

AustralianBushfireSolutions

BUSHFIRE ASSESSMENT REPORT
FOR PROPOSED SUBDIVISION OF
Lot 12 DP 866036 & Lot 3 DP 706194
CHELSEA GARDENS & COOMUNGIE
MOSS VALE NSW 2577

Site Visit: 17 August 2018

Report Date: 12 July 2019



Prepared by:

Jane Brandon
Grad Dip in Bushfire Protection
BPAD Accredited Practitioner L3 - BPD-23617
Director Australian Bushfire Solutions



REVISIONS

DATE	AUTHOR	CHECKED	VERSION - REASON/CHANGES
27 Sept 2018	Jane Brandon	Greg Hynd/Lee Ouch	Draft
30 Oct 2018	Jane Brandon	Greg Hynd/Angela Villate	Draft 2 post RFS discussion
21 Dec 2018	Jane Brandon	Greg Hynd/Angela Villate	Draft 3 post RFS pre DA- DA submission
12 July 2019	Jane Brandon		Amended masterplan – July 2019 DA submission

© 2019 Australian Bushfire Solutions

DISCLAIMER

Any representation, statement opinion, or advice expressed or implied in this report is made in good faith on the basis that Australian Bushfire Solutions, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above.

Executive Summary

This report has been prepared for Aoyuan Group Pty Ltd by Australian Bushfire Solutions, PO Box 498, Bowral NSW 2576. It has been prepared as a bushfire assessment for a staged Urban Release Area subdivision of Lot 12 DP 866036 – Chelsea Gardens, and Lot 3 DP 706194 – Coomungie into approximately 1073 allotments in the Local Government Area of Wingecarribee, NSW.

The land has been identified as being minimally buffer for bushfire prone land vegetation category 1, and hence as the development application is for subdivision, is subject to consideration under Section 4.46 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in combination with 100B of the *Rural Fires Act*, and must be submitted to the NSW RFS for a Bushfire Safety Authority.

The lots total approximately 124Ha in size (80Ha being Chelsea Gardens, and 44Ha Coomungie) and are located approximately 2km to the south-east of Moss Vale Town Centre and Railway Station and adjacent to the southern edge of the urban area of Moss Vale and directly adjacent to Moss Vale Golf Course. The land is currently grazed paddocks and been rezoned to R2- low density residential and R5 Large Lot Residential.

The lots are accessed from Lovelle St, Yarrawa Rd and the corner of Villiers and Hill Roads.

Ranging in altitude from 686-752m, gentle 0-5° slopes cover most of the subject land, although some localised steep slopes (>11°) are also present on the northern portion of the land.

The subject land is grazed pasture, as are many of the surrounding lots. As per FPA Australia discussion re grassland hazards, “having a reasonable expectation of ongoing management does not include stock grazing...”. The other vegetation affecting the subject land is isolated pockets of forest vegetation, some being roughs on the Golf Course, some of which is able to be excluded due to size and depth of vegetation, and some to be modified and become managed land at a later Stage of the development.

As the release of *Pre-Release Planning for Bushfire Protection August 2018* (Pre Release PBP 2018) is expected to be legislated in the second half of 2019 and the proposed staged subdivision will occur after the gazetting of this document rather than prior, this report has been prepared in accordance with the submission requirements of Appendix 4 of *PBP 2006* and Appendix 2 of *Pre Release PBP 2018*, and identifies if the proposal can meet the appropriate objectives and performance criteria of Section 4.1 *PBP 2006* and Section 5 *Pre Release PBP 2018*.

Pre DA advice was sought and obtained from the NSW RFS (RFS ref DOC18/147040) regarding the use of Pre Release PBP 2018, the exclusion of some minor mapped vegetation, and the interface with adjoining paddock land.

This report addresses the Masterplan overall and Stage 1 specifically.

Due to the importance of developable space on the residential lots in this proposed Urban Release Area (URA), subsequent DA's for later stages of this Masterplan development may consider a radiant heat shield (fence) alternate solution for lots interfacing with paddocks to increase the potentially developable area.

For any infill development on the proposed new lots a separate bushfire report assessed under Section 4.14 or 4.46 of the *Environmental Planning and Assessment Act 1979* may be required.

Performance criteria required as per Pre Release PBP 2018 and PBP 2006 have been assessed and the performance criteria to be satisfied have been outlined in Section 4 of this report.

Pending acceptance and compliance with the recommendations following (also in Section 0 this report does not find sufficient justification for the proposal to be rejected due to any bushfire considerations.

Pending compliance with the below conditions, the performance criteria and deemed to satisfy provisions outlined in Section 4.1 of Pre Release PBP 2018 are found to be satisfied.

BAL, APZ and Landscaping Recommendations

- All lots are able to have a dwelling to Bal 29 or lower.
- The following indicative APZ's apply:
 - North Portion – managed or excluded land.
 - East Portion
 - South 10m
 - North East 12m
 - South East 10m
 - South Portion
 - East 10m
 - West Portion - managed or excluded land
 - Entry Portion - managed or excluded land
- APZ's can be met on subject land
- Subject land should be managed in accordance with the requirements of Appendix 4 Pre Release PBP 2018 (see Appendix 11)

Public Roads

- property access roads are two-wheel drive, all-weather roads; and
 - perimeter roads are provided; and
 - more than one access in and out of the development; and
- traffic management devices are constructed to not prohibit access by emergency services vehicles; and
- maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; and
- all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; and
- where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;
- the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.
- hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;
 - hydrants are provided in accordance with AS 2419.1:2005;

- there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.

PERIMETER ROADS

- perimeter roads are two-way sealed roads; and
- 8m carriageway width kerb to kerb; and
- parking is provided outside of the carriageway width; and
- hydrants are located clear of parking areas; and
- there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and
- curves of roads have a minimum inner radius of 6m; and
- the maximum grade road is 15° and average grade is 10°; and
- the road crossfall does not exceed 3°; and
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

NON PERIMETER ROADS

- minimum 5.5m width kerb to kerb; and
- parking is provided outside of the carriageway width; and
- hydrants are located clear of parking areas; and
- roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and
- curves of roads have a minimum inner radius of 6m; and
- the road crossfall does not exceed 3°; and
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

Services Recommendations

Water:

- reticulated water is to be provided to the development, where available;
- a static water supply is provided where no reticulated water is available .
- fire hydrant spacing, design and sizing comply with the Australian Standard AS 2419.1:2005;
- hydrants are not located within any road carriageway;
- reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
- fire hydrant flows and pressures comply with AS 2419.1:2005.
- all above-ground water service pipes are metal, including and up to any taps.
- Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.

Electricity:

- Where practicable, electrical transmission lines are underground
- where overhead electrical transmission lines are proposed:
 - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and
 - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in in ISSC3 Guideline for Managing Vegetation Near Power Lines.

Gas:

- Reticulated gas is to be installed and maintained in accordance with AS/NZ 1596:2014 and the requirements of relevant authorities. Metal piping is to be used
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
- connections to and from gas cylinders are metal;
- polymer-sheathed flexible gas supply lines are not used;
- above-ground gas service pipes are metal, including and up to any outlets.



Jane Brandon

Grad Dip in Bushfire Protection

BPAD Accredited Practitioner L3 - BPD-23617

EXECUTIVE SUMMARY	III
1 INTRODUCTION	1
2 SITE DESCRIPTION	1
2.1 LOCATION	1
2.2 DESCRIPTION	2
2.3 ZONING	5
2.4 PROPOSAL	6
3 BUSHFIRE HAZARD AND RISK ASSESSMENT	6
3.1 BUSHFIRE PRONE LAND	6
3.2 VEGETATION	6
3.2.1 VEGETATION ON SUBJECT LOT	7
3.2.2 VEGETATION ON NEARBY LAND	7
3.2.2.1 North, North East and North West	7
3.2.2.2 East & South East	7
3.2.2.3 Golf Course boundaries	7
3.2.2.4 West	8
3.2.2.5 Revegetation proposed as part of development	8
3.2.3 VEGETATION TO 140M & EFFECTIVE SLOPE UNDER HAZARD TO 100M	8
3.2.3.1 Northern Portion	9
3.2.3.2 Eastern Portion	10
3.2.3.3 Southern Portion	11
3.2.3.4 Western Portion	12
3.2.3.5 Entry Portion	13
3.2.4 PREDOMINANT VEGETATION AND CLOSEST THREAT OF BUSHFIRE	13
3.3 HAZARD ASSESSMENT	13
3.3.1 FIRE AND EMBER ATTACK	13
3.3.2 FIRE HISTORY	13
3.3.3 BUSHFIRE ATTACK LEVEL	13
3.3.4 ASSET PROTECTION ZONE - APZ	13
3.4 SIGNIFICANT ENVIRONMENTAL FEATURES	14
3.4.1 HERITAGE	14
3.4.2 ABORIGINAL HERITAGE	14
3.4.3 FLORA AND FAUNA	14
3.5 OVERALL ASSESSMENT	14
4 BUSHFIRE PROTECTION MEASURES	15

4.1	ASSET PROTECTION ZONE – APZ & LANDSCAPING	15
4.1.1	HOW PRE RELEASE PRE RELEASE PBP 2018 APZ REQUIREMENTS SATISFIED	15
4.2	ACCESS (1&2) – PUBLIC ROADS & PROPERTY ACCESS	15
4.2.1	PUBLIC ROADS	15
4.2.2	PROPERTY ACCESS	15
4.2.3	PRE RELEASE PBP 2018 (1) – PUBLIC ROADS - REQUIREMENTS	16
4.3	SERVICES – WATER, ELECTRICITY AND GAS	17
4.3.1	EXISTING WATER, ELECTRICITY AND GAS	17
4.3.2	SERVICES – WATER, ELECTRICITY AND GAS	17
4.4	RECOMMENDATIONS	18
4.4.1	BAL, APZ AND LANDSCAPING RECOMMENDATIONS	18
4.4.2	PUBLIC ROADS	18
4.4.3	SERVICES RECOMMENDATIONS	19
5	SUMMARY OF FINDINGS AND RECOMMENDATIONS	20
6	APPENDICES	21
7	REFERENCES	48

1 Introduction

This Bush Fire Assessment Report has been compiled regarding the proposed large scale / Urban Release Area subdivision of Lot 12 DP 866036 & Lot 3 DP 706194. These two allotments are 124 Ha in size, and form the Chelsea Gardens and Coomungie precincts in Moss Vale NSW.

After a contentious period of debate pertaining to the proposed lots, an amendment was made to the Wingecarribee LEP in 2017 to rezone the subject land from RU2 Rural Landscape to R2-Low Density Residential and R5- Large Lot Residential. This has provided the potential to yield an additional approximately 1073 lots, predominantly 450-600sqm in size, with some 2000sqm lots in limited areas, and a small neighbourhood centre.

The subject land is minimally mapped as affected by Bushfire Prone Vegetation Category 1 and buffer, thus, a bushfire assessment is required as part of a Development Application to be submitted to Wingecarribee Shire Council, and referred to the NSW RFS for a Bushfire Safety Authority for the purpose of a subdivision and assessment under Section 4.46 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Section 100B of the *Rural Fires Act*.

As of this report date, *Planning for Bushfire Protection 2006* (PBP 2006) is the legislated document to be complied with. However, *Pre-Release Planning for Bushfire Protection August 2018* (Pre Release PBP 2018) has been released and is expected to be legislated mid 2019. For completeness and due to the size and staging of the proposed development, consideration will be given to the requirements of both documents. Thus, this report has been prepared in accordance with the submission requirements of *Appendix 2 of Pre Release PBP 2018*, and consideration given to *Appendix 4 of PBP 2006* and identifies if the proposal can meet the appropriate objectives and performance criteria of *Section 5 Pre Release PBP 2018* and consideration given to *Section 4.1 PBP 2006*.

