different coloured contour intervals constructed around the classified bushfire prone vegetation. These represent the different Bushfire Attack Levels (BAL's) that exist as the distance increases away from the classified vegetation. Each BAL represents a set range of radiant heat flux (refer to Appendix 2) that can be generated by the bushfire in that vegetation. The width of each shaded contour interval (i.e. the applicable vegetation separation distances corresponding to a BAL rating) will vary and is determined by calculations involving vegetation type, fuel structure, ground slope, and climatic conditions (i.e. the expected fire behaviour). They are unique to a site and can vary across a site.

The Primary Use of BAL Contour Mapping - Planning

BAL contour mapping is primarily a planning tool that can give an overview as to the suitability of a site for development with respect to the extent to which bushfire is a potential threat to future buildings and persons on the subject land.

The mapping considers the development site (i.e. all existing or proposed lots) and does not consider the bushfire risk at an individual lot level or over different development time frames. Rather it is assessing the situation that will exist when the entire development has been completed, including any vegetation management that would reasonably be expected to take place as part of establishing buildings on the lots. On this basis, it helps decision makers determine the suitability of the proposed development for planning approval.

As a result, there will be situations where, for the purposes of planning, classifiable vegetation is not contoured (e.g. e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified). However, at a specific point in time (prior to full completion of a development) this vegetation may impact on a proposed buildings BAL rating.



BAL Contour Map

Lot 7 (#41) Marion Way Gooseberry Hill

Legend

- H Hydrants
- Proposed Boundary
- Proposed Building
- Lot Boundary
- 100 Metre Buffer
- Cadastral

Bushfire Attack Levels

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

Assessment Date: 1 Aug 2017
Prepared by: Ian Macleod
Accreditation Level: 1
Accreditation No: BPAD39131
Expiry: Nov 2017
Aerial Photo: Metro Central Feb 2017 Mosaic
Map Compiled by: Ian Macleod

N

0 20 40 60 80 m

Meters (A4)

Coordinate System:
GDA 94 : MGA 50 Map Projection

BUSHFIRE PRONE PLANNING

Construction of the BAL Contours - Statement of Site Data and 'Separation Distance Range' Applied

For the subject site, the vegetation separation distance range that corresponds to each Bushfire Attack Level (and represented by the BAL Contour Map), has been derived from:

1. An AS3959-2009 Method 1 assessment and sourced from AS3959-2009 Table 2.4.3.

Table 4.1: Construction of the BAL contours

Statement of Site Data and 'Separation Distance Range' Applied			
Vegetation Area	BAL Assessment Method Used	Site Data Applied in the BAL Assessment	Separation Distance Range Applied/Determined
1	AS3959-2009 Method 1	Refer to Table "All Vegetation Within 100 metres of the Site / Proposed Development" on page 6 of this report	The distance corresponding to each BAL Rating as per AS3959-2009 Table 2.4.3
2			
3			
4			
5			

The assumptions made in producing this BAL Contour Map are that the whole of the subject lot and its street verges are able to be managed to a low bushfire threat state as per AS3959-2009 s2.2.3.2. See Appendices 1 and 2 for Asset Protection Zone requirements. Approval from the relevant authorities will be required before clearing of any native vegetation onsite or on street verges.

BAL's as Indicated / Determined by the Contour Map

Bushfire Prone Planning's Interpretation of Deriving BAL Ratings from the BAL Contour Map

Indicative BAL Ratings

If the assessed BAL for a lot or building envelope (the 'area') is stated as being 'indicative', it is because that 'area' is impacted by more than one BAL contour interval and/or classifiable vegetation remains on the lot, or on adjacent lots, that can influence a future building's BAL rating (and this vegetation may have been omitted from being contoured for planning purposes e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified). In this report the indicative BAL is presented as either the highest BAL impacting the 'area' or as a range of achievable BAL's within the 'area' – whichever is the most appropriate.

The BAL rating that will apply to any future building within that 'area' will be dependent on:

1. vegetation management onsite; and/or
2. vegetation remaining on adjacent lots; and/or
3. the actual location of the future building within that 'area'.

A BAL Certificate cannot be provided for future buildings within an 'area' with an indicative BAL until the location of any future building has been determined. It usually requires an onsite visit and a BAL assessment report to be produced before the certificate can be issued.

Determined BAL Ratings

If the assessed BAL for a Lot or building envelope (the 'area') or existing building, is stated as being 'determined' it is because that 'area' or building is impacted by a single BAL contour interval. This has been determined by offsite classified vegetation, and no classifiable vegetation currently exists on the lot or on adjacent lots (i.e. it has been cleared to a minimal fuel, low bushfire threat state).

As a result, a determined BAL can be provided in this limited situation because:

1. No classified vegetation is required to be removed or modified to achieve the determined BAL, either within the lot or on adjacent lots (or if vegetation is excluded from classification, it is reasonable to assume it will be maintained in this state into the future); and
2. A future building can be located anywhere within the 'area' and be subject to the determined BAL rating; and
3. The degree of certainty is more than sufficient to allow for any small discrepancy that might occur in the mapping of the BAL contours.

A BAL Certificate (referring to the BAL Contour Map assessment) can be provided for a future building on those 'areas' assessed as having a determined BAL as long as the assessment is still valid and there is no requirement reassess the vegetation and update the contour map (this is a dependant on the time that has passed since the original assessment). Note also that a BAL Certificate will only remain valid for one year).

As the building works have been located on the lot, the BAL that the proposed buildings will be exposed to is able to be indicated from the contour map. These BAL's are indicative only, as classifiable vegetation remains on the lot and its verges. The indicated BAL's for the buildings on the proposed lots are presented in Table 5.2.2.

