



**DISTRICT
PLANNING
SCHEME No. 2**

Amendment No. 177

Planning and Development Act 2005

**RESOLUTION TO ADOPT AMENDMENT TO
LOCAL PLANNING SCHEME**

CITY OF WANNEROO

DISTRICT PLANNING SCHEME NO. 2 - AMENDMENT NO. 177

RESOLVED that the local government pursuant to section 75 of the *Planning and Development Act 2005*, amend the above local planning scheme to:

- a) Rezone Lot 9193 Joseph Banks Boulevard, Banksia Grove from Special Residential to Urban Development and amend the scheme map accordingly;
- b) Modify Schedule 11 - Special Residential provisions relating Special Residential Zone No.2 by deleting 'Portion of Lot 9189 Flynn Drive, Banksia Grove', currently described as Lot 9193 Joseph Banks Boulevard, Banksia Grove.

The Amendment is standard under the provisions of the *Planning and Development (Local Planning Schemes) Regulations 2015* for the following reason(s):

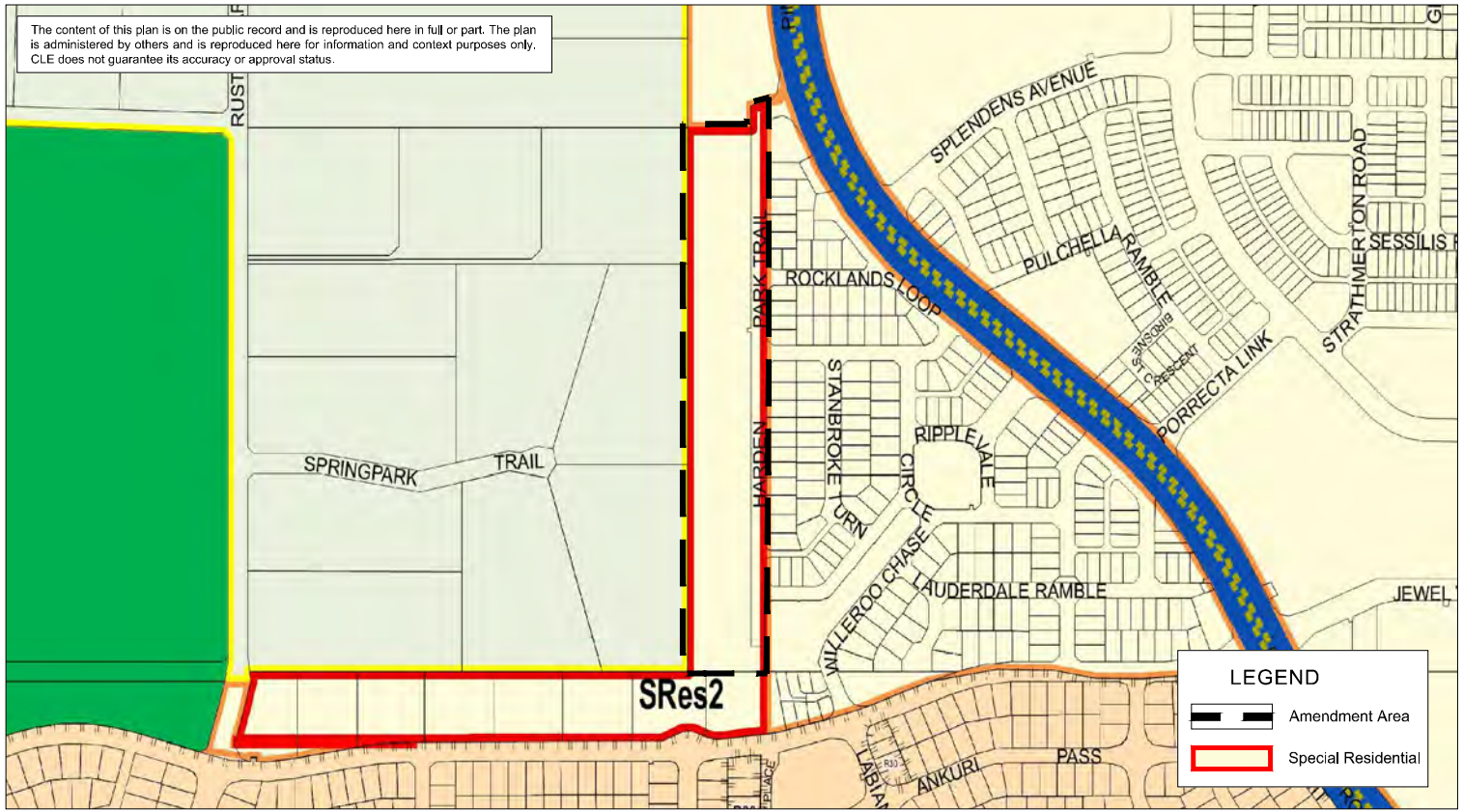
- 1. It proposes to rezone the amendment area to Urban Development to be consistent with the Metropolitan Region Scheme wherein the amendment area is zoned Urban.

Date of Council Resolution



.....
(Chief Executive Officer)

Dated this day of 20.....

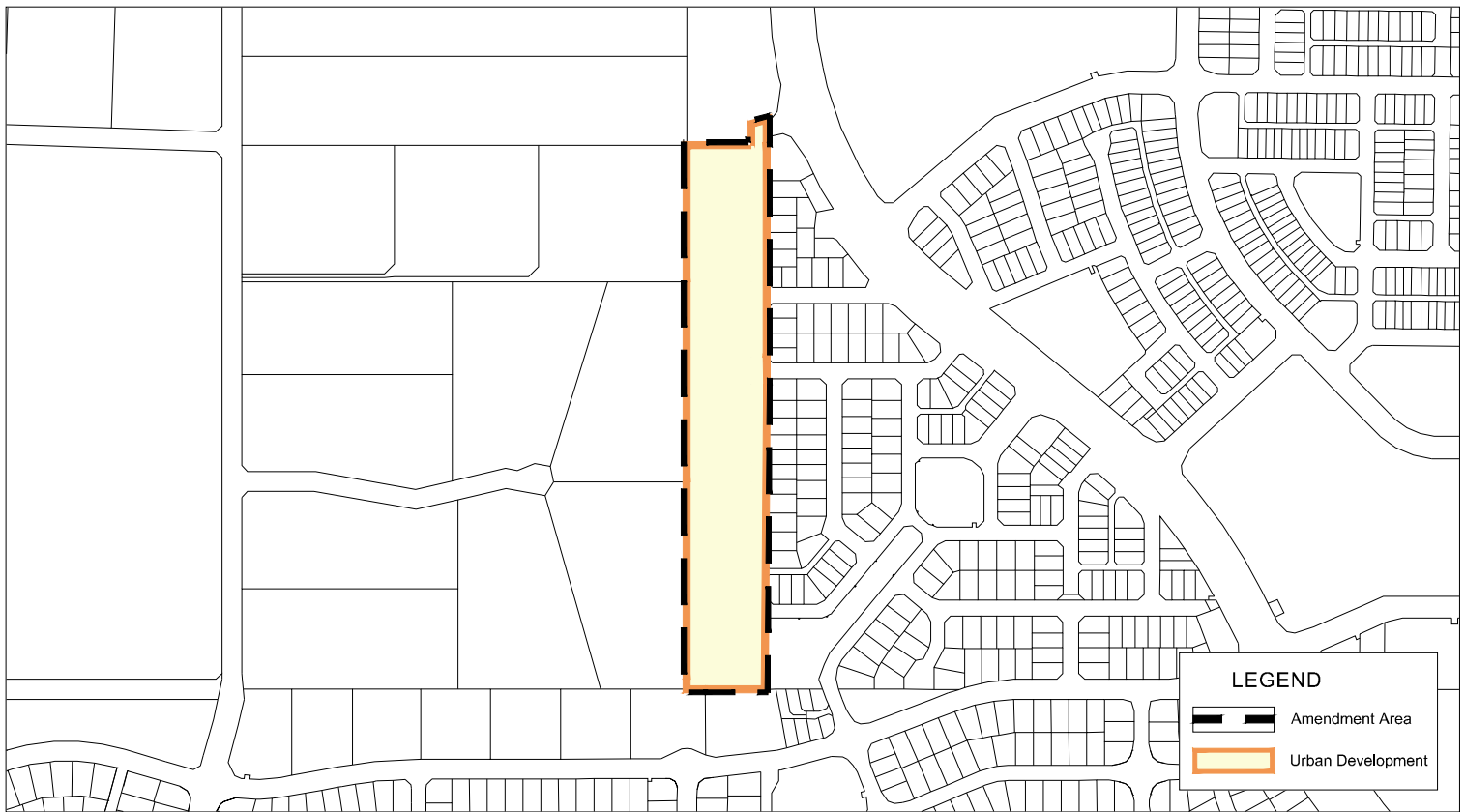
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LEGEND

-  Amendment Area
-  Special Residential

EXISTING



LEGEND

-  Amendment Area
-  Urban Development

PROPOSED



Title: City of Wanneroo District Planning Scheme No. 2
Amendment No. 177
Scheme Amendment Report

Prepared for: LWP Property Group Pty Ltd

CLE Reference: 981Rep573E

Date: 28 October 2019

Status: Final

Review date: 28 October 2019

Prepared by: CLE Town Planning + Design

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1.1 Introduction

Banksia Grove is an established residential suburb in the northern suburbs of the Perth metropolitan area and is nearing its final stages of development. Banksia Grove is identified as 'Urban' under the Metropolitan Region Scheme (MRS) and is predominantly zoned 'Urban Development' under the City of Wanneroo's District Planning Scheme No.2 (DPS2).

The portion of Banksia Grove that is zoned 'Urban Development' is covered by the Banksia Grove Agreed Structure Plan No. 21A (the Banksia Grove ASP) which has been adopted pursuant to clause 3.14.3 of DPS2 which requires the preparation of a structure plan over land zoned 'Urban Development'. In addition to the land zoned 'Urban Development', the ASP includes a small portion of land on its western periphery that is zoned 'Special Residential' under DPS2. The ASP however, does not contain any specific development controls that relate to the 'Special Residential' zone in addition to those prescribed under DPS2.

At the time the Banksia Grove ASP was prepared, it was intended that this area of land would be rezoned from 'Special Residential' to 'Urban Development' as outlined in Part 1.6.2 of the original Banksia Grove LSP Part 2 – Explanatory Report. Consequently, the land was included within the Banksia Grove ASP however; a scheme amendment to facilitate the rezoning was not subsequently progressed.

In late 2017, an application, referred to as Amendment 149, to rezone the northern portion of the 'Special Residential' (within the Banksia Grove ASP) to 'Urban Development', was supported by the City of Wanneroo and received final approval from the WAPC in May 2018, a copy of which is enclosed as Attachment 1. An amendment to the Banksia Grove ASP (Amendment 2) has since been endorsed by the WAPC as well as a subdivision approval for lots of approximately 1500m² (WAPC/156782).

1.2 Purpose

The purpose of this scheme amendment is to rezone a portion of Lot 9193 Joseph Banks Boulevard and Harden Park Trail, Banksia Grove from 'Special Residential' to 'Urban Development', consistent with the original intent for the land as outlined within the Part 2 Explanatory Section of the Banksia Grove ASP. The scheme amendment will in turn facilitate a modification to the Banksia Grove ASP to enable the land to be subdivided into residential lots of approximately 1,500m² in area.

Schedule 11 – 'Special Residential Provisions' of DPS2 is also proposed to be amended with specific regards to 'SRes2' so that it correctly references the lots to which it applies. Given that the subject land will effectively be removed from the 'Special Residential' zone, its reference in the table, currently as 'Portion of Lot 9189 Flynn Drive, Banksia Grove' will be deleted.

1.3 Site Description

The land the subject of this amendment comprises a portion of Lot 9193 Joseph Banks Boulevard and Harden Park Trail, Banksia Grove. The portion of Lot 9193 the subject of this amendment is approximately 3.6ha in size; of linear proportions; and orientated along a north-south axis. Hereafter the subject portion of Lot 9193 may also be referred to as 'the land'.

The land is located in the south-western most extents of the Banksia Grove estate and is generally bound by the 'Special Rural' suburb of Carramar to the west; Harden Park Trail to the east; and traditional special residential lots of approximately 5,000m² (also part of Carramar) to the south.

The land currently acts as a transitional area and interface between the urban- densities of Banksia Grove and the larger (2 – 2.5ha) 'Special Rural' zoned lots within Carramar Estate.

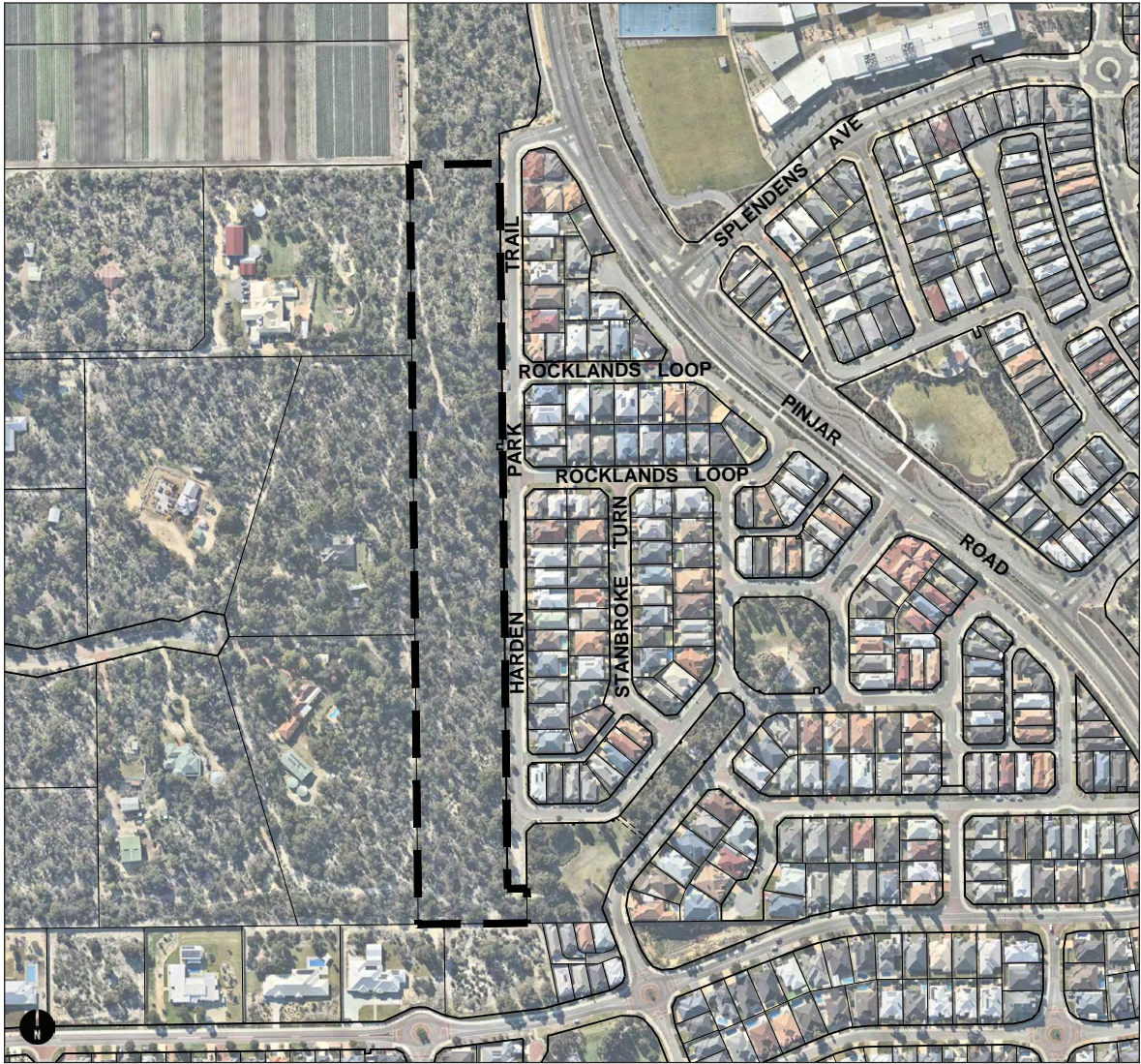


Figure 1 Site Plan

source: Nearmap

2.1. Metropolitan Region Scheme

The land is zoned 'Urban' under the Metropolitan Region Scheme (MRS) with the area to the east similarly zoned 'Urban', refer Figure 2. The area abutting the western boundary within Carramar is zoned 'Rural' under the MRS.

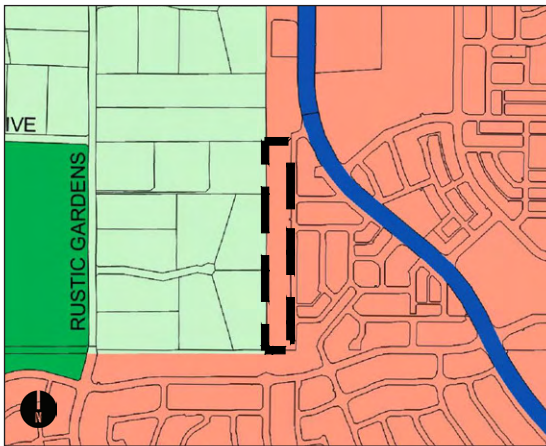


Figure 2 MRS Zoning

source: WAPC

This amendment to DPS2 to rezone the subject land 'Urban Development' is entirely consistent with its 'Urban' zoning under the MRS and is a logical next step towards the land being developed for residential purposes at a more appropriate density.

