



BUSHFIRE THREAT ASSESSMENT

FOR
A PROPOSED
RESIDENTIAL SUBDIVISION

AT
186 TOCAL ROAD, BOLWARRA
HEIGHTS NSW 2320

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 HGBE Property Pty Ltd. for a proposed residential subdivision at 186 Tocal Road, Bolwarra Heights NSW 2320. The report forms part of the supporting documentation for a DA to be submitted to Maitland City Council (MCC).

The report demonstrates compliance with Planning for Bushfire Protection 2019 (NSW RFS, 2019) and AS3959-2018 Construction of Buildings in Bush Fire Prone Areas. 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:

1. **Asset Protection Zone (APZ) - The APZ provides space and reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and to prevent direct flame contact.**
 - To achieve a Bushfire Attack Level (BAL) of BAL-29 or less, the following land is to be managed as an APZ, which is made up of an Inner Protection Area (IPA) and Outer Protection Area (OPA):
 - West for a distance of 19m as an IPA and 10m as an OPA.

These distances are to be managed as described under 'Planning for Bushfire Protection (Appendix 4 – Asset Protection Zone Requirements)' and the document titled 'Standards for Asset Protection Zones'.

2. **Construction Standards – Construction standards seek to increase the protection of the habitable buildings from bushfire. The shorter the APZ (distance between the external wall of the habitable building and the unmanaged vegetation), then the higher the construction standard, which is referred to as the BAL**

Based on the APZ provided above, future dwellings will have a BAL rating of BAL-29 or less.

3. **Perimeter Roads - Access standards provide for emergency evacuation and firefighting operations**

A perimeter road is not provided; however, it is not required as there is no bushfire hazards to the north, east, and south of the site. Tocal Road occurs to the west, and provides a perimeter road between the proposed development and the Open Forest to



the west. Furthermore, the proposed access road does not occur on bushfire prone land and emergency vehicles can gain safe, all-weather access to structures as per Section 7.9 of PBP.

4. Non-Perimeter Road

Each lot will have direct access to a public road via access roads less than 70m in length.

The proposed non-perimeter roads identified on the subdivision plan is consistent with the following requirements:

- Traffic management devices are constructed to not prohibit access by emergency services vehicles.
- Two-way sealed roads.
- Hydrants are located clear of parking areas.
- The proposed road is a cul-de sac as a dead-end road is unavoidable. The proposed length of the access road will be less than 200 metres in length, however, with the existing part of Cedarwood Close will be a length of approx. 238m in length. The proposed access road will incorporate a minimum 12 metres outer radius turning circle, and will be clearly sign posted as a dead end.
- Curve of road 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
- A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
- Hydrants are:
 - Located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression, and
 - Provided in accordance with the relevant clauses of AS 2419.1:2017.

5. Water Supplies – A water supply is required for firefighting operations

An assessment of the site and proposed subdivision plans have identified that a reticulated water supply is required to be constructed. This reticulated water supply is to be consistent with the following requirements:

- a. Reticulated water is to be provided to the development where available;
- b. Fire hydrant, spacing, design and sizing complies with the relevant clauses of the Australian Standard AS 2419.1:2017;
- c. Hydrants are not located within any road carriageway; and
- d. Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2017.



Sarah Jones

A handwritten signature in black ink, appearing to read 'Sarah Jones'.



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Terms & Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419 -2017	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
MCC	Maitland 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 HGBE Property Pty Ltd. for a proposed residential subdivision at 186 Tocal Road, Bolwarra Heights NSW 2320, hereafter referred to as the “site” (refer to Figure 1-1 for site locality). Refer to Appendix A for Proposed Site Plans.