BAL Contour Map Enlargement

Table 4.2: Future Buildings on Proposed Lots – Indicative BAL

Indicative Bushfire Attack Level for Future Building on the Proposed Lots	
Relevant Fire Danger Index (AS3959-2009 Table 2.1)	80
BAL Determination Method	Method 1 as per AS 3959-2009 s2.2.6 and Table 2.4.3. Refer to Appendix 2 this Plan
Proposed Lots / Buildings	**Indicative BAL**
1	BAL-29
2	BAL-29
3	BAL-29
4	BAL-29

Identification of Specific Issues Arising from BAL Contour Map

Onsite Vegetation

Vegetation onsite is within the control of the subject site's landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to any approval being required by a local government.

For this Proposal the classified vegetation onsite (Area 4 Class B Woodland) can either be removed or managed to a low threat state so as to achieve a BAL-Low rating with the limit of area being to the extent of the current lot boundaries.

Offsite Vegetation

Vegetation offsite is not within the control of the subject site's landowner and therefore the vegetation cannot be removed or modified by the landowner and as a result the assessed BAL's determined by this vegetation are unable to be reduced.

It is assumed that the road verges adjacent to the subject lot are able to managed to a low bushfire threat state as per AS3959-2009 (Shire approval will be required). The highest BAL that applies to the proposed buildings from the remaining offsite areas is BAL-29.

5. Appendices – Advisory Information Only

Appendix 1

Explaining Asset Protection Zones (APZ)

Description: An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation. For planning applications, the minimum sized acceptable APZ is that which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29). It will be site specific.

(For subdivision planning, hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot).

Defendable Space: The APZ includes a defendable space which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure. Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defendable space is dependent on the space which is available on the property, but as a minimum should be 3 metres.

Establishment: 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. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

Native Vegetation: APZ's can adversely affect the retention of native vegetation. Where the loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, such as waterway foreshore areas and wetland buffers, reducing lot yield may be necessary to minimise the removal and modification of remnant vegetation.

Responsibility: It is the responsibility of the landowner/proponent to maintain their APZ in accordance with the 'Guidelines' Appendix 4 Schedule 1 'Standards for Asset Protection Zones' (WAPC 2017). It is likely that this requirement is also contained in the firebreak notice issued by the relevant local government under s33 of the Bushfire Act 1954 along with any additional requirements.

Source: Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.1) Appendix 4 Element 2

Standards for Asset Protection Zones

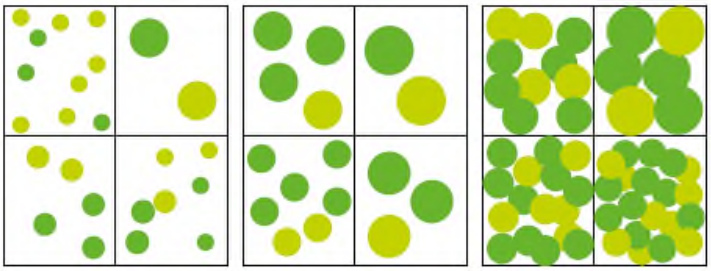
('Guidelines' WAPC 2017 v1.1 Appendix 4 Schedule 1)

Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel Load: combustible dead vegetation matter less than 6 mm in thickness reduced to and maintained at an average of two tonnes per hectare. The visual guide below shows a fuel load that equates to approximately 2t/ha (source: Shire of Augusta Margaret River's Firebreak and Fuel Reduction Hazard Notice).

Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. Diagram below represents tree canopy cover at maturity.



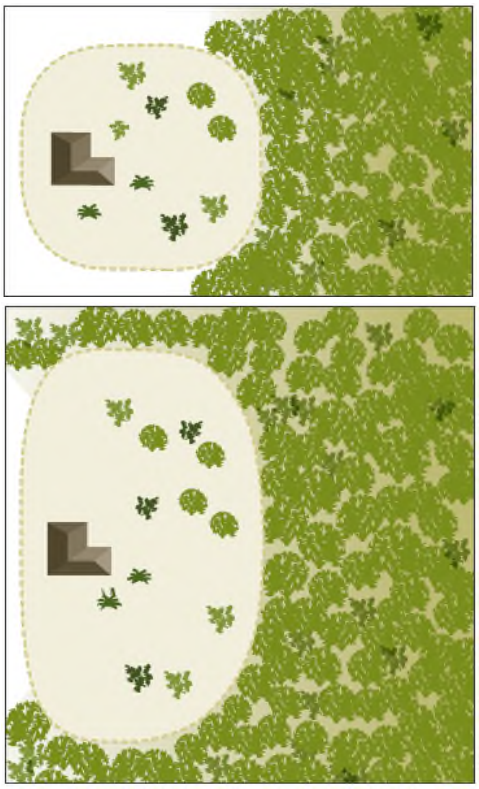
Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 mm in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 mm or less.

Note that individual local governments may set their APZ standards with additional requirements compared to the standard set in the 'Guidelines'. These will be contained in their annual firebreak notice issued under s33 of the Bushfires Act 1954 and are to be complied with.

The example diagrams below illustrate how the required dimensions of the APZ will be determined by the type and location of the vegetation



Additional DFES Guidance

a) Store firewood at least 20 metres away from the building.
b) Keep gutters free of leaves and other combustible material.
c) Roof mounted evaporative coolers to be fitted with ember screens.
d) Gas cylinders to vent away from a building and be tethered to prevent falling over.
e) Driveways and access ways must allow for safe passage of a fire appliance to all buildings on the land.
f) Land owners/occupiers must maintain compliance with the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, it should be noted that fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation is unsafe.

Appendix 2

Managing the Asset Protection Zone

It is the responsibility of the landowner to maintain the established bushfire protection measures on their property. This includes maintaining an asset protection zone (APZ) of the required dimensions, as a non-vegetated area or as low threat vegetation managed to a minimal fuel condition, as defined in the APZ standard (refer to Appendix 1) and AS 3959-2009 s2.2.3.2 part (f) (see below).