2 Site Description

2.1 Location

Lot 12 DP 866036, being 32 Lovelle St Moss Vale – ‘Chelsea Gardens’, wraps around Moss Vale Golf Course in the southern portion of Moss Vale and is accessed from Lovelle St and the corner of Villers and Hill Rds. Lot 3 DP 706194, being 141 Yarrowa Road Moss Vale – ‘Coomungie’, is located south of the Lovelle St property, and is accessible from Yarrowa Rd.

The lots total approximately 124Ha in size (80Ha being Chelsea Gardens, and 44Ha Coomungie) and are located approximately 2km to the south-east of Moss Vale Town Centre and Railway Station and adjacent to the southern edge of the urban area of Moss Vale.

As identified in the Planning Proposal dated Aug 2015 by AE Design Partnership, the site is generally bounded by:

- Large rural and rural residential lots to the east with lot sizes 1.5ha to 50ha.
- Yarrawa Rd and large rural and rural residential lots to the south and west with lot sizes 4ha to 24ha.
- Hill Rd and residential part of Moss Vale to the north with lot sizes varying between 700m² and 12ha.
- Moss Vale Golf Club to the north.

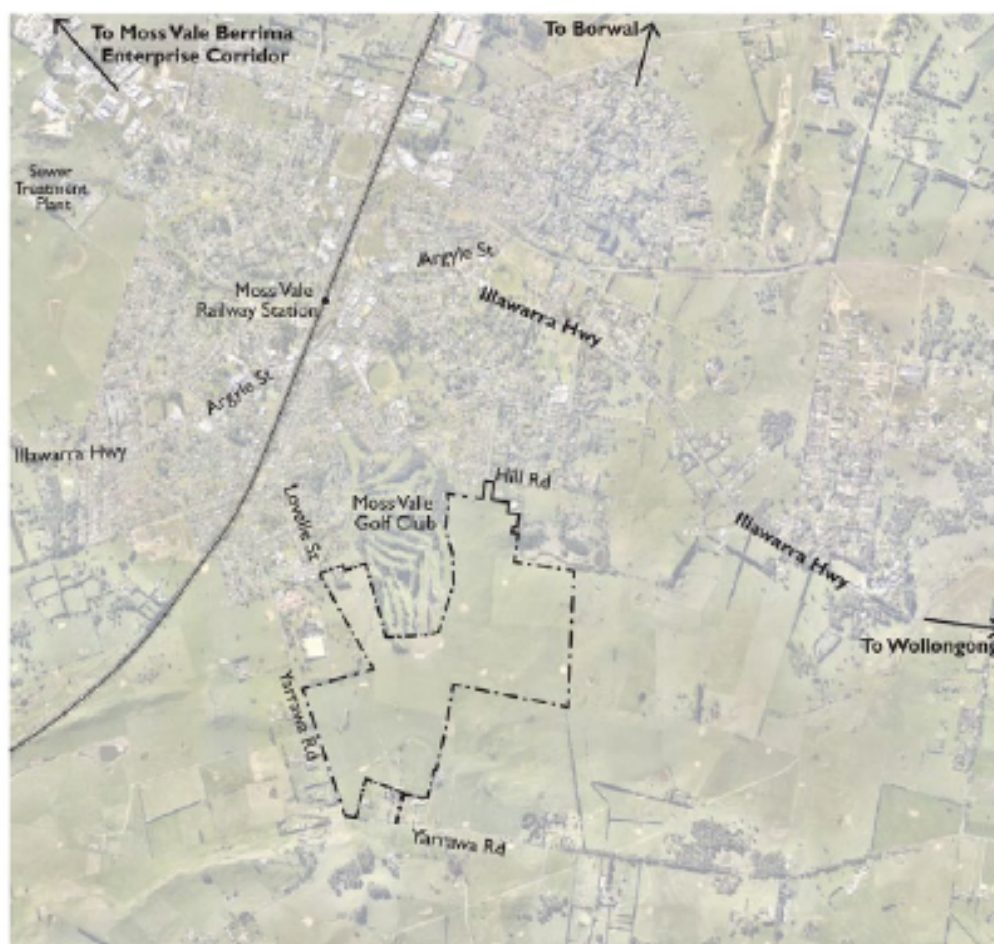


Figure 2-1 Location Map © AE Design Partnership

2.2 Description

Cadastre of the subject land can be found in Appendix 1 and a proposed masterplan Appendix 2 and Staging Plan in Appendix 3.

The subject land proposal is for a staged Urban Release Area subdivision development of approximately 1073 lots.

The subject land is highly disturbed cleared pasture land that is currently grazed.

Size: 124Ha in size

Aspect: Varied

Altitude: Approximately 686 (directly south of the golf course) to 752m (at the north of the lot)

Slope: As can be seen in the following, although presenting some localised steep slopes ($>11^\circ$), most of the subject land is has $0-5^\circ$ slopes.

Existing: Two dwellings and a number of farm buildings.

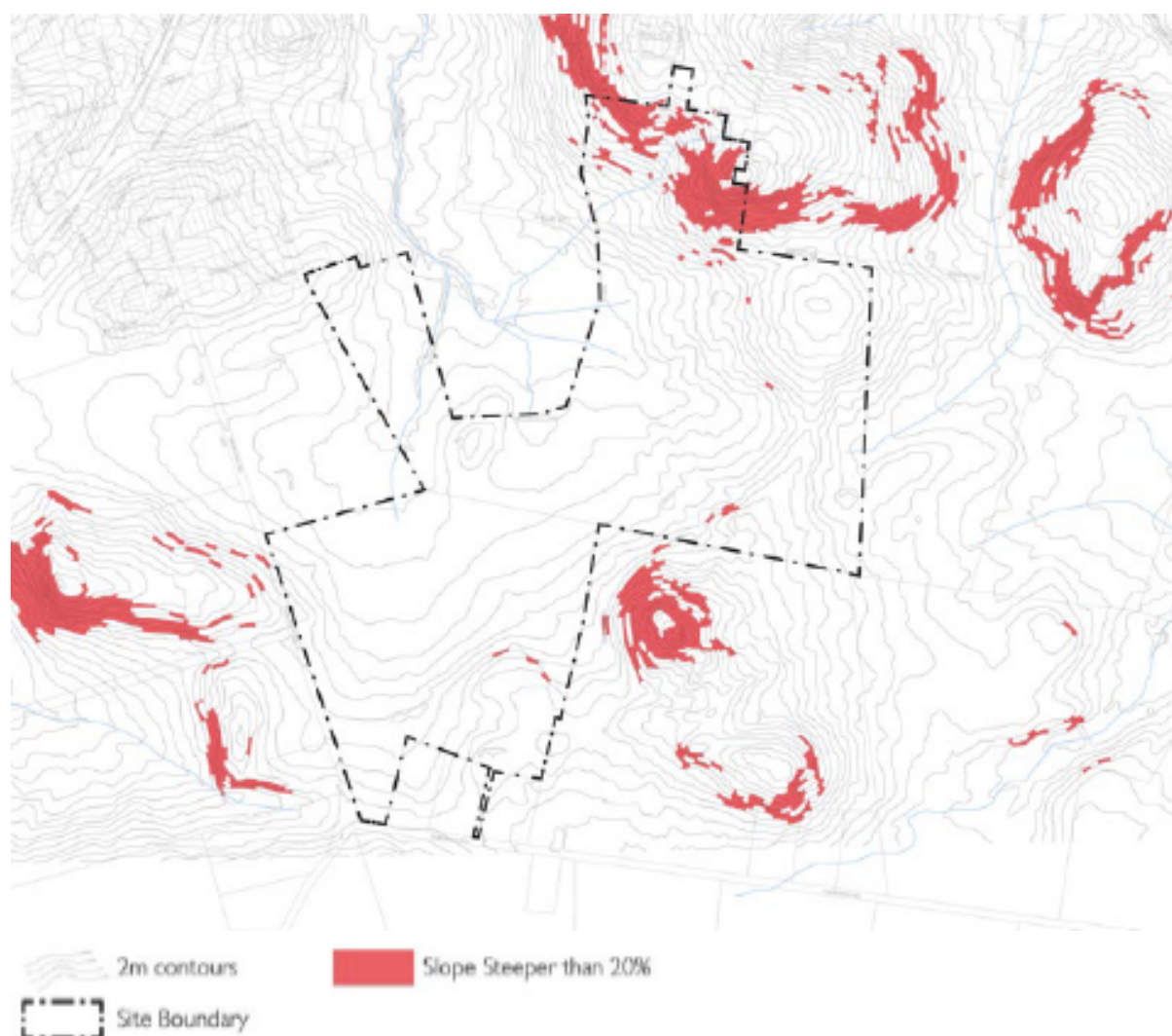


Figure 2-2 Topography Map © AE Design Partnership

Water: A number of dams are present on the lots, and six first order riparian corridors, five of which flow into Whites Creek, identified to experience localised flooding.

One hydrant is located on Yarrawa Rd at the north east corner of Lot 12 DP 866036, and hydrants are located in Villiers and Hill Rds at the northern end of the subject land.

Electricity: Above ground as is common in the Shire

Gas: To be installed

Access: Directly from Yarrawa Rd, Lovelle St and Villiers and Hill Roads.

FDI: 100



Figure 2-2 Aerial photo of subject land © Nearmap



Figure 2-3 Aerial photo of subject land on periphery of Moss Vale town © Nearmap

2.3 Zoning

The subject land is zoned R2 – Low Density Residential and R5 – Large Lot Residential, as are the nearby and adjacent lots to the north. Nearby is zoned RU2 and E3, with Moss Vale Golf Course and Seymour Park to the north zoned RE2 and RE1 respectively.

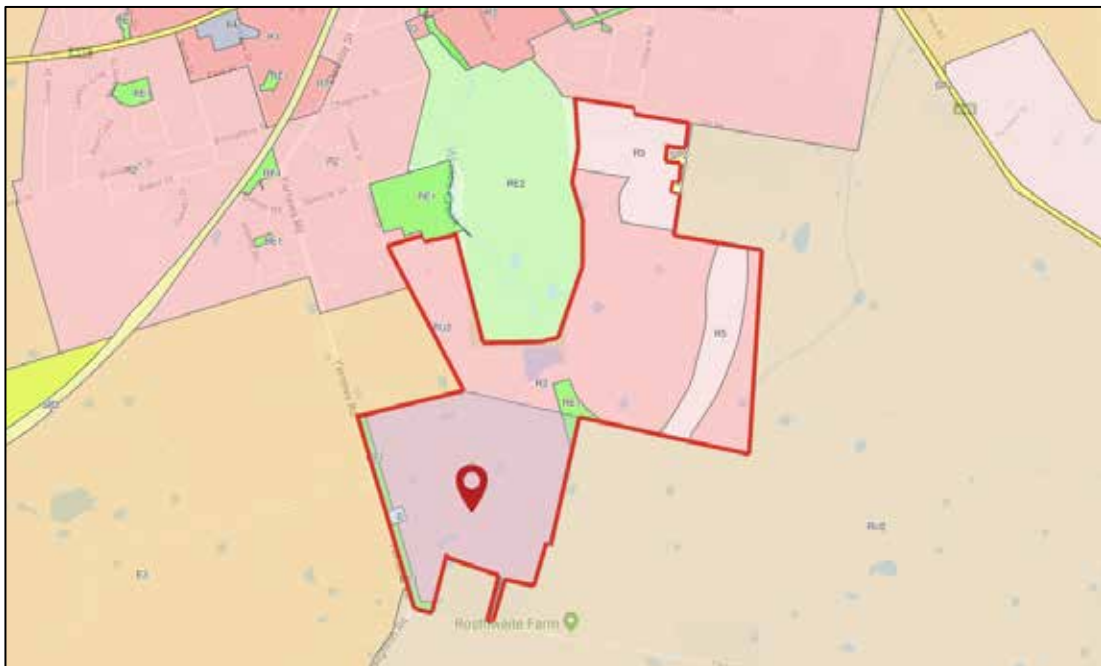


Figure 2-4 - Zoning of subject land – WSC LEP 2010

2.4 Proposal

The proposal is for a staged Urban Release Area subdivision of land mapped as bushfire prone. As such, this report has been prepared in accordance with the submission requirements of Appendix 4 of *PBP 2006* and Appendix 2 of *Pre Release PBP 2018*, and identifies if the proposal can meet the appropriate objectives and performance criteria of Section 4.1 *PBP 2006* and Section 5 *Pre Release PBP 2018*.