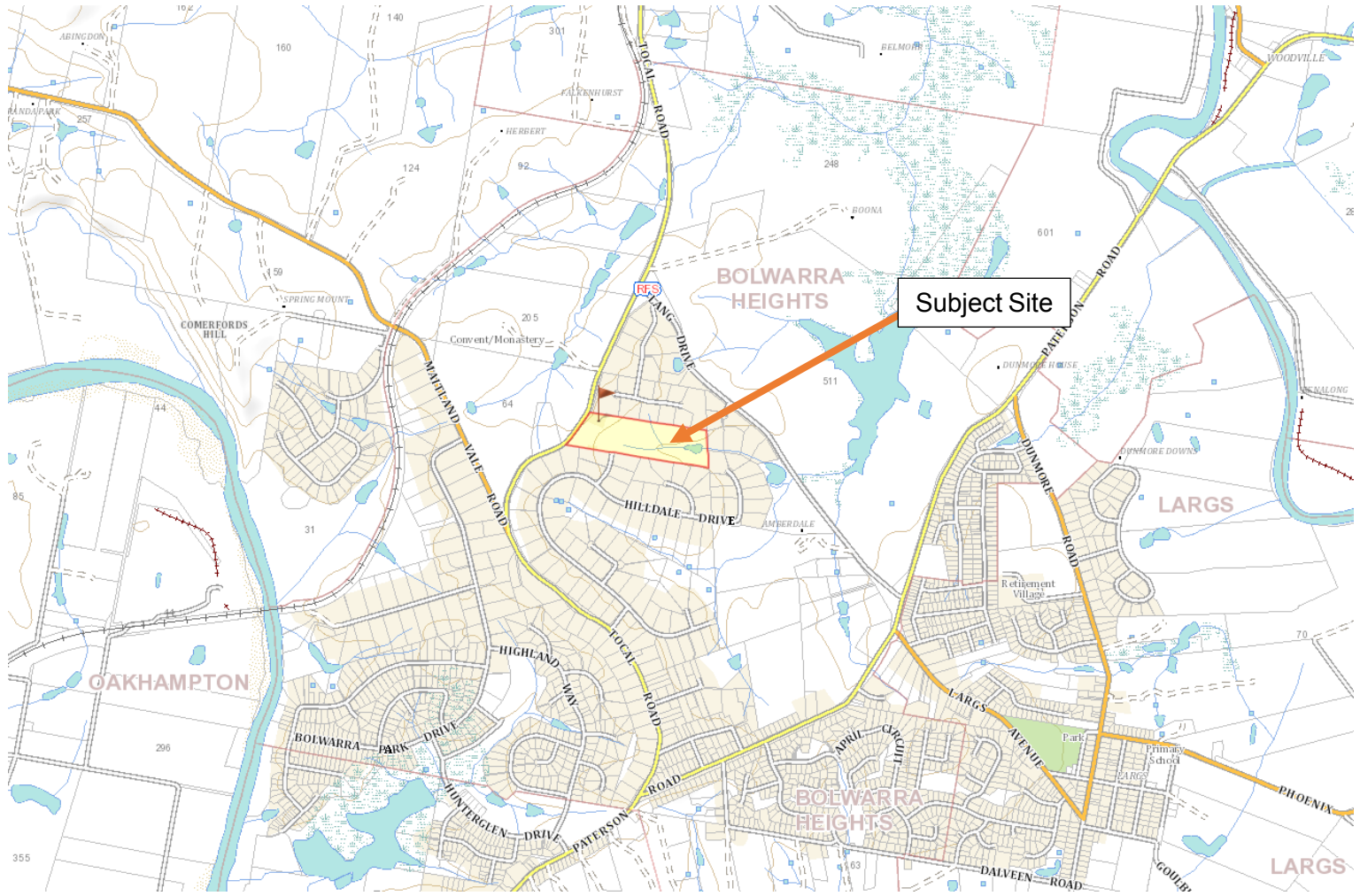
This BTA is suitable for submission with a Development Application (DA) and provides information on measures that will enable the development to comply with ‘Planning for Bushfire Protection’ (NSW RFS, 2019), hereafter referred to as PBP (RFS, 2019).

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:	186 Tocal Road, Bolwarra Heights NSW 2320
Lot/DP:	Lot 21 in DP998784
LGA:	Maitland City Council
Current Land Use:	Existing dwelling in R5 Large Lot Residential
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 MCC.

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

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 2m.



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 beneath the vegetation considered a bushfire hazard was undertaken and the results are presented in Table 3-1 below.