The required dimensions of the APZ will vary dependent upon the purpose for which the APZ has been defined (which is determined by the purpose of this assessment). There are effectively three APZ dimensions that can apply:

1. An application for planning approval will be required to show that an APZ can be created which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29); and
2. If the assessment has determined a BAL rating for an existing or future building is less than BAL-29, the APZ must be of a size such that the vegetation separation distances correspond to the lower BAL rating to maintain that BAL rating; or
3. Complying with the relevant local government's annual firebreak notice can result in an APZ of greater size than that defined by the two previous parameters.

The dimensions (vegetation separation distances) that are to apply to the APZ for this Proposal are presented in the tables below.

'BAL' APZ - Minimum Dimensions to achieve a BAL-29 rating for this Site					
Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80	
BAL Determination Method	Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)				
Vegetation Area	Applied Vegetation Classification	Effective Slope (degrees)	Bushfire Attack Level	Minimum Separation Distance Required (metres)	Current Separation Distance (metres)
1	Class A Forest	0	BAL-29	21	3
2	Class A Forest	>0-5		27	51
3	Class B Woodland	0		14	15
4	Class B Woodland	>0-5		17	0
5	Class D Scrub	>0-5		15	54
-	Excluded AS3959-2009 2.2.3.2 (f)	N/A		N/A	N/A

‘Local Government Firebreak Notice APZ’ - Minimum Dimensions	
Requirement Set By:	City of Kalamunda
Minimum Dimensions:	Refer to City of Kalamunda Firebreak and Fuel Load Notice
Other Conditions:	The APZ must be maintained as per the APZ requirements set out in Appendix 1 and any differences in the Local Government notice.
This requirement has been established through the local governments annual fire break notice issued under the Bushfires Act 1954 s33.	

Extract from AS 3959-2009 Section 2.2.3.2 – low threat vegetation definition

The Bushfire Attack Level shall be classified BAL-LOW where the vegetation is one or a combination of the following:

a), b), c), d), e) – not relevant to vegetation management within the APZ.

f) low threat vegetation, including grassland managed in a **minimal fuel condition** (i.e. insufficient fuel available to significantly increase the severity of a bushfire attack – recognisable as short cropped grass to a nominal height of 100mm for example), maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.

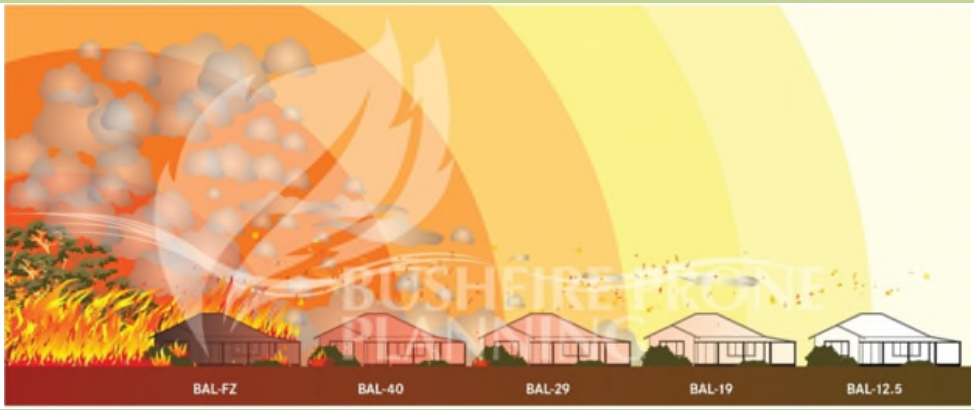
Appendix 3

Explaining Bushfire Attack Levels and Radiant Heat

Definition: A Bushfire Attack Level (BAL) is a "means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat flux expressed in kilowatts per metre squared, and is the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire." AS 3959-2009 Construction of Buildings in Bushfire Prone Areas.

AS 3959-2009 defines six categories of Bushfire Attack Level (AS 3959-2009 Appendix G) and provides the assessment methodology (AS 3959-2009 s2 and Appendix B) to calculate Bushfire Attack Levels. Two methods are provided, Method 1 is the simplified procedure but is subject to some limitations in the circumstances in which it can be used. Method 2 is a detailed procedure and is to be used where a more specific result is sought or site conditions are outside the scope of Method 1. The standard then specifies the construction requirements that correspond to each BAL rating (AS 3959 s3 Table 3.1 and s5 to s9).

Bushfire Attack Level	Description of Predicted Bushfire Attack and Levels of Heat Flux Exposure (Source: *AS 3959-2009, Appendix G and Table 3.1*)
BAL - LOW	There is insufficient risk to warrant specific construction requirements but there is still some risk.
BAL - 12.5	There is risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m^2
BAL - 19	There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2
BAL - 29	There is an increased risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m^2
BAL - 40	There is a much-increased risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m^2
BAL - FZ	There is an extremely high risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2



Radiant Heat – Explanation and Perspective

Radiant heat is the heat that you feel from a fire (campfire or heater). Radiant heat is the biggest killer in a fire. The human body cannot absorb large amounts of radiant heat without its cooling system failing, leading to heat exhaustion and heart failure.

Radiant heat is invisible, travels in straight lines, radiates out from a bushfire ahead of the flames and will bounce off solid objects, although it will travel through glass.

Radiant heat can be blocked by a solid object or barrier such as a brick/concrete wall or building and suitable clothing – but this partial protection from radiant heat may still not save your life. Radiant heat can crack or break windows, allowing embers to enter a building and can ignite exposed surfaces without direct flame contact.

The best protection from radiant heat is distance. If the distance from the fire is doubled, the radiant heat load can be reduced by four times. You can greatly reduce potential radiant heat and direct flame contact around dwellings by carefully managing the vegetation.

