



# PERFORMANCE-BASED ASSESSMENT

FOR  
A PROPOSED SUBDIVISION

AT  
STAGE 2 THORNTON  
(LOT 425 DP 1262858)

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.*



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## Executive Summary

A Bushfire Threat Assessment Report (BTA) has been prepared by Firebird ecoSultants Pty Ltd at the request of Landlink Property Pty Ltd for a proposed subdivision at Stage 2 Thornton (Lot 425 DP1262858).

The report forms part of the supporting documentation for a Development Application (DA) to be submitted to Maitland City Council (MCC). The proposed development is classified as Integrated Development under the provisions of Planning for Bushfire Protection (PBP) (NSW Rural Fire Service (RFS), 2019), and is therefore required under the legislation to be referred to the commissioner of the RFS, for the issue of a Bushfire Safety Authority. The report demonstrates compliance with PBP (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:

- APZs are required to be implemented for the proposed residential subdivision in accordance with Table 4-1 and Figure 4-1. This is based on AS3959-2018 Appendix B-Detailed Method 2 using Hunter Macleay DSF fuel loads to the North and a downslope of 3.57 degrees.
- Assessment in accordance with AS3959 and the PBP (section 5 of this report) 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.
- A perimeter road has been provided to the North to separate potential bushfire hazard from future residential development. The proposed perimeter road provides through access / egress to the subject site. Non-perimeter roads have incorporated suitable turning circles and do not extend for more than 200m in length. All future development will have direct access to a public road <70m in length.
- 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 (2005).

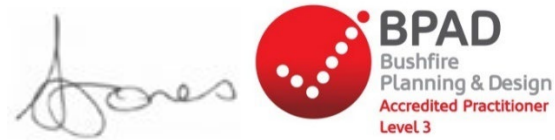


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Provided the recommendations stated within this report are implemented in full, Firebird ecoSultants Pty Ltd is of the opinion that the proposed development is able to meet the aims and objectives of PBP (RFS, 2019).

Yours faithfully

**Firebird ecoSultants**



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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
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPL Map	Bush Fire Prone Land Map
BPMs	Bush Fire Protection Measures
<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
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation



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# I INTRODUCTION

Firebird ecoSultants Pty Ltd has been engaged to undertake a Bushfire Threat Assessment (BTA) for a proposed subdivision at Stage 2 Thornton (Lot 425 DP1262858), hereafter referred to as the “site” (Figure 1-1).

The report forms part of the supporting documentation for a Development Application (DA) to be submitted to Maitland City Council (MCC). The proposed development is classified as Integrated Development under the provisions of Planning for Bushfire Protection (PBP) (NSW Rural Fire Service (RFS), 2019), and is therefore required under the legislation to be referred to the commissioner of the RFS for the issue of a Bushfire Safety Authority. The report demonstrates compliance with PBP 2019 (NSW RFS, 2019) and AS3959-2018 Construction of Buildings in Bush Fire Prone Areas (RFS, 2019).

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.

## I.1 Site Particulars

<b>Locality:</b>	Stage 2 Thornton (Brentwood Estate) (Lot 425 DP1262858)
<b>LGA:</b>	Maitland City Council (MCC)
<b>Forest Danger Index:</b>	100 FFDI
<b>Boundaries:</b>	The site is bounded by Forest vegetation to the North which is to be retained. Existing residential development is bounded to the South, West and East.
<b>Current Land Use:</b>	The site consists of disturbed forest vegetation and cleared land.
<b>Climate / Fire History:</b>	The site lies within a geographical area with a Forest Fire Danger Index (FFDI) rating of 100. Extreme bushfire weather is therefore associated with long periods of drought, high temperatures, low humidity and gusty often north-westerly winds.



## **I.2 Objectives of Assessment**

This report has been prepared to address the requirements of Clause 44 of the *Rural Fires Regulation*, for an application for a Bush Fire Safety Authority (BFSA). This BTA also addresses the six key Bush Fire Protection Measures (BFPMs) 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.