Table 3-1: Vegetation Classification

Proposed Residential Subdivision		
Direction	Vegetation Type	Slope
North	Managed Land	N/A
East	Managed Land	N/A
South	Managed Land	N/A
West	Forest Vegetation	Downslope (0-5°)
Within the site	The proposed detention basin within the site if replanted will meet the definition of Low Threat Vegetation in accordance with Section A1.10 Low Threat Vegetations – exclusions being a single area of vegetation less than 1 ha in area and > 100m separation from other areas of Cat 1 and 2 vegetation	N/A
	The patch of trees within the site will meet the definition of Low Threat Vegetation in accordance with Section A1.10 Low Threat Vegetations – exclusions being a single area of vegetation less than 1 ha in area and > 100m separation from other areas of Cat 1 and 2 vegetation	N/A

4 BUSHFIRE PROTECTION ASSESSMENT

4.1 Asset Protection Zones (APZ)

The PBP (RFS, 2019) guidelines have been used to determine the widths of the APZs required for habitable buildings within the site using the vegetation and slope data identified in Section 3.1 of this report.

The site lies within Maitland Local Government Area and therefore is assessed under an FDI rating of 100. Using the results from the Site Assessment (section 3.1 of this report) the deemed to satisfy APZ requirements for the proposed buildings within the site were determined using Table A1.12.2 in PBP (RFS, 2019). Refer to Table 4-1 and Figure 5-1 for the required APZs for the proposed habitable buildings.

Table 4-1: Recommended APZs for Proposed Future Dwellings

Direction from Building Envelope	Vegetation Classification within 140m	Effective Slope (within 100m)	APZ to be Provided ¹²	Width of allowable OPA	Comment
North	Managed Land	N/A	N/A	N/A	Acceptable solution in accordance with PBP (RFS, 2019)
East	Managed Land	N/A	N/A	N/A	Acceptable solution in accordance with PBP (RFS, 2019)
South	Managed Land	N/A	N/A	N/A	Acceptable solution in accordance with PBP (RFS, 2019)
West	Forest Vegetation	Downslope (0-5°)	An APZ of 29m is to be provided. This is partly provided by Tocal Road a Public Road.	10m	Acceptable solution in accordance with PBP (RFS, 2019)
Within the site	The proposed detention basin within the site if	N/A	N/A – Low Threat vegetation are	N/A	N/A

¹ APZs as per Table A1.12.2 in PBP 2019

² The APZ to the West is inclusive of the Road Reserve on Tocal Road.



Direction from Building Envelope	Vegetation Classification within 140m	Effective Slope (within 100m)	APZ to be Provided ¹²	Width of allowable OPA	Comment
	<p>replanted and the patch of trees within the site will meet the definition of Low Threat Vegetation in accordance with Section A1.10 Low Threat Vegetations – exclusions being a single area of vegetation less than 1 ha in area and > 100m separation from other areas of Cat 1 and 2 vegetation</p>		<p>not required to be considered for the purposes of PBP.</p>		



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

Using a FFDI of 100, the information relating to vegetation and slope was applied to Table A1.12.5 of PBP 2019 to determine the appropriate BAL ratings. The results from this bush fire risk assessment are detailed below in Table 5-1–Bush Fire Attack Assessment and Figure 5-1 BAL Map.

Table 5-1: Determination of Required BALs for Future Dwellings within the Site

Vegetation Type & Direction	Separation Distance from vegetation	Bushfire Attack Level (BAL)	Construction Section
Forest to the West	29-<40m	BAL-29	Sect 3 & 7 of AS3959
	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



Given the information in Table 5-1 above any future dwellings within the lots will be able to comply with AS3959-2018 and PBP 2019.

Legend

- ▬ Subject Site
- ▬ 100m Buffer
- ▬ 29m APZ
- Proposed Building Envelope
- ▬ Open Forest
- ▬ BAL 29
- ▬ BAL 19
- ▬ BAL 12.5
- ▬ BAL Low
- ▬ Creek

Disclaimer
 The BALS as depicted on this map have been determined by vegetation within 100m of the site at the time of the assessment in February 2023. It should be noted that conditions may change over time, that may result in different BALS for the site.
 Although every care has been taken in the preparation of this map the author accepts no responsibility for any misprints, errors, omissions, inaccuracies in these maps or damages resulting from the use of this information.