This 'appropriateness' is determined on the basis of the marketability of lot product, and a broader sentiment towards more efficient development of land. The minimum lot area requirements that will be imposed as part of the concurrent Banksia Grove ASP amendment will assist to ensure that an appropriate interface is maintained with the land to the west within the Carramar estate.

2.2 District Planning Scheme No.2

The land is currently zoned 'Special Residential' under DPS2 (the Scheme) and is specifically identified as 'SRes2' on the scheme map (refer Figure 3) and schedule 11 of the Scheme.

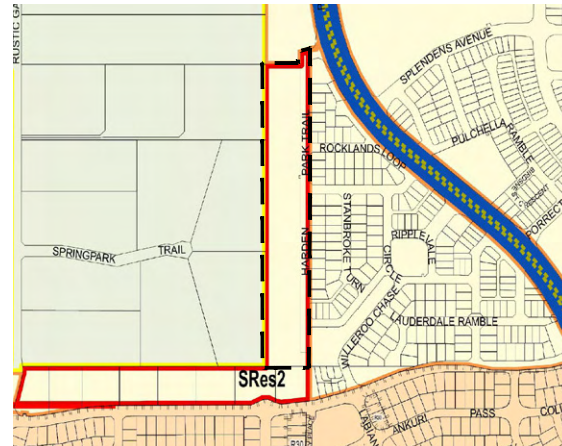


Figure 3 District Planning Scheme No.2 - Existing

source: WAPC

The following general provisions apply to the 'Special Residential' zone pursuant to clause 3.19 of the Scheme:

- Subdivision should be in accordance with the Development Guide Plan.*
- A reticulated deep sewerage system will be required if, in the opinion of the relevant authorities, the land is considered not suitable for the long term, efficient on-site disposal of effluent.*
- A reticulated water supply from the Water Corporation network shall be provided to each lot.*
- Only one dwelling (a single house) shall be permitted on each lot.*

- e) *No building shall be constructed closer than 15 metres to a street alignment, within 5 metres of a side boundary, or within 10 metres of the rear boundary of any lot. Where a lot has frontage to more than one street, the Council shall designate one such street as the frontage and may permit the construction of buildings to within 7.5 metre from the other street boundaries.*
- f) *Except to the extent necessary for the construction of approved buildings and driveways, no land shall be cleared of vegetation without the prior written approval of the Council.*
- g) *A person shall not without Planning Approval of the Council remove, cut down, or damage any mature tree on land within a Special Residential Zone including street verges.*
- h) *The Council may, as a condition of any approval granted under general provisions (f) and (g) of this subclause, require the applicant to plant and/or maintain to its satisfaction mature trees and shrubs to promote the natural or other aesthetic setting of the area.*
- i) *No cattle, goats, sheep, horses, bees or any other animal stipulated from time to time by the Council to be inappropriate to Special Residential Zones, shall be kept on any lot.*

Clause 3.19.4 of the Scheme states that:

Special Provisions relating to individual Special Residential Zones are set out in Schedule 11. In the case of any conflict the Special Provisions shall prevail over the general provisions of the Scheme.

Schedule 11 – Special Residential Provisions of the Scheme sets out the following specific provisions with regards to ‘SRes2’:

Subdivision is restricted to a minimum lot size of 5,000m² in accordance with the Development Guide Plans for this zone and that all development shall be contained within the building envelopes as specified on these plans.

The proposed amendment will rezone the land to ‘Urban Development’. Pursuant to clause 3.14.3 of DPS2 an Agreed Structure Plan is required to be prepared and adopted over land zoned ‘Urban Development’ prior to development or subdivision occurring. This amendment to DPS2 is therefore the first step in modifying the framework to facilitate subdivision of the land for lots of approximately 1,500m². Further detail regarding the zoning, r-coding and development control provisions are required to be implemented as part of an amendment to the Banksia Grove ASP which has been lodged concurrently with this amendment to inform decision making and provide context for the rezoning.

The specific provisions that will be implemented as part of the amendment to the Banksia Grove ASP are discussed further in section 3.3 of this report.

2.3 Banksia Grove Agreed Structure Plan No. 21A

The Banksia Grove Agreed Structure Plan No. 21A is the operative planning framework over the portion of Banksia Grove zoned ‘Urban Development’ and the subject land. The Banksia Grove ASP assigns a ‘Special Residential (SR2)’ zoning to the land, consistent with DSP2. The Banksia Grove ASP however, does not contain any specific development controls that relate to the ‘Special Residential’ zone in addition to those prescribed under DPS2.

As stated in clause 1.6.2 of the Banksia Grove ASP Part 2 – Explanatory report, the land was included within the ASP area on the premise that it would be rezoned to ‘Urban Development’ as part of a subsequent scheme amendment process. This amendment to DPS2 fulfils this original intent for the land, establishing a zoning that will facilitate the ultimate intended development outcome.

3.0 Planning Justification

3.1 Planning Framework

This rezoning to 'Urban Development' does not automatically facilitate subdivision and development of the land into 1,500m² lots as proposed. Pursuant to clause 3.14.3 of DPS2, an Agreed Structure Plan is required to be prepared and adopted over land zoned 'Urban Development'. As previously stated, the land is already covered by an approved structure plan however, the zoning and density coding of the land under the Banksia Grove ASP do not differ from the existing scheme provisions. An amendment to the Banksia Grove ASP is also therefore required to be adopted in conjunction with this scheme amendment to allow for further subdivision of the land to 1,500m² lots. An amendment to the Banksia Grove ASP is being undertaken concurrently to inform this scheme amendment and facilitate a coordinated planning approach.

3.2 Rural Interface

The potential impact on the 'Special Rural' zoned lots to the west will be negligible, particularly given that the land abuts only 3 lots, and that dwellings will be separated (east-west) by minimum 50m.

The land directly north of the amendment area has a density coding of R10 as per Map 3 of the Banksia Grove ASP. This land is the subject of a WAPC subdivision approval issued in September 2018 and includes lots of approximately 1500m², refer Attachment 2. The endorsement of these larger residential lots establishes a clear precedent and demonstrates that low density residential lots are an appropriate interface with 'Special Rural' land.

3.3 Development Control

As previously stated, there are a number of specific development control provisions that are applicable to the subject land based on its previous 'Special Residential' zoning. To ensure continuity and that the desired built form for the land is maintained through the rezoning process, the amendment to the Banksia Grove ASP that is necessitated by this scheme amendment will include statutory development controls that are generally consistent with those under the existing 'Special Residential' zone. Whilst not technically forming part of this rezoning process, the structure plan amendment has been prepared and lodged concurrently with this scheme amendment to inform the amendment process.

3.3.1 Setbacks

The transitional role that the land currently plays between the medium density Banksia Grove and 'Special Rural' zoned portion of Carramar is acknowledged and will be maintained through implementation of this Scheme amendment

Clause 3.19.3 (e) of DPS2 prescribes a minimum front setback of 15m and a minimum rear setback of 10m for the 'Special Residential' Zone. To maintain continuity and the status quo with regards to streetscapes and views from adjoining properties, it is proposed to carry over these setbacks, or a greater setback. If required to address fire management, into the Part 1 Statutory Section of the Banksia Grove ASP via a local development plan. In determining appropriate setback requirements, regard has been given to bush fire requirements, and this is discussed further in Section 3.4. A draft Indicative Building Envelope Plan has been prepared and is appended to this report, refer Attachment 4.

These generous setbacks will ensure that the general rural feel is maintained and that buildings are not highly visible from the adjoining properties thereby minimising the potential for conflict with established residents in Carramar.

3.4 Environmental Considerations

The land is covered by Ministerial Statement No. 280, which makes the project exempt from requiring a clearing permit under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. As part of the proposal for the rezoning of the land to the north, the Environmental Protection Authority (EPA) confirmed that land is subject to Ministerial Statement 280 and does not require any further State environmental approvals.

Vegetation retention shall take place where possible, subject to compliance with fire requirements and with regard to site works.

3.5 Bushfire Protection

The land is located within a Bushfire Prone area in accordance with DFES mapping. Accordingly, any future subdivision or development of the land must comply with an approved Fire Management Plan (FMP).

A FMP has been prepared by BushfireWest to support the proposed Amendment to DPS 2. The FMP is attached. The FMP is premised on the development scenario illustrated in CLE's Indicative Concept Plan as attached.

The FMP finds that through the implementation of prescribed asset protection zones, as well as other fire safety measures, bushfire risk can be managed sufficiently to enable residential development to occur in accordance with the WAPC's 'State Planning Policy 3.7 – Planning in Bushfire Prone Areas', together with the associated Guidelines.

3.6 Servicing

A requirement to connect to essential service infrastructure is expected to be imposed as a condition of any future subdivision approval.

The subject land will likely be serviced by extending the existing infrastructure from within the Banksia Grove estate, either from the north-east, or due east across Harden Park trail.

It is the developer's intent to earthwork the proposed Lots once subdivision approval has been obtained and prior to the sale of any lots. Vegetation retention will be a priority objective of the earthworks plan.

4.0 Conclusion

This amendment to DPS2 to rezone the land from 'Special Residential' to 'Urban Development' will ultimately allow for the land to be developed at a more appropriate density, making subdivision of the land viable for the project. The proposal is consistent with the rezoning recently approved for land to the north of the subject site from 'Special Residential' to 'Urban Development'. A subsequent structure plan amendment and subdivision approval for lots of 1500m² has all been issued by the WAPC.

The rezoning will provide the foundation for the accompanying amendment to the Banksia Grove ASP which applies more detailed development and subdivision standards to ensure thoughtful subdivision and development of the land. This will ensure an appropriate interface and transitional area between the urban densities of Banksia Grove and the 'Special Rural' zoned land within the Carramar Estate, assisting to minimise potential concerns with adjoining property owners as well as achieve the original development objectives for the land.

PLANNING AND DEVELOPMENT ACT 2005

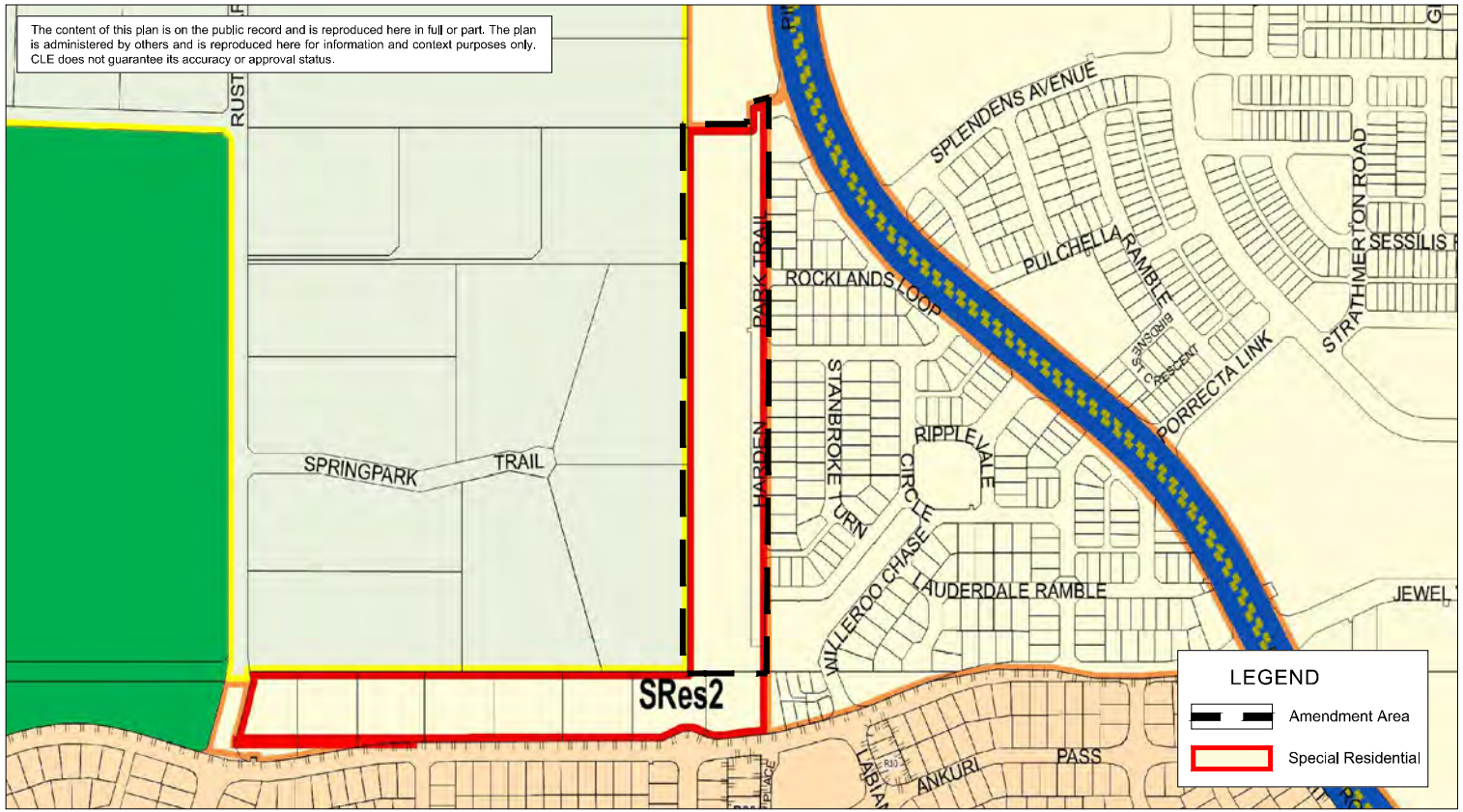
CITY OF WANNEROO

DISTRICT PLANNING SCHEME NO. 2 - AMENDMENT NO. 177

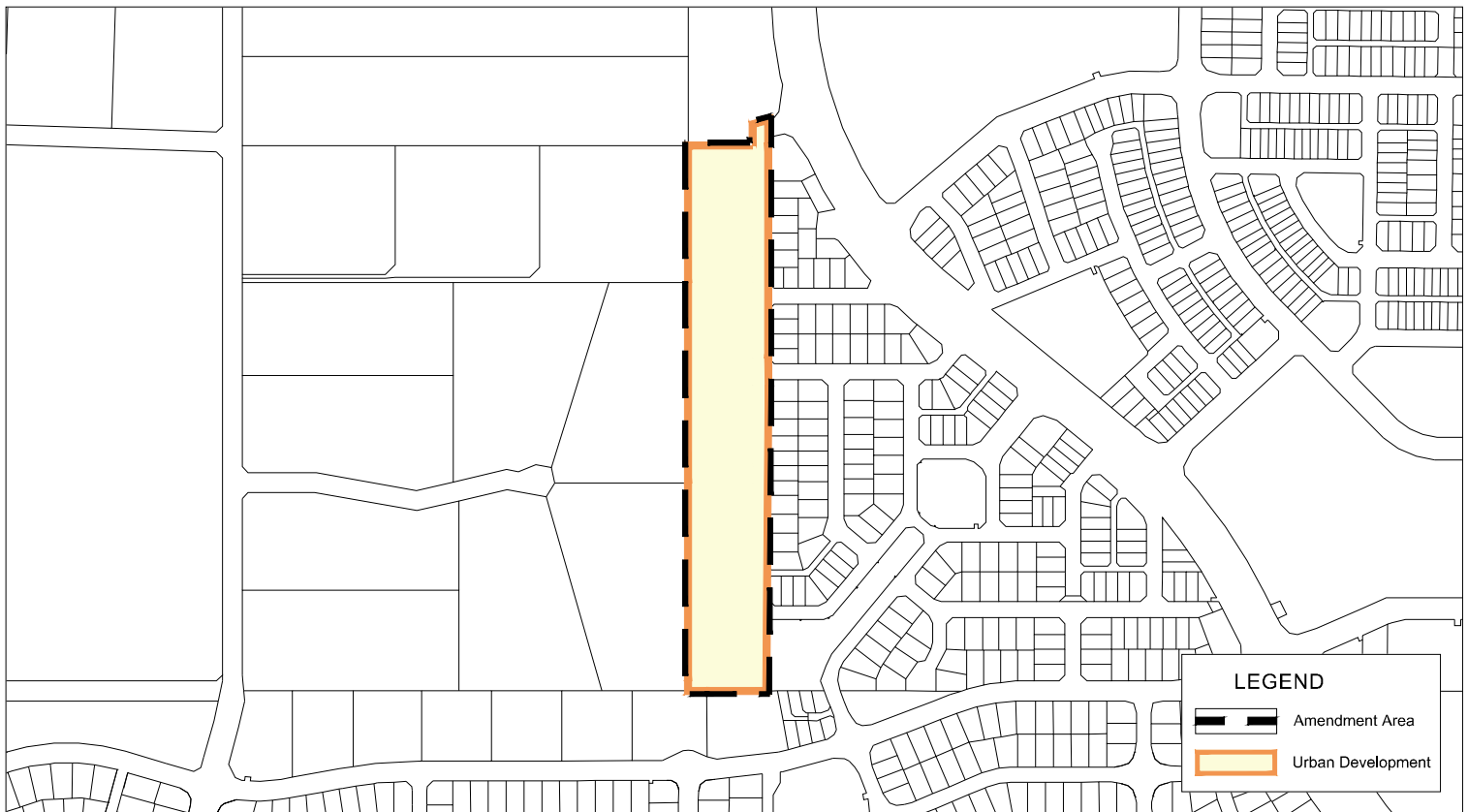
The City of Wanneroo under and by virtue of the powers conferred upon it in that behalf by the Planning and Development Act 2005 hereby amends the above local planning scheme to:

- a) Rezone Lot 9193 Joseph Banks Boulevard, Banksia Grove from Special Residential to Urban Development and amending the scheme map accordingly;
- b) Modify Schedule 11 - Special Residential provisions relating Special Residential Zone No.2 by deleting 'Portion of Lot 9189 Flynn Drive, Banskia Grove' currently described as Lot 9193 Joseph Banks Boulevard, Banksia Grove.

