



BUSHFIRE THREAT ASSESSMENT

FOR
A PROPOSED RESIDENTIAL
SUBDIVISION

AT
STAGE 7 BRUSH CREEK,
EDGEWORTH NSW 2285

Prepared by:

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Disclaimer

Notwithstanding the precautions adopted within this report, it should always be remembered that bushfires burn under a wide range of conditions. An element of risk, no matter how small always remains, and although the standard is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion.



Executive Summary

A Bushfire Threat Assessment Report (BTA) has been prepared by Firebird ecoSultants Pty Ltd at the request of McCloy Group for a proposed residential subdivision at Stage 7 Brush Creek, Edgeworth NSW 2285. The report forms part of the supporting documentation for a DA to be submitted to Lake Macquarie City Council (LMCC).

This assessment aims to consider and assess the bushfire hazard and associated potential threats relevant to the proposal. Recommendations are provided with regard to fuel management, access, provision of emergency services, building protection and construction standards to facilitate an acceptable level of bushfire protection.

In summary, the following is recommended to enable the proposal to meet the relevant legislative requirements for the proposed subdivision:

- Assessment in accordance with PBP 2019 and AS3959 (2018) Appendix B - Detailed Method 2 has shown that future dwellings within the lots will be able to comply with the required BALs. In any case, future dwellings within the site will be assessed under Section 4.14 of EP&A Act for each individual dwelling upon application.
- Reticulated water is extended into the site. The development will be linked to the water pressure mains and the proposed internal fire hydrant spacing, sizing and pressures are to comply with AS 2419.1-2005 Fire Hydrant Installations – System design, installation and commissioning (2017).
- APZS are required in accordance with Table 4-1 of this report between the surrounding vegetation and the proposed subdivision. The 44m APZ on the land to the north has been established via an 88b instrument until such time this land is developed for future allotments.
- The proposed access internal road is to meet either the performance criteria or acceptable solutions as detailed in Section 6 of this report and Section 4.1.3 (1) of PBP.
- Fencing – All new fencing and gates shall be constructed in accordance with the NSW Rural Fire Service Guideline: Fast Fact – Fences or Gates in Bushfire Prone Areas.
- Home owners should prepare a Bush Fire Survival Plan refer to the RFS Website http://www.rfs.nsw.gov.au/file_system/attachments/Attachment_Bush_FireSurvivalPlan.pdf

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Terms & Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419 -2005	Australian Standard – Fire Hydrant Installations
AS3959-2018	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BCA	Building Code of Australia
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BFPL Map	Bush Fire Prone Land Map
BPMs	Bush Fire Protection Measures
BFSA	Bush Fire Safety Authority
CC	Construction Certificate
<i>EPA Act</i>	<i>NSW Environmental Planning and Assessment Act 1979</i>
FFDI	Forest Fire Danger Index
FMP	Fuel Management Plan
ha	hectare
IPA	Inner Protection Area
LGA	Local Government Area
LMCC	Lake Macquarie City Council
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection 2019
PoM	Plan of Management
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation



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I INTRODUCTION

A Bushfire Threat Assessment Report (BTA) has been prepared by Firebird ecoSultants Pty Ltd at the request of McCloy Group for a proposed residential subdivision at Stage 7 Brush Creek, Edgeworth NSW 2285, hereafter referred to as the “site” (refer to Figure 1-1 for site locality). Refer to Appendix A for Proposed Site Plans.

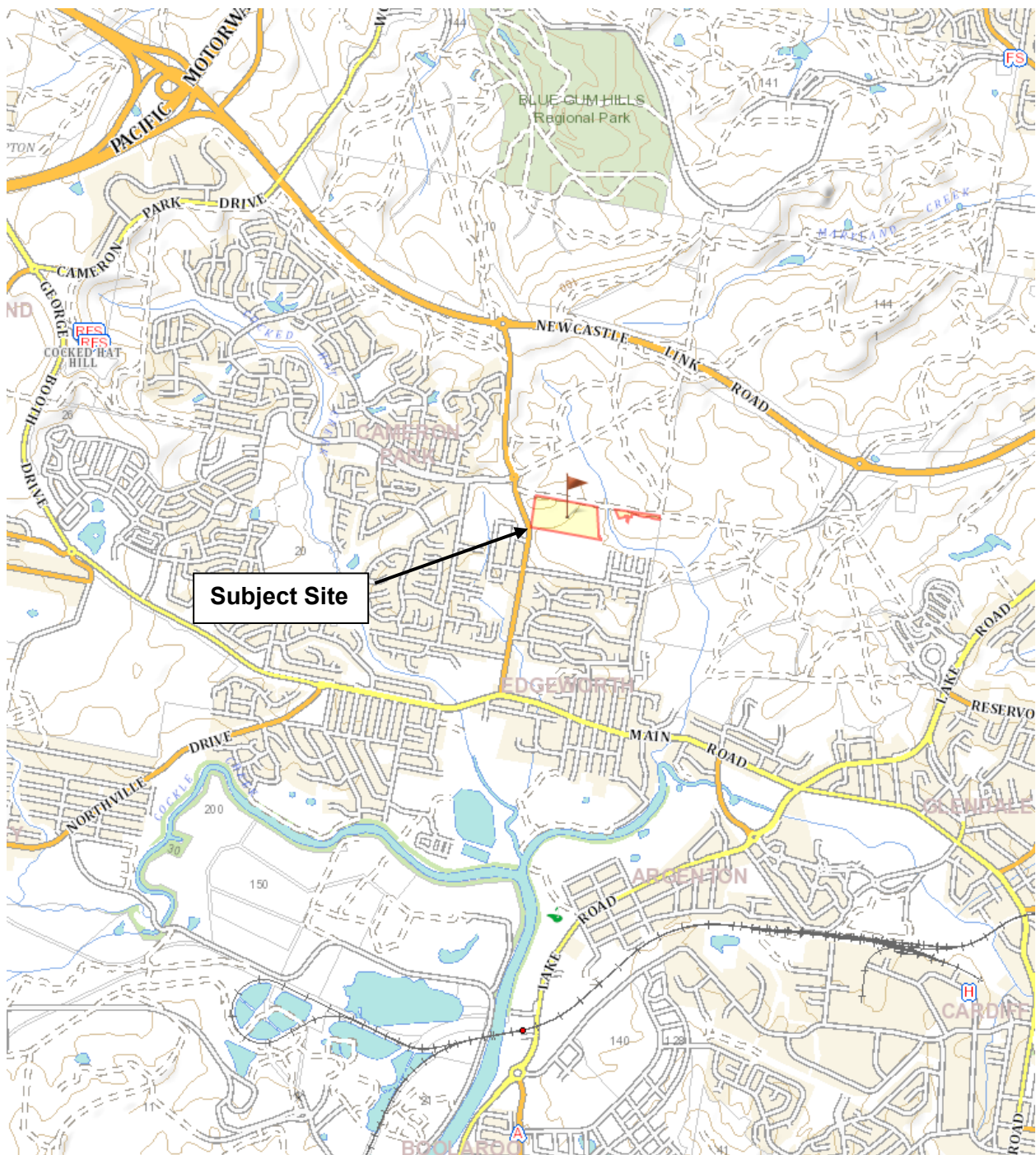
This BTA is suitable for submission with a Development Application (DA) and provides information on measures that will enable the development to comply with ‘Planning for Bushfire Protection’ (NSW RFS, 2019), hereafter referred to as PBP (RFS, 2019).