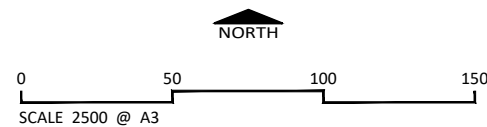
Note:
 Boundaries are not survey accurate.
 Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Google
 Nearmap

FIGURE 5 - 1 : APZ AND BUSHFIRE ATTACK LEVELS

Ref No 3182 C

CLIENT Client
SITE DETAILS No.186 Tocal Road Bolwarra Heights
DATE 20 July 2023



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6 COMPLIANCE

The proposal is for a residential subdivision and therefore development standards apply. Table 6-1 details compliance with Development Standards for Residential and Rural Residential Subdivisions.

Table 6-1: Proposed Subdivision 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 Acceptable Solution – APZs for the site have been provided in accordance with Table A1.12.2 of PBP 2019.
> 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 PBP 2019.
> APZs are wholly within the boundaries of the development site	the APZs is provided in perpetuity	Complies with Performance Solution – Part of the 29m APZ occur on Tocal Road with the remaining are to be installed on site, inclusive of a 10m allowable OPA.
> 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 land with slope <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 Performance Criteria –</p> <p>A perimeter road is not provided, as there is no bushfire hazards to the north, east and south. Tocal Road occurs to the west and provides a perimeter road between the proposed development and the Open Forest to the west. Each lot will have direct access to a public road via access roads less than 70m in length. The proposed access road leads away from the primary source of bushfire threat providing safe access and egress for firefighting vehicles. Furthermore, the proposed access road does not occur on bushfire prone land.</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/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 comply.</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="margin-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>N/A - Complies with Performance Criteria</p> <p>A perimeter road is not provided, as there is no bushfire hazards to the north, east and south. Tocal Road occurs to the west and provides a perimeter road between the proposed development and the Open Forest to the west. Each lot will have direct access to a public road via access roads less than 70m in length. The proposed access road leads away from the primary source of bushfire threat and shall comply with all other acceptable solutions, providing safe access and egress for firefighting vehicles.</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 Performance Solution –</p> <p>The non-perimeter road is a cul-de-sac, as a dead-end road is unavoidable to the site, however, the proposed section of road is < 200m with the entire length being approx. 238m incorporating a 12 metres outer radius turning circle, and will be clearly sign posted as a dead</p>
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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. 		<p>end road. Furthermore, the proposed access road is surrounded by managed land and does not go through forest, woodland and heath vegetation. The Open Forest occurs to the west of the site and is separated by Tocal Road. The access road has been designed to allow safe access and egress for firefighting vehicles while residents are evacuating the site.</p>
<h3>Property Access</h3>		
<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; › in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, 	<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>



<p>making a minimum trafficable width of 6m at the passing bay;</p> <ul style="list-style-type: none">› 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 apply to community style development</p>		
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<p>property access roads in addition to the above.</p>		
<h2 style="background-color: #004a87; color: white; padding: 5px;">Water Supplies</h2>		
<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 style="padding-left: 40px;">static water supplies shall comply with Table 5.3d.</p>	<p>adequate water supplies are provided for firefighting purposes.</p>	<p>Complies with Acceptable Solution – all proposed lots are to be connected to reticulated water.</p>
<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. 	<p>Water supplies are located at regular intervals; and</p> <p>the water supply is accessible and reliable for firefighting operations.</p>	<p>Complies with Acceptable Solution – hydrants are to be appropriately located.</p>
<ul style="list-style-type: none"> > fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2017. 	<p>flows and pressure are appropriate.</p>	<p>Complies with Acceptable Solution – fire hydrant pressures and flows are assumed to be compliant.</p>
<ul style="list-style-type: none"> > all above-ground water service pipes are metal, including and up to any taps; and <p>above-ground water storage tanks shall be of concrete or metal.</p>	<p>the integrity of the water supply is maintained.</p>	<p>Complies with Acceptable Solution – All above ground water service pipes will meet the requirements.</p>



Electricity Services

<ul style="list-style-type: none"> > where practicable, electrical transmission lines are underground; > where overhead, electrical transmission <ul style="list-style-type: none"> > lines are proposed as follows: lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and <p>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.</p> 	<p>location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.</p>	<p>Complies with Acceptable Solution – All future dwellings are able to meet the requires for electricity services.</p>
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Gas Services

<ul style="list-style-type: none"> > 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; > 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. 	<p>location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.</p>	<p>Can Complies with Acceptable Solution – All future dwellings are able to meet the requirements for gas services.</p>
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7 CONCLUSION & RECOMMENDATIONS

In summary, a Bushfire Risk Assessment has been undertaken for a proposed residential subdivision at 186 Tocal Road, Bolwarra Heights NSW 2320. The report forms part of the supporting documentation for a Development Application (DA) to be submitted to MCC.