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EXISTING



PROPOSED



COUNCIL ADOPTION

This Standard Amendment was adopted by resolution of the Council of the City of Wanneroo at the Ordinary Meeting of the Council held on the 15 day of October, 2019.

.....
MAYOR

.....
CHIEF EXECUTIVE OFFICER

COUNCIL RESOLUTION TO ADVERTISE

By resolution of the Council of the City of Wanneroo at the Ordinary Meeting of the Council held on the 15 day of October, 2019, proceed to advertise this amendment.

.....
MAYOR

.....
CHIEF EXECUTIVE OFFICER

COUNCIL RECOMMENDATION

This Amendment is recommended for support without modification by resolution of the City of Wanneroo at the Ordinary Meeting of the Council held on the XX day of XXXX, 20XX , and the Common Seal of the City of Wanneroo was hereunto affixed by the authority of a resolution of the Council in the presence of:

.....
MAYOR

.....
CHIEF EXECUTIVE OFFICER

WAPC RECOMMENDATION FOR APPROVAL

.....
DELEGATED UNDER S.16 OF
PD ACT 2005

DATE

Approval Granted

.....
MINISTER FOR PLANNING, LANDS AND HERITAGE

DATE

Attachments

Attachment 1: Amendment 149 Approval

Attachment 2: WAPC Approval 156782

Attachment 3: Indicative Concept Plan

Attachment 4: Indicative Building Envelope Plan

Attachment 5: Bushfire Management Plan (Bushfire West)



Attachment 1 Amendment 149 Approval

Chief Executive Officer
City of Wanneroo
Locked Bag No 1
Wanneroo WA 6946

Transmission via electronic mail to: enquiries@wanneroo.wa.gov.au

Dear Sir

DISTRICT PLANNING SCHEME NO. 2 - AMENDMENT NO. 149

I refer to your letter dated 12 March 2018 regarding Amendment No. 149.

The WAPC has considered the amendment and submitted its recommendation to the Minister in accordance with section 87(1) of the *Planning and Development Act 2005* (the Act).

The Minister has approved the amendment in accordance with section 87(2)(a) of the Act. In accordance with section 87(3) of the Act, the WAPC will cause the approved amendment to be published in the Government Gazette.

The WAPC has forwarded notice to the State Law Publisher (attached) and it is the local governments' responsibility to make arrangements for the payment of any publication costs. The local government is required under section 87(4B) of the Act, and regulation 64 of the *Planning and Development (Local Planning Schemes) Regulations 2015*, to publish the approved amendment, ensure that it is available to the public, and notify each person who made a submission.

For all payment and purchase order queries, please contact the State Law Publisher on (08) 6552 6012 or fax (08) 9321 7536. One signed set of the amending documents is returned for your records.

Please direct any queries about this matter to Heather Brooks on 6551 9436 or schemes@planning.wa.gov.au.

Yours sincerely



Ms Sam Fagan
Secretary
Western Australian Planning Commission
24/05/2018

PLANNING AND DEVELOPMENT ACT 2005

APPROVED DISTRICT PLANNING SCHEME AMENDMENT

City of Wanneroo

DISTRICT PLANNING SCHEME No. 2- AMENDMENT No. 149

Ref: TPS/1736

It is hereby notified for public information, in accordance with section 87 of the *Planning and Development Act 2005* that the Minister for Planning approved the City of Wanneroo District Planning Scheme amendment on 22 May 2018 for the purpose of:

- a) Rezoning Lot 9164 Flynn Drive and portion of Lot 9189 Flynn Drive, Banksia Grove and Lot 8025 Donia Way, Carramar from Special Residential to Urban Development and amending the scheme map accordingly.
- b) Replacing the 'Special Residential Zone No. 2' provisions of Schedule 11 - Special Residential Provisions with the following table:

NO	DESCRIPTION LOCALITY	OF	SPECIAL PROVISIONS
SRes2 2 (formerly SRP No. 3 under TPS1)	Lots 2111-2115 Carramar Road, Carramar. Lots 3186-3193 Golf Links Drive, Carramar. Portion of Lot 9189 Flynn drive, Banksia Grove. Lots 5001-5006 Peridot Turn, Banksia Grove. Lots 70-78 Turquoise Loop, Banksia Grove, and Lots 398-401 Harbour Elbow, Banksia Grove.		1) Subdivision is restricted to a minimum lot size of 5000m ² in accordance with the Development Guide Plans for this zone and that all development shall be contained within the building envelopes as specified on these plans.

**T ROBERTS
MAYOR**

**D SIMMS
CHIEF EXECUTIVE OFFICER**



Attachment 2
WAPC Approval 156782



Your Ref : 981-549A

Everett Bennett Pty Ltd
PO Box 796
SUBIACO WA 6904

**Approval Subject To Condition(s)
Freehold (Green Title) Subdivision**

Application No : 156782

Planning and Development Act 2005

Applicant	:	Everett Bennett Pty Ltd PO Box 796 SUBIACO WA 6904
Owner	:	Housing Authority 99 Plain Street EAST PERTH WA 6004
Application Receipt	:	8 June 2018

Lot Number	:	9164, 9190
Diagram / Plan	:	Deposited Plan 402673, 413436
Location	:	-
C/T Volume/Folio	:	2846/667, 2946/608
Street Address	:	Lot 9164, 9190 Flynn Drive, Banksia Grove
Local Government	:	City of Wanneroo

The Western Australian Planning Commission has considered the application referred to and is prepared to endorse a deposited plan in accordance with the plan date-stamped **08 June 2018** once the condition(s) set out have been fulfilled.

This decision is valid for **four years** from the date of this advice, which includes the lodgement of the deposited plan within this period.

The deposited plan for this approval and all required written advice confirming that the requirement(s) outlined in the condition(s) have been fulfilled must be submitted by **07 September 2022** or this approval no longer will remain valid.

Reconsideration - 28 days

Under section 151(1) of the *Planning and Development Act 2005*, the applicant/owner may, within 28 days from the date of this decision, make a written request to the WAPC to reconsider any condition(s) imposed in its decision. One of the matters to which the WAPC will have regard in reconsideration of its decision is whether there is compelling evidence by way of additional information or justification from the applicant/owner to warrant a reconsideration of the decision. A request for reconsideration is to be submitted to the WAPC on a Form 3A with appropriate fees. An application for reconsideration may be submitted to the WAPC prior to submission of an application for review. Form 3A and a schedule of fees are available on the WAPC website: <http://www.planning.wa.gov.au>

Right to apply for a review - 28 days

Should the applicant/owner be aggrieved by this decision, there is a right to apply for a review under Part 14 section 251 of the *Planning and Development Act 2005*. The application for review must be submitted in accordance with part 2 of the *State Administrative Tribunal Rules 2004* and should be lodged within 28 days of the date of this decision to: the State Administrative Tribunal, Level 6, State Administrative Tribunal Building, 565 Hay Street, PERTH, WA 6000. It is recommended that you contact the tribunal for further details: telephone 9219 3111 or go to its website: <http://www.sat.justice.wa.gov.au>

Deposited plan

The deposited plan is to be submitted to the Western Australian Land Information Authority (Landgate) for certification. Once certified, Landgate will forward it to the WAPC. In addition, the applicant/owner is responsible for submission of a Form 1C with appropriate fees to the WAPC requesting endorsement of the deposited plan. A copy of the deposited plan with confirmation of submission to Landgate is to be submitted with all required written advice confirming compliance with any condition(s) from the nominated agency/authority or local government. Form 1C and a schedule of fees are available on the WAPC website: <http://www.planning.wa.gov.au>

Condition(s)

The WAPC is prepared to endorse a deposited plan in accordance with the plan submitted once the condition(s) set out have been fulfilled.

The condition(s) of this approval are to be fulfilled to the satisfaction of the WAPC.

The condition(s) must be fulfilled before submission of a copy of the deposited plan for endorsement.

The agency/authority or local government noted in brackets at the end of the condition(s) identify the body responsible for providing written advice confirming that the WAPC's requirement(s) outlined in the condition(s) have been fulfilled. The written advice of the agency/authority or local government is to be obtained by the applicant/owner. When the

written advice of each identified agency/authority or local government has been obtained, it should be submitted to the WAPC with a Form 1C and appropriate fees and a copy of the deposited plan.

If there is no agency/authority or local government noted in brackets at the end of the condition(s), a written request for confirmation that the requirement(s) outlined in the condition(s) have been fulfilled should be submitted to the WAPC, prior to lodgement of the deposited plan for endorsement.

Prior to the commencement of any subdivision works or the implementation of any condition(s) in any other way, the applicant/owner is to liaise with the nominated agency/authority or local government on the requirement(s) it considers necessary to fulfil the condition(s).

The applicant/owner is to make reasonable enquiry to the nominated agency/authority or local government to obtain confirmation that the requirement(s) of the condition(s) have been fulfilled. This may include the provision of supplementary information. In the event that the nominated agency/authority or local government will not provide its written confirmation following reasonable enquiry, the applicant/owner then may approach the WAPC for confirmation that the condition(s) have been fulfilled.

In approaching the WAPC, the applicant/owner is to provide all necessary information, including proof of reasonable enquiry to the nominated agency/authority or local government.

The condition(s) of this approval, with accompanying advice, are:

CONDITION(S):

1. Uniform fencing being constructed along the boundaries of all of the proposed lots abutting Pinjar Road. (Local Government)
2. The land being filled, stabilised, drained and/or graded as required to ensure that
 - a) lots can accommodate their intended development;
 - b) finished ground levels at the boundaries of the lot(s) the subject of this approval match or otherwise coordinate with the existing and/or proposed finished ground levels of the land abutting; and
 - c) stormwater is contained on-site, or appropriately treated and connected to the local drainage system (Local Government)
3. Prior to the commencement of subdivisional works, the landowner/applicant is to provide a pre-works geotechnical report certifying that the land is physically capable of development or advising how the land is to be remediated and compacted to ensure it is capable of development.

In the event that remediation works are required, the landowner/applicant is to provide a post geotechnical report certifying that all subdivisional works have been carried out in accordance with the pre-works geotechnical report. (Local Government).

4. Drainage easements and reserves as may be required by the local government for drainage infrastructure being shown on the diagram or plan of survey (deposited plan) as such, granted free of cost, and vested in that local government under Sections 152 and 167 of the *Planning and Development Act 2005*. (Local Government)
5. Measures being taken to ensure the identification and protection of any vegetation on the site worthy of retention that is not impacted by subdivisional works, prior to commencement of subdivisional works. (Local Government).
6. Information is to be provided to demonstrate that the measures contained in the bushfire management plan prepared by Bushfire Safety Consulting dated June 2015 have been implemented during subdivisional works. (Local Government)
7. A compliance certificate/report for the BAL Contour Map relating to the approved subdivision shall be completed prior to the issuing of titles to the satisfaction of the Western Australian Planning Commission. (Local Government)
8. A Notification, pursuant to Section 165 of the *Planning and Development Act 2005* is to be placed on the certificates of title of the proposed lots with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:

'This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and may be subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land'

(Western Australian Planning Commission)

9. Local Development Plan being prepared and approved for lots shown on the plan dated 8 June 2018 (attached) that address the following:
 - a) Building Envelopes and Building Protection Zone;
 - b) Retained natural bushland; and
 - c) Significant trees to be retained

to the satisfaction of the Western Australian Planning Commission. (Local Government)

10. The landowner/applicant shall make arrangements to ensure that prospective purchasers of lots subject of a Local Development Plan are advised in writing that Local Development Plan provisions apply (Local Government).
11. Engineering drawings and specifications are to be submitted, approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications, to ensure that those lots not fronting an existing road are provided with frontage to a constructed road connected by constructed roads to the local road system and such roads are constructed and drained at the landowner/applicant's cost.

As an alternative, and subject to the agreement of the Local Government the Western Australian Planning Commission (WAPC) is prepared to accept the landowner/applicant paying to the local government the cost of such road works as estimated by the local government and the local government providing formal assurance to the WAPC confirming that the works will be completed within a reasonable period as agreed by the WAPC. (Local Government)

12. All local streets within the subdivision being truncated in accordance with the Western Australian Planning Commission's *Liveable Neighbourhoods* policy.(Local Government)
13. Engineering drawings and specifications are to be submitted and approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications to ensure that roads that have been designed to connect with existing or proposed roads abutting the subject land are coordinated so the road reserve location and width connect seamlessly to the satisfaction of the Western Australian Planning Commission. (Local Government)
14. Pursuant to Section 150 of the *Planning and Development Act 2005* and Division 3 of the *Planning and Development Regulations 2009* a covenant preventing vehicular access onto Pinjar Road being lodged on the certificates of title of the proposed lots at the full expense of the landowner/applicant. The covenant is to prevent access, to the benefit of the City of Wanneroo, in accordance with the plan dated **4 September 2018** (attached) and the covenant is to specify:

"No vehicular access is permitted from Pinjar Road."

(Local Government)

15. Engineering drawings and specifications are to be submitted, approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications, for the provision of footpaths through and connecting to the application area in accordance with the plan dated 4 September 2018 (attached). The approved footpaths are to be constructed by the landowner/applicant. (Local Government)
16. A notification, pursuant to Section 165 of the *Planning and Development Act 2005* is to be placed on the certificates of title of the proposed lots advising of the existence

of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:

'This lot is in close proximity to the Wanneroo Raceway and may be adversely affected by motor sport noise.'

(Western Australian Planning Commission)

17. Arrangements being made to the satisfaction of the Western Australian Planning Commission and to the specification of Western Power for the provision of an underground electricity supply to the lots shown on the approved plan of subdivision. (Western Power).
18. The transfer of land as a Crown reserve free of cost to Western Power for the provision of electricity supply infrastructure. (Western Power)
19. Arrangements being made with the Water Corporation so that provision of a suitable water supply service will be available to the lots shown on the approved plan of subdivision. (Water Corporation)
20. Arrangements being made with the Water Corporation so that provision of a sewerage service will be available to the lots shown on the approved plan of subdivision. (Water Corporation)

ADVICE:

1. The landowner/applicant and the local government are advised to refer to the Institute of Public Works Engineering Australia Local Government Guidelines for Subdivisional Development (current edition). The guidelines set out the minimum best practice requirements recommended for subdivision construction and granting clearance of engineering conditions imposed.
2. In regard to Conditions 11 and 13, the landowner/applicant is advised that the road reserves, including the constructed carriageways, laneways, truncations, footpaths/dual use paths and car embayments, are to be generally consistent with the approved plan of subdivision.
3. In regard to Condition 17, Western Power provides only one underground point of electricity supply per freehold lot.
4. In regard to Conditions 19 and 20, the landowner/applicant shall make arrangements with the Water Corporation for the provision of the necessary services. On receipt of a request from the landowner/applicant, a Land Development Agreement under Section 83 of the *Water Services Act 2012* will be prepared by the Water Corporation to document the specific requirements for the proposed subdivision.



5. Anyone proposing to carry out construction or excavation works must contact 'Dial Before You Dig' (Ph 1100) to determine the location of buried gas infrastructure.