3 Bushfire Hazard and Risk Assessment

3.1 Bushfire Prone Land

- ‘Chelsea Gardens’ is minimally identified as buffer for bushfire prone land vegetation category 1, as per the below.
- Although not currently mapped, grasslands are also considered a hazard and new Bushfire Prone Land Maps will also be identifying these. These new maps are expected to be certified in 2019.
- As per FPA Australia ongoing discussion re grassland hazards, “having a reasonable expectation of ongoing management does not include stock grazing...”.

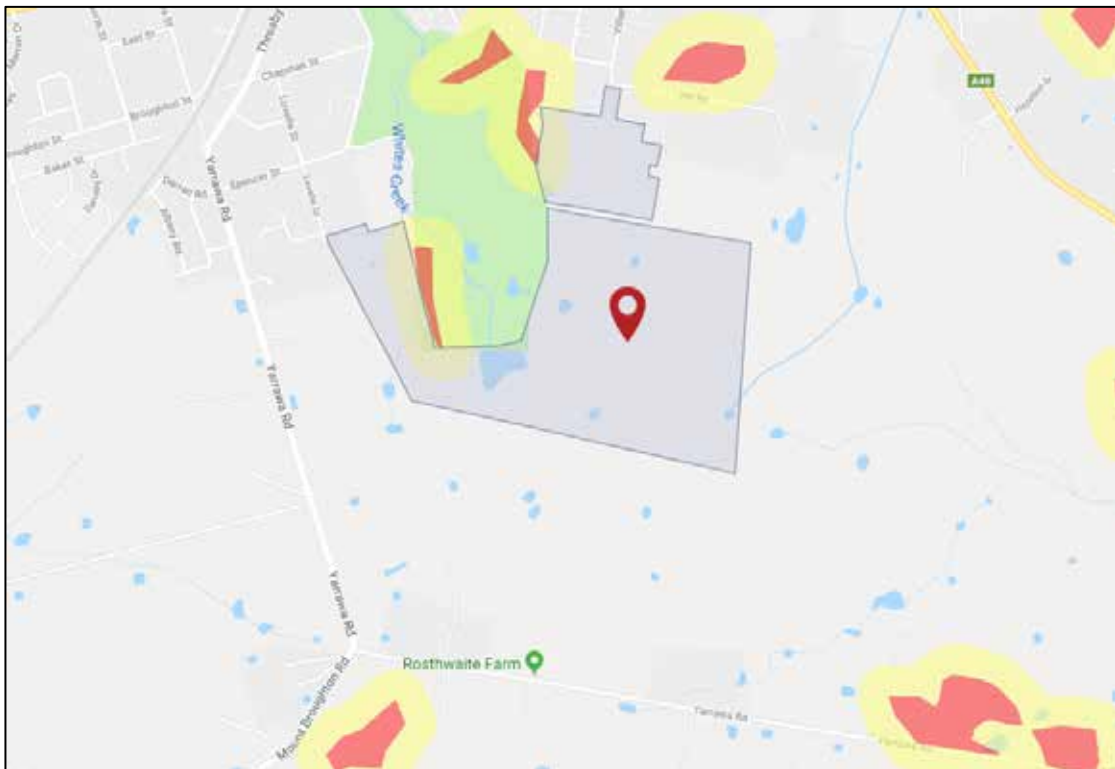


Figure 3-1 Bushfire Prone Land Map © Wingecarribee Shire Council certified 2011

3.2 Vegetation

The images that can be found in Appendix 7 show the vegetation present on the subject and surrounding lots during a site inspection.

Mapping of the vegetation communities affecting the lot can be found in Appendix 3

3.2.1 Vegetation on subject lot

- The subject land is disturbed cleared pastureland that is currently grazed.
- A windbreak is currently present on the north eastern boundary near the dwelling on Chelsea Gardens, and around the existing farm house.
- A small stand of predominantly radiata pines is located on Chelsea Gardens near the southern end of the Golf Course
- Occasional scattered trees, more likely along riparian corridors.

3.2.2 Vegetation on nearby land**3.2.2.1 North, North East and North West**

- North along Hill Rd and Villiers Road - developed residential lots with managed gardens
- The rural/residential lot directly adjacent to the water reservoir is developed, with maintained garden. A small portion of forest vegetation is located on this lot, but as per A1.10 Pre Release PBP 2018 – Low threat vegetation – Exclusions. As per Pt 1 of this section, this area of vegetation is not required to be considered for the purposes of PBP

3.2.2.2 East & South East

- The adjacent lots to the east and south east are similar to the subject land being pastureland. As per FPA Australia discussion re grassland hazards, “having a reasonable expectation of ongoing management does not include stock grazing...” Thus, these lots are considered a grassland hazard.

3.2.2.3 Golf Course boundaries

- Whilst fairways are considered managed land, the rough on a golf course can be bushfire hazard. With Moss Vale Golf Course, there is:
 - a small portion of rough vegetation in the south east corner between the subject land and creek running into the golf course (approx. 2500sqm);
 - a larger portion of rough in the north east corner (approx. 1.7Ha in total);
 - and there are rows of rough between the fairways, predominantly radiata pines, which are usually <20m in width.
- The author did confirm with the Golf Club groundsman that the ground and understorey in the rough areas is not maintained, but that the winds do clear a lot of litter from under the trees.

South West Boundary of Golf Course

- Located on the south western boundary of the golf course is one of the areas of vegetation mapped as bushfire prone land vegetation category 1. This parcel of vegetation is part windbreak and partly along a watercourse, and is between 15-40m in width and is mapped by EcoLogical Australia for Wingecarribee Shire Council as Critically Endangered Ecological Community (CEEC) Southern Highlands Shale Woodland (SHSW). This area is actually predominantly radiata pine.
- A1.10 Pre Release PBP 2018 – Low threat vegetation – Exclusions. As per Pt 1 of this section, this area of vegetation is not required to be considered for the purposes of PBP

North East Boundary of Golf Course

- Located on the north eastern boundary of the golf course is another area mapped as bushfire prone land vegetation category 1. This parcel of vegetation is mapped by EcoLogical Australia for Wingecarribee Shire Council as Endangered Ecological Community (EEC) Robertson Basalt Tall Open Forest. A number of pines are present on the edge of this vegetation.
- As required, these vegetation classifications are to be converted to Keith (2004) formations, and are identified as being Dry Sclerophyll Forest (DSF), and **Forest** as per AS3959-2009.
- Attendance on site has confirmed that clearing has occurred in a large section of this in the past, and that the vegetation now is a largely overgrown weeds, with occasional native tree.
- Proposed to be addressed in Stage 4-
 - Developer to clean up the vegetation in this area, removing all weeds
 - Negotiate easement with Moss Vale Golf Course for ongoing maintenance of this area of vegetation
 - This area of vegetation becomes managed land, and thus not a hazard

3.2.2.4 West

- To the west of the subject land is Harbison Nursing Home, and Harper Entertainment Distribution Services (HE - a book/entertainment warehouse and distribution facility).
- Both of these lots are developed from Yarrowa Road, with grass areas at the rear.
- Harbison Nursing Home has the grass maintained periodically, and thus this is considered managed land
- HE maintains a fenced area around the warehouse, and near the front of the lot (between Harbison and the Harper facility). The remaining area (approx. 9.15Ha) is grass, which has been regularly slashed in the past, and is currently grazed (by the adjacent lot/subject land).
- See Appendix 5 for a letter from HE outlining their vegetation management for their site. As such, this site is considered managed land and assessed as such.
- Running along the HE side of the boundary is an eroded 'channel' located between two dams, likely to be an intermittent watercourse. Along this are trees with a width ranging from approximately 10-20m and currently acting as a windbreak, with another short windbreak running perpendicular off this. This area of windbreak trees is approximately 5600m² in size, and as per Pt 1 A1.10 *Low Threat Vegetation Exclusions Pre Release PBP 2018* can be considered low threat vegetation and thus excluded.

3.2.2.5 Revegetation proposed as part of development

- It is noted that an area of revegetation is proposed along a riparian area in the south west arm of development. Considering the minimal size (depth) of revegetation proposed along the riparian area, and within the proposed parkland area, it is believed reasonable to consider that this area will be land managed by Council, and thus not considered a hazard.

3.2.3 Vegetation to 140m & Effective slope under hazard to 100m

The vegetation affecting the proposed development site can be outlined as per the table following.

Notes re table 1 following:

- As any trees remaining as part of the development will be as part of managed gardens, *vegetation affecting the subject land from adjacent lots is assessed here.*
- Minimum APZ shown as per table A1.12.5 Pre Release PBP 2018 (revised issue June 2019), however an alternate solution with a radiant heat barrier (fence) may be presented in subsequent DA's for Stages 5 and 7a, being the stages affected by currently grazed paddocks.