Typical Radiant Heat Flux (kW/m^2)	**Likely Effects (1)** The radiant heat flux levels are indicative values and the likely effects are an aggregation of various research. Extended duration of exposure can result in the effect occurring at lower radiant heat flux level.	**Approx. Vegetation Separation Distance (2) (m)**
1	The average radiant heat flux from the sun at midday on a summer's day. 1.6 kW/m^2 acceptable limit for prolonged exposure.	180
2	Pain to unprotected humans after I minute.	125
3	Hazardous conditions. Firefighter in protective clothing expected to operate for a short period (<10 minutes).	100
4	Pain to unprotected humans after 20 seconds. No lethality, 2nd degree burns probable.	61
5	Extreme conditions. Firefighter in protective clothing will feel pain after one minute of exposure.	75
7	Likely fatal to unprotected humans after exposure for several minutes.	61
10	Firefighters not expected to operate in these conditions although they may be encountered. Considered to be life threatening < 1 minute in protective equipment. Piloted (e.g. embers) ignition of textile fabrics in enclosed spaces may occur.	49
13	Standard float glass may crack and with longer exposure may fail. Piloted (e.g. embers) ignition of lightweight textile furnishings may occur. Piloted ignition of timber may occur with long exposure. Lethality to humans 1% in 1 min, 1st degree burns in 10 sec.	40
19	Screened float glass could fail.	31
25	Piloted (e.g. embers) ignition of timber may occur (spontaneous if long exposure). Lethality to humans 100% in 1 min, significant injury in 10 sec.	24
29	Toughened glass could fail. Spontaneous ignition of most timbers with >3 minutes exposure.	21
38	Spontaneous ignition of lightweight textile furnishings can occur (short exposure). Lethality to humans 100% in 1 min, 1% in 10 sec.	17
45	Spontaneous ignition of timbers can occur in 20 seconds.	15
>29 - 100	Within the Flame Zone (BAL-40 and BAL-FZ). During a high-intensity head fire, radiant heat fluxes in excess of 150 kW/m^2 have been measured.	0-21

(1) Sources: AS 1530.4 – 2005, CSIRO, RFS NSW, Warrington Fire Research (literature review on bushfire construction), Assael and Kakosimos, 2010, Fires, explosions, and toxic gas dispersions: effects calculation and risk, CRC Press, Florida
(2) Modelled using AS 3959-2009 methodology for a forest fire on flat ground with FDI 80 and default fuel loads.

Appendix 4

Technical Requirements - Bushfire Protection Criteria (Vehicular Access)

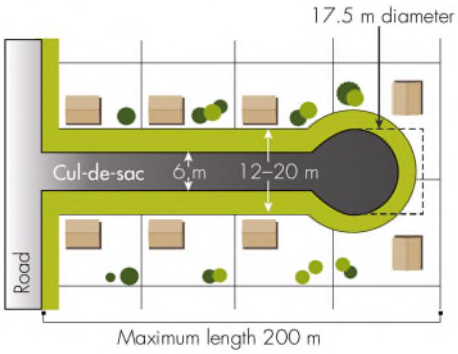
Vehicular Access – Technical Requirements of Acceptable Solutions - Part 1

Source: Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.1)

Acceptable Solution 3.3 Cul-de-sacs (including a dead-end road)

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

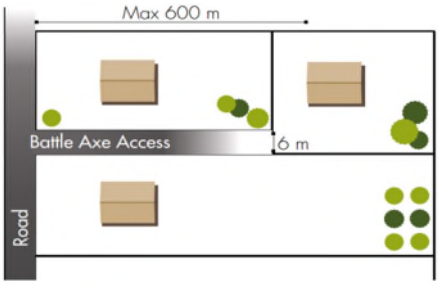
- Maximum length is 200m. If public emergency access is provided between cul-de-sac heads (as a right of way or public access easement in gross), the maximum length can be increased to 600m provided no more than 8 lots are serviced and the emergency access way is less than 600m in length;
- Turnaround area requirements, including a minimum 17.5m diameter head to allow type 3.4 fire appliances to turn around safely;
- The cul-de-sac connects to a public road that allows for travel in two directions; and
- Meet the additional design requirements set out in Part 2 of this appendix.



Acceptable Solution 3.4 Battle-axe

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

- Maximum length 600m and minimum width 6m; and
- Comply with minimum standards for private driveways.



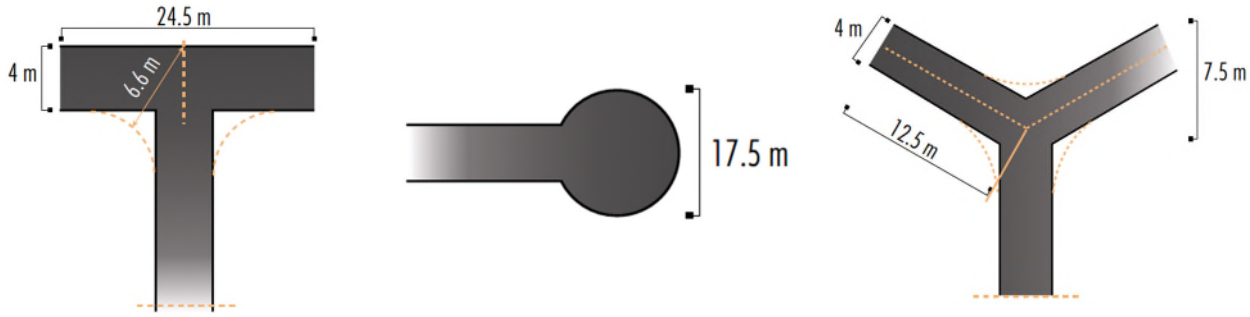
Acceptable Solution 3.5 Private Driveways