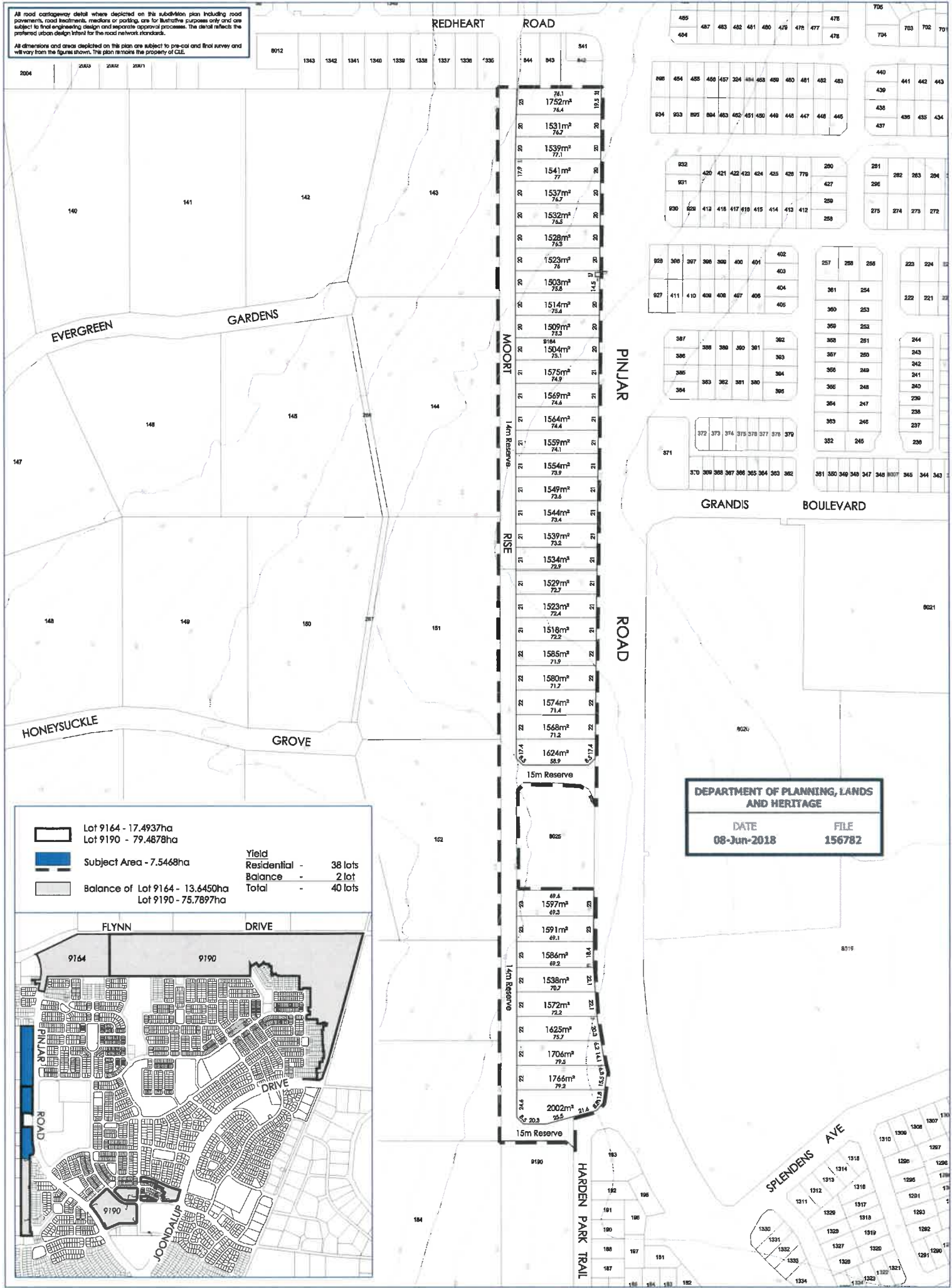
Sam Fagan

Ms Sam Fagan
Secretary
Western Australian Planning Commission
7 September 2018

Enquiries : Nicole Alexander (Ph 6551 9861)

All road cartageway details where depicted on this subdivision plan including road pavements, road treatments, medians or parking, are for illustrative purposes only and are subject to final engineering design and separate approval processes. The detail reflects the preferred urban design intent for the road network standards.

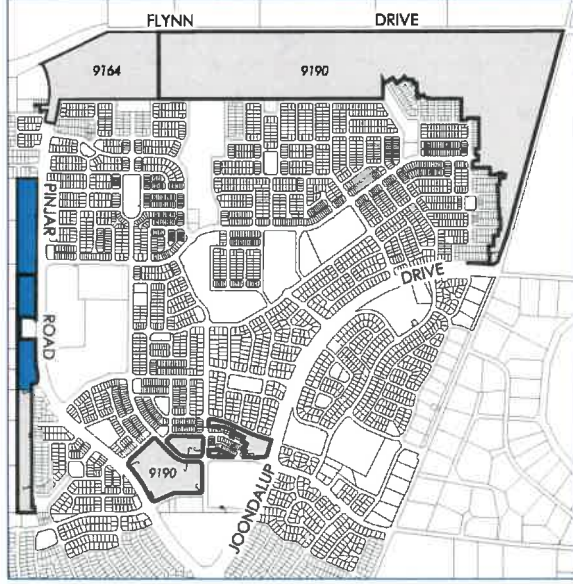
All dimensions and areas depicted on this plan are subject to pre-col and final survey and will vary from the figures shown. This plan remains the property of CLE.



DEPARTMENT OF PLANNING, LANDS AND HERITAGE

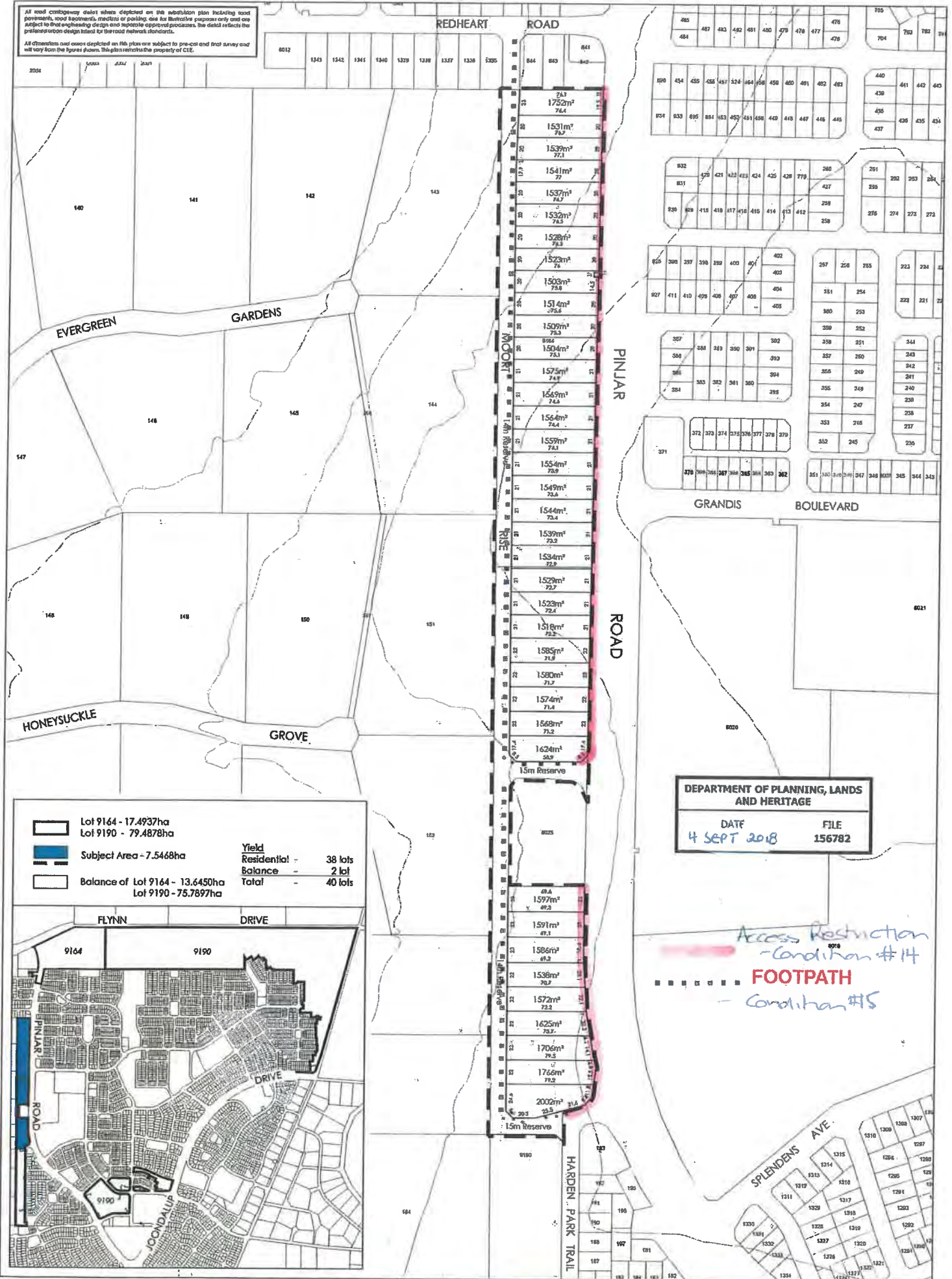
DATE: 08-Jun-2018 FILE: 156782

	Lot 9164 - 17.4937ha		
	Lot 9190 - 79.4878ha		
	Subject Area - 7.5468ha	Yield Residential -	38 lots
	Balance of Lot 9164 - 13.6450ha	Balance -	2 lot
	Lot 9190 - 75.7897ha	Total -	40 lots



All road centerlines and widths depicted on this subdivision plan including road pavements, road boundaries, medians or parking, are for illustrative purposes only and are subject to final engineering design and appropriate approval processes. The detail reflects the professional design based on the road network standards.

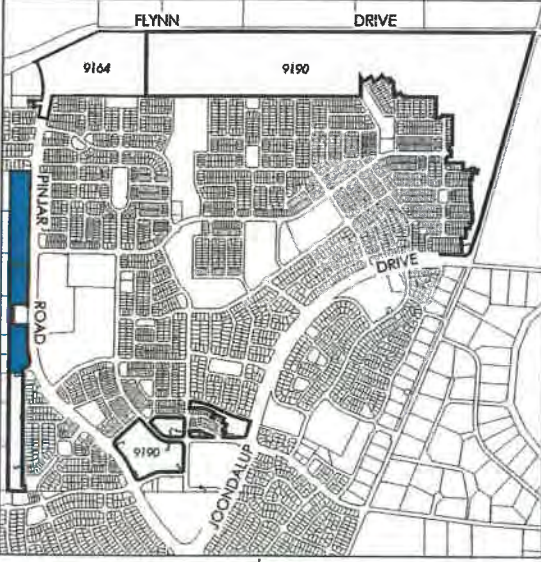
All dimensions and areas depicted on this plan are subject to pre-cut and final survey and will vary from the figures shown. This plan remains the property of CLE.



DEPARTMENT OF PLANNING, LANDS AND HERITAGE
 DATE 4 SEPT 2018 FILE 156782

Access Restriction - Condition #14
 FOOTPATH - Condition #15

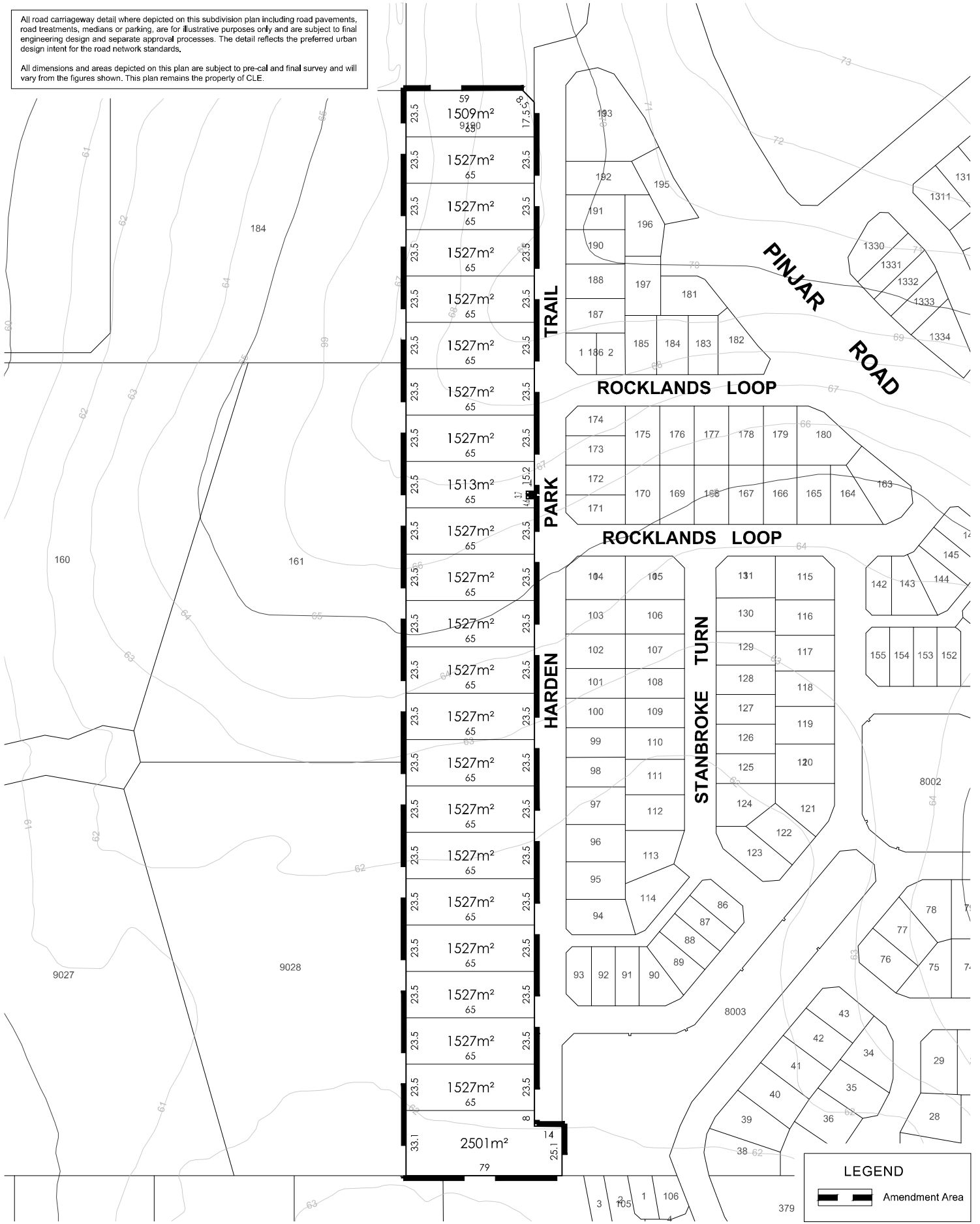
	Lot 9164 - 17.4937ha		
	Lot 9190 - 79.4878ha		
	Subject Area - 7.5468ha	Yield	
	Balance of Lot 9164 - 13.6450ha	Residential -	38 lots
	Lot 9190 - 75.7897ha	Balance -	2 lot
		Total -	40 lots



Attachment 3 Indicative Concept Plan

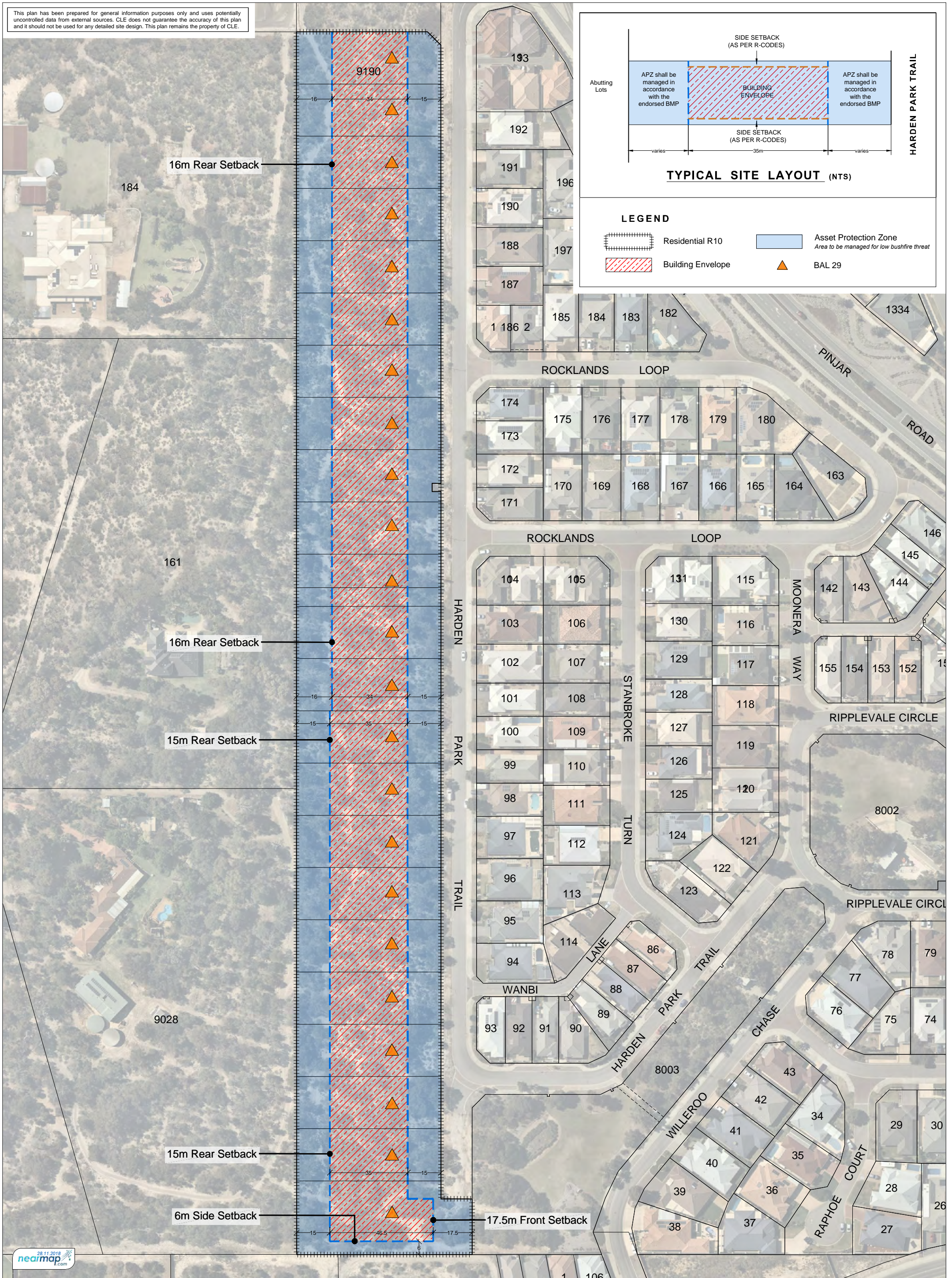
All road carriageway detail where depicted on this subdivision plan including road pavements, road treatments, medians or parking, are for illustrative purposes only and are subject to final engineering design and separate approval processes. The detail reflects the preferred urban design intent for the road network standards.