3.2.3.1 Northern Portion

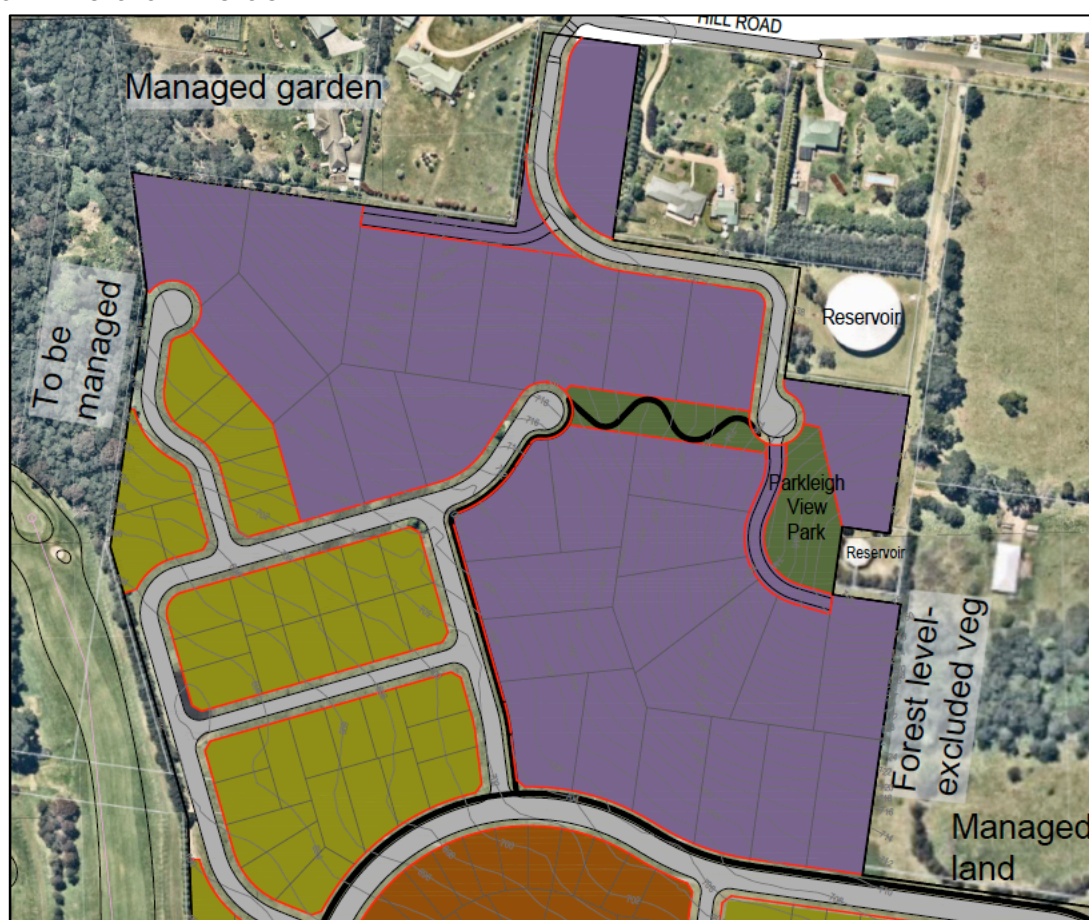


Figure 3-2 Northern portion of Chelsea Gardens

Table 1 – N Portion - Proposed subdivision - Predominant vegetation; Effective slope and APZ

Aspect	Distance to Hazard	Vegetation up to 140m	Effective Slope under hazard to 100m	Min APZ Required for BAL 29
North	>140m	Managed land	Level/Upslope	n/a
West	On boundary	To become managed land*	0-5° Downslope	→ n/a
East	On boundary	Forest→ excluded vegetation as per Pre Release PBP 2018	Level	→ n/a

* Management of this vegetation to be addressed in DA for Stage 4

3.2.3.2 Eastern Portion

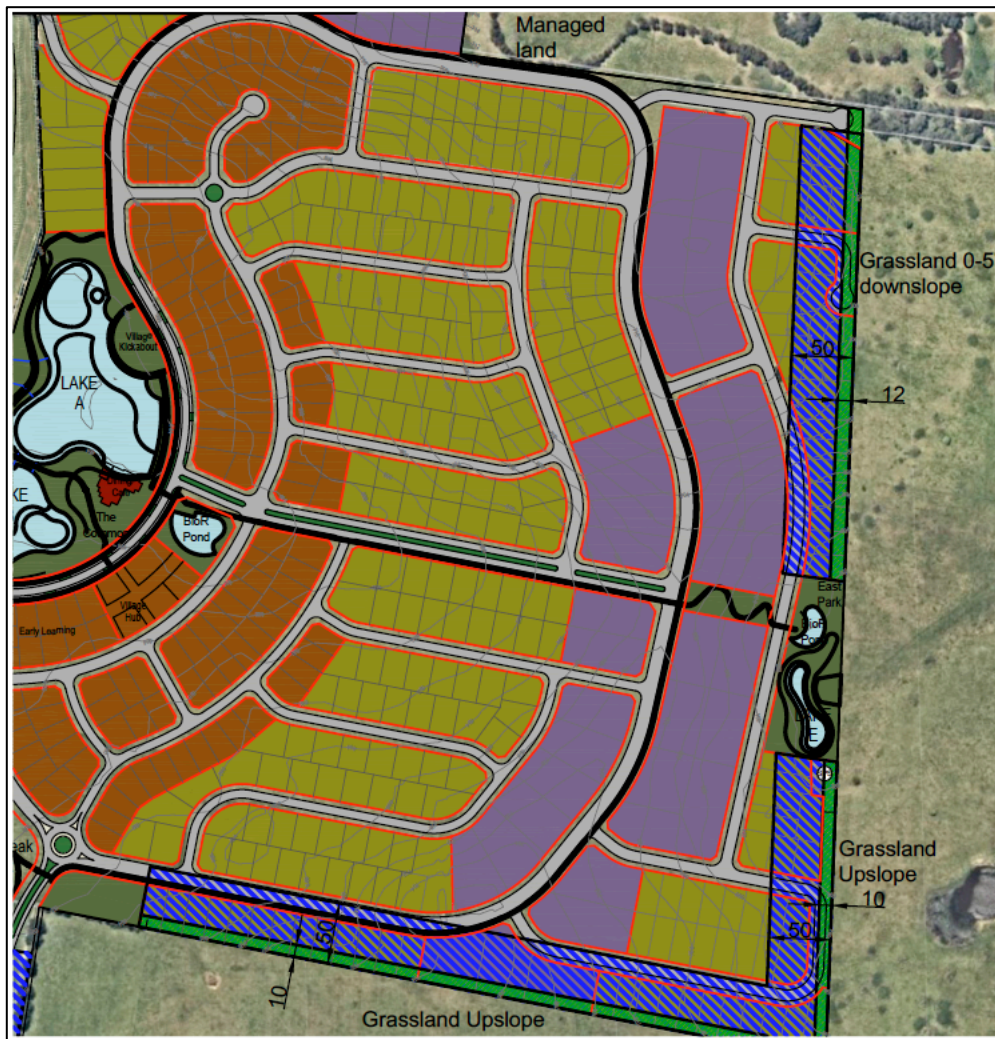


Figure 3-3 Eastern portion of Chelsea Gardens

Table 2 – E Portion - Proposed subdivision - Predominant vegetation; Effective slope and APZ

Aspect	Distance to Hazard	Vegetation up to 140m	Effective Slope under hazard to 100m	Min APZ Required for BAL 29
North	60m	Forest → excluded vegetation as per Pre Release PBP 2018	Level/Upslope	n/a
South	On boundary	Grassland	Upslope	10m
East	On boundary	Grassland – N end Grassland – S end	0-5° downslope Upslope	12m* 10m*

*Alternate solution with radiant heat barrier (fence) may be presented in subsequent DA for Stage 5

3.2.3.3 Southern Portion



Figure 3-4 Southern portion of Chelsea Gardens

Table 3 – S Portion - Proposed subdivision - Predominant vegetation; Effective slope and APZ

Aspect	Distance to Hazard	Vegetation up to 140m	Effective Slope under hazard to 100m	Min APZ Required for BAL 29
South	>140m	Managed Land	n/a	n/a
East	On boundary	Grassland	Upslope	10m*

*Alternate solution with radiant heat barrier (fence) may be presented in subsequent DA for Stage 7a

3.2.3.4 Western Portion



Figure 3-5 Western portion of Chelsea Gardens

Table 4 – W Portion - Proposed subdivision - Predominant vegetation; Effective slope and APZ

Aspect	Distance to Hazard	Vegetation up to 140m	Effective Slope under hazard to 100m	Min APZ Required for BAL 29
North	>140m	Managed Land	n/a	n/a
South	On lot	Revegetation of riparian → to be managed by Council	→ n/a	→ n/a
East	On boundary	Rough → Excluded vegetation	→ n/a	→ n/a
West	On boundary	Grassland under VMP	Upslope	→ n/a

3.2.3.5 Entry Portion



Figure 3-6 Entry portion of Chelsea Gardens

Table 1 – Entry Portion - Proposed subdivision - Predominant vegetation; Effective slope and APZ

Aspect	Distance to Hazard	Vegetation up to 140m	Effective Slope under hazard to 100m	Min APZ Required for BAL 29
North	On boundary	Grassland under VMP	Level	→ n/a
West	50m+	Grassland	n/a	n/a

3.2.4 Predominant Vegetation and Closest threat of Bushfire

The closest threat is the grassland hazard abutting the eastern boundaries of the subject land.

3.3 Hazard Assessment

3.3.1 Fire and Ember Attack

Fire and ember attack would be possible from hazardous vegetation near the subject land.

3.3.2 Fire History

MyRFS does not indicate fire on the subject land or nearby lots. The closest fire mapped on MyRFS is the Burke River fire of 2002, however this was 16km from the subject land.

3.3.3 Bushfire Attack Level

The BAL's as established in the tables above indicate that as required by PBP 2006 and Pre Release PBP 2018, each new proposed lot would be able to have a dwelling built to BAL 29 or lower. For any infill development on the proposed lots a separate bushfire report assessed under Section 4.14 of the *Environmental Planning and Assessment Act 1979* may be required.

3.3.4 Asset Protection Zone - APZ

The required APZ as per Table A1.12.2 from Pre Release PBP 2018 are able to be met on the subject land.

With later DA's for Stages 5 and 7a, the grassland/urban interface coupled with the importance of developable space on the residential lots in this proposed Urban Release Area (URA) may consider the application of an alternate solution using a radiant heat barrier (fence).

Evidence of a plan of management or an easement on the adjacent lot to the east could remove the need for an APZ, however should it still be required within the subject land as per the tables above the minimum APZ required varies around the site, ranging from 10-12m.

3.4 Significant Environmental Features

3.4.1 Heritage

In accordance with the Wingecarribee Shire Council Heritage map, there are no heritage considerations on the subject land.

3.4.2 Aboriginal Heritage

A search of the AHIMS database, maintained by DECC reveals 1 Aboriginal site is recorded in or near Lot 3 DP 706194 – 'Coomungie'.

3.4.3 Flora and Fauna

A Flora and Fauna Assessment has been undertaken by Eco Planning, with no significant ecological concerns for the subject land.

Hence, there are no known significant environmental constraints or considerations on the subject land that would preclude the approval of this proposal.

3.5 Overall Assessment

Pending the satisfaction of section 4.2 below, the level of bushfire hazard risk identified in relation to the subject land and the proposed development is not considered to be such that the proposal should be denied due to bushfire considerations.

4 Bushfire Protection Measures

Section 4.1 of PBP 2006 and Section 5 Pre Release PBP 2018 provides the standards, performance criteria and acceptable solutions for subdivision in bushfire prone areas. Section 5 Pre Release PBP 2018 has been applied below.

The tables below outline the performance criteria specified in Pre Release PBP 2018 that must be satisfied for this subdivision to be approved.

4.1 Asset Protection Zone – APZ & Landscaping

Intent of measures: to provide sufficient space and maintain reduced fuel loads, to ensure radiant heat levels at buildings does not exceed 29kW/m²

4.1.1 How Pre Release Pre Release PBP 2018 APZ requirements satisfied

Performance Criteria The intent may be achieved where:	Acceptable Solutions and how satisfied for this subdivision
<ul style="list-style-type: none"> potential building footprints will not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot 	<ul style="list-style-type: none"> Any future buildings would be subject to their own bushfire assessments, but all lots can have a dwelling built to BAL 29 or lower
<ul style="list-style-type: none"> APZs are managed and maintained to prevent the spread of a fire towards the building. 	<ul style="list-style-type: none"> Subject land should be managed in accordance with the requirements of Appendix 4 Pre Release PBP 2018 (see Appendix 11)
<ul style="list-style-type: none"> APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated 	<ul style="list-style-type: none"> Slope is <18°
<ul style="list-style-type: none"> Landscaping is managed to minimise flame contact, reduce radiant heat levels, minimise embers and reduce the effect of smoke on residents and firefighters 	<ul style="list-style-type: none"> Subject land should be landscaped in accordance with the requirements of Appendix 4 Pre Release PBP 2018 (see Appendix 11)

4.2 Access (1&2) – Public Roads & Property Access

Public Roads - Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

4.2.1 Public Roads

New roads are to be created as part of the development, and are recommended to satisfy the requirements of *Pre Release PBP 2018* as outlined below.