This assessment aims to consider and assess the bushfire hazard and associated potential threats relevant to such a proposal, and to outline the minimum mitigative measures which would be required in accordance with the provisions of the Environmental Planning and Assessment Amendment (Planning for Bushfire Protection) Regulation 2007 and the Rural Fires Amendment Regulation 2007 (RF Amendment Regulation 2007).

I.1 Site Particulars

Locality:	Stage 7 Brush Creek, Edgeworth NSW 2285
LGA:	Lake Macquarie City Council
Current Land Use:	Vacant lot
Forest Danger Index:	100 FFDI

Figure 1-1: Site Location





I.2 Description of the Proposal

This DA relates to the proposal for a residential subdivision. Refer to Appendix A for proposed plans.

I.3 Legislative Requirements

The Site has been mapped as Bush Fire Prone Land Map (BFPLM) by LMCC.

This report forms part of the supporting documentation for a Development Application (DA) to be submitted to LMCC.

This BTA has been prepared using current legislative requirements and associated guidelines for assessment of bushfire protection, these being:

- PBP (RRS, 2019); and
- AS3959-2018 Construction of Buildings in Bushfire Prone Area.

I.4 Objectives of Assessment

This report has been prepared to address the requirements of Clause 44 of the Rural Fires Regulation. This BTA also addresses the six key Bush Fire Protection Measures (BFRMs) in a development assessment context being:

- The provision of clear separation of buildings and bush fire hazards, in the form of fuel-reduced APZ (and their components being Inner Protection Areas (IPA's) and Outer Protection Areas (OPA's);
- Sitting and design of the proposal;
- Construction standards;
- Appropriate access standards for residents, fire-fighters, emergency workers and those involved in evacuation;
- Adequate water supply and pressure, and utility services; and
- Suitable landscaping, to limit fire spreading to a building.



2 METHODOLOGY

2.1 Vegetation Assessment

Vegetation surveys and vegetation mapping carried out on the site has been undertaken as follows:

- Aerial Photograph Interpretation to map vegetation cover and extent
- Confirmation of the vegetation assemblage typology present.

2.2 Slope Assessment

Slope assessment has been undertaken as follows:

- Aerial Photograph Interpretation in conjunction with analysis of electronic contour maps with a contour interval of 10m.



3 SITE ASSESSMENT

The following assessment has been undertaken in accordance with the requirements of PBP (RFS, 2019).

3.1 Vegetation & Slope Assessment

In accordance with PBP (RFS 2019), an assessment of the vegetation over a distance of 140m in all directions from the site was undertaken. Vegetation that may be considered a bushfire hazard was identified in all directions from the site. This assessment is depicted in Table 3-1.

In accordance with PBP (RFS 2019), an assessment of the slope underneath the vegetation considered a bushfire hazard was undertaken and the results are presented in Table 3-1 below.

The vegetation to the north and east of the site has been assessed as Hunter Macleay Dry Sclerophyll Forest that has a Surface Fuel load of 14 t/ha and an Overall Fuel Load of 25.6 t/ha.

Table 3-1: Vegetation Classification

Proposed Dwelling		
Direction	Vegetation Type	Slope
North ¹	Forest	Downslope (0-5°)
		Downslope (5-10°)
		Downslope (10-15°)
		Downslope (15-20°)
		Downslope (19°)
East	Forest	Downslope (5-10°)
South	Managed Land – Residential Development ²	N/A

¹ The slope to the north of the site is irregular and varied. All relevant slope categories have been included to demonstrate the slopes that occur; however, the APZ distance and associated BAL ratings calculated via AS3959 (2018) Appendix B - Detailed Method 2 apply. As a worst-case scenario, the sharpest slope (19°) has been applied. Refer to Appendix D of this report, which includes the performance-based calculation.

² Vegetation to the south has been cleared for residential development. The remaining strip of vegetation to the south-east is to be thinned to meet APZ requirements.



Proposed Dwelling		
Direction	Vegetation Type	Slope
West	Remnant Vegetation ³	Upslope

³ Vegetation to the west is regarded as remnant vegetation in accordance with Section A1.11.1 of PBP 2019 as it has a total area of less than 1ha. This vegetation is separated from forest vegetation to the north by a powerline easement.

4 BUSHFIRE PROTECTION ASSESSMENT

4.1 Asset Protection Zones (APZ)

The required APZ distances for habitable buildings within the site have been measured by applying Table A1.12.2 of PBP 2019 and AS3959 (2018) Appendix B - Detailed Method 2, using the vegetation and slope data identified in Section 3-1 of this report.

The site lies within Lake Macquarie Local Government Area and therefore is assessed under an FFDI rating of 100. Refer to Table 4-1 and Figure 4-1 for required APZs for the proposed habitable buildings.

Table 4-1: Recommended APZs for Proposed dwellings

Direction from Building Envelope	Vegetation Classification within 140m	Effective Slope (within 100m)	APZ to be Provided	APZ Method	Width of allowable OPA	OPA Method
North	Forest Vegetation	Downslope (19°)	44m to the north of the site ⁴	AS3959 (2018) Appendix B - Detailed Method 2	9m	AS3959 (2018) Appendix B - Detailed Method 2
East	Forest Vegetation	Downslope (0-5°)	29m within the site	Table A1.12.2 of PBP 2019	10m	Table A1.12.4 of PBP 2019
South	Managed Land	N/A	N/A	N/A	N/A	N/A
West	Remnant Vegetation	Upslope	11m within the site	Table A1.12.2 of PBP 2019	N/A	N/A

⁴ An APZ of 44m has been implemented on land to the north of the site via an 88b instrument (refer to Appendix C). This APZ will remain until such time that the future subdivision to the north is developed.