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:

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

6. Asset Protection Zone (APZ) - The APZ provides space and reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and to prevent direct flame contact.

- To achieve a Bushfire Attack Level (BAL) of BAL-29 or less, the following land is to be managed as an APZ, which is made up of an Inner Protection Area (IPA) and Outer Protection Area (OPA):
 - West for a distance of 19m as an IPA and 10m as an OPA.

These distances are to be managed as described under 'Planning for Bushfire Protection (Appendix 4 – Asset Protect Zone Requirements)' and the document titled 'Standards for Asset Protection Zones'.

7. Construction Standards – Construction standards seek to increase the protection of the habitable buildings from bushfire. The shorter the APZ (distance between the external wall of the habitable building and the unmanaged vegetation), then the higher the construction standard, which is referred to as the BAL

- Based on the APZ provided above, future dwellings will have a BAL rating of BAL-29 or less.

8. Perimeter Roads - Access standards provide for emergency evacuation and firefighting operations

A perimeter road is not provided; however, it is not required as there is no bushfire hazards to the north, east, and south of the site. Tocal Road occurs to the west, and provides a perimeter road between the proposed development and the Open Forest to the west. Furthermore, the proposed access road does not occur on bushfire prone land



and emergency vehicles can gain safe, all-weather access to structures as per Section 7.9 of PBP.

9. Non-Perimeter Road

Each lot will have direct access to a public road via access roads less than 70m in length.

The proposed non-perimeter roads identified on the subdivision plan is consistent with the following requirements:

- Traffic management devices are constructed to not prohibit access by emergency services vehicles.
- Two-way sealed roads.
- Hydrants are located clear of parking areas.
- The proposed road is a cul-de sac as a dead-end road is unavoidable. The proposed length of the access road will be less than 200 metres in length, however, with the existing part of Cedarwood Close will be a length of approx. 238m in length. The proposed access road will incorporate a minimum 12 metres outer radius turning circle, and will be clearly sign posted as a dead end.
- Curve of road 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
- A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
- Hydrants are:
 - Located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression, and
 - Provided in accordance with the relevant clauses of AS 2419.1:2017.

10. Water Supplies – A water supply is required for firefighting operations

An assessment of the site and proposed subdivision plans have identified that a reticulated water supply is required to be constructed. This reticulated water supply is to be consistent with the following requirements:

- e. Reticulated water is to be provided to the development where available;
- f. Fire hydrant, spacing, design and sizing complies with the relevant clauses of the Australian Standard AS 2419.1:2017;
- g. Hydrants are not located within any road carriageway; and
- h. Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2017.