All dimensions and areas depicted on this plan are subject to pre-cal and final survey and will vary from the figures shown. This plan remains the property of CLE.



Attachment 4 Indicative Building Envelope Plan

This plan has been prepared for general information purposes only and uses potentially uncontrolled data from external sources. CLE does not guarantee the accuracy of this plan and it should not be used for any detailed site design. This plan remains the property of CLE.



28.11.2018
nearmap.com



Attachment 5
Bushfire Management Plan
(Bushfire West)

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address:

Site visit: Yes No

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

Report author or reviewer:

WA BPAD accreditation level (please circle):

Not accredited Level 1 BAL assessor Level 2 practitioner Level 3 practitioner

If accredited please provide the following.

BPAD accreditation number: Accreditation expiry: Month Year

Bushfire management plan version number:

Bushfire management plan date: Day Month Year

Client/business name:

	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)?	X	
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the bushfire protection criteria elements)?	X	

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

None of the above

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Strategic Planning proposal including re-zoning and sub-division.

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

Signature of report author or reviewer



Date

BUSHFIRE MANAGEMENT PLAN

Subdivision Application

Lot 9190 Banksia Grove



Bushfire West Pty Ltd
12 Davidson Road, Attadale WA 6156
0403 328 835



Ref: 181009
Version: 1.1
Feb 2019

Project Number: 181009
Project Name: Lot 9190 Banksia Grove
Author: Jeremy Durston, BPAD36525
Version: 1.1
Date of issue: 19th February 2019



Author: Jeremy Durston



This report supersedes all previous Bushfire Management Plans for the site.

DISCLAIMER AND LIMITATION

This report is prepared solely for Banksia Grove Development Nominees (the 'proponent') and any future landowners of the subject lot(s) and is not for the benefit of any other person and may not be relied upon by any other person.

The mitigation strategies contained in this Bushfire Management Plan are considered to be prudent minimum standards only, based on the writer's experience as well as standards prescribed by relevant authorities. It is expressly stated that Bushfire West Pty Ltd and the writer do not guarantee that if such standards are complied with or if a property owner exercises prudence, that a building or property will not be damaged or that lives will not be lost in a bush fire.

Fire is an extremely unpredictable force of nature. Changing climatic factors (whether predictable or otherwise) either before or at the time of a fire can also significantly affect the nature of a fire and in a bushfire prone area it is not possible to completely guard against bushfire.

Further, the growth, planting or removal of vegetation; poor maintenance of any fire prevention measures; addition of structures not included in this report; or other activity can and will change the bushfire threat to all properties detailed in the report. Further, the achievement of the level of implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which Bushfire West Pty Ltd has no control. If the proponent becomes concerned about changing factors then a new Bushfire Management Plan should be requested.

To the maximum extent permitted by the law, Bushfire West Pty Ltd and the writer excludes all liability whatsoever for:

1. claim, damage, loss or injury to any property and any person caused by fire or as a result of fire or indeed howsoever caused;
2. errors or omissions in this report except where grossly negligent; and

the proponent expressly acknowledges that they have been made aware of this exclusion and that such exclusion of liability is reasonable in all the circumstances.

If despite the provisions of the above disclaimer Bushfire West Pty Ltd and/or the writer is found liable then liability is limited to the lesser of the maximum extent permitted by the law and the proceeds paid out by Bushfire West Pty Ltd's professional or public liability insurance following the making of a successful claim against such insurer.

Bushfire West Pty Ltd and/or the writer accept no liability or responsibility whatsoever for or in respect of any use or reliance upon this report and its supporting material by any third party.

This report is valid for a period of three years only from the date of its issue.

Jeremy Durston

Bushfire West Pty Ltd

ABN: 37 625 893 450

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1.0 Summary

This Bushfire Management Plan (the Plan) has been prepared to accompany the subdivision application (23 proposed Special Residential lots) for Lot 9190 Banksia Grove located in the City of Wanneroo (the Proposal).

The subdivision site of 3.6071 ha is within a designated bushfire prone area and the Proposal requires the application of *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7).

The aim of this Plan is to reduce the threat to people, property and infrastructure in the event of a bushfire. The Plan includes:

- o How the identified bushfire threat will be reduced and managed for the life of the subdivision.
- o How the Bushfire Protection Criteria in the Guidelines have been addressed.

This report determines the following compliance of the Proposal with the objectives of State Planning Policy 3.7:

1. *It avoids any increase in the threat of bushfire to people, property and infrastructure.*

The proposed subdivision avoids unacceptable bushfire hazard. The design provides for the management of the bushfire threat to people, property and infrastructure to an acceptable level.

2. *It reduces vulnerability to bushfire through the identification and consideration of bushfire risks in the design of the development and the decision-making process.*

The bushfire risks have been identified, assessed and considered in the subdivision design including proposed building envelopes, as described within this report.

3. *The design of the subdivision takes into account bushfire protection requirements and includes specific bushfire protection measures.*

Compliance with the Bushfire Protection Criteria of the Guidelines is as follows:

- o The proposed lots will each incorporate building envelopes subject to an acceptable rating of no greater than BAL-29.
- o The entirety of each proposed Lot is required to be managed for low bushfire threat according to the specifications required of an Asset Protection Zone.
- o Multiple access and egress routes will be available to the proposed lots. Harden Park Trail will terminate in a cul-de-sac with an acceptable length of 50m, however, the width of the existing road reserve is insufficient to install a compliant vehicle turning area at the cul-de-sac head.
- o A reticulated water supply including existing hydrants is available to the proposed lots.

3. *Achieves an appropriate balance between bushfire risk management measures and biodiversity, conservation values, and environmental protection.*

The subdivision will avoid impact to any vegetation having significant conservation value. Any significant habitat trees or other significant vegetation is to be identified for retention in consultation with the City of Wanneroo.

2.0 Proposal Details

2.1 Subject Site

The subject site of this report is Lot 9190 (No.17) Banksia Grove located in the City of Wanneroo. Figure 2A illustrates the subject site and immediate surrounds.

The site is identified as being Bushfire Prone on the Map of Bush Fire Prone Areas 2018 (OBRM, 2018), as illustrated in Figure 2B.

The site is 3.6071 ha in area and is currently vegetated and undeveloped. Figure 2C illustrates the subdivision concept plan for the subject site.

2.2 Subdivision Description

The proposal involves the subdivision of the site into 23 Special Residential lots as follows:

Proposed Lot *	Area (m ²)
1	1509
2	1527
3	1527
4	1527
5	1527
6	1527
7	1527
8	1527
9	1513
10	1527
11	1527
12	1527
13	1527
14	1527
15	1527
16	1527
17	1527
18	1527
19	1527
20	1527
21	1527
22	1527
23	2501

* the lot numbers have been adopted only for identification purposes for this Plan.

2.3 Previous Bushfire Assessments

A previous bushfire assessment for the subject site, by Bushfire West Pty Ltd dated 26/01/2019, incorporated a 22 Lot subdivision concept. The assessment is amended within this document to incorporate the proposed 23 Lot subdivision design.

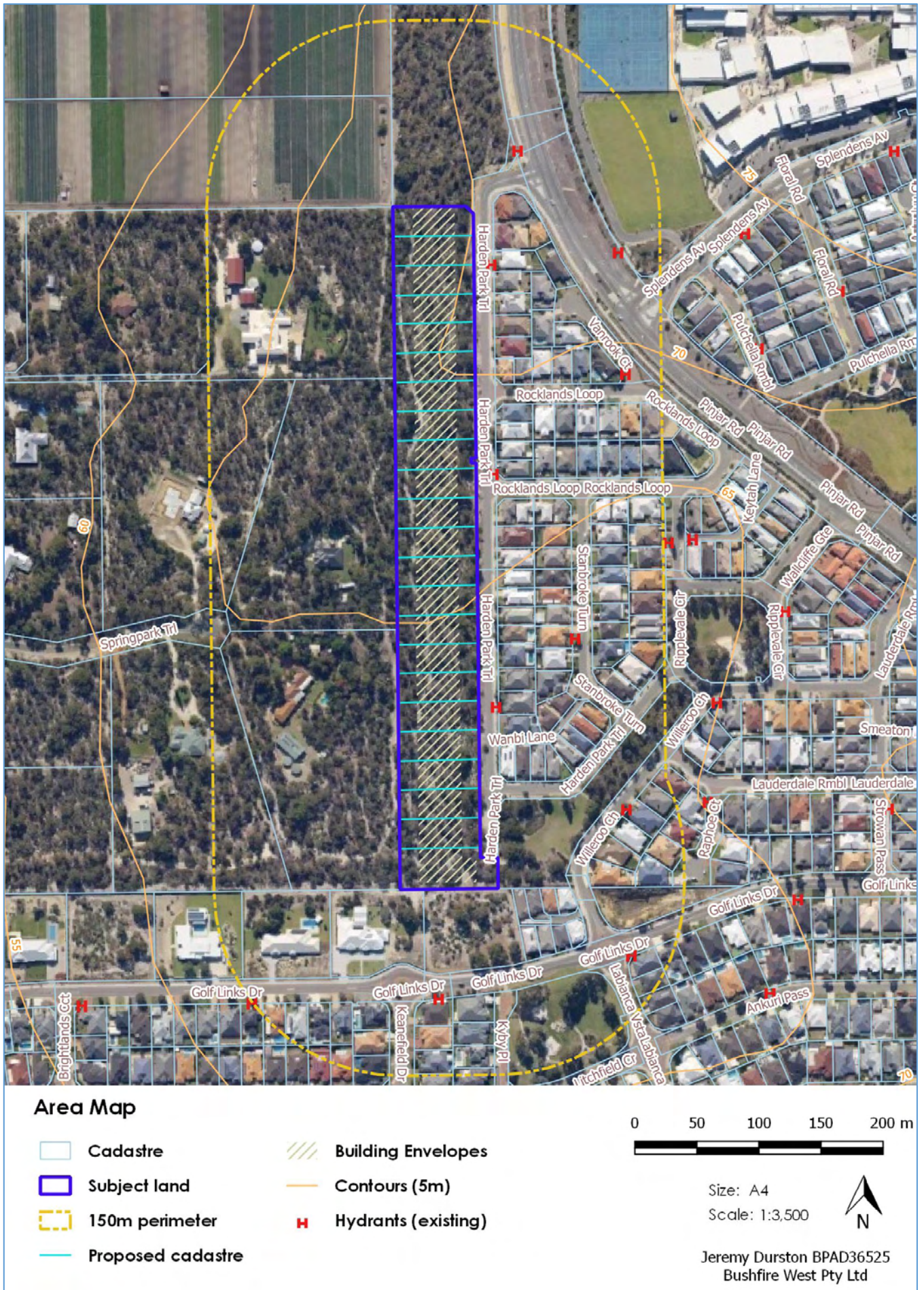


Figure 2A: Area Map



Figure 2B: Designated Bushfire Prone Area Map



Figure 2C: Subdivision Concept Plan

3.0 Environmental Considerations

The following environmental considerations have been addressed with the aid of the WALGA Environmental Planning Tool.

Figure 3A illustrates the identified environmental considerations for the subdivision. The proponent has not identified any additional environmental considerations located within the site or potentially affected by the subdivision.

3.1 Native Vegetation

Local Natural Area (LNA) category vegetation is identified within the site, and also to the west and north of the site. Consultation with the City of Wanneroo regarding the potential impact of the Proposal on native vegetation is therefore required.

3.2 Environmentally Sensitive Areas

The site is not located within a designated Environmentally Sensitive Area.

3.3 Re-vegetation & Landscaping

All proposed lots will require landscaping to manage the potential bushfire threat from onsite vegetation. The required landscaping will include the removal and/or management of understorey vegetation in addition to the removal of sufficient trees to achieve a low bushfire threat, which generally requires canopy cover to be no greater than 15%.

Prior to the removal or modification of any native vegetation, any significant habitat trees or other significant vegetation should firstly be identified for retention in consultation with the City of Wanneroo. Such vegetation identified for retention should be illustrated on any future applicable Local Development Plan.

The removal of any native vegetation will be subject to the prior approval from the relevant authorities. Should approval not be forthcoming to remove the necessary onsite vegetation required to manage the site for low bushfire threat, the assessed BAL ratings will need to be updated and this Bushfire Management Plan will need to be revised accordingly.

No known requirement exists for any re-vegetation that will impact the assessed bushfire threat.

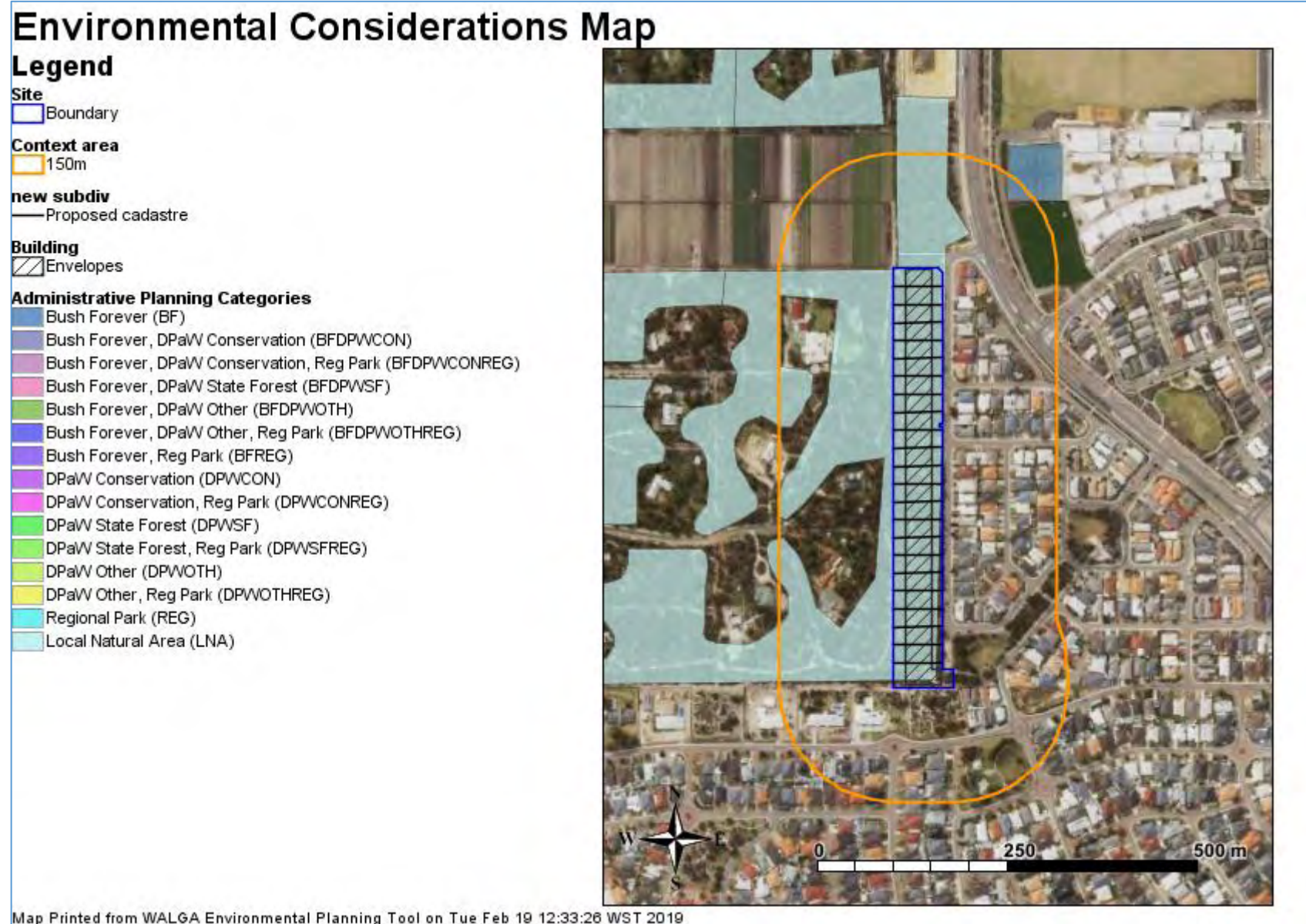


Figure 3A: Environmental Considerations Map

4.0 Bushfire Assessment Inputs

4.1 Effective Slope

Effective slope under each vegetation area was assessed in accordance with the methodology detailed in AS 3959-2018 *Construction of buildings in bushfire prone areas* (AS 3959) (Standards Australia, 2009). Slope data was measured on site and cross referenced with Landgate elevation data.