The following requirements are to be achieved:

- The design requirements set out in Part 2 of this appendix; and

Where the house site is more than 50 metres from a public road:

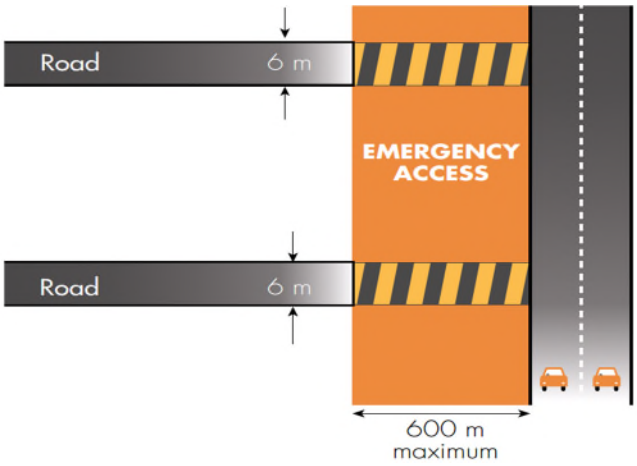
- Passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (ie combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas every 500 metres and within 50 metres of a house, designed to accommodate type 3.4 fire appliances to turn around safely (ie kerb to kerb 17.5 metres);
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes; and
- All weather surface (i.e. compacted gravel, limestone or sealed).



Acceptable Solution 3.6 Emergency Access Way

An access way that does not provide through access to a public road is to be avoided bushfire prone areas. Where no alternative exists, an emergency access way is to be provided as an alternative link to a public road during emergencies. The following requirements are to be achieved:

- No further than 600 metres from a public road;
- Must be signposted including where they ajoin public roads;
- Provided as a right of way or public access easement in gross;
- Where gates are used they must not be locked and they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix); and
- Meet the additional design requirements set out in Part 2 of this appendix.



Acceptable Solution 3.7 Fire Service Access Routes (Perimeter Roads)

Are to be established to provide access within and around the edge of subdivision and related development and to provide direct access to bushfire prone areas for firefighters and link between public road networks for firefighting purposes. Fire service access is used during bushfire suppression activities but can also be used for fire prevention work. The following requirements are to be achieved:

- No further than 600 metres from a public road (driveways may be used as part of the designated fire service access;
- Dead end roads not permitted;
- Allow for two-way traffic (i.e. two 3.4 fire appliances);
- Provide turn-around areas designed to accommodate 3.4 fire appliances and to enable them to turn around safely every 500m (i.e. kerb to kerb 17.5 metres);
- All weather surface (i.e. compacted gravel, limestone or sealed) and have erosion control measures in place;
- Must be adequately sign posted;
- Where gates are used they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix) and may be locked (use a common key system);
- Meet the additional design requirements set out in Part 2 of this appendix;
- Provided as right of ways or public access easements in gross; and
- Management and access arrangements to be documented and in place.

A3.8 Firebreak Width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three meters or to the level as prescribed in the local firebreak notice issued by the local government.

Vehicular Access - Technical Requirements of Acceptable Solutions - Part 2 Source: Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.1)					
Technical Component	Vehicular Access Types				
	Public Roads	Cul-de-sacs	Private Driveways	Emergency Access Ways	Fire Service Access Routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum cross-fall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5

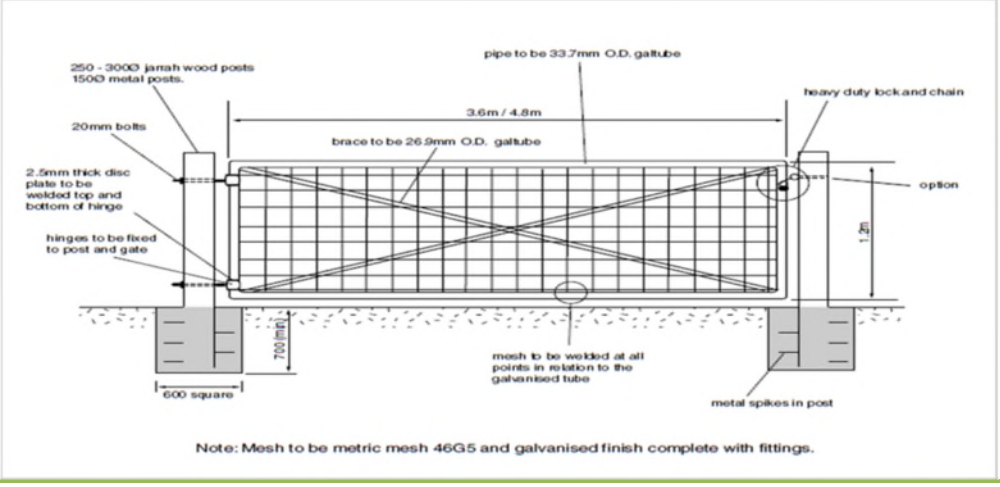
* A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metres of paving and one metre of constructed road shoulders. In special circumstances, where 8 lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of ninety metres may be provided subject to the approval of both the local government and DFES.

Vehicular Access - Technical Requirements of Acceptable Solutions - Gates and Signs

(example requirements – check with local government)

Gates (Bollards)

- Minimum width 3.6m
- Design and construction to be approved by relevant local government.
- Emergency access way gates must not be locked.
- Fire service access route gates may be locked but only with a common key that is available to local fire service personnel.
- Bollards will be to the relevant local government specifications



Signs

- Minimum height above ground of 0.9m.
- Lettering height to be 100mm.
- To display the words (as appropriate) “Emergency Access Only” or “Fire Service Access – No Public Access”.
- Design and construction to be approved by the relevant local government.
- Size 600mm x 400mm.
- Sign colour red, base (white) area is reflective background.
- Rounded corners, radius 20mm.
- White key-line 3mm wide, 3mm from outside edge.
- Suggested mounting hole six 6mm diameter.