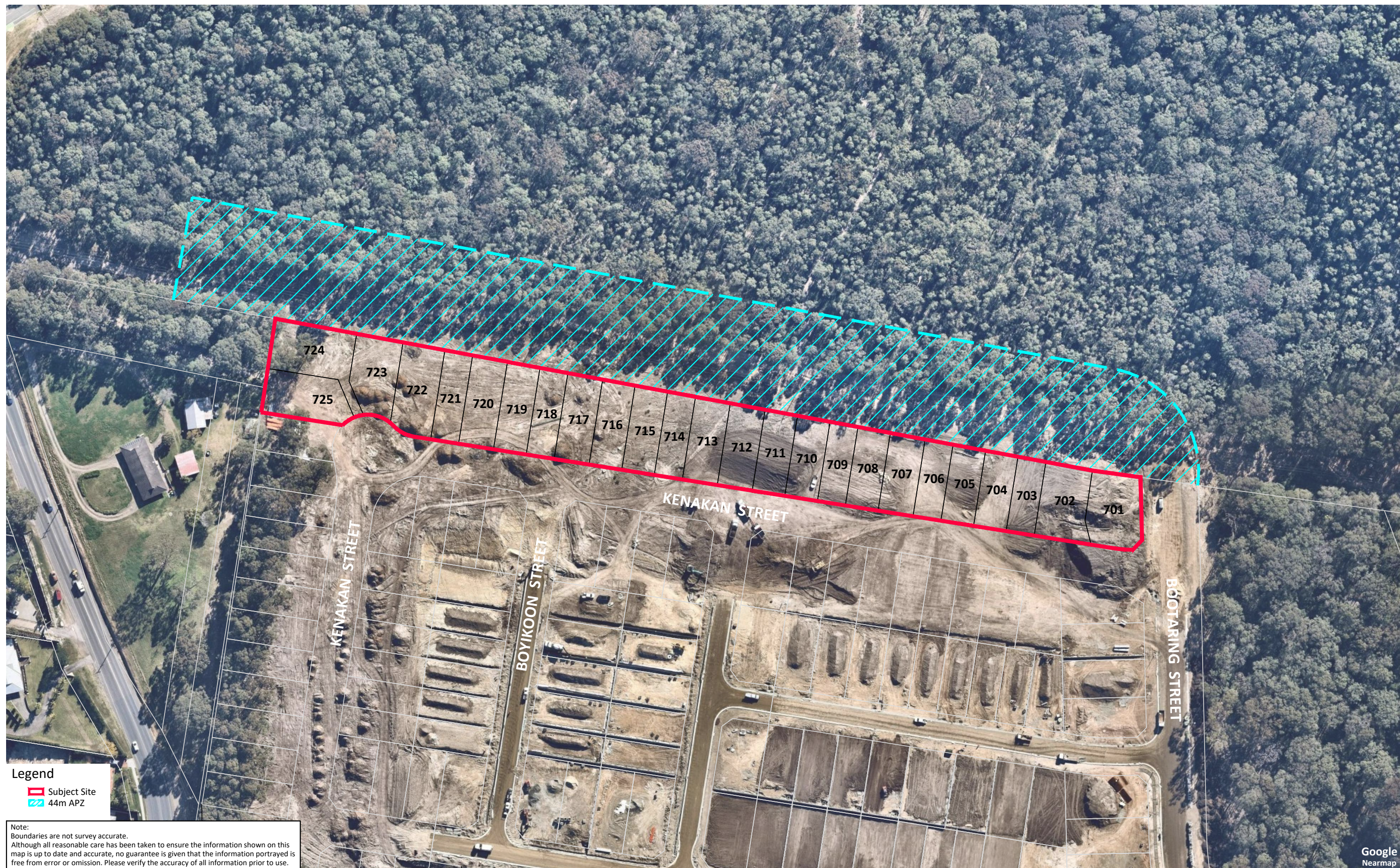
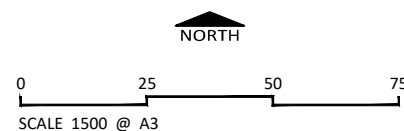


FIGURE 4-1: ASSET PROTECTION ZONES

CLIENT
SITE DETAILS
DATE

Client
Stage 7 Transfield Avenue Edgeworth
17 September 2021



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5 DWELLING DESIGN & CONSTRUCTION

Building design and the materials used for construction of future dwellings should be chosen based on the information contained within AS3959-2018, and accordingly the designer / architect should be made aware of this recommendation. It may be necessary to have dwelling plans checked by the architect involved to ensure that the proposed dwellings meet the relevant Bushfire Attack Level (BAL) as detailed in AS3959-2018.

The determinations of the appropriate BAL are based upon parameters such as weather modelling, fire-line intensity, flame length calculations, as well as vegetation and fuel load analysis. The determination of the construction level is derived by assessing the:

- Relevant FFDI = 100
- Flame temperature
- Slope
- Vegetation classification; and
- Building location.

The following BAL, based on heat flux exposure thresholds, are used in the standard:

(a) **BAL – LOW** The risk is considered to be **VERY LOW**

There is insufficient risk to warrant any specific construction requirements but there are still some risks.

(b) **BAL – 12.5** The risk is considered to be **LOW**

There is a risk of ember attack.

The construction elements are expected to be exposed to a heat flux not greater than 12.5 k/m².

(c) **BAL – 19** The risk is considered to be **MODERATE**

There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat.

The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m².

(d) **BAL-29** The risk is considered to be **HIGH**

There is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat.



The construction elements are expected to be exposed to a heat flux no greater than 29 kW/m².

(e) **BAL-40** The risk is considered to be **VERY HIGH**

There is much increased risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front.

The construction elements are expected to be exposed to a heat flux no greater than 40 kW/m².

(f) **BAL-FZ** The risk is considered to be **EXTREME**

There is an extremely high risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front.

The construction elements are expected to be exposed to a heat flux greater than 40 kW/m².