The assessment area was found to exhibit a minor slope generally from the west upwards towards the east. The effective slope of each vegetation area is listed in the tables provided in Section 4.2 below.

4.2 Bushfire Fuels

The location and extent of classified vegetation structures, including low-threat exclusions, within 150 metres of the site are mapped in Figure 4A and illustrated in the photos below. All bushfire structures and fuel loads are assessed in their mature states unless otherwise identified. The areas of classified vegetation are summarised in Table 4A

Where relevant, the requirements of the City of Wanneroo Annual Firebreak and Fuel Hazard Reduction Notice have been referenced to support the classification and/or Exclusion of vegetation as a bushfire threat, including the requirement to “install and maintain a twenty (20) metre building protection zone surrounding all buildings”. A copy of the 2018/19 Firebreak and Fuel Hazard Reduction Notice is included in Appendix 2.

Area 1	
AS3959-2018 Classification	Class B Woodland
Effective Slope	Downslope 3 degrees
<p><i>Plot 1 comprises the wooded area to the north of the site. Vegetation consists of predominately Banksia and Sheoak trees below 6m in height. Isolated Eucalypts represent less than 10% canopy coverage. The understorey is shrubs, grasstrees and grass. The vegetation lacks the extent of Eucalypts that would characterise Forest classification.</i></p>	
 <p>DIRECTION: 99 deg (T) -31.69936° +115.79316° ACCURACY 5 m DATUM WGS84</p> <p>8... Banksia Grove 31/10/18, 12:10:38 pm</p>	 <p>DIRECTION: 318 deg (T) -31.70015° +115.79389° ACCURACY 5 m DATUM WGS84</p> <p>8... Banksia Grove 31/10/18, 12:19:01 pm</p>
Photo ID: 1a	Photo ID: 1b

Area 2

AS3959-2018 Classification	Class B Woodland
Effective Slope	Downlope 3.0 degrees

Area 2 comprises a wooded area to the west of the site, defined by the slope of up to 3.0 degrees downslope. Vegetation consists of predominately Banksia and Sheoak trees below 6m in height. Isolated Eucalypts represent less than 10% canopy coverage. The understorey is shrubs, grasstrees and grass. The vegetation lacks the extent of Eucalypts that would characterise Forest classification.



Photo ID: 2a



Photo ID: 2b



Photo ID: 2c

Area 3

AS3959-2018 Classification	Class B Woodland
Effective Slope	Downslope 1.5 degrees

Area 3 comprises a wooded area to the west of the site, defined by the slope of up to 1.5 degrees downslope. Vegetation consists of predominately Banksia and Sheoak trees below 6m in height. Isolated Eucalypts represent less than 10% canopy coverage. The understorey is shrubs, grasstrees and grass. The vegetation lacks the extent of Eucalypts that would characterise Forest classification.



Photo ID: 3a



Photo ID: 3b



Photo ID: 3c

Area 4	
AS3959-2018 Classification	Class B Woodland
Effective Slope	Upslope
<p><i>Area 4 comprises a wooded strip of public open space to the east of the site. Vegetation consists of predominately Banksia and Sheoak trees below 6m in height. Isolated Eucalypts represent less than 10% canopy coverage. The understorey is shrubs, grasstrees and grass. The vegetation lacks the extent of Eucalypts that would characterise Forest classification.</i></p>	

Area 5	
AS3959-2018 Classification	Class B Woodland
Effective Slope	Upslope
<p><i>Area 5 comprises a wooded pocket of public open space to the east of the site. Vegetation consists of predominately Banksia and Sheoak trees below 6m in height. Isolated Eucalypts represent less than 10% canopy coverage. The understorey is shrubs, grasstrees and grass. The vegetation lacks the extent of Eucalypts that would characterise Forest classification.</i></p>	

Area 6

AS3959-2018 Classification	Class B Woodland
Effective Slope	Upslope

Area 6 comprises the wooded area of the undeveloped land to the south of the site. Vegetation consists of dispersed eucalypts with Banksia and Sheoak trees, and canopy cover below 30%. The understorey is shrubs, grasstrees and grass. The vegetation structure is classified Woodland. The vegetation lacks the extent of Eucalypts that would characterise Forest classification.



Photo ID: 6a



Photo ID: 6b

Area 7

AS3959-2018 Classification	Class C Shrubland
Effective Slope	Upslope

Area 7 comprises the non-wooded area of the undeveloped land to the south of the site. Vegetation consists of shrubs and grasstrees below 2m in height with grass. The vegetation structure is classified Shrubland.



Photo ID: 7a



Photo ID: 7b (to the right of firebreak)

Area 8

AS3959-2018 Classification	Exclusion 2.2.3.2(f)
Effective Slope	n/a

Area 8 comprises the area of maintained public open space to the east of the site, with lawn, shade trees and landscaped gardens managed for low bushfire threat.



Photo ID: 8a



Photo ID: 8b

Area 9

AS3959-2018 Classification	Exclusion 2.2.3.2(f)
Effective Slope	n/a

Area 9 comprises the maintained area of public open space to the south of the site, with lawn, shade trees and landscaped gardens managed for low bushfire threat.



Photo ID: 9a

Area 10

AS3959-2018 Classification	Exclusion 2.2.3.2(c)
Effective Slope	n/a

Area 10 comprises the unmanaged vegetation in the drainage basin to the south east of the site. Vegetation consists of grass and isolated shrubs. This area is less than 0.25 ha, not within 20m of other such vegetation, and not within 20m of the site. This area is excluded as a bushfire threat under clause 2.2.3.2(c).



Area 11

AS3959-2018 Classification	Exclusions 2.2.3.2(e) and (f)
Effective Slope	n/a

Area 11 comprises the developed residential area to the south west of the site and north of Golf Links Drive. Vegetation consists of lawns, landscaped gardens and road verges managed for low threat. Residential Lot owners/occupants are required by the Firebreak and Fuel Hazard Reduction Notice to install and maintain a building protection zone surrounding all buildings.



Area 12

AS3959-2018 Classification	Exclusions 2.2.3.2(e) and (f)
Effective Slope	n/a

Area 12 comprises the balance of developed residential areas to the south of the site. Vegetation consists of lawns, gardens and road verges managed for low threat. Residential Lot owners/occupants are required by the Firebreak and Fuel Hazard Reduction Notice to install and maintain a building protection zone surrounding all buildings.



Photo ID: 12a



Photo ID: 12b

Area 13

AS3959-2018 Classification	Exclusions 2.2.3.2(e) and (f)
Effective Slope	n/a

Area 13 comprises the developed residential area to the east of the site. Vegetation consists of lawns, gardens and road verges managed for low threat. Residential Lot owners/occupants are required by the Firebreak and Fuel Hazard Reduction Notice to install and maintain a building protection zone surrounding all buildings.



Photo ID: 13a



Photo ID: 13b

Area 13



Photo ID: 13c



Photo ID: 13d



Photo ID: 13e


Area 14

AS3959-2018 Classification	Exclusions 2.2.3.2(e) and (f)
Effective Slope	n/a

Area 14 comprises the market garden located to the north west of the site. Vegetation consists of non-curing crops maintained for low threat.



Photo ID: 14a

Area 15	
Pre-development AS3959-2018 Classification	Class B Woodland
Post-development AS3959-2018 Classification	Exclusions 2.2.3.2 (e) and (f)
Effective Slope	n/a
<p>Area 15 comprises the Wooded area adjacent to the north of the site. This area is identified as a section of Moort Rise road reserve on the Banksia Grove Local Development Plan No.13. Pre-development vegetation consists of predominately Banksia and Sheoak trees below 6m in height, with isolated Eucalypts representing less than 10% coverage. The understorey is shrubs, grasstrees and grass. The pre-development vegetation classification is Woodland. This section of road reserve is required to be maintained in low threat condition to provide an asset protection zone, to the minimum extent of 17m, between the site and the unmanaged vegetation to the north. Ultimately, this area is to include a sealed road with verge.</p>	
<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; font-size: 8px; margin-bottom: 5px;"> DIRECTION 41 deg(T) -31.70029° +115.79317° ACCURACY 5 m DATUM WGS84 </div>  <div style="display: flex; justify-content: space-between; font-size: 8px; margin-top: 5px;"> 8... Banksia Grove 31/10/18, 12:07:20 pm </div> </div> <p>Photo ID: 15a</p>	

Area 16

Pre-development AS3959-2018 Classification	Class B Woodland
Post-development AS3959-2018 Classification	Exclusions 2.2.3.2 (e) and(f)
Effective Slope	n/a

Area 16 comprises the area of the subject site. Pre-development vegetation consists of predominately Banksia and Sheoak trees below 6m in height, with isolated Eucalypts representing less than 10% coverage. The understorey is shrubs, grasses and grass. The pre-development vegetation classification is Woodland.
 The entire area of the site is required to be managed in low threat condition in future to the specifications required of an asset protection zone.



Photo ID: 16a



Photo ID: 16b



Photo ID: 16c



Photo ID: 16d

Table 4A Areas of classified vegetation and exclusions, post-development:

Vegetation Area	Vegetation Classification	Effective Slope
Area 1	Class B Woodland	Downslope 3.0°
Area 2	Class B Woodland	Downslope 3.0°
Area 3	Class B Woodland	Downslope 1.5°
Area 4	Class B Woodland	Upslope
Area 5	Class B Woodland	Upslope
Area 6	Class B Woodland	Upslope
Area 7	Class C Shrubland	Upslope
Area 8	Exclusion 2.2.3.2 (f)	n/a
Area 9	Exclusion 2.2.3.2 (f)	n/a
Area 10	Exclusion 2.2.3.2 (c)	n/a
Area 11	Exclusions 2.2.3.2 (e) & (f)	n/a
Area 12	Exclusions 2.2.3.2 (e) & (f)	n/a
Area 13	Exclusions 2.2.3.2 (e) & (f)	n/a
Area 14	Exclusions 2.2.3.2 (e) & (f)	n/a
Area 15	Exclusions 2.2.3.2 (e) & (f)	n/a
Area 16	Exclusions 2.2.3.2 (e) & (f)	n/a

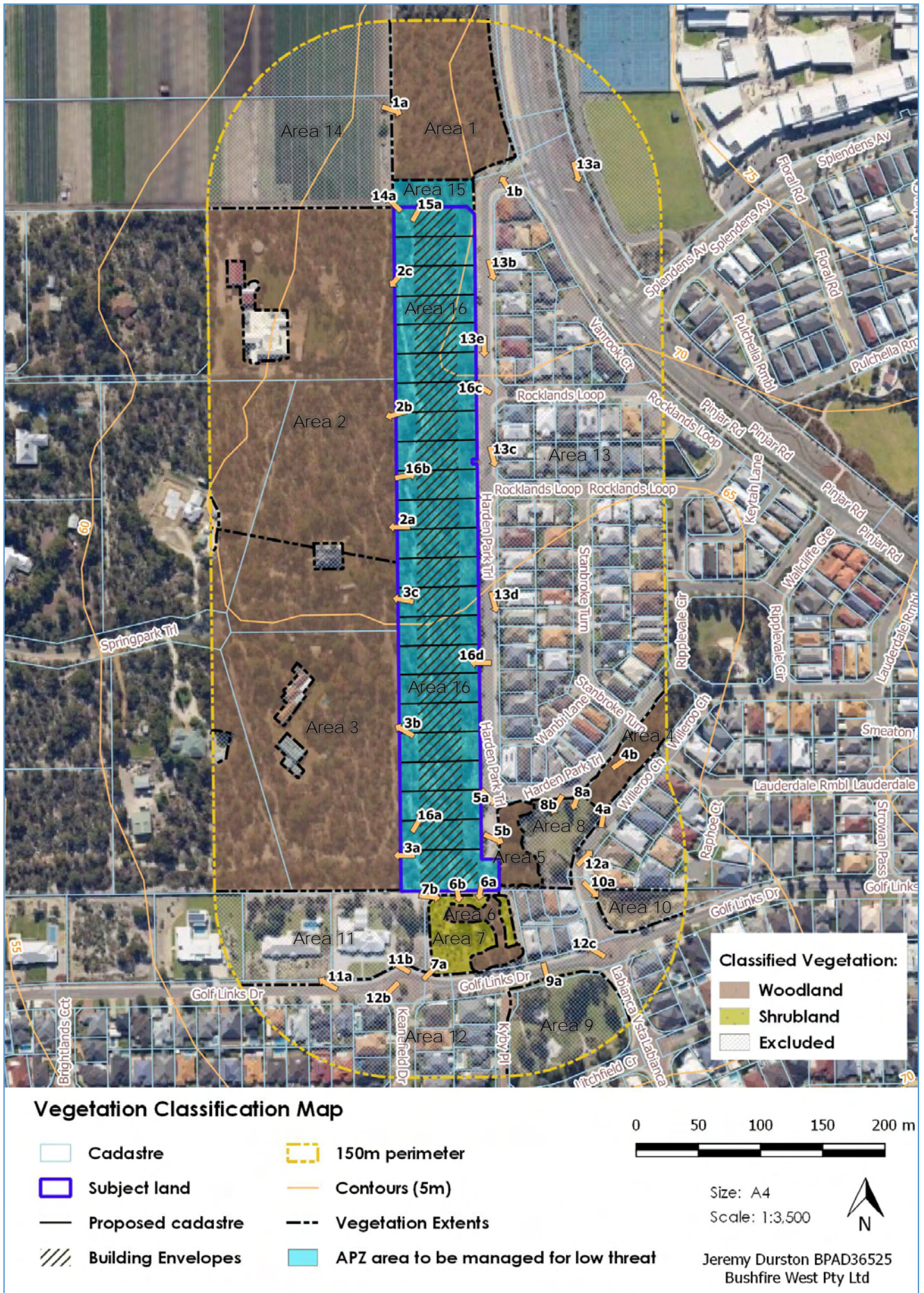


Figure 4A: Vegetation Classifications

5.0 Bushfire Assessment Outputs

5.1 Potential Bushfire Impact

Potential bushfire impact analysis was undertaken in accordance with SPP3.7 Guidelines and AS3959 to determine the potential radiant heat impacts to habitable buildings within the proposed building envelopes on each of the lots in the subdivision.

The potential impacts from identified vegetation Area 2 and Area 3 have been determined using AS 3959 Method 2 calculations, with modified input values as follows:

1. The Area 2 variables for Effective Slope and Site Slope are both determined at up to 3.0 degrees downslope, rather than applying the Method 1 slope bracket of >0 up to 5.0 degrees downslope.
2. The Area 3 variables for Effective Slope and Site Slope are both determined at 1.5 degrees downslope, rather than applying the Method 1 slope bracket of >0 up to 5.0 degrees downslope.

If the Method 1 slope bracket of up to 5.0 degrees downslope were applied, the potential slope effect would be over-estimated for Area 2 and Area 3. Using the Method 2 methodology provides a more accurate assessment of the Bushfire Attack Levels that apply to the proposed building envelopes from the primary bushfire hazard located to the west of the site, based on the assessed vegetation and topography.

The determined slope variables for Area 2 and Area 3 are the maximum assessed slopes that apply to these areas. No other input variables have been modified from those used for AS3959 Method 1.

The outputs from the Method 2 Bushfire Attack Level assessments are as follows:

Area	Vegetation Classification	Slope		Minimum distances to achieve BAL Ratings					
		Effective	Site	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5	BAL-LOW
2	Class B Woodland	3.0° down	3.0° down	<11.8m	11.8m	15.9m	23.1m	32.6m	100m
3	Class B Woodland	1.5° down	1.5° down	<11.0m	11.0m	14.8m	21.7m	30.7m	100m

Details of the Method 2 calculations for vegetation Area 2 and Area 3 are presented in Appendix 3.

The potential impacts from all other identified vegetation areas, aside from Area 2 and Area 3, have been determined using AS 3959 Method 1 calculations.

In accordance with SPP 3.7, BAL Contour Maps have been prepared to illustrate the potential radiant heat impacts and associated BAL ratings for the assessment area after the subdivision is completed (see Figures 5A to 5D). The resulting *maximum* BAL ratings that will apply to the subdivision site from each identified vegetation area are presented in the following table (Table 5A).

Table 5A: Maximum post-development BAL ratings for the site from each vegetation area:

Vegetation Area	Vegetation Classification	AS3959 Method	Effective Slope	Site Slope	Vegetation Separation	Maximum BAL
1	Class B Woodland	1	3.0°	n/a	17m	BAL-29
2	Class B Woodland	2	3.0°	3.0°	0m	BAL-FZ
3	Class B Woodland	2	1.5°	1.5°	0m	BAL-FZ
4	Class B Woodland	1	Upslope	n/a	80m	BAL-12.5
5	Class B Woodland	1	Upslope	n/a	0m	BAL-FZ
6	Class B Woodland	1	Upslope	n/a	4m	BAL-FZ
7	Class C Shrubland	1	Upslope	n/a	3m	BAL-FZ
8	Exclusion 2.2.3.2 (f)	1	n/a	n/a	n/a	BAL-LOW
9	Exclusion 2.2.3.2 (f)	1	n/a	n/a	n/a	BAL-LOW
10	Exclusion 2.2.3.2 (c)	1	n/a	n/a	n/a	BAL-LOW
11	Exclusions 2.2.3.2 (e)&(f)	1	n/a	n/a	n/a	BAL-LOW
12	Exclusions 2.2.3.2 (e)&(f)	1	n/a	n/a	n/a	BAL-LOW
13	Exclusions 2.2.3.2 (e)&(f)	1	n/a	n/a	n/a	BAL-LOW
14	Exclusions 2.2.3.2 (e)& f)	1	n/a	n/a	n/a	BAL-LOW
15	Exclusions 2.2.3.2 (e)&(f)	1	n/a	n/a	n/a	BAL-LOW
16	Exclusions 2.2.3.2 (e)&(f)	1	n/a	n/a	n/a	BAL-LOW

The separation between classified vegetation and future habitable buildings required to achieve indicative ratings of no higher than BAL-29 will be established by the proposed building envelopes, as detailed below.