4.2.2 Property Access

No specific access requirements apply in a urban area where a 70 metre unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply).

4.2.3 Pre Release PBP 2018 (1) – Public Roads - requirements

Performance Criteria The intent may be achieved where:	Acceptable solutions
<ul style="list-style-type: none"> • fire fighters are provided with safe all weather access to structures (thus allowing more efficient use of fire fighting resources) 	<ul style="list-style-type: none"> • property access roads are two-wheel drive, all-weather roads; and • perimeter roads are provided; and • more than one access in and out of the development; and • traffic management devices are constructed to not prohibit access by emergency services vehicles; and • maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; and • all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; and • where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;
<ul style="list-style-type: none"> • the capacity of access roads is adequate for fire fighting vehicles. 	<ul style="list-style-type: none"> • the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.
<ul style="list-style-type: none"> • there is appropriate access to water supply 	<ul style="list-style-type: none"> • hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; • hydrants are provided in accordance with AS 2419.1:2005; • there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.
PERIMETER ROADS access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface	<ul style="list-style-type: none"> • perimeter roads are two-way sealed roads; and • 8m carriageway width kerb to kerb; and • parking is provided outside of the carriageway width; and • hydrants are located clear of parking areas; and • there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and • curves of roads have a minimum inner radius of 6m; and • the maximum grade road is 15° and average grade is 10°; and • the road crossfall does not exceed 3°; and • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
NON - PERIMETER ROADS access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating	<ul style="list-style-type: none"> • minimum 5.5m width kerb to kerb; and • parking is provided outside of the carriageway width; and • hydrants are located clear of parking areas; and • roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and • curves of roads have a minimum inner radius of 6m; and • the road crossfall does not exceed 3°; and • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

4.3 Services – Water, electricity and gas

Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building

4.3.1 Existing water, electricity and gas

The subject land is on reticulated water. One hydrant is located on Yarrawa Rd at the north east corner of Lot 12 DP 866036, and hydrants are located in Villiers and Hill Rds at the northern end of the subject land.

Electrical lines servicing the subject land are above ground to the lot (as is normal in the Shire), however as a new Urban Release Area, power below ground is expected.

Any future buildings that could include a residence will have to comply with performance criteria, as specified in Pre Release PBP 2018 Section 6 or 7 as part of any future infill development.

4.3.2 Services – Water, electricity and gas

Performance Criteria	Acceptable Solutions
The intent may be achieved where:	
Reticulated water supplies <ul style="list-style-type: none"> a water supply is provided for firefighting purposes 	<ul style="list-style-type: none"> reticulated water is to be provided to the development, where available; a static water supply is provided where no reticulated water is available.
<ul style="list-style-type: none"> Water supplies are easily accessible and located at regular intervals the water supply is accessible and reliable for firefighting operations 	<ul style="list-style-type: none"> fire hydrant spacing, design and sizing comply with the Australian Standard AS 2419.1:2005; hydrants are not located within any road carriageway; reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
<ul style="list-style-type: none"> flows and pressure are appropriate 	<ul style="list-style-type: none"> fire hydrant flows and pressures comply with AS 2419.1:2005.
<ul style="list-style-type: none"> the integrity of the water supply is maintained 	<ul style="list-style-type: none"> all above-ground water service pipes are metal, including and up to any taps.
Electricity Services <ul style="list-style-type: none"> location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings 	<ul style="list-style-type: none"> Where practicable, electrical transmission lines are underground where overhead electrical transmission lines are proposed: <ul style="list-style-type: none"> lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in in ISSC3 Guideline for Managing Vegetation Near Power Lines.
Gas services <ul style="list-style-type: none"> location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings 	<ul style="list-style-type: none"> Reticulated gas is to be installed and maintained in accordance with AS/NZ 1596:2014 and the requirements of relevant authorities. Metal piping is to be used. all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; connections to and from gas cylinders are metal; polymer-sheathed flexible gas supply lines are not used; above-ground gas service pipes are metal, including and up to any outlets.

4.4 Recommendations

4.4.1 BAL, APZ and Landscaping Recommendations

- All lots are able to have a dwelling to Bal 29 or lower.
- The following indicative APZ's apply:
 - North Portion – managed or excluded land.
 - East Portion
 - South 10m
 - North East 12m
 - South East 10m
 - South Portion
 - East 10m
 - West Portion - managed or excluded land
 - Entry Portion - managed or excluded land
- APZ's can be met on subject land
- Subject land should be managed in accordance with the requirements of Appendix 4 Pre Release PBP 2018 (see Appendix 11)

4.4.2 Public Roads

- property access roads are two-wheel drive, all-weather roads; and
- perimeter roads are provided; and
- more than one access in and out of the development; and
- traffic management devices are constructed to not prohibit access by emergency services vehicles; and
- maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; and
- all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; and
- where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;
- the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.
- hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;
- hydrants are provided in accordance with AS 2419.1:2005;
- there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.

PERIMETER ROADS

- perimeter roads are two-way sealed roads; and
- 8m carriageway width kerb to kerb; and
- parking is provided outside of the carriageway width; and
- hydrants are located clear of parking areas; and

- there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and
- curves of roads have a minimum inner radius of 6m; and
- the maximum grade road is 15° and average grade is 10°; and
- the road crossfall does not exceed 3°; and
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

NON PERIMETER ROADS

- minimum 5.5m width kerb to kerb; and
 - parking is provided outside of the carriageway width; and
 - hydrants are located clear of parking areas; and
- roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and
- curves of roads have a minimum inner radius of 6m; and
 - the road crossfall does not exceed 3°; and
 - a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

4.4.3 Services Recommendations

Water:

- reticulated water is to be provided to the development, where available;
- a static water supply is provided where no reticulated water is available .
- fire hydrant spacing, design and sizing comply with the Australian Standard AS 2419.1:2005;
- hydrants are not located within any road carriageway;
- reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
- fire hydrant flows and pressures comply with AS 2419.1:2005.
- all above-ground water service pipes are metal, including and up to any taps.
- Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.

Electricity:

- Where practicable, electrical transmission lines are underground
- where overhead electrical transmission lines are proposed:
 - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and
 - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in in ISSC3 Guideline for Managing Vegetation Near Power Lines.

Gas:

- Reticulated gas is to be installed and maintained in accordance with AS/NZ 1596:2014 and the requirements of relevant authorities. Metal piping is to be used
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
- connections to and from gas cylinders are metal;

- polymer-sheathed flexible gas supply lines are not used;
- above-ground gas service pipes are metal, including and up to any outlets.

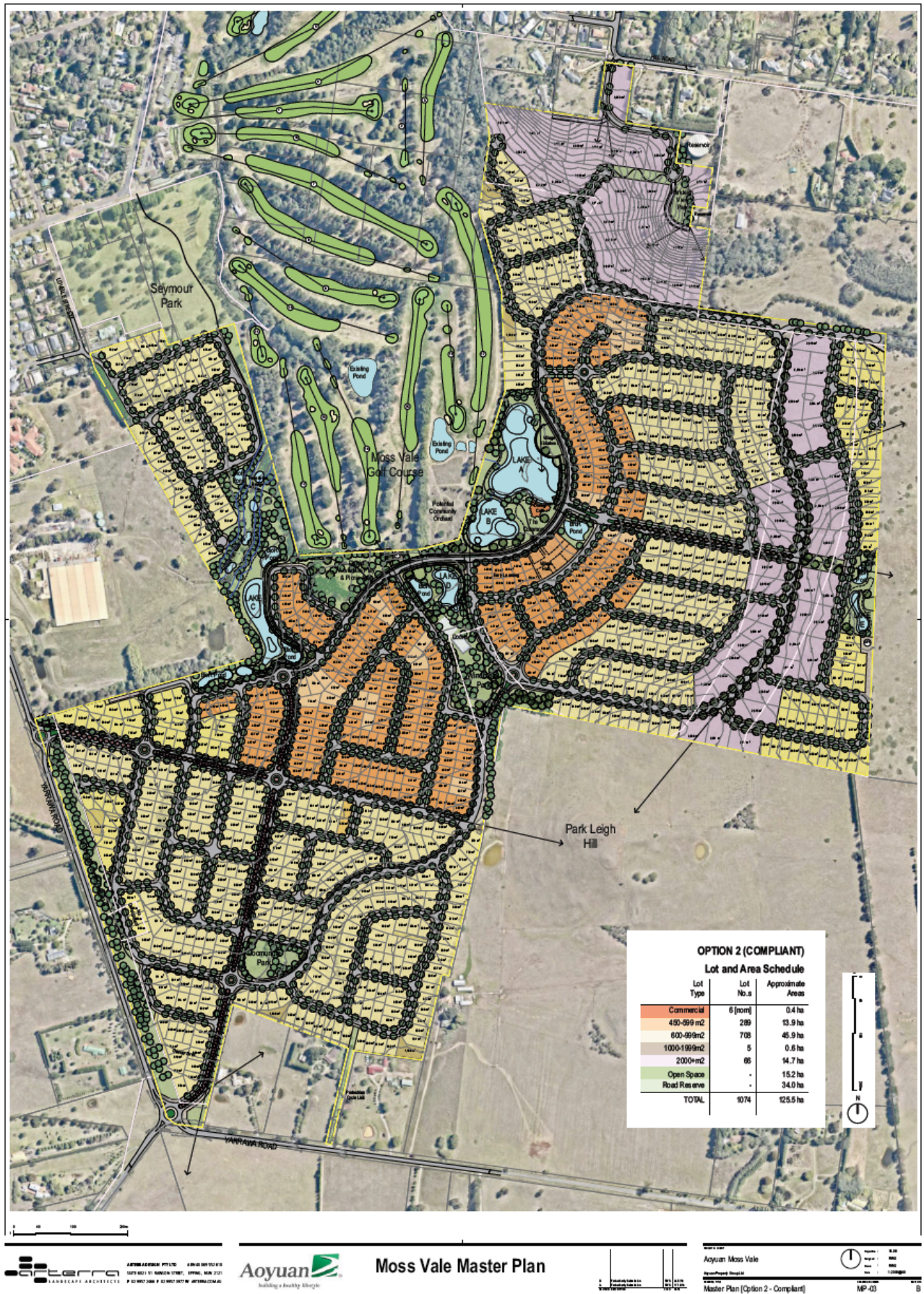
5 Summary of Findings and Recommendations

This report finds that the proposed subdivision would allow buildings to be located on the proposed new lots satisfying the requirement of being able to be built to a level of construction of BAL 29 or lower.