Appendix 5

Technical Requirements - Bushfire Protection Criteria (Water)

Source: Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.1) and DFES website

Acceptable Solution 4.1 Reticulated Areas

The requirement is to supply a reticulated water supply, together with fire hydrants, in accordance with the specifications set by DFES and the relevant water supply authority (WA Water Corporation or Aqwest - Bunbury or Busselton Water). The Water Corporation's 'No 63 Water Reticulation Standard' is deemed to be the baseline criteria for developments and should be applied unless local water supply authority's conditions apply. Key specifications in the most recent version/revision of the design standard include:

- ***Residential Standard*** – hydrants are to be located so that the maximum distance between the hydrants shall be no more than 200 metres.

- ***Commercial Standard*** – hydrants are to be located with a maximum of 100 metre spacing in Industrial and Commercial areas.

- ***Rural Residential Standard*** – where minimum site areas per dwelling is 10,000 m^2 (1ha), hydrants are to be located with a maximum 400m spacing. If the area is further subdivided to land parcels less than 1ha, then the residential standard (200m) is to be applied.

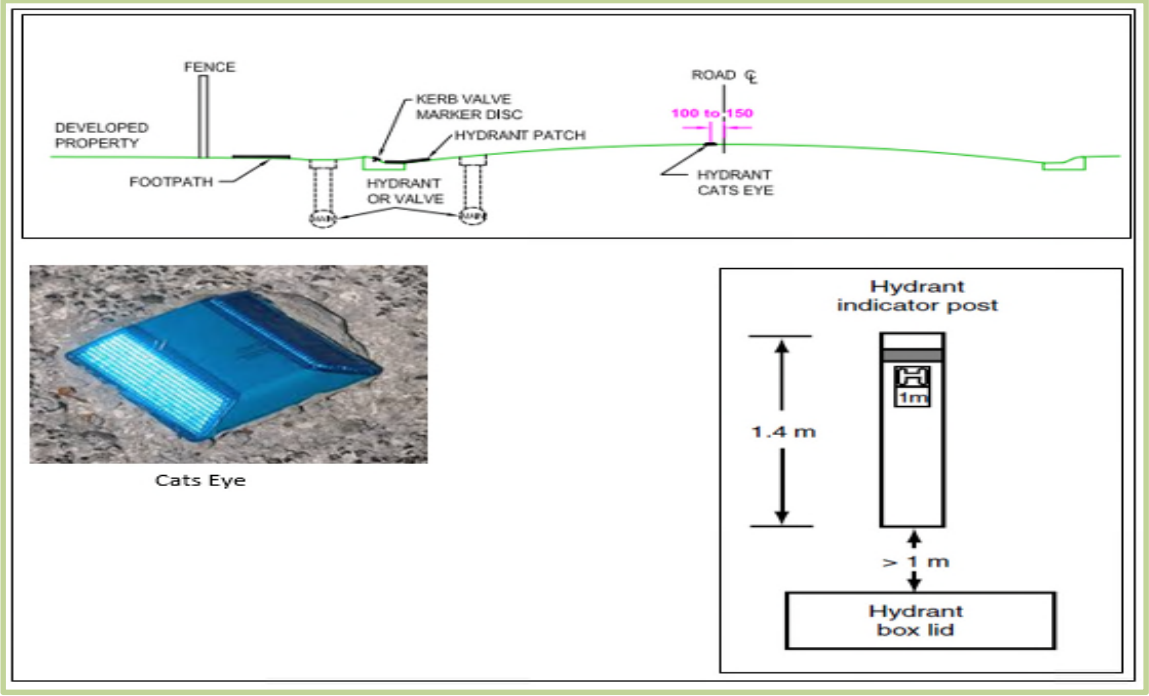
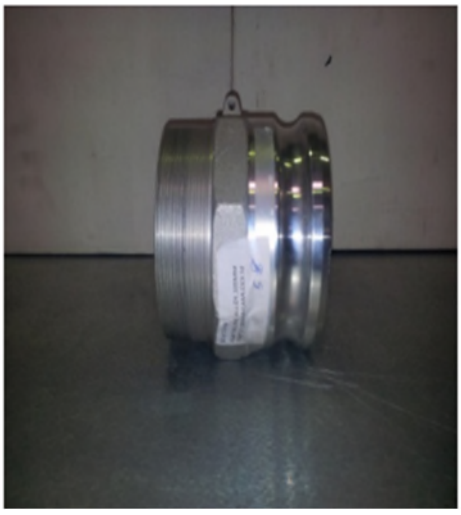


Figure A4.1: Hydrant Location and Identification Specifications

Acceptable Solution 4.2 Non-Reticulated Areas

Static water supplies are used by firefighters in areas where there is no reticulated water supply. Water tanks are the only acceptable static water source acceptable to meet Element 4 (Water) of the Bushfire Protection Criteria as per the *Guidelines for Planning in Bushfire Prone Areas (WAPC 2015) Appendix 4*.

The requirements for the development being assessed can be increased by the relevant local government. If a variation applies it will be noted in s7.1 and s7.5.

Volume:	50,000 litres per tank
Ratio of tanks to lots:	1 tank per 25 lots (or part thereof)
Location:	No more than two kilometres to the furthermost house site within the residential development to allow a 2.4 fire appliance to achieve a 20-minute turnaround time at legal road speeds.
Tank Construction:	Above ground tanks constructed using concrete or metal. Stands of raised tanks are constructed using non-combustible materials and heat shielding where applicable (required for metal stands).
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround areas suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) are provided within three metres of each tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 100mm cam-lock coupling of metal/alloy construction (source: DFES). Examples below:
	 
Ownership and Responsibility:	Water tanks and associated facilities are vested in the relevant local government. A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times.