The following table (Table 5B) illustrates the indicative ratings that are achievable for any future dwellings within the proposed building envelope on each Lot.

Table 5B: Indicative BAL ratings for the proposed building envelopes

Lot	Vegetation Classification	AS3959 Method	Effective Slope	Site Slope	Vegetation Separation	Maximum BAL
1	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
2	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
3	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
4	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
5	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
6	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
7	Class C Shrubland	2	3.0°	3.0°	16m	BAL-29
8	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
9	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
10	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
11	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
12	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
13	Class B Woodland	2	3.0°	3.0°	16m	BAL-29
14	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
15	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
16	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
17	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
18	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
19	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
20	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
21	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
22	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
23	Class B Woodland	2	1.5°	1.5°	15m	BAL-29
Note						
i	The selected vegetation area is that with the highest indicative BAL rating.					
ii	The separation distance is measured to the nearest point on the building envelope.					

As indicated above, future habitable buildings within all proposed building envelopes will achieve ratings no greater than BAL-29, as required by SPP3.7.

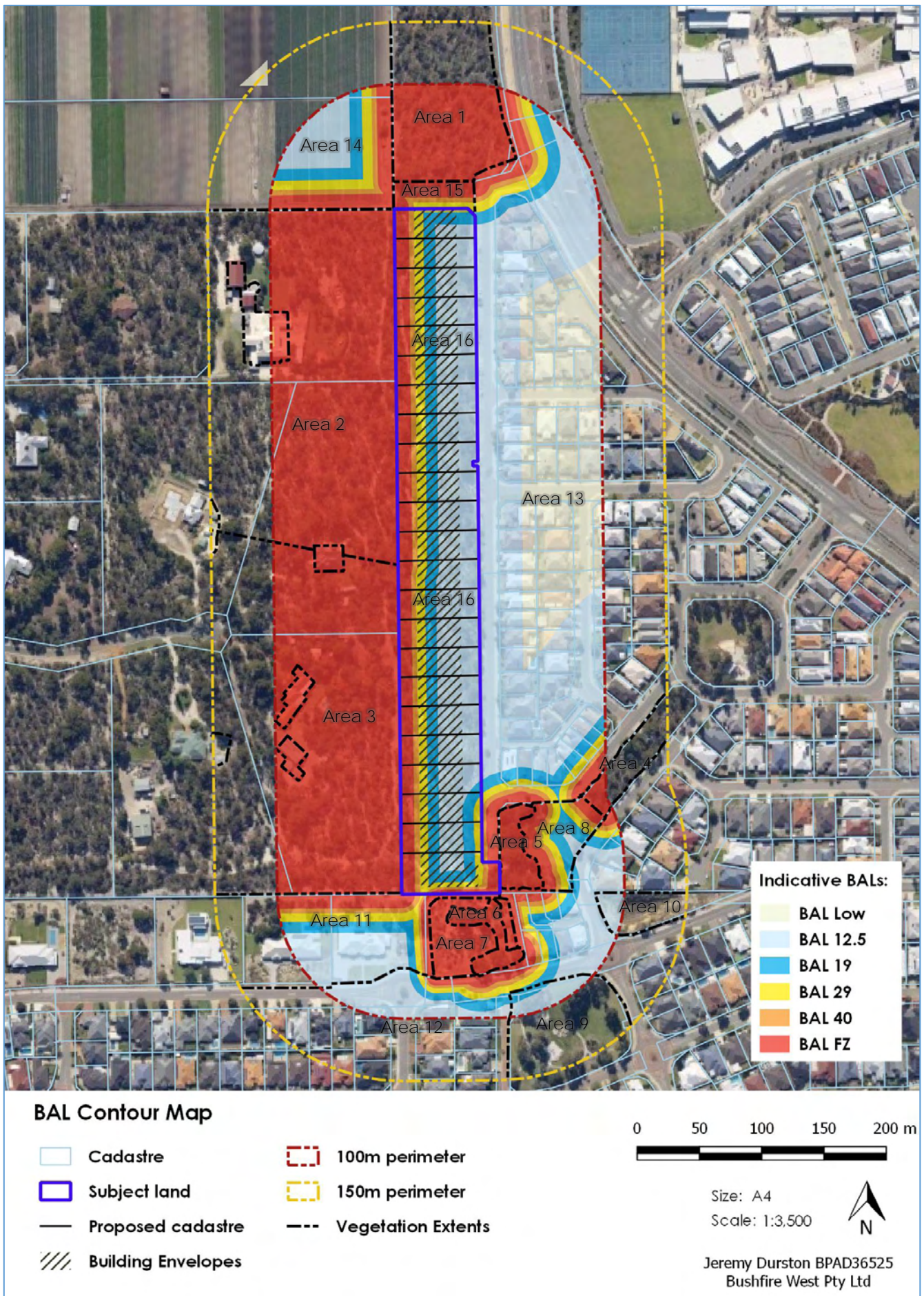


Figure 5A: BAL Contour Map (overview)

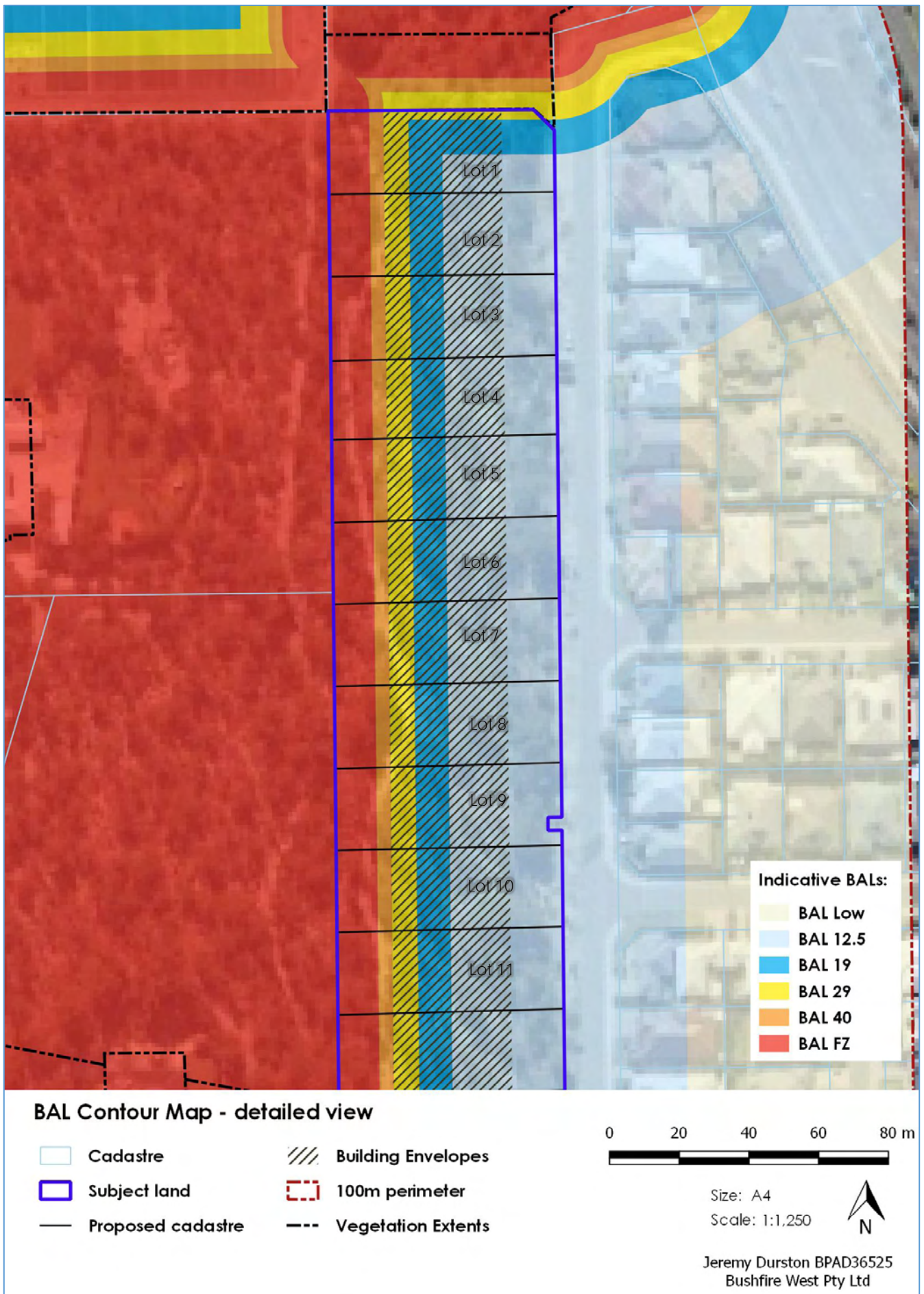


Figure 5B: BAL Contour Map (detail – northern section)

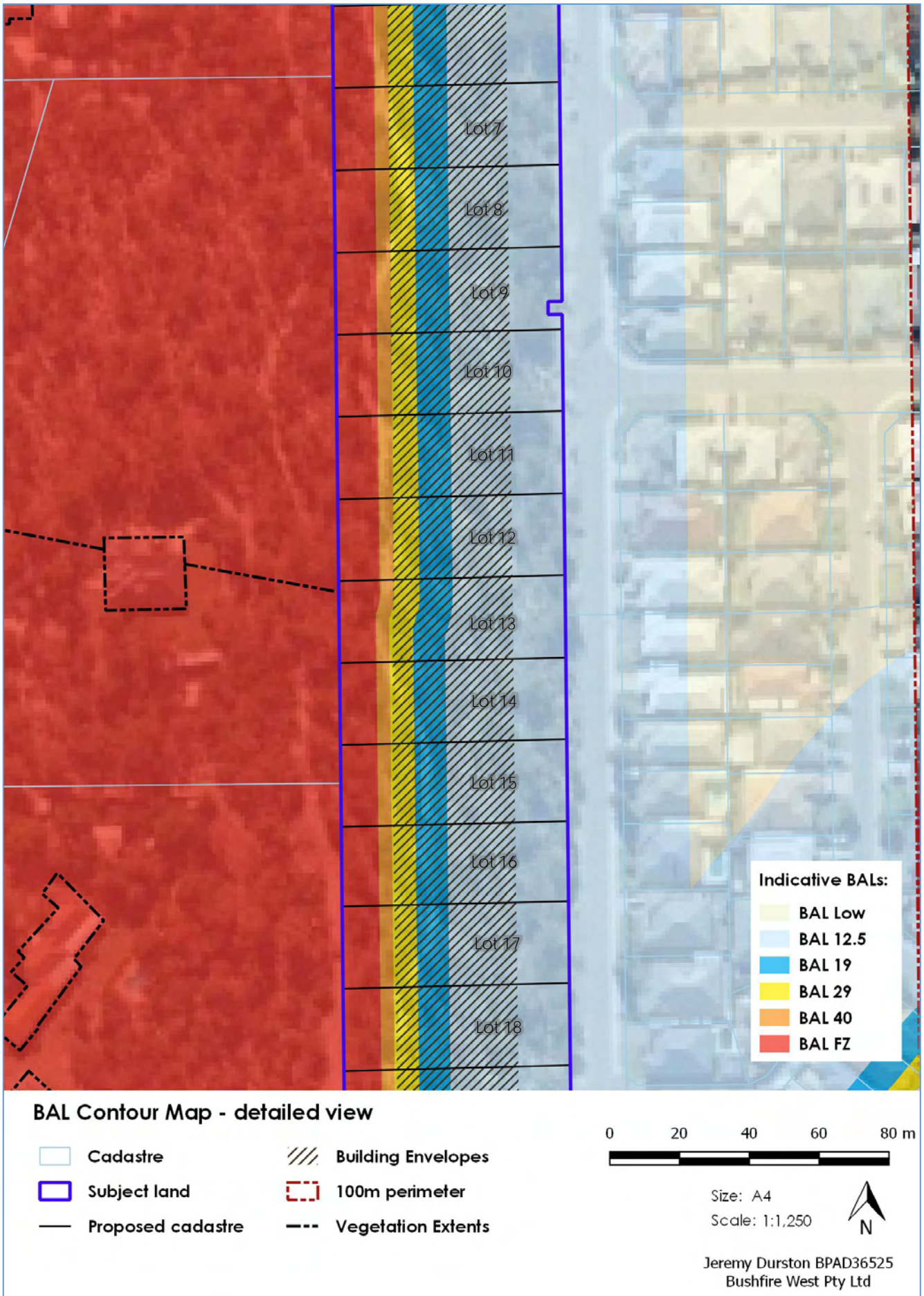


Figure 5C: BAL Contour Map (detail – central section)

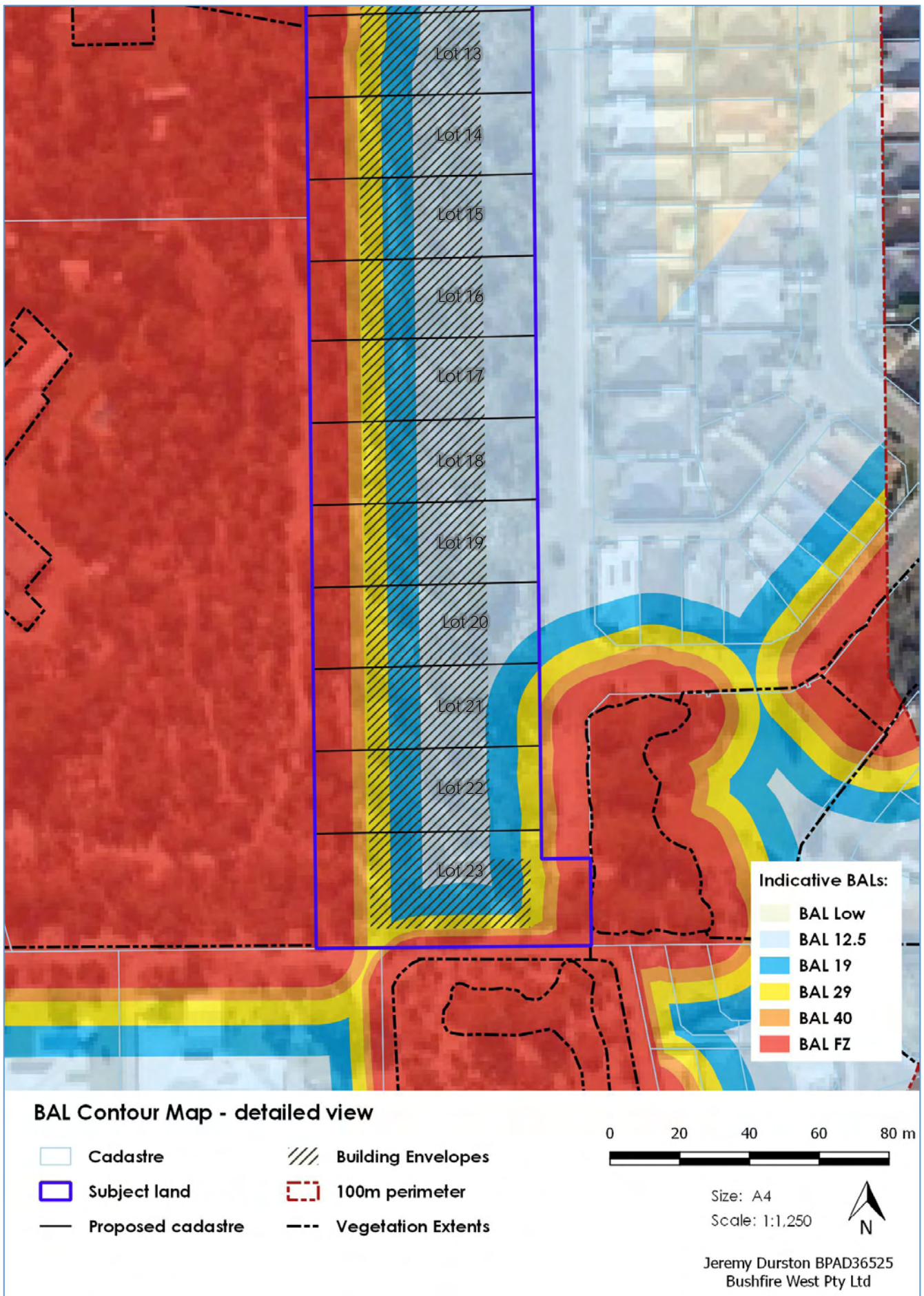


Figure 5D: BAL Contour Map (detail – southern section)

5.2 Bushfire Hazard Issues

The most significant identified bushfire hazards are:

- The vegetation within the site itself, which is required to be managed;
- The large areas of vegetation adjacent to the west and north of the site; and
- The pockets of vegetation in proximity to the southern sections of the site.