5.1 Determination of Bushfire Attack Levels

The appropriate BAL ratings were determined by applying the information relating to vegetation and slope to Table A1.12.5 of PBP 2019 and AS3959 (2018) Appendix B - Detailed Method 2. The results from this bush fire risk assessment are detailed below in Table 4-1–Bush Fire Attack Assessment and Figure 4-1 shows the vegetation.

Table 4-1: Determination of BALs for Future dwellings within site

Vegetation Type & Direction	Effective Slope	Separation Distance from vegetation	Bushfire Attack Level (BAL)	Construction Section
Forest to North	Downslope (19°)	44-<73m	BAL-29	Sect 3 & 7 of AS3959
		73-<92m	BAL-19	Sect 3 & 6 of AS3959
		91-<100m	BAL-12.5	Sect 3 & 5 of AS3959
Forest to the East	Downslope (0-5°)	29-<40m	BAL-29	Sect 3 & 7 of AS3959

Vegetation Type & Direction	Effective Slope	Separation Distance from vegetation	Bushfire Attack Level (BAL)	Construction Section
		40-<54m	BAL-19	Sect 3 & 6 of AS3959
		54-<100m	BAL-12.5	Sect 3 & 5 of AS3959
		>100m	BAL-LOW	No construction requirements
Managed Land to the South	N/A	N/A	BAL-LOW	No construction requirements
Remnant Vegetation to the West	Upslope	<8m	BAL-FZ	Sect 3 & 9 of AS3959
		8-<11m	BAL-40	Sect 3 & 8 of AS3959
		11-<16m	BAL-29	Sect 3 & 7 of AS3959
		16-<23m	BAL-19	Sect 3 & 6 of AS3959
		23-<100m	BAL-12.5	Sect 3 & 5 of AS3959
		>100m	BAL-LOW	No construction requirements

Given, the information in Table 5-1 above any future dwellings within the lots will be able to comply with AS3959-2018. These will be subject to further assessment under Section 4.14 of the EP&A Act depending on location of future dwellings and retained vegetation within the site.

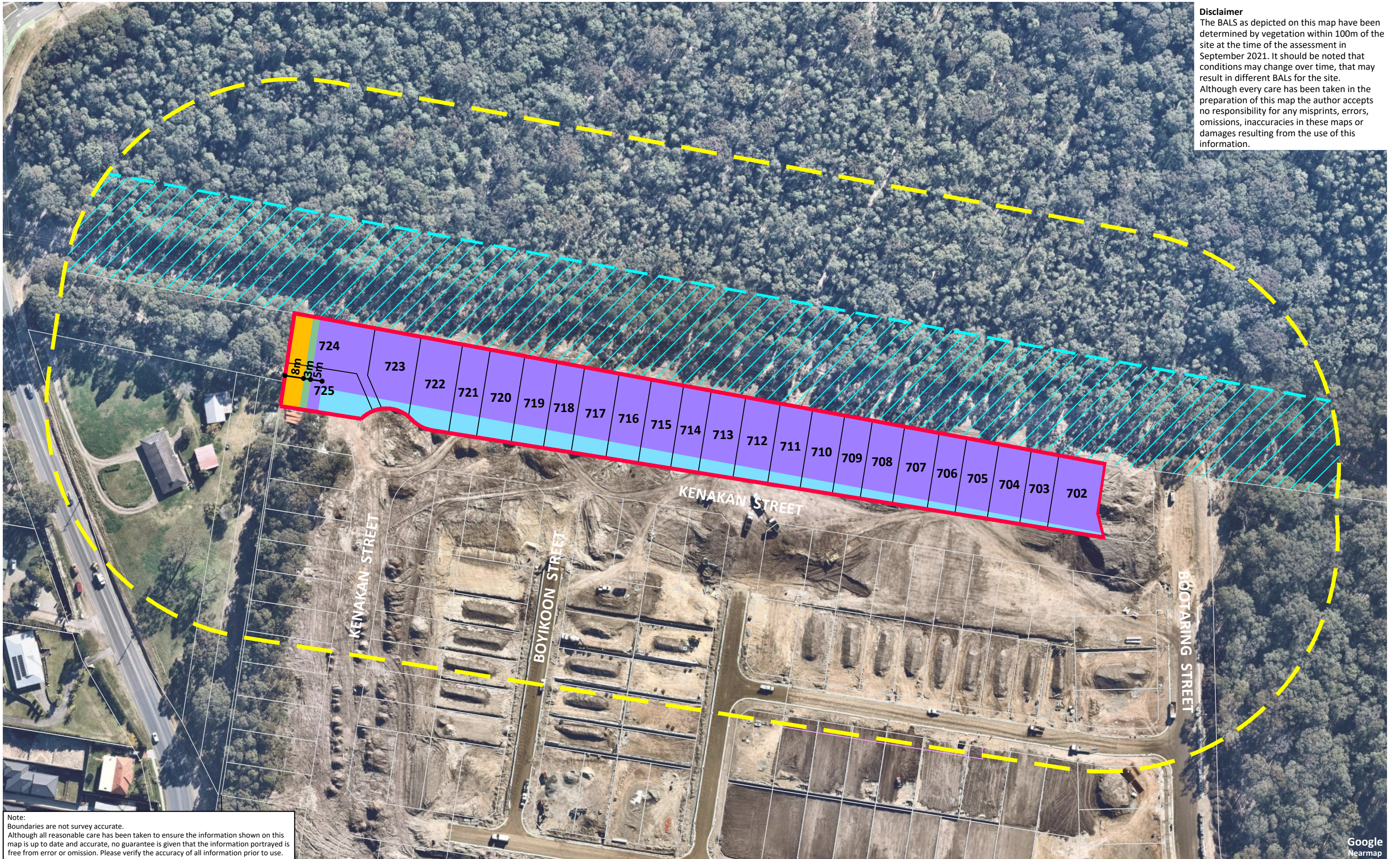


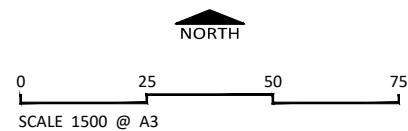
FIGURE 5-1: BUSHFIRE ATTACK LEVELS

CLIENT
SITE DETAILS
DATE

Client
Stage 7 Transfield Avenue Edgeworth
17 September 2021

Legend

- Subject Site
- 100m Buffer
- 44m APZ
- BAL FZ
- BAL 40
- BAL 29
- BAL 19



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6 COMPLIANCE

The proposal is for a residential subdivision and therefore development standards apply. Table 5-1 details the proposed compliance with Development Standards for Residential and Rural Residential Subdivisions.