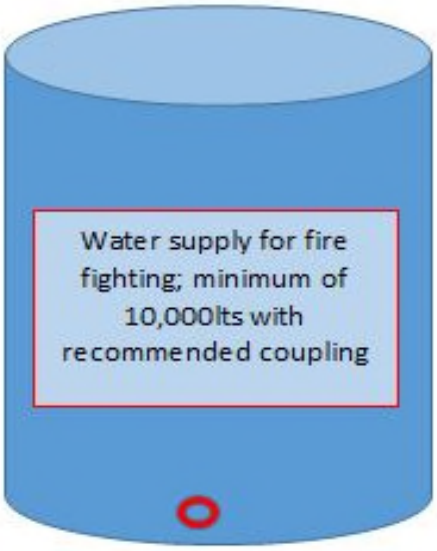
Acceptable Solution 4.3 Non-Reticulated Areas - Individual Lots

This solution is only for use if creating one additional lot and cannot be applied cumulatively (*Guidelines for Planning in Bushfire Prone Areas WAPC 2015 Appendix 4)*.

Single lots above 500 m^2 need a dedicated static water supply on the lot that has an effective capacity of 10,000 litres (*Guidelines for Planning in Bushfire Prone Areas WAPC 2015)*.

An Example Local Government Requirement:

Volume:	Minimum 10,000 litres (effective) per tank dedicated to firefighting purposes. The storage tank must not facilitate sharing the water for domestic use (danger of contamination).
Tank Construction:	Above ground tanks constructed using concrete or metal.
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround area suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) is provided at the tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 50mm or 100mm cam-lock coupling of metal/alloy construction. Examples below:
Responsibility:	A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times.



Appendix 6

Building Applications (Building Permit) and the Requirement for a Bushfire Attack Level (BAL) Assessment

Most development in WA requires the submission of a building application in order to obtain a building permit before construction can commence. The proposed construction must comply with the Building Code of Australia (BCA).

In a designated bushfire prone area, construction, renovation, alteration, extension, improvement or repair of residential buildings (Classes 1, 2, 3 and associated Class 10a buildings or decks), must comply with the bushfire construction requirements of the BCA.

The BCA references AS 3959-2009 'Construction of buildings in bushfire prone areas' and the NASH Standard 'Steel Framed Construction in Bushfire Areas', as providing deemed to satisfy solutions that achieve compliance with the BCA bushfire performance requirements.

A Bushfire Attack Level (BAL) assessment (using the methodology set out in AS 3959-2009) is required to determine the BAL rating of the proposed building work. The corresponding design and construction requirements are then able to be determined.

Class 4 to Class 9 buildings will also require a BAL assessment but are not required (by the BCA for WA) to comply with the bushfire construction requirements. However, the requirement to comply may be established by the responsible authority or the requirements might also be voluntarily adopted. For these class of buildings, the bushfire provisions use the planning process to focus on location, siting and design, vehicular access and firefighting water supply to mitigate the bushfire risk.

In certain situations, if the determined BAL is BAL-40 or BAL-FZ and/or for certain types of building, the State and/or local government bushfire provisions for planning are triggered and this will require the submission of a development application and the provision of additional assessments against the Bushfire Protection Criteria as set out in State Planning Policy 3.7 Planning in Bushfire Prone Areas and the Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.1).