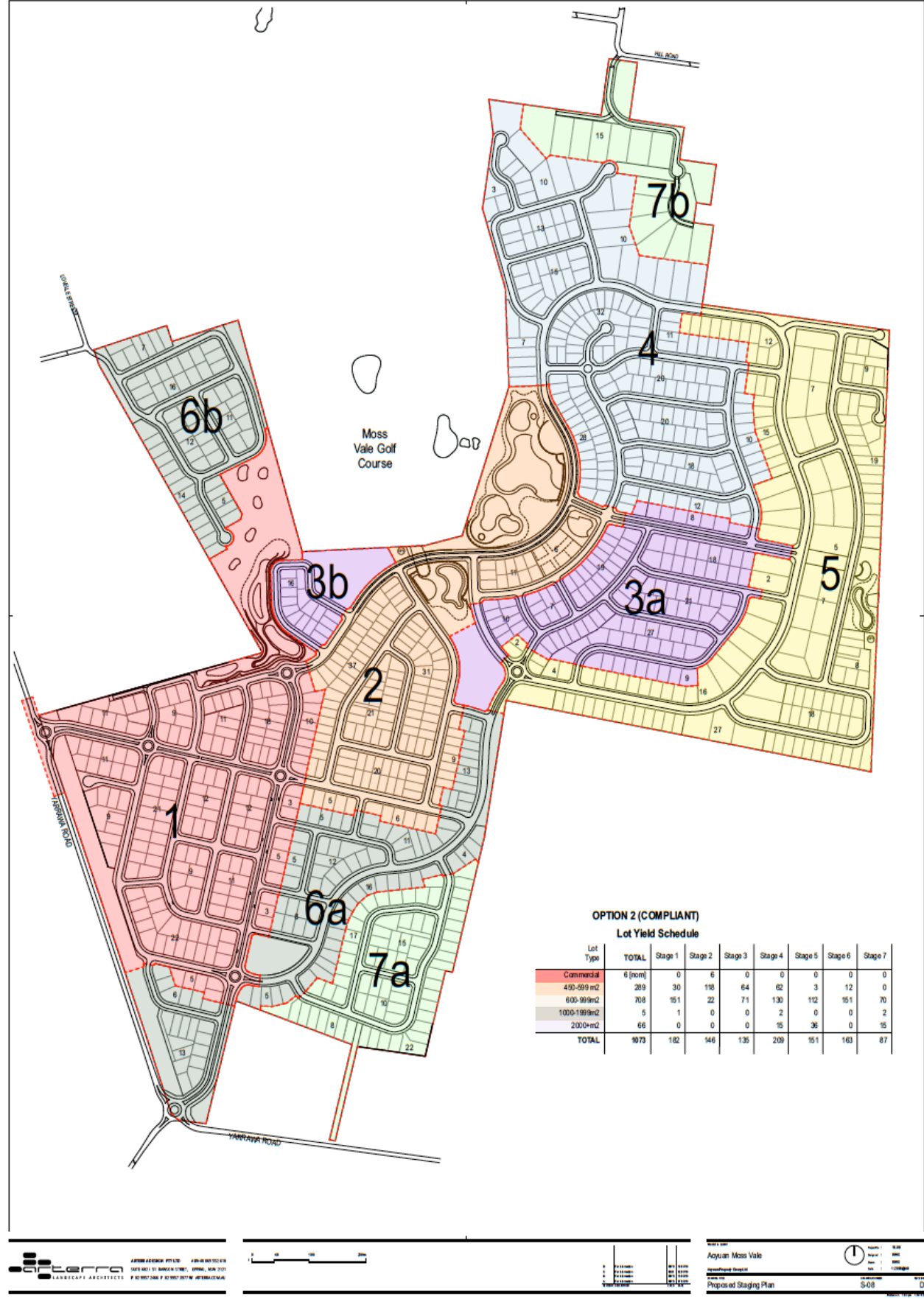
If the proposal incorporates the recommendations in 4.4 above, then the proposed subdivision design is considered acceptable in satisfying the performance criteria outlined in Section 4.1 of Pre Release PBP 2018 (detailed in section 4 above).

Hence this report does not believe that the proposal should be rejected due to bushfire considerations.

Appendix 2. Proposed Cadastre



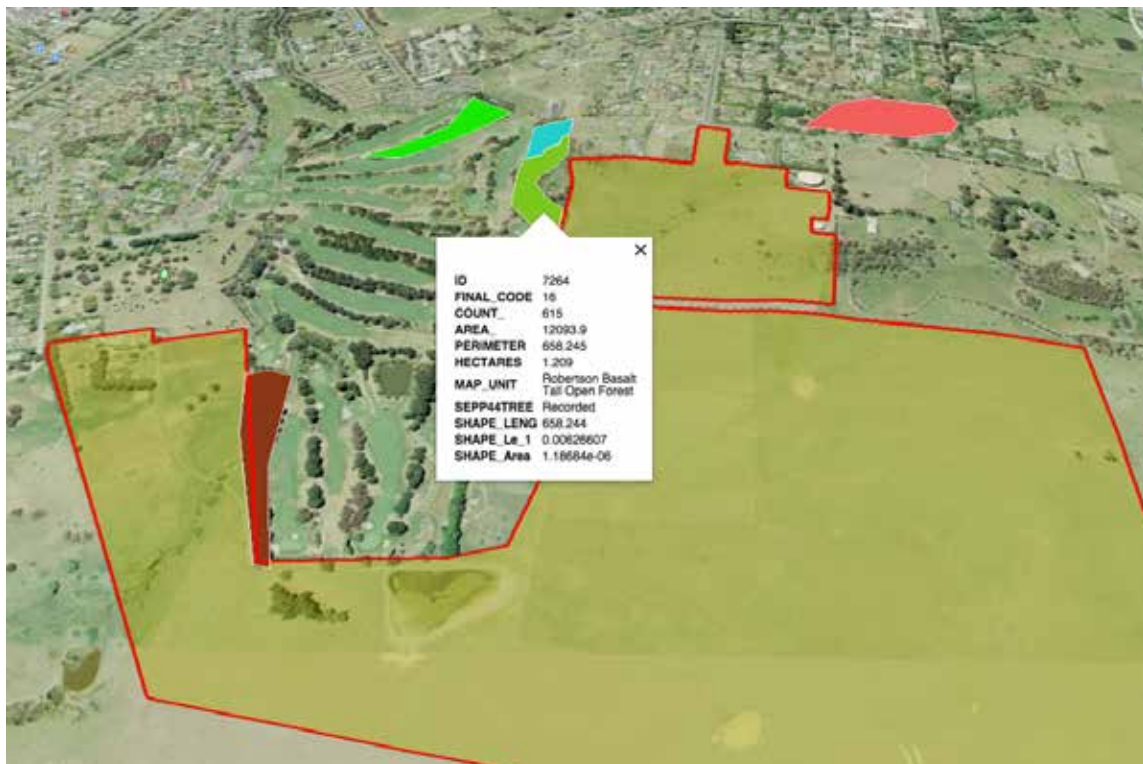
Appendix 3. Staging Plan



Appendix 4. Vegetation Mapping



'EcoLogical Aust (2003). Wingecarribee Biodiversity StrategyPhase 1 Vegetation Mapping Threatened Species Database Habitat Corridors Conservation Assessment.



Appendix 5. Harpers Entertainment – Vegetation Management

Harper Entertainment *Distribution Services*
A division of HarperCollins *Publishers*
Australia Pty Limited ABN 36 009 913 517

37 Yarrowa Road (P.O Box 264)
Moss Vale NSW 2577
Australia

Telephone 1300 551 721



Tuesday, 9 July 2019

Director of Planning & Environment Services
NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Dear Sir/Madam

37 Yarrowa Road Moss Vale Lot 1 DP 842623 Landscape Management

Please be advised that HarperCollins Publishers Australia Pty Limited, trading as Harper Entertainment Distribution Services, owns the property at the above address and operates a distribution facility there. The site is approximately 15 hectares and is developed as two separate areas. The first area contains the warehouse, parking and docking areas which are enclosed by a fence within the site boundaries. This area is approximately 4.3 hectares and the land is managed to the standard of an Asset Protection Zone (Inner Protection Area) and contains a few trees, mainly in the parking areas, as well as landscaped gardens.

The rest of the site is undeveloped with scattered trees, two dams and unformed vehicle tracks. The appearance is that of a rural paddock and the predominant vegetation is grassland. Originally the landscape management of this portion of the site was undertaken by slashing the grass periodically. Currently this area has been used for grazing by our neighbours' cattle and this has been effective in maintaining the height of the grass to a managed level.

In the near future, we are anticipating the proposed urban development being constructed along the southern and eastern boundaries of the site. Therefore, cattle will no longer be available to us for grazing to maintain the height of grass to a managed level. At that point in time, landscape management will revert to regular slashing of the grass. HarperCollins will continue to maintain the site as managed land for the duration of the tenure at this site as we are committed to ensuring the safety of the area.

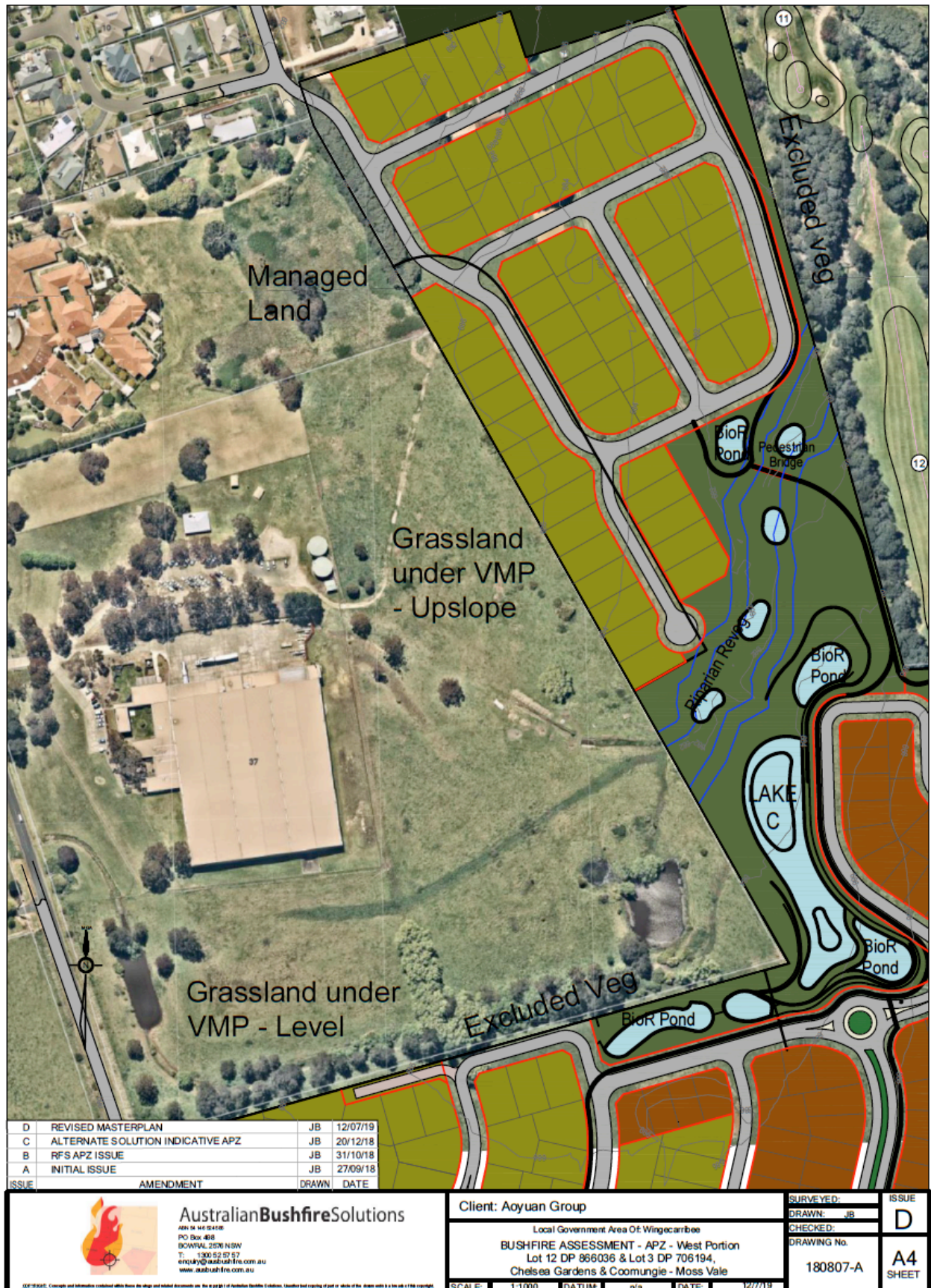
Yours faithfully

A handwritten signature in black ink, appearing to read 'Mark Thompson'.