Table 5-1: Proposed Dwelling Compliance with Development Standards

Acceptable Solutions	Performance Criteria	Compliance
Asset Protection Zones		
› APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m ² on each proposed lot.	Complies with Performance Criteria – APZs for the site have been provided in accordance with A1.12.2 and AS3959 (2018) Appendix B - Detailed Method 2
› APZs are managed in accordance with the requirements of Appendix 4.	APZs are managed and maintained to prevent the spread of a fire towards the building.	Complies with Acceptable Solution – APZs on site are to be managed in accordance with Appendix 4 of the PBP 2019.
› APZs are wholly within the boundaries of the development site	the APZs is provided in perpetuity	Complies with Performance Criteria – An APZ of 44m has been implemented on land to the north of the site via an 88b instrument (refer to Appendix C). This APZ will remain until such time that the future subdivision to the north is developed.
› APZs are located on lands with a slope less than 18 degrees.	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	Complies with Acceptable Solution – APZs on site occur over lands with a slope of less than 18°.
Landscaping		
› landscaping is in accordance with Appendix 4; and fencing is constructed in accordance with section 7.6.	landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Complies with Acceptable Solution – All landscaping within the site will meet the requirements of the acceptable solution.



Access (General Requirements)

<ul style="list-style-type: none">› property access roads are two-wheel drive, all-weather roads;› perimeter roads are provided for residential subdivisions of three or more allotments;› subdivisions of three or more allotments have more than one access in and out of the development;› traffic management devices are constructed to not prohibit access by emergency services vehicles;› 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;› all roads are through roads;› dead end roads are not recommended, but if unavoidable, 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;› where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;› where access/egress can only be achieved through forest, woodland and heath	<p>firefighting vehicles are provided with safe, all-weather access to structures.</p>	<p>Complies with Acceptable Solution – All roads within the site are designed to meet the requirements of the acceptable solution.</p>
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<p>vegetation, secondary access shall be provided to an alternate point on the existing public road system; and</p> <p>one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.</p>		
<p>› 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/</p> <p>causeways are to clearly indicate load rating.</p>	<p>the capacity of access roads is adequate for firefighting vehicles.</p>	<p>Complies with Acceptable Solution – All roads within the site are designed to meet the requirements of the acceptable solution.</p>
<p>› hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;</p> <p>› hydrants are provided in accordance with the relevant clauses of AS 2419.1:2017 - Fire hydrant installations System design, installation and commissioning; and</p> <p>there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.</p>	<p>there is appropriate access to water supply.</p>	<p>Complies with Acceptable Solution – Hydrants are to be positioned appropriately across the site.</p>



Perimeter Roads

<ul style="list-style-type: none"> › are two-way sealed roads; › minimum 8m carriageway width kerb to kerb; › parking is provided outside of the carriageway width; › hydrants are located clear of parking areas; › are through roads, and these are linked to the internal road system at an interval of no greater than 500m; › curves of roads have a minimum inner radius of 6m; › the maximum grade road is 15 degrees and average grade of not more than 10 degrees; › the road crossfall does not exceed 3 degrees; and <p style="padding-left: 40px;">a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</p>	<p>access roads are designed to allow safe access and egress for 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.</p>	<p>Can Comply with Acceptable Solution – All access roads to the site are designed to meet the requirements of the acceptable solution.</p>
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Non-Perimeter Roads

<ul style="list-style-type: none"> › minimum 5.5m carriageway width kerb to kerb; › parking is provided outside of the carriageway width; › hydrants are located clear of parking areas; 	<p>access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.</p>	<p>Complies with Acceptable Solution –</p> <ul style="list-style-type: none"> › minimum 5.5m carriageway width kerb to kerb; › parking is provided outside of the carriageway width;
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<ul style="list-style-type: none"> › roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; › curves of roads have a minimum inner radius of 6m; › the road crossfall does not exceed 3 degrees; and › a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided. 		<ul style="list-style-type: none"> › hydrants are located clear of parking areas; › roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; › curves of roads have a minimum inner radius of 6m; › the road crossfall does not exceed 3 degrees; and › a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
<h2 style="text-align: center;">Property Access</h2>		
<ul style="list-style-type: none"> › There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided 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. <p>In circumstances where this cannot occur, the following requirements apply:</p> <ul style="list-style-type: none"> › minimum 4m carriageway width; 	<p>firefighting vehicles can access the dwelling and exit the property safely.</p>	<p>Complies with Acceptable Solution – All future lots are to be connected to a public road by a driveway <70m</p>



<ul style="list-style-type: none">› in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay;› a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;› provide a suitable turning area in accordance with Appendix 3;› curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;› the minimum distance between inner and outer curves is 6m;› the crossfall is not more than 10 degrees;› maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and› a development comprising more than three dwellings has access by dedication of a road and not by right of way. <p>Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also</p>		
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apply to community style development property access roads in addition to the above.		
Water Supplies		
<ul style="list-style-type: none"> › reticulated water is to be provided to the development where available; › a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and <p>static water supplies shall comply with Table 5.3d.</p>	adequate water supplies are provided for firefighting purposes.	Complies with Acceptable Solution – All lots are to be connected to reticulated water.
<ul style="list-style-type: none"> › fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2017; › hydrants are not located within any road carriageway; and › reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. 	Water supplies are located at regular intervals; and the water supply is accessible and reliable for firefighting operations.	Can Comply with Acceptable Solution – Hydrants are to be positioned appropriately across the site.
› fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2017.	flows and pressure are appropriate.	Complies with Acceptable Solution – Flows and pressure assumed



› all above-ground water service pipes are metal, including and up to any taps; and above-ground water storage tanks shall be of concrete or metal.	the integrity of the water supply is maintained.	Complies with Acceptable Solution – All above ground water service pipes will meet the requirements.
Electricity Services		
› where practicable, electrical transmission lines are underground; › where overhead, electrical transmission › lines are proposed as follows: lines are installed with short pole spacing of 30m, 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 ISSC3 Guideline for Managing Vegetation Near Power Lines.	location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Complies with Acceptable Solution – All future dwellings are able to meet the requires for electricity services.
Gas Services		
› reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas, the requirements of relevant authorities, and metal piping is used;	location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Can Complies with Acceptable Solution – All future dwellings are able to meet the requires for gas services.