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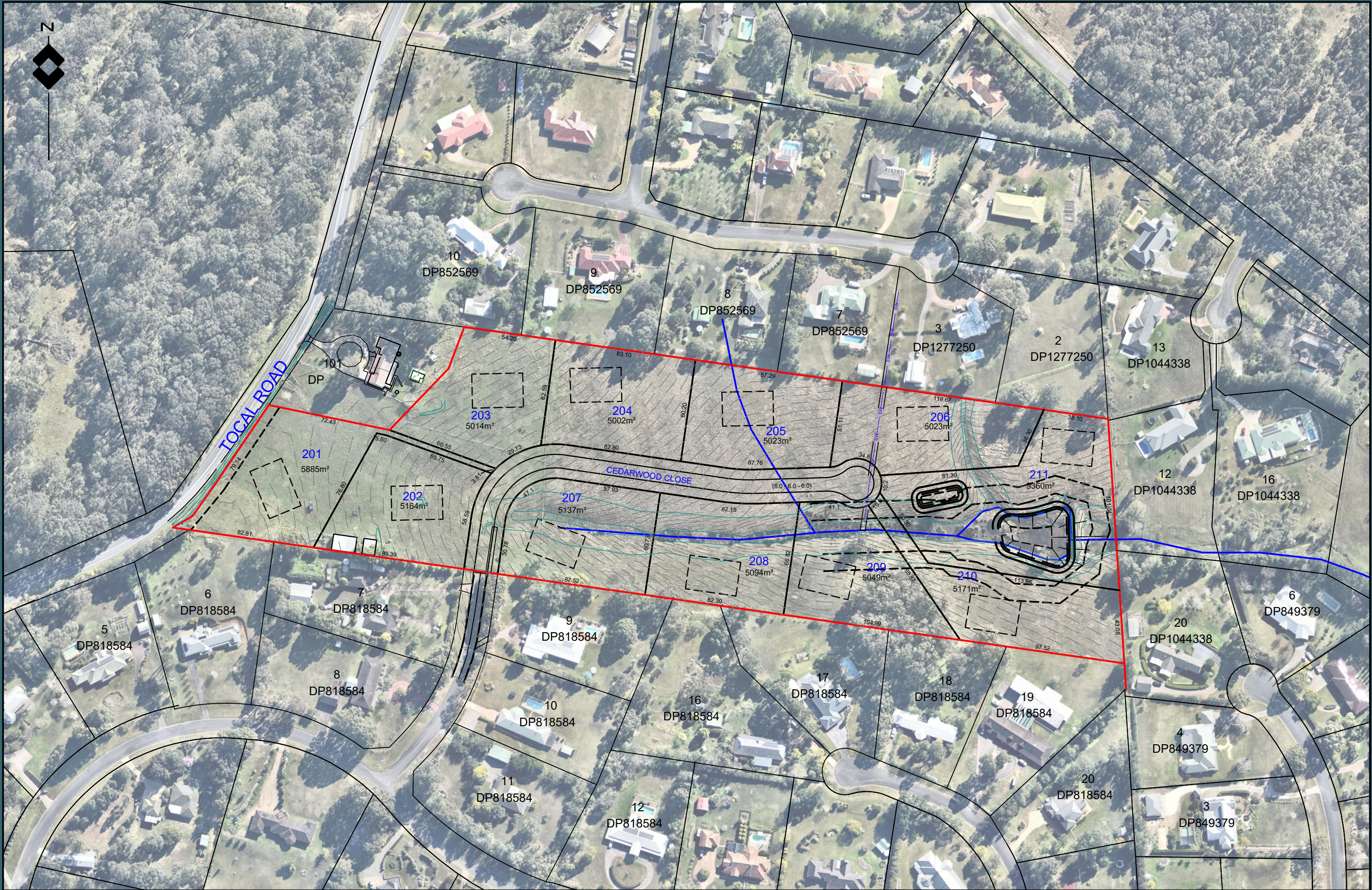
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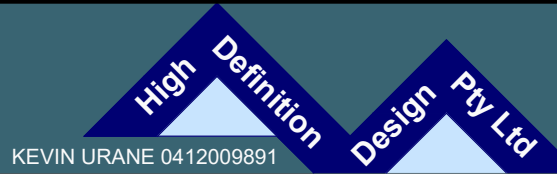
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APPENDIX A PROPOSED SITE PLANS



TITLE: PROPOSED SUBDIVISION OF LOT 102 (DP UNREGISTERED)
 OF LOT 21 DP998784
 186 TOTAL ROAD BOLWARRA
 AERIAL OVERLAY



Date:	29.10.22	Scale:	1:2000 A3	Designed:	KU	Project No	HD360	
Cad Ref:	HD360 r5	LOT	102			Drawing No	Revision	
3	AMEND BOUNDARIES			KU	15.02.23	HD03	5	
5	REMOVE STAGE 1			KU	12.07.23			
4	AMEND LAYOUT			KU	02.06.23			
No	Amendment			Drawn	Date			

APPENDIX B ASSET PROTECTION ZONES

APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

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

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

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 building or structure. It is located between the building or structure and the bush fire hazard.