Mark Thompson
Distribution Centre Manager

Appendix 6. Bushfire Measures – APZ & BAL

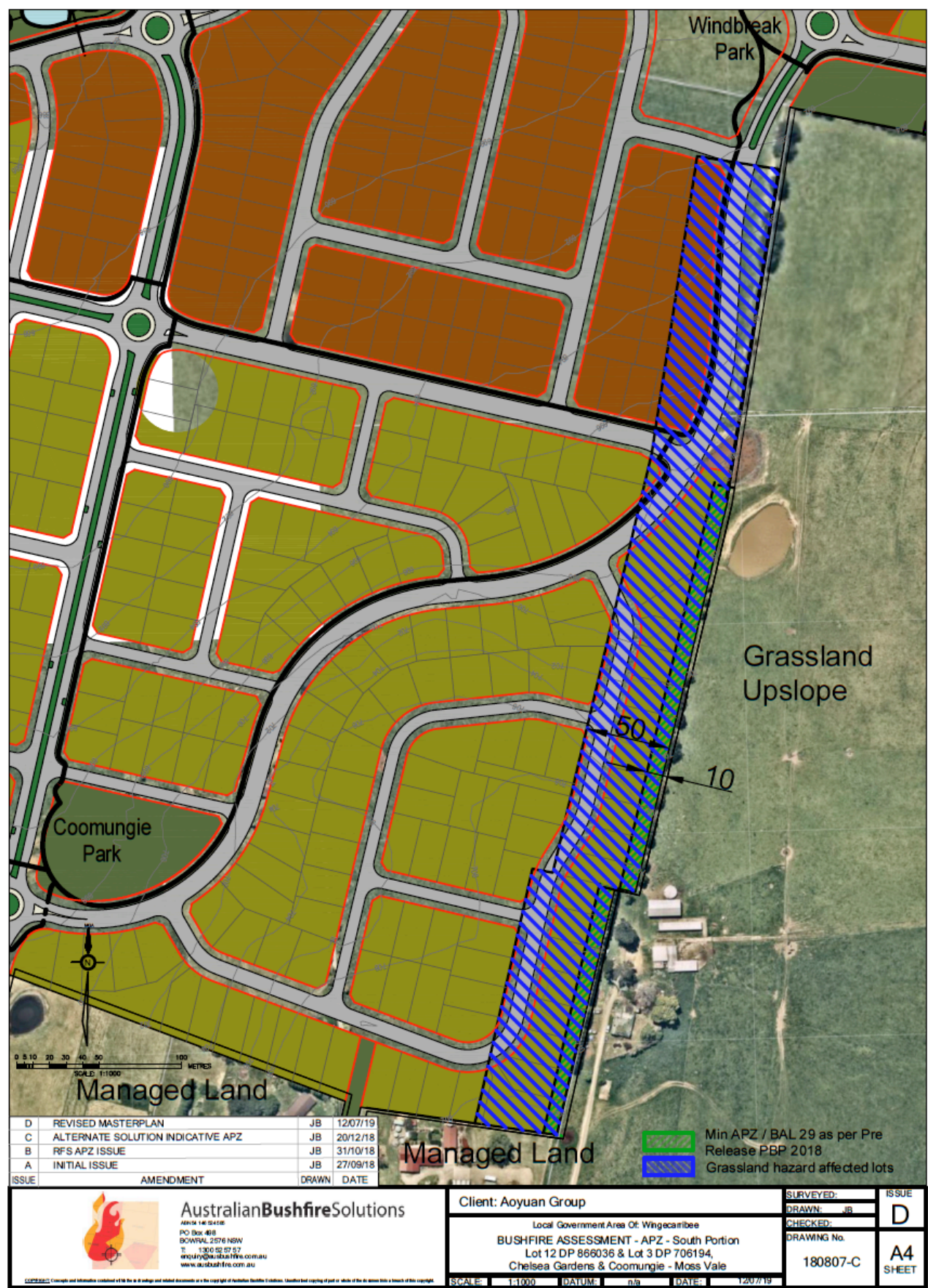
Western Portion



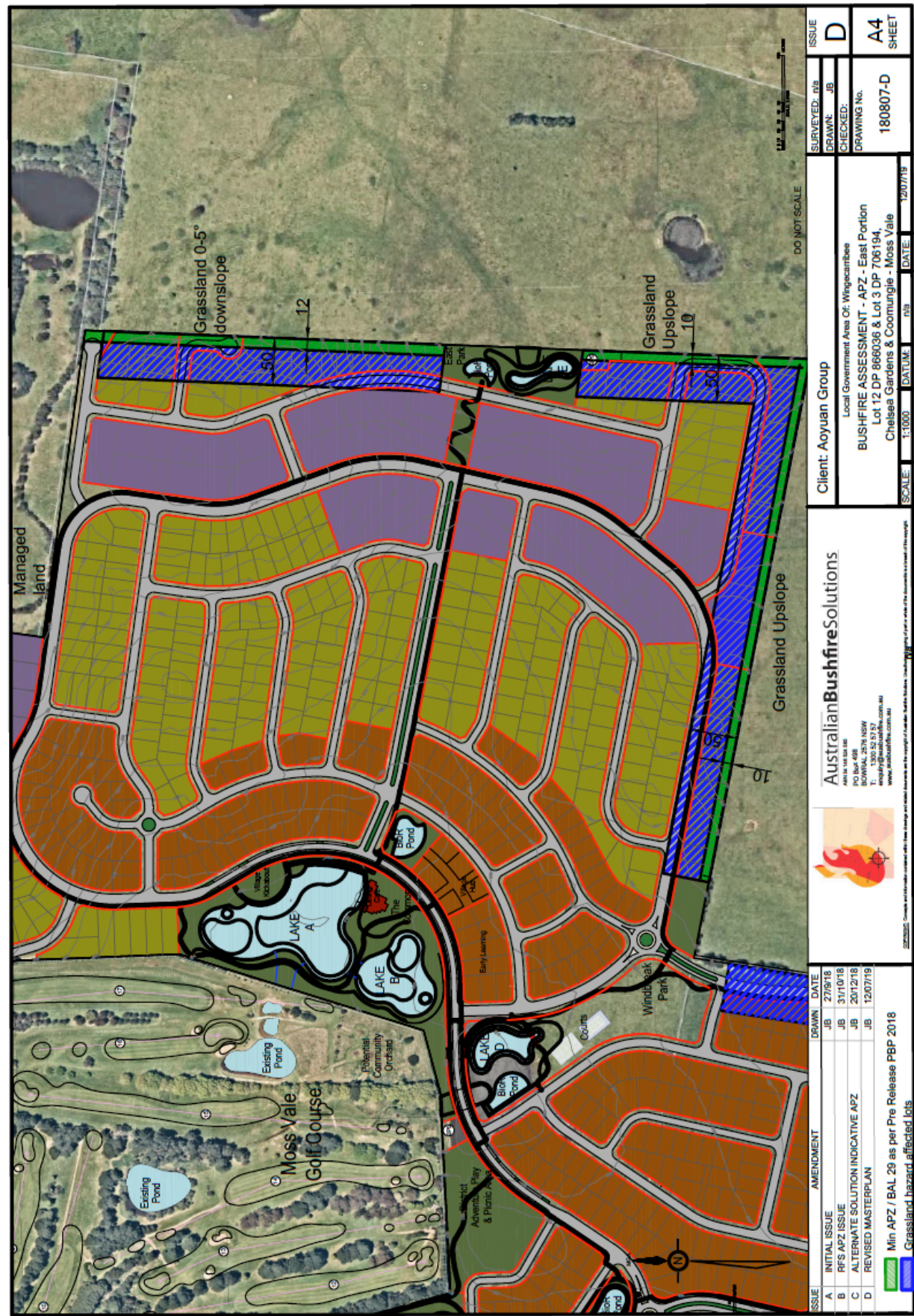
Entry Portion



Southern Portion



Eastern Portion



Northern Portion



Appendix 7. Site photos



Figure A-1 - Looking north across Seymour Park to the north of Chelsea Gardens



Figure A-2 - Looking south across Chelsea Gardens from Seymour Park



Figure A-3 - Looking north along Lovelle St



Figure A-4 - Looking south along Yarrowa Road



Figure A-5 - Looking north across Coomungie from Yarrowa Rd



Figure A-6 - Looking NE across subject land from Yarrowa Rd towards Hill Rd



Figure A-7 - Looking south from Hill Rd



Figure A-8 - Corner of Villers and Hill Rds



Figure A-9 - Looking across what will be eastern portion of proposed development



Figure A-10 - Creek along western boundary of Golf Course



Figure A-11 - Looking across Golf Course fairways



Figure A-12 - Looking west to dwelling on Chelsea Garden



Figure A-13 - Ground cover in rough area of golf course – size and location meets excluded vegetation



Figure A-14 - Ground cover in rough area of golf course - size and location meets excluded vegetation



Figure A-15 - Ground cover in rough between fairways - size and location meets excluded vegetation



Figure A-16 - Large dam on subject land at southern end of golf course



Figure A-17 - Southern end of golf course



Figure A-18 - Golf course rough at southern end



Figure A-19 - Golf course rough at southern end



Figure A-20 - Looking north towards Hill Rd from large dam

Appendix 8.



Figure A-21 - Looking east from Golf Course to subject land – to be cleaned up and maintained



Figure A-22 - Looking east from Golf Course to subject land at northern end – to be cleaned up and maintained



Figure A-23 - Looking east from Golf Course to subject land at northern end – to be cleaned up and maintained

Appendix 9.