<ul style="list-style-type: none">› 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; and› above-ground gas service pipes are metal, including and up to any outlets.		
Given the information in the above table the proposed development does not meet the Codes SEPP and therefore is not complying development. As such the Development Application needs to be referred to the NSW Rural Fire Service (RFS).		

7 CONCLUSION & RECOMMENDATIONS

In summary, a Bushfire Risk Assessment has been undertaken for a proposed residential subdivision at Stage 7 Brush Creek, Edgeworth NSW 2285. The report forms part of the supporting documentation for a Development Application (DA) to be submitted to LMCC.

If the recommendations contained within this report are duly considered and incorporated, it is considered that the fire hazard present is containable to a level necessary to provide an adequate level of protection to life and property on the subdivision. In summary, the following is recommended to enable the proposal to meet the relevant legislative requirements for the proposed subdivision:

- Assessment in accordance with PBP 2019 and AS3959 (2018) Appendix B - Detailed Method 2 has shown that future dwellings within the lots will be able to comply with the required BALs. In any case, future dwellings within the site will be assessed under Section 4.14 of EP&A Act for each individual dwelling upon application.
- Reticulated water is extended into the site. The development will be linked to the water pressure mains and the proposed internal fire hydrant spacing, sizing and pressures are to comply with AS 2419.1-2005 Fire Hydrant Installations – System design, installation and commissioning (2017).
- APZS are required in accordance with Table 4-1 of this report between the surrounding vegetation and the proposed subdivision. The 44m APZ on the land to the north has been established via an 88b instrument until such time this land is developed for future allotments.
- The proposed access internal road is to meet either the performance criteria or acceptable solutions as detailed in Section 6 of this report and Section 4.1.3 (1) of PBP.
- Fencing – All new fencing and gates shall be constructed in accordance with the NSW Rural Fire Service Guideline: Fast Fact – Fences or Gates in Bushfire Prone Areas.
- Home owners should prepare a Bush Fire Survival Plan refer to the RFS Website http://www.rfs.nsw.gov.au/file_system/attachments/Attachment_BushFireSurvivalPlan.pdf



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Rural Fires and Environmental Assessment Legislation Amendment Act 2002.

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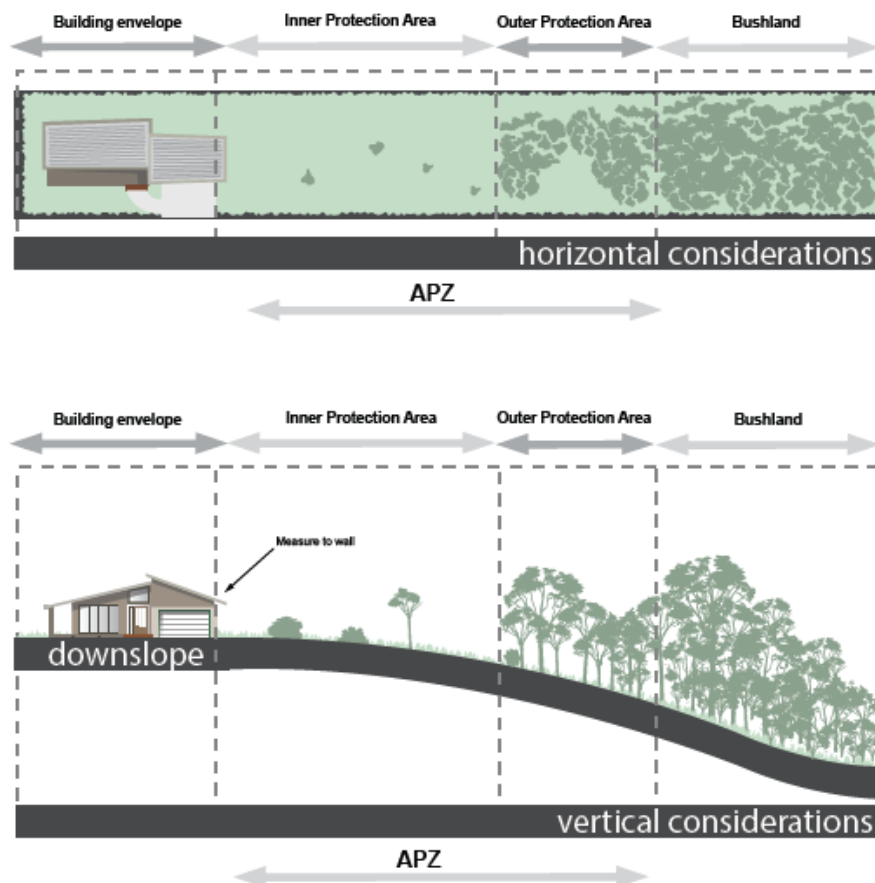
APPENDIX A PROPOSED SITE PLANS

APPENDIX B ASSET PROTECTION ZONES

An Asset Protection Zone (APZ) is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property (refer to Figure B-1 below). The required width of the APZ varies with slope and the type of hazard. An APZ can consist of both an Inner Protection Area (IPA) and an Outer Protection Area (OPA). An APZ can include the following:

- Lawns;
- Discontinuous gardens;
- Swimming pools;
- Driveways;
- Unattached non-combustible garages with suitable separation from the Dwelling;
- Open space / parkland; and
- Car parking.

Figure 1: Components of an APZ (PBP 2019)



Inner Protection Area

The Inner Protection Area (IPA) extends from the edge of the OPA to the development. The IPA aims to ensure that the presence of fuels which could contribute to a fire event / intensity, are minimised close to the development. The performance of the IPA must be such that:

- There is minimal fine fuel at ground level which could be set alight by a bushfire; and
- Any vegetation in the IPA does not provide a path for the transfer of fire to the development – that is, the fuels are discontinuous.