ATTACHMENT 2

2. SCHEME AMENDMENT MAP

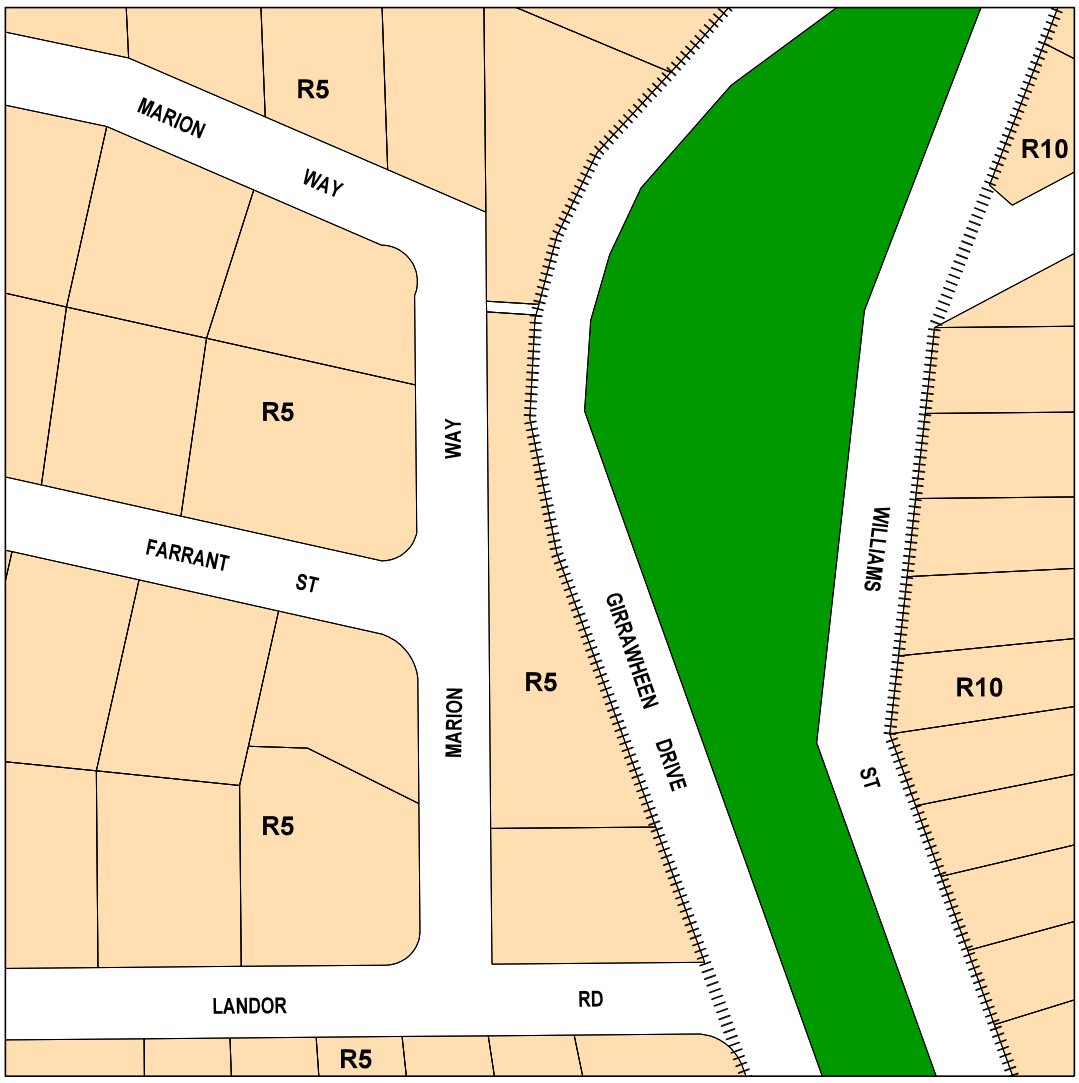
Prepared by: Leighton Drafting

Reference: 7 Marion-5-001

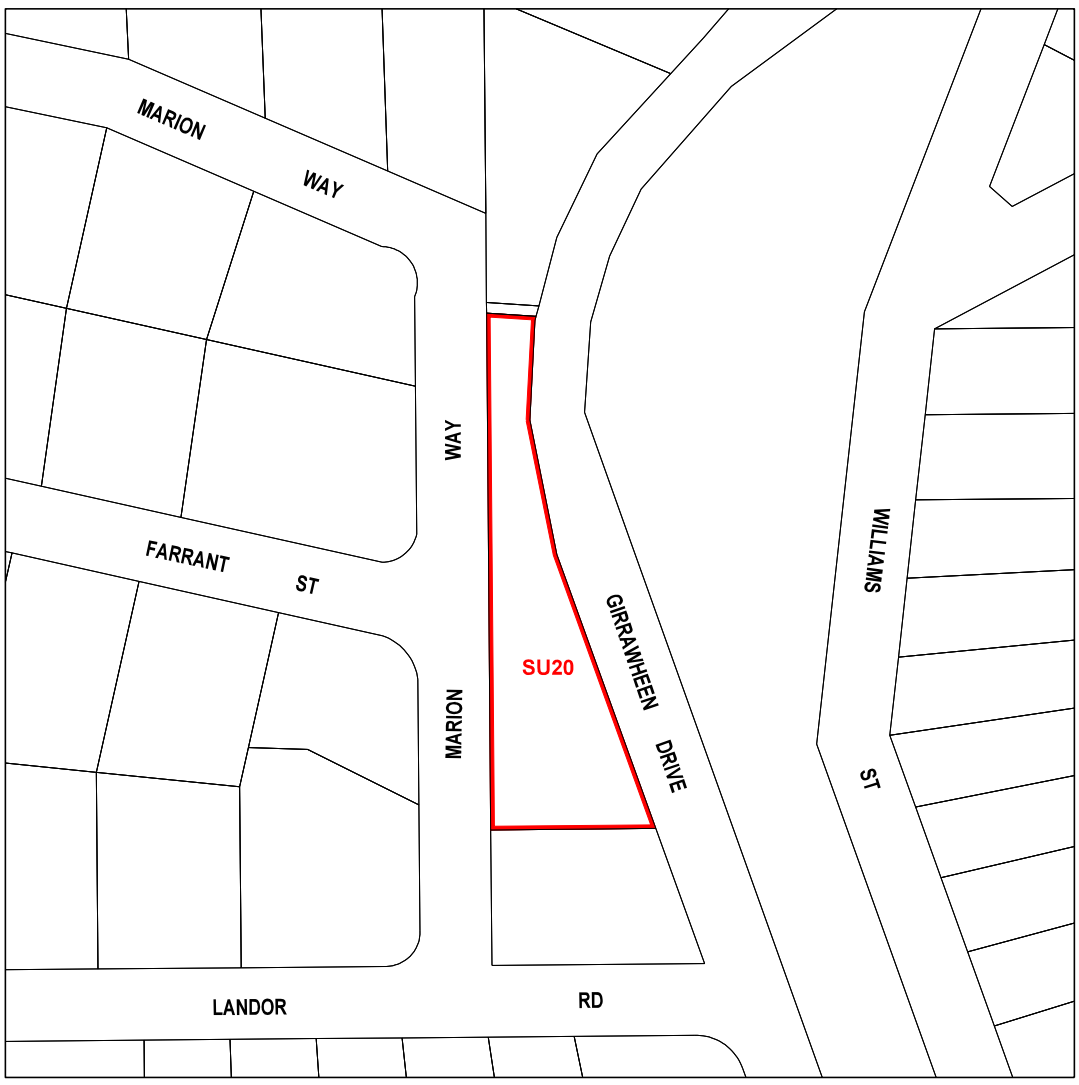
Dated: September 2017

SCHEME AMENDMENT MAP

SHIRE OF KALAMUNDA
LOCAL PLANNING SCHEME No.3
AMENDMENT No. 97



EXISTING ZONING



PROPOSED ZONING

LEGEND

REGION SCHEME RESERVES

PARKS AND RECREATION

LOCAL SCHEME ZONES

RESIDENTIAL

OTHER CATEGORIES

R10 RCODES

SPECIAL USE

0 80 160m

SEPTEMBER 2017