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

An APZ provides:

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

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

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

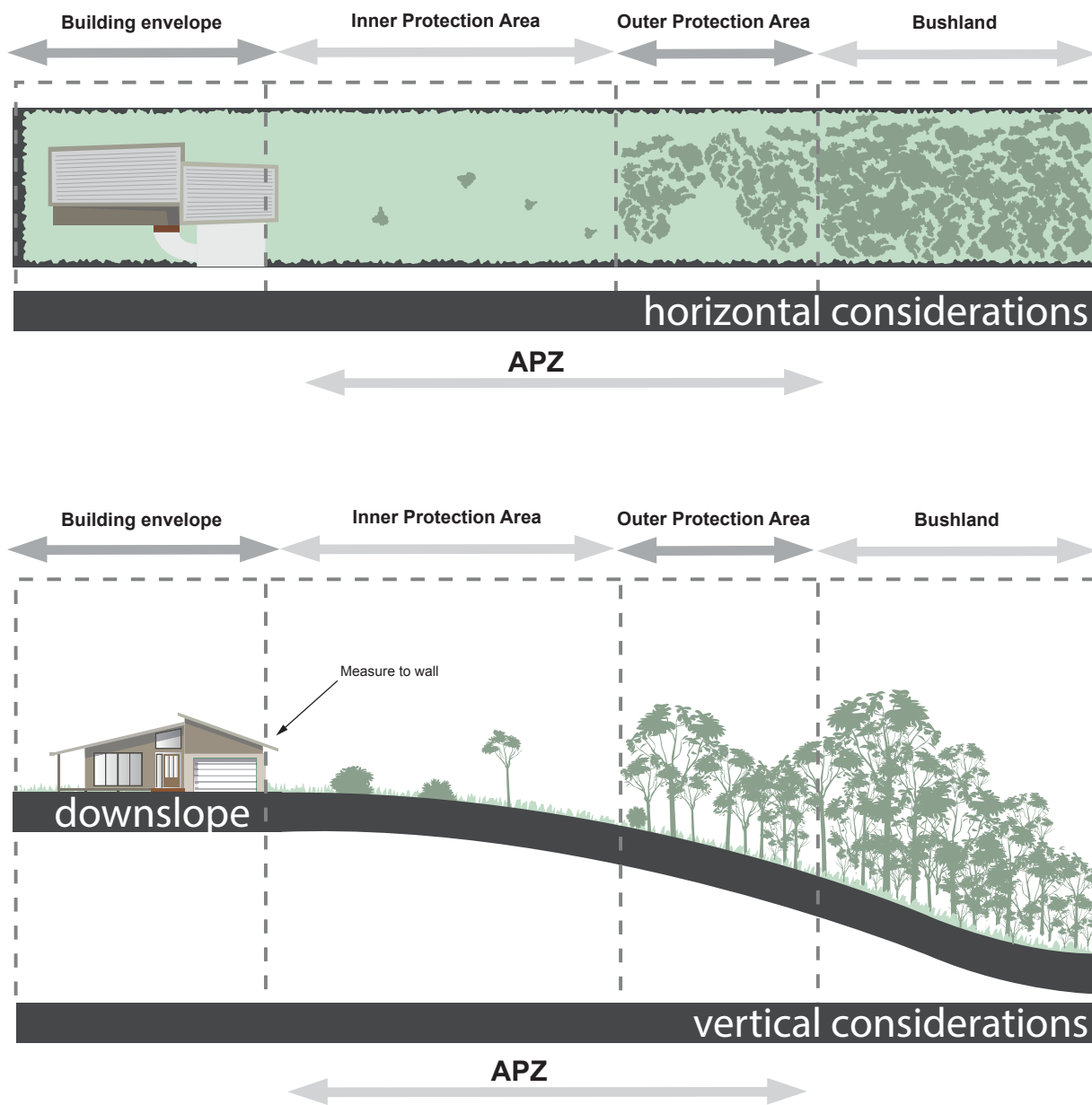
- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

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 and bush fire threat. 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).

Figure A4.1

Typical Inner and Outer Protection Areas.



A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as 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 building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree 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 the ground;
- tree canopies should be separated by 2 to 5m; and
- 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 should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

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

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; 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.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

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

Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.