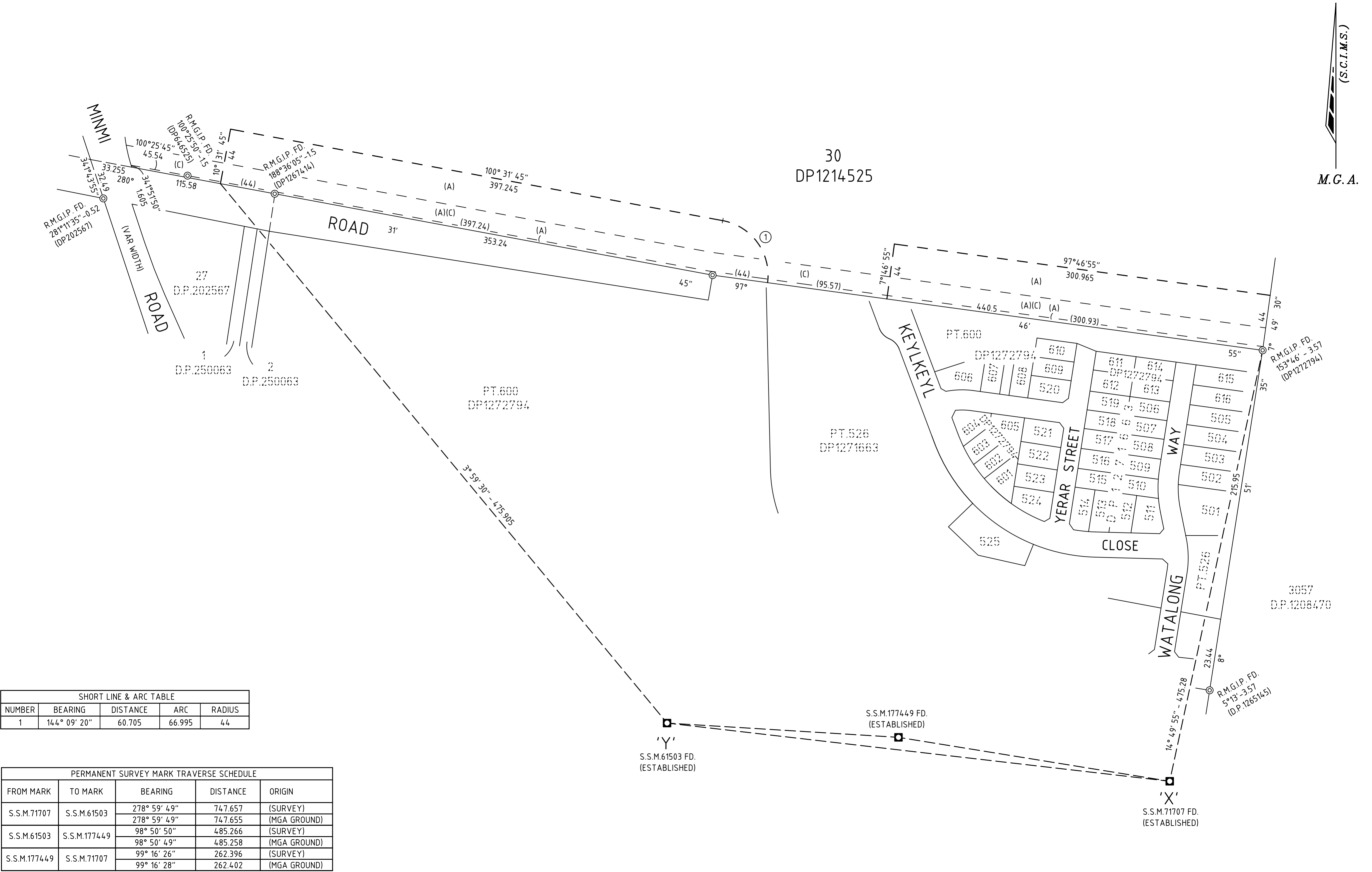
The presence of a few shrubs or trees in the IPA is acceptable provided that they:

- Do not touch or overhang any buildings;
- Are well spread out and do not form a continuous canopy;
- Are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and
- Are located far enough away from any Dwelling so that they will not ignite the Dwelling by direct flame contact or radiant heat emission.
- Woodpiles, wooden sheds, combustible material storage areas, large areas / quantities of garden mulch, stacked flammable building materials etc are not permitted in the IPA

Outer Protection Area

The Outer Protection Area (OPA) is located adjacent to the hazard. Within the OPA any trees and shrubs should be maintained in a manner such that the vegetation is not continuous. Fine fuel loadings should be kept to a level where the fire intensity expected will not impact on adjacent developments.

APPENDIX C 88B INSTRUMENT FOR LAND TO THE NORTH



(A) - EASEMENT FOR ASSET PROTECTION ZONE 44 WIDE
(C) - PROPOSED EASEMENT FOR TRANSMISSION LINE AND ACCESS THERTO 15 WIDE (D.P.646525)

<div>SURVEYOR</div> <div>Name: MITCHELL A. WARWICK</div> <div>Date: 23/07/2020</div> <div>Reference: 16634 (Exemption Policy 4)</div>	PLAN OF EASEMENT WITHIN LOT 30 D.P.1214525	<div>LGA: LAKE MACQUARIE</div> <div>Locality: CAMERON PARK</div> <div>Reduction Ratio 1:2000</div> <div>Lengths are in metres.</div>	REGISTERED	D.P.
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PLAN FORM 6 (2017)	DEPOSITED PLAN ADMINISTRATION SHEET	Sheet 1 of 3 sheet(s)
Office Use Only Registered: Title System:		Office Use Only
PLAN OF EASEMENT WITHIN LOT 30 D.P.1214525		LGA: LAKE MACQUARIE Locality: CAMERON PARK Parish: TERALBA County: NORTHUMBERLAND
<p align="center">Survey Certificate</p> <p>I, <u>MITCHELL A. WARWICK</u> of <u>Delfs Lascelles Pty Ltd, 260 Maitland Road Mayfield</u> a surveyor registered under the <i>Surveying and Spatial Information Act 2002</i>, certify that:</p> <p>*(a) The land shown in the plan was surveyed in accordance with the Surveying and Spatial Information Regulation 2017, is accurate and the survey was completed on, or</p> <p>*(b) The part of the land shown in the plan (*being/*excluding** <u>LOT 30 DP1214525</u>) was surveyed in accordance with the <i>Surveying and Spatial Information Regulation 2017</i>, the part surveyed is accurate and the survey was completed on, <u>23/07/20</u>, the part not surveyed was compiled in accordance with that Regulation, or</p> <p>*(c) The land shown in this plan was compiled in accordance with the Surveying and Spatial Information Regulation 2017.</p> <p>Datum Line: 'X' - 'Y'</p> <p>Type: *Urban/*Rural—</p> <p>The terrain is *Level Undulating / *Steep Mountainous—</p> <p>Signature: Dated: <u>23/07/20</u></p> <p>Surveyor Identification No: <u>8821</u></p> <p>Surveyor registered under the <i>Surveying and Spatial information Act 2002</i></p> <p>* Strike through if inapplicable. ** Specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey.</p>		<p align="center">Crown Lands NSW/Western Lands Office Approval</p> <p>I, (Authorised Officer) in approving this plan certify that all necessary approvals in regard to the allocation of the land shown herein have been given.</p> <p>Signature:</p> <p>Date:</p> <p>File Number:</p> <p>Office:</p> <hr/> <p align="center">Subdivision Certificate</p> <p>I, *Authorised Person/*General Manager/*Accredited Certifier, certify that the provisions of section 6.15 of the <i>Environmental Planning and Assessment Act 1979</i> have been satisfied in relation to the proposed subdivision, new road or reserve set out herein.</p> <p>Signature:</p> <p>Accreditation number:</p> <p>Consent Authority:</p> <p>Date of endorsement:</p> <p>Subdivision Certificate number:</p> <p>File number:</p> <p>* Strike through if inapplicable</p>
Plans used in the preparation of survey/compilation. D.P.202567 D.P.646525 D.P.1265145 D.P.1272794		Statements of intention to dedicate public roads, create public reserves and drainage reserves, acquire/resume land.
Surveyor's Reference: 16634 (Exemption Policy 4)		Signatures, Seals and Section 88B Statements should appear on PLAN FORM 6A