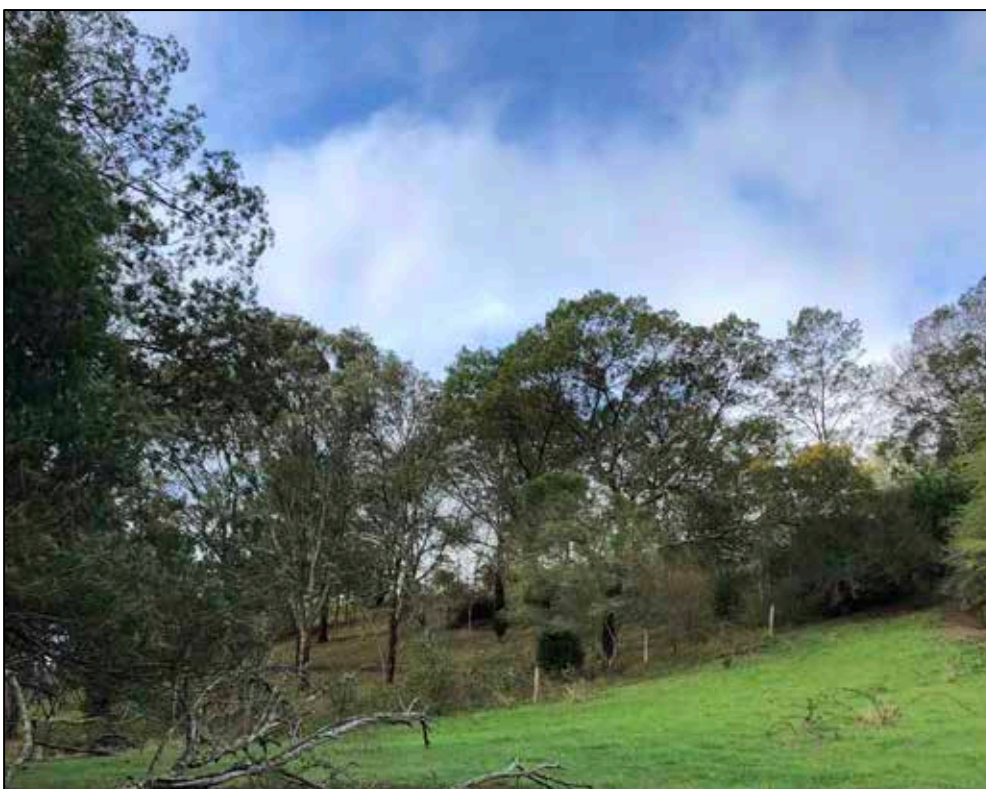


Figure A-24 - Looking east from Golf Course across northern end of subject land – to managed land on adjacent lot to the north

Appendix 10. AHIMS Report



AHIMS Web Services (AWS) Search Result

Purchase Order/Reference : 180807

Client Service ID : 373275

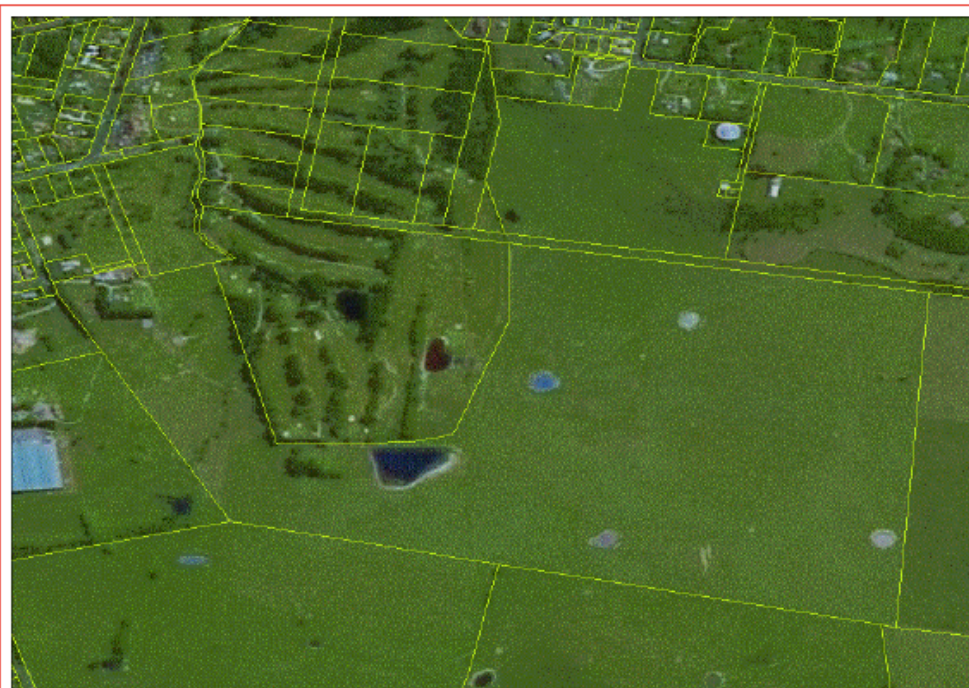
Australian Solutions Pty Ltd
PO Box 498
BOWRAL New South Wales 2576
Attention: Jane Brandon
Email: jane@ausbushfire.com.au

Date: 28 September 2018

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 12, DP:DP866036 with a Buffer of 50 meters, conducted by Jane Brandon on 28 September 2018.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Australian Solutions Pty Ltd
 PO Box 498
 BOWRAL New South Wales 2576
 Attention: Jane Brandon
 Email: jane@ausbushfire.com.au

Date: 28 September 2018

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Lot : 3, DP:DP706194 with a Buffer of 0 meters,
 conducted by Jane Brandon on 28 September 2018.**

The context area of your search is shown in the map below. Please note that the map does not accurately
 display the exact boundaries of the search as defined in the paragraph above. The map is to be used for
 general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information
 Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

APPENDIX 4

ASSET PROTECTION ZONE STANDARDS

In Australia, bush fires are a natural and essential aspect of the landscape as many plants and animals have adapted to fire as part of their life cycle. However, development adjacent to bush land areas has increased the risk of fire impacting on people and their assets. The impact on property and life can be reduced with responsible preparation and management of bush fire hazards.

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps in reducing vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset protection zones

An APZ is a fuel-reduced area surrounding a built asset or structure.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at: www.rfs.nsw.gov.au/resources/publications.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset
- an area of reduced bush fire fuel that allows suppression of fire
- an area from which backburning or hazard reduction can be conducted,
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset
- damage to the built asset from intense radiant heat
- ember attack.

The APZ should be located between an asset and the bush fire hazard.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an inner protection area (IPA) and an outer protection area (OPA).

Inner protection areas (IPAs)

The IPA is the area closest to the asset and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and be a defensible space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the dwelling, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees:

- canopy cover should be less than 15% (at maturity)
- trees (at maturity) should not touch or overhang the building
- lower limbs should be removed up to a height of 2m above ground
- canopies should be separated by 2 to 5m
- preference should be given to smooth barked and evergreen trees.

Shrubs:

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings
- shrubs should not be located under trees
- shrubs should not form more than 10% ground cover
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass:

- should be kept mown (as a guide grass should be kept to no more than 100mm in height)
- leaves and vegetation debris should be removed.

Outer protection areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. Vegetation within the OPA can be managed to a more moderate level. The reduction of fuel in this area substantially decreases the intensity of an approaching fire and restricts the pathways to crown fuels; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

In practical terms the OPA is an area where there is maintenance of the understorey and some separation in the canopy.

When establishing and maintaining an OPA the following requirements apply:

Trees:

- tree canopy cover should be less than 30%
- trees should have canopy separation
- canopies should be separated by 2 to 5m

Shrubs:

- shrubs should not form a continuous canopy
- shrubs should form no more than 20% of ground cover

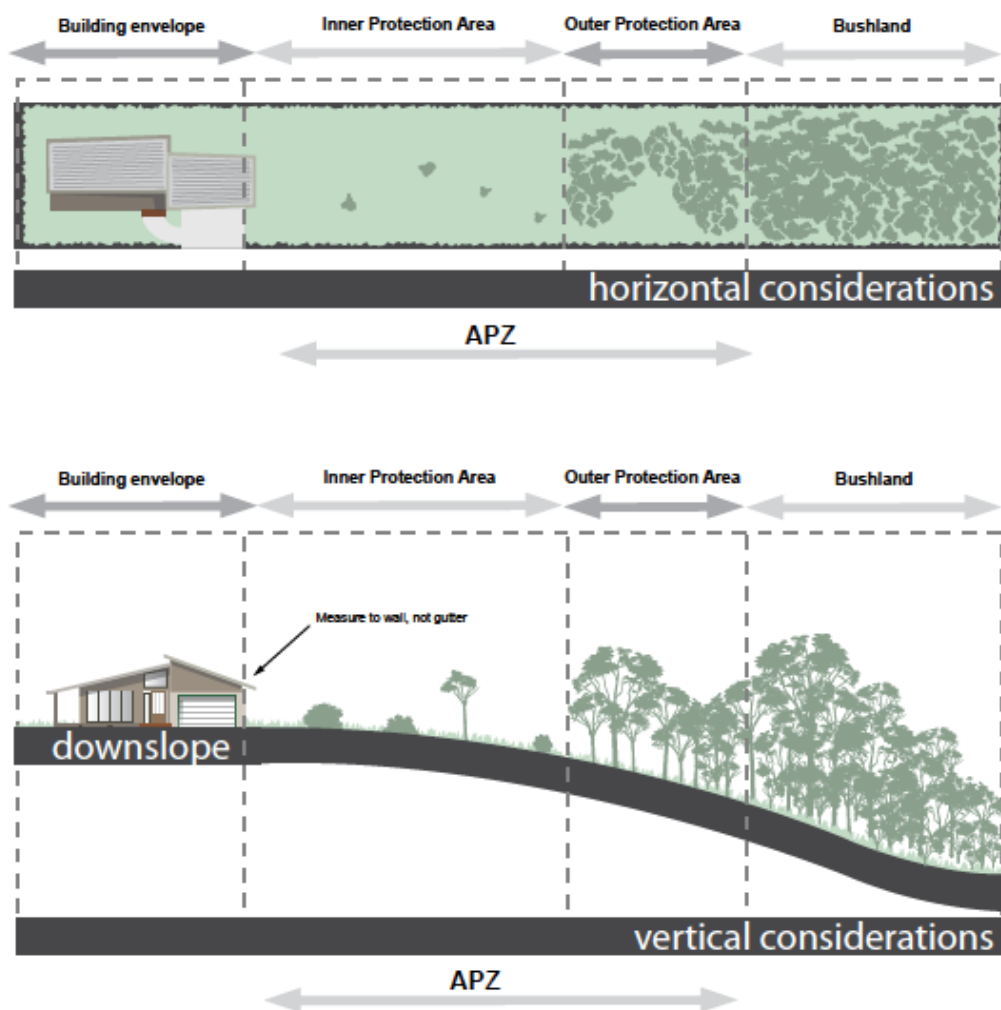
Grass:

- should be kept mown (as a guide grass should be kept to no more than 100mm in height)
- leaf and other debris should be mown, slashed or mulched.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA to the standards given above should be undertaken on an annual basis, in advance of the fire season, as a minimum.

Figure A4.1

Inner and outer protection areas – example designs



7 References

Couch, P. The Urban Fringe Under Pressure, Fire Australia Conference November 2010

Google Maps 2018, <http://maps.google.com.au/>, viewed Aug 2018 – July 2019

Keith D. (2004) Ocean Shores to Desert Dunes, National Parks and Wildlife, Department of Environment and Conservation- Hurstville NSW.

Keith, D. A. and Simpson, C. C. (2010) Vegetation Formations of NSW (version 3.0): A seamless map for modelling fire spread and behaviour. Report to the Rural Fire Service. NSW Department of Environment & Climate Change. October 2010

Leonard, J. E., Blanchi, R., White, N., Bicknell, A., Sargeant, A., Reisen, F. and Cheng M. (2006) Research and Investigation Into the Performance of Residential Boundary Fencing Systems in Bushfires. Blue Scope Steel.

MyRFS, <http://MyRFS.nsw.gov.au>, NSW Government, NSW Rural Fire Service, viewed Aug 2018 – July 2019

Nearmap 2019, <http://www.nearmap.com>, viewed Aug 2018 – July 2019

NSW Government Planning & Environment - <https://www.planningportal.nsw.gov.au/find-a-property>, viewed Aug 2018 – July 2019

NSW Rural Fire Service (2006) Planning for Bushfire Protection, A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners. NSW Rural Fire Service Sydney.

Spatial Information Exchange 2018-19, <https://six.lands.nsw.gov.au> viewed Aug 2018 – July 2019

Standards Australia 2009, AS 3959 – 2009 Construction of Buildings in Bushfire-prone Areas. Standards Australia, Sydney.

Wingecarribee Shire Council Dated 2018-19, <http://www.Wingecarribee.nsw.gov.au> viewed Aug 2018 – July 2019