From the BAL assessments and mapping, the following bushfire hazard issues have been identified:

- The site will have ratings of up to BAL-FZ when assessed at the site boundaries, which necessitates appropriate building envelopes.
- The onsite vegetation is required to be managed for low threat, to the standards required of an Asset Protection Zone, to ensure the BAL ratings are not impacted by any onsite vegetation. This is addressed in Section 6 of this report.
- All proposed lots will include building envelopes that will be subject to ratings no higher than BAL-29.
- Future residential buildings and any associated Class 10a buildings are to be constructed to the applicable construction standard of AS 3959.
- Due to the proposed subdivision being subject to a rating above BAL-LOW the relevant bushfire protection criteria apply and are addressed in Section 6 of this report.
- The BAL ratings provided in the BAL Contour Maps and associated tables are indicative only and are for the purposes of demonstrating compliance with the bushfire protection criteria of SPP 3.7. Individual BAL assessments are required to determine the final BAL ratings for applicable buildings prior to the issuance of building permits.

6.0 Bushfire Protection Criteria

6.1 Guidelines for Planning in Bushfire Prone Areas Version 1.3 (the Guidelines)

The Guidelines apply to subdivision applications located within designated bushfire prone areas. The Guidelines provide supporting information for implementation of SPP 3.7. Specifically, they provide the Bushfire Protection Criteria to be addressed for all applications.

6.2 Proposal Assessment

Table 6A provides an assessment against the bushfire protection criteria detailed in Appendix 4 of the Guidelines, including the applicable Acceptable Solutions for each element.

Table 6A: Assessment against the bushfire protection criteria of the Guidelines

Element	Acceptable Solution (A)	Compliance		Notes
1. Location	A1.1 Development location	Yes	When developed	The development location is assessed as capable of achieving BAL-29 or lower for future dwellings within the proposed building envelopes, subject to management of onsite vegetation.
2. Siting of Development	A2.1 Asset Protection Zone	Yes	When developed	The entire area of the proposed lots is to be managed for low bushfire threat in accordance with the APZ specifications detailed in Appendix 1. The required APZ is to extend to the north of the site for a minimum width of 17m (i.e. to include a section of the designated Moort Rise road reserve).
3. Vehicular Access	A3.1 Two access routes	Yes	Existing Site	All lots will be accessible from Harden Park Trail, which connects with Pinjar Road to the north, and with Golf Links Drive to the south via Ripplevale Circle and Willeroo Chase. These routes connect to the wider area public road network providing access in multiple directions.
	A3.2 Public road	Yes	When developed	The southern, undeveloped section of Harden Park Trail is to be constructed with minimum 6m trafficable surface and to the relevant standards specified in the Local Government Guidelines for Subdivisional Development, which meet the requirements for bushfire access.

Element	Acceptable Solution (A)	Compliance		Notes
	A3.3 Cul-de-sac	No		The existing southern end of the Harden Park Trail road reserve will create a cul-de-sac of approximately 50m in length. The length of the cul-de-sac is acceptable. The width of the road reserve is not sufficient to allow a compliant vehicle turning area. There is no proposed modification to the road reserve.
	A3.4 Battle-axe	N/A		No battle-axe lots are proposed.
	A3.5 Private driveways longer than 50m	N/A		All driveways will be less than 50m in length.
	A3.6 Emergency access way	N/A		No emergency access ways are required.
	A3.7 Fire service access routes	N/A		No fire service access routes are required.
	A3.8 Firebreak widths	N/A		All residential lots are less than 0.5 ha in area and are not required by the Guidelines to have firebreaks. Any created balance Lot over 0.5 ha is required to have a 3m wide boundary firebreak.
4. Water	A4.1 Reticulated areas	Yes	Current	The site is located within an existing reticulated area with hydrants installed along Harden Park Trail and also Golf Links Drive. The furthest point on any building envelope from an existing hydrant is no greater than 120m.
	A4.2 Non-reticulated areas	N/A		Reticulated area.
	A4.3 Individual lots within non-reticulated areas	N/A		Reticulated area.

6.3 Bushfire Management Strategies

The proposed risk management measures, as detailed in Table 6A, are illustrated in the following Bushfire Management Strategies Map (Figure 6A).

REQUIREMENTS

1. The entire area of the site, and extending 17m to the north of the site, is to be managed for low threat to the standards of an Asset Protection Zone.
2. Any significant Habitat Tree or other significant vegetation is to be identified and retained.
3. All Lots have a building envelope exposed to BAL-29 or lower.
4. The building envelopes for Lots 1 to 13 are to be setback 16m from the western boundaries.
5. The building envelopes for Lots 14 to 22 are to be setback 15m from the western boundaries.
6. The building envelope for Lot 23 is to be setback 15m from the western boundary, 6m from the southern boundary and 14m from the eastern boundary.
7. The new road section is to be constructed to the relevant standards of the Local Government Guidelines for Subdivisional Development.
8. Harden Park Trail provides two-way access.
9. Existing fire hydrants are located on Harden Park Trail and adjoining roads.

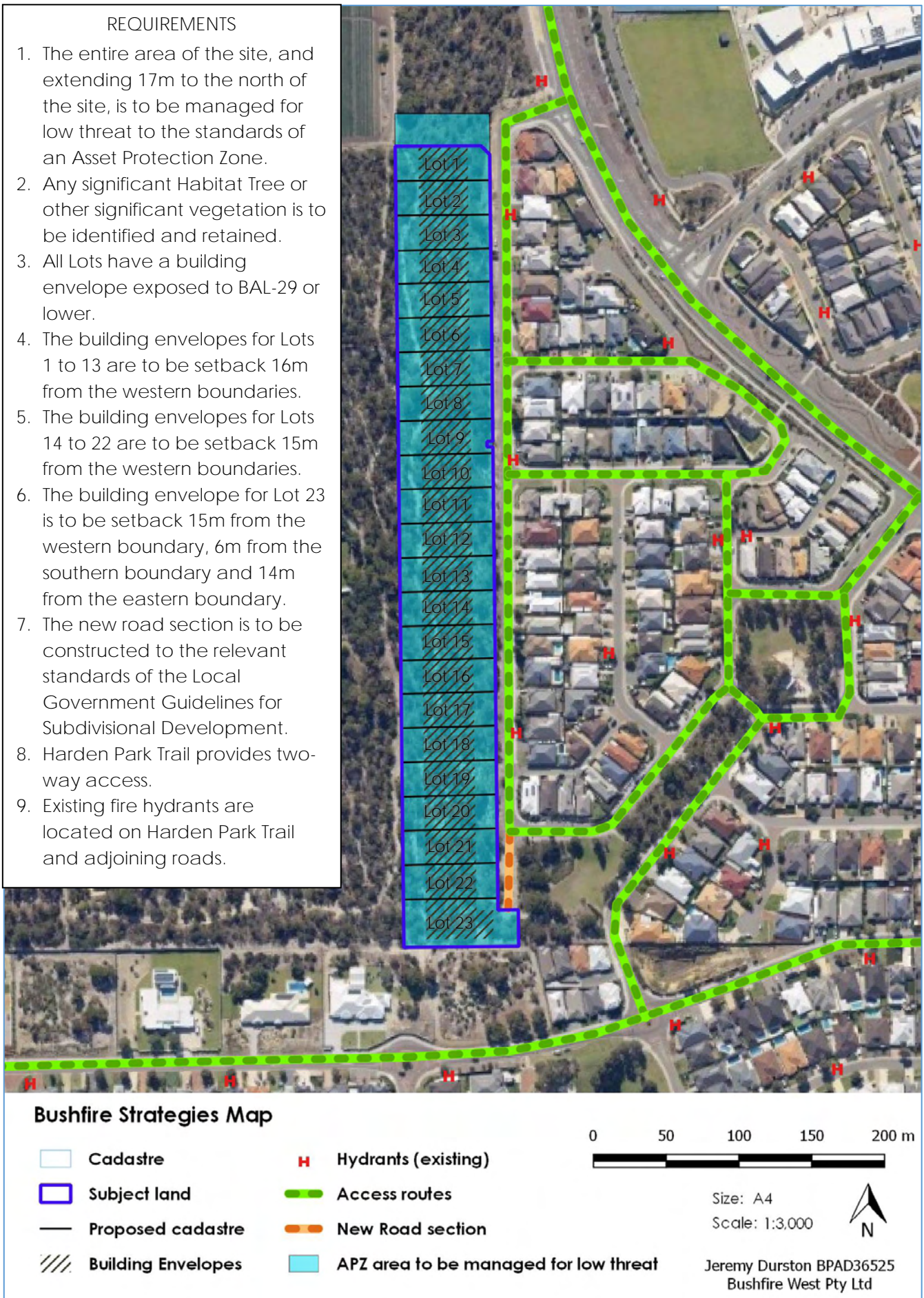


Figure 6A: Bushfire Management Strategies Map

7.0 Implementation and Management

Table 7A: Implementation Schedule

No.	Management Action	Timing
1.0 Developer Prior to Issue of Titles		
1.1	Construction of the southern section of Harden Park Trail to the relevant standards of the Local Government Guidelines for Subdivisional Development to ensure safe access and egress.	Subdivision
1.2	Consult with the City of Wanneroo to identify any significant vegetation to be retained.	Subdivision
1.3	Installation of the low threat Asset Protection Zone as detailed within this Bushfire Management Plan, retaining any identified significant vegetation.	Subdivision
1.4	Prepare a notification to be included on the certificate of titles advising the relevant Bushfire Attack Level and the land being subject to a Bushfire Management Plan.	Subdivision
2.0 Developer Prior to Sale		
2.1	Providing prospective residents with a summary of this Bushfire Management Plan.	Sale of Lots

No.	Management Action	Timing
3.0 Landowners Prior to Occupancy		
3.1	Ensuring that any application for a building permit for a dwelling is to include a Bushfire Attack Level assessment.	Development
4.0 Landowners Ongoing		
4.1	Undertaking regular property maintenance in preparation for the annual fire season.	Ongoing
4.2	Comply with all required fire mitigation measures prescribed in Council's annual Firebreak and Fuel Hazard Reduction Notice.	Ongoing

Table 7A: Implementation Schedule (continued)

No.	Management Action	Timing
5.0 Local Government Prior to Issue of Titles		
5.1	Identify any significant vegetation to be retained.	Subdivision
6.0 Local Government Ongoing Management		
6.1	Ensuring Building Permit Applications and Development Applications are compliant with the building and land use planning provisions.	Ongoing
6.2	Maintenance of vegetation in low threat condition within the designated areas of Public Open Space and road reserves.	Ongoing
6.3	Enforce compliance with its annual Firebreak and Fuel Hazard Reduction Notice.	Ongoing

8.0 References

City of Wanneroo. (2018). Annual Firebreak and Fuel Hazard Reduction Notice 2018/19.

Department of Planning Lands and Heritage. (2017). Local Government Guidelines for Subdivisional Development.

OBRM. (2018). Map of Bush Fire Prone Areas 2018. Office of Bushfire Risk Management.

Standards Australia. (2018). AS 3959-2018 Construction of buildings in bushfire prone areas.

WAPC. (2015). State Planning Policy 3.7 Planning in Bushfire Prone Areas.

WAPC. (2016). Planning Bulletin 111/2016 Planning in Bushfire Prone Areas.

WAPC. (2017a). Guidelines for Planning in Bushfire Prone Areas Version 1.3.

WAPC. (2017b). Guidelines for Planning in Bushfire Prone Areas Appendices Version 1.3.

Appendix 1 – Asset Protection Zone Specifications

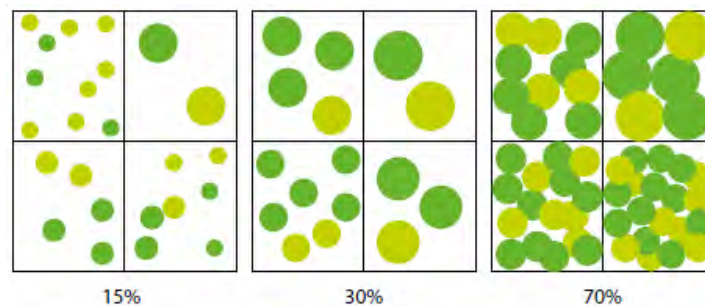
Source: *Guidelines for Planning in Bushfire Prone Areas (DoP/DFES v1.3 2017)*

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.

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.

FIRE BREAKS / FUEL HAZARD REDUCTION / FIRE BREAK EXAMPLES



Under the Bushfires Act (1954), all owners and occupiers of land in Western Australia must establish and maintain fire breaks.

Fire breaks and protection measures are vital in assisting the prevention of fires spreading and to allow safer access for bushfire fighters and vehicles.

Land with an area of less than 4,000m²

- A fire break, not less than three (3) metres wide must be cleared immediately inside (or as close as possible) around all external boundaries of the land.
- All tree branches that over-hang a fire break must be trimmed back to a minimum height of three and a half (3.5) metres above ground level and the growth on the fire break cannot exceed fifty (50) millimetres high.

Land with an area of 4,000m² or more

- A fire break, not less than three (3) metres wide, must be cleared immediately inside (or as close as possible) around all external boundaries of the land.
- All tree branches that over-hang a fire break must be trimmed back to a minimum height of three and a half (3.5) metres above ground level and the growth on the fire break cannot exceed fifty (50) millimetres high.

Buildings

- Install and maintain a twenty (20) metre building protection zone surrounding all buildings, large hay stacks and fuel storage areas. A building protection zone includes undertaking measures such as pruning all lower tree branches to prevent fire entering the trees, ensuring three (3) metre spacing between tree canopies to prevent treetop fires spreading between trees, keeping all grasses to a height of not more than fifty (50) millimetres and storing all firewood piles more than twenty (20) metres away from the buildings.

APPLICATION TO VARY THE ABOVE REQUIREMENTS

If it is considered impracticable for any reason to implement any of the requirements of this Notice, application may be made not later than the 18th of October 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.

ADDITIONAL WORKS

In addition to the requirements of this Notice, you may be required to carry out further works which are considered necessary by an Authorised Officer and specified by way of a separate written notice forwarded to the address of the owner/s as shown on the City of Wanneroo rates record for the relevant land.



ALL LANDOWNERS WITHIN THE CITY OF WANNEROO BE ADVISED

Fire break installation must be completed by 1 November each year. Property inspections will commence the following day.

Failure to comply with these requirements may incur fines and further action by the City of Wanneroo.

Minimum clearances 3.5m above ground level dependent upon land area.



Non-compliant: no fire break installed inside boundary fence



Compliant: grass slashed to ground level



Non-compliant: mineral earth fire break showing grass/weed regrowth



Compliant: mineral earth fire break



Non-compliant: thick scrub creates a fire hazard around power poles



Compliant: cleared buffer zone around power poles

Appendix 3 – AS 3959 Method 2 Bushfire Attack Level calculations



Calculated November 21, 2018, 12:28 pm (MDC v.4.8)

Area 2: Woodland, **Downslope to 3 degrees**

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	1.77 km/h
Vegetation classification	Woodland	Flame length	14.51 m
Surface fuel load	15 t/ha	Flame angle	55 °, 65 °, 73 °, 78 °, 80 ° & 85 °
Overall fuel load	25 t/ha	Elevation of receiver	5.32 m, 5.74 m, 5.72 m, 5.38 m, 5.11 m & 2.34 m
Vegetation height	n/a	Fire intensity	22,877 kW/m
Effective slope	3 °	Transmissivity	0.872, 0.853, 0.828, 0.802, 0.789 & 0.727
Site slope	3 °	Viewfactor	0.5987, 0.4438, 0.3011, 0.2047, 0.1662 & 0.0451
Flame width	100 m	Minimum distance to < 40 kW/m ²	11.8 m
Windspeed	n/a	Minimum distance to < 29 kW/m ²	15.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m ²	23.1 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m ²	32.6 m
		Minimum distance to < 10 kW/m ²	38.7 m

Rate of Spread - McArthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Calculated November 21, 2018, 12:16 pm (MDC v.4.8)

Area 3: Woodland, **Downslope to 1.5 degrees**

Minimum Distance Calculator - AS3959-2009 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	1.59 km/h
Vegetation classification	Woodland	Flame length	13.38 m
Surface fuel load	15 t/ha	Flame angle	53.5 °, 64.5 °, 72.5 °, 76.5 °, 78.5 ° & 84.5 °
Overall fuel load	25 t/ha	Elevation of receiver	5.09 m, 5.65 m, 5.81 m, 5.7 m, 5.6 m & 4.32 m
Vegetation height	n/a	Fire intensity	20,628 kW/m
Effective slope	1.5 °	Transmissivity	0.875, 0.857, 0.831, 0.806, 0.793 & 0.73
Site slope	1.5 °	Viewfactor	0.5997, 0.4447, 0.299, 0.2035, 0.1655 & 0.045
Flame width	100 m	Minimum distance to < 40 kW/m ²	11 m
Windspeed	n/a	Minimum distance to < 29 kW/m ²	14.8 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m ²	21.7 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m ²	30.7 m
		Minimum distance to < 10 kW/m ²	36.5 m

Rate of Spread - McArthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005