PLAN FORM 6A (2017)	DEPOSITED PLAN ADMINISTRATION SHEET	Sheet 2 of 3 sheet(s)										
Office Use Only		Office Use Only										
Registered:												
PLAN OF EASEMENT WITHIN LOT 30 D.P.1214525		This sheet is for the provision of the following information as required: <ul style="list-style-type: none">• A schedule of lots and addresses - See 60(c) <i>SSI Regulation 2017</i>• Statements of intention to create and release affecting interests in accordance with section 88B <i>Conveyancing Act 1919</i>• Signatures and seals - See 195D <i>Conveyancing Act 1919</i>• Any information which cannot fit in the appropriate panel of sheet 1 of the administration sheets.										
Subdivision Certificate number :												
Date of Endorsement :												
<p>PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT, 1919, AS AMENDED, IT IS INTENDED TO CREATE:-</p> <p>1. EASEMENT FOR ASSET PROTECTION ZONE 44 WIDE (A)</p>												
<table><tr><td>LOT</td><td>STREET No.</td><td>STREET NAME</td><td>STREET TYPE</td><td>LOCALITY</td></tr><tr><td>1</td><td>140</td><td>MINMI</td><td>ROAD</td><td>CAMERON PARK</td></tr></table>			LOT	STREET No.	STREET NAME	STREET TYPE	LOCALITY	1	140	MINMI	ROAD	CAMERON PARK
LOT	STREET No.	STREET NAME	STREET TYPE	LOCALITY								
1	140	MINMI	ROAD	CAMERON PARK								
<p>EXECUTED BY WINTEN (NO 21) PTY LIMITED ACN 096 449 393 IN) ACCORDANCE WITH SECTION 127 OF THE CORPORATIONS ACT 2001) (CTH) BY AUTHORITY OF ITS DIRECTORS:)</p>												
..... SIGNATURE	 SIGNATURE										
..... NAME	 NAME										
..... POSITION	 POSITION										
If space is insufficient use additional annexure sheet												
Surveyor's Reference: 16634 (Exemption Policy 4)												

PLAN FORM 6A (2017)	DEPOSITED PLAN ADMINISTRATION SHEET	Sheet 3 of 3 sheet(s)
Office Use Only Registered:	Office Use Only	
PLAN OF EASEMENT WITHIN LOT 30 D.P.1214525		This sheet is for the provision of the following information as required: <ul style="list-style-type: none">• A schedule of lots and addresses - See 60(c) <i>SSI Regulation 2017</i>• Statements of intention to create and release affecting interests in accordance with section 88B <i>Conveyancing Act 1919</i>• Signatures and seals - See 195D <i>Conveyancing Act 1919</i>• Any information which cannot fit in the appropriate panel of sheet 1 of the administration sheets.
Subdivision Certificate number : Date of Endorsement :		
AUSTRALIA AND NEW ZEALAND BANKING GROUP LIMITED		
If space is insufficient use additional annexure sheet		
Surveyor's Reference: 16634 (Exemption Policy 4)		

APPENDIX D AS3959 (2018) APPENDIX B - DETAILED METHOD 2 CALCULATION



NBC Bushfire Attack Assessment Report V4.0

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 16/09/2021

Assessment Date: 16/09/2021

Site Street Address: Stage 7 Brush Creek Estate, Edgeworth

Assessor: Sarah Jones; Firebird Eco

Local Government Area: Lake Macquarie

Alpine Area: No

Equations Used

Transmissivity: Fuss and Hammins, 2002

Flame Length: RFS PBP, 2001/Vesta/Catchpole

Rate of Fire Spread: Noble et al., 1980

Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005

Peak Elevation of Receiver: Tan et al., 2005

Peak Flame Angle: Tan et al., 2005

Run Description: Vegetation to the North

Vegetation Information

Vegetation Type: Hunter Macleay DSF

Vegetation Group: Dry Sclerophyll Forests (Shrub/Grass)

Vegetation Slope: 19 Degrees

Vegetation Slope Type: Downslope

Surface Fuel Load(t/ha): 14

Overall Fuel Load(t/ha): 24.6

Vegetation Height(m): 0.9

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 0 Degrees

Site Slope Type: Downslope

Elevation of Receiver(m): Default

APZ/Separation(m): 44

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K): 1090

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 25

Heat of Combustion(kJ/kg): 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 100

Program Outputs

Level of Construction: BAL 29

Peak Elevation of Receiver(m): 17.8

Radiant Heat(kW/m²): 27.6

Flame Angle (degrees): 55

Flame Length(m): 43.46

Maximum View Factor: 0.453

Rate Of Spread (km/h): 6.23

Inner Protection Area(m): 35

Transmissivity: 0.801

Outer Protection Area(m): 9

Fire Intensity(kW/m): 79216