Figure 1-1: Site Location

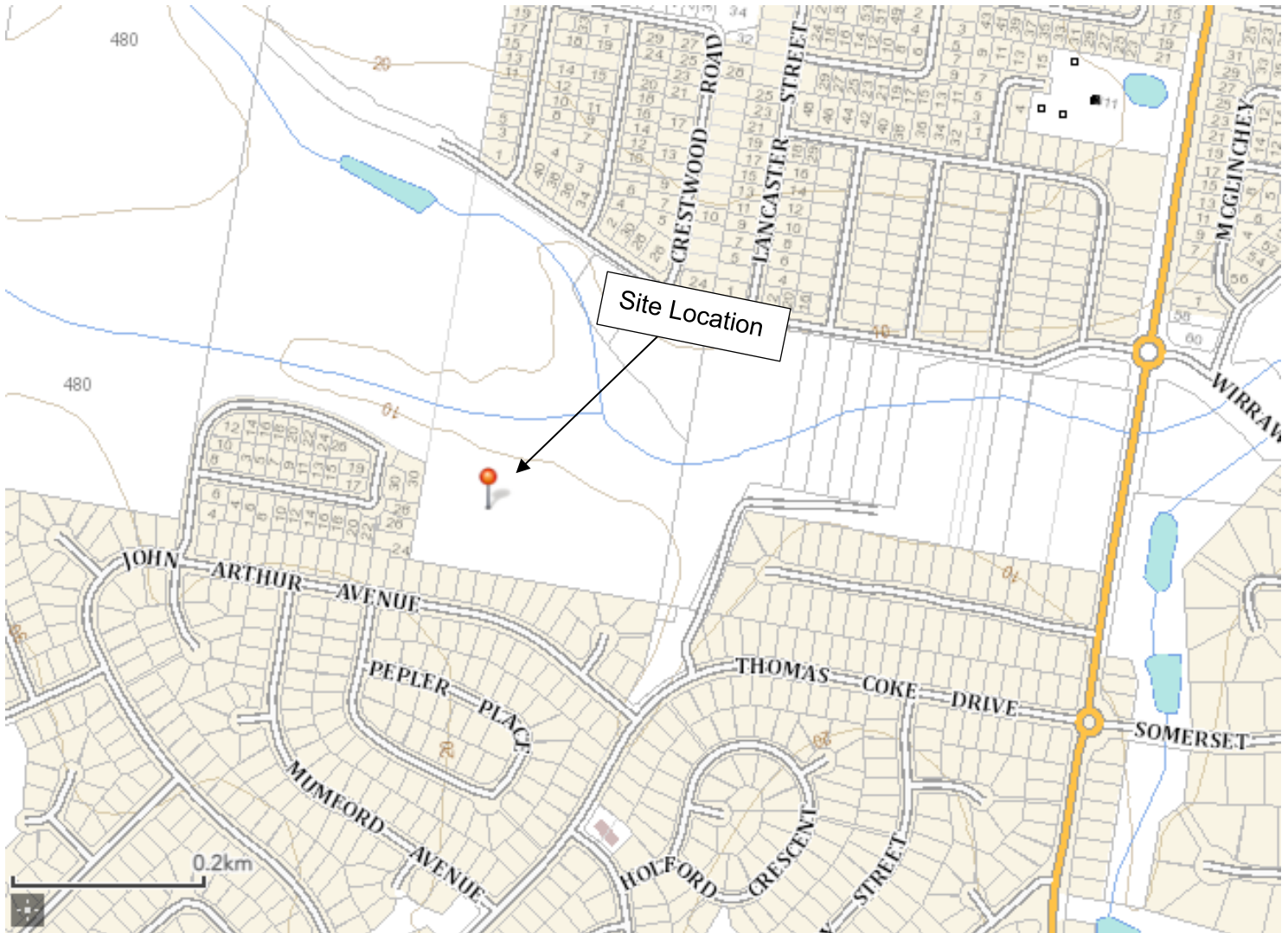
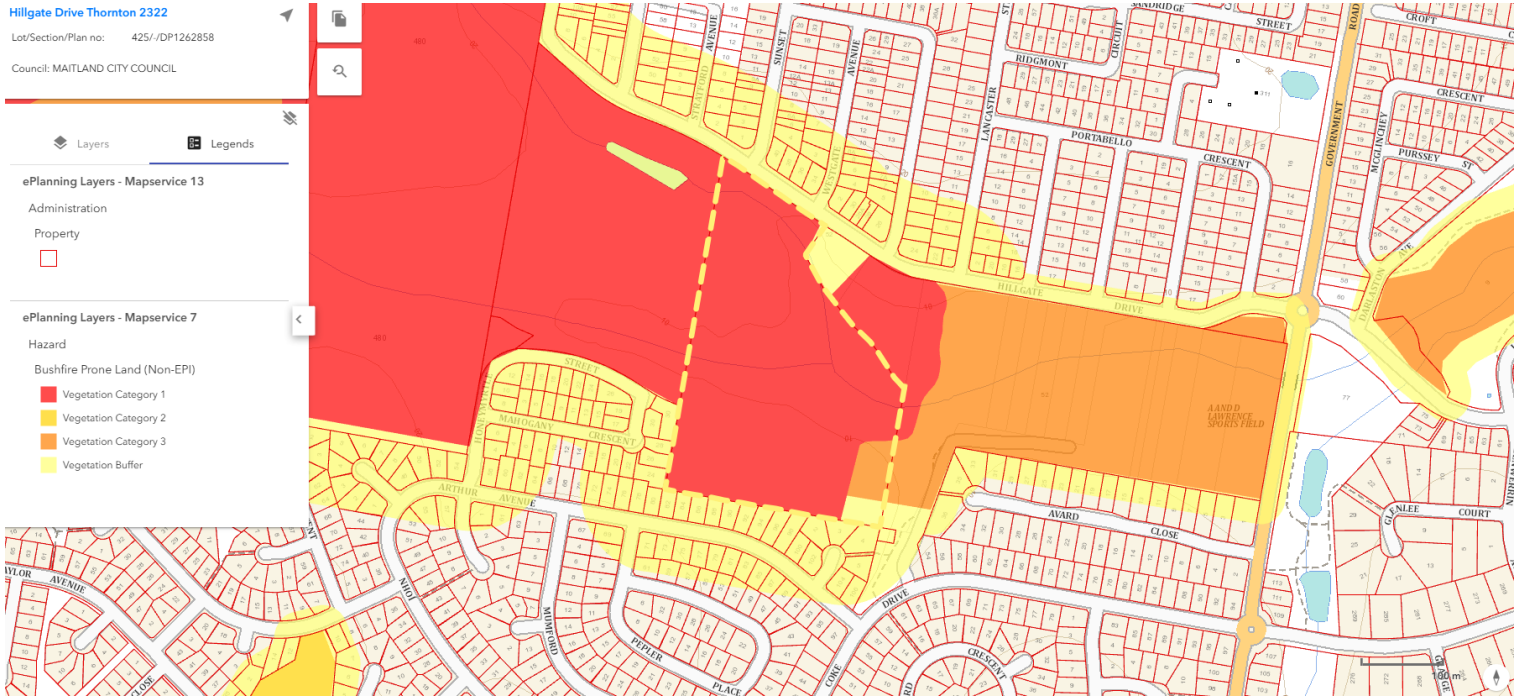


Figure 1-2: Bushfire Prone Land Map





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## 2 METHODOLOGY

### 2.1 Vegetation Assessment

The vegetation formations in and surrounding the subject land, to a distance of 140 m, was assessed in accordance with PBP (RFS, 2019). The vegetation assessment was carried out, as follows:

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

### 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 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 and are presented and depicted in Table 3-1.

**Table 3-1: Vegetation Classification**

<b>Direction from Site</b>	<b>Vegetation Classification</b>	<b>Effective Slope</b>
North	Hunter Macleay DSF	Downslope 3.57°
North	Freshwater wetlands (detention basin)	Downslope 0-5°
East	Managed Land – Residential Development	N/A
South	Managed Land – Residential Development	N/A
West	Managed Land – Residential Development	N/A



## 4 BUSHFIRE ATTACK ASSESSMENT

### 4.1 Bushfire Assessment

The site lies within Maitland Local Government Area and therefore is assessed under a FFDI rating of 100. In accordance with Table A1.12.2 within PBP (RFS, 2019), the appropriate width setbacks have been calculated based on the topography and the vegetation present in and around the site.

This assessment showed that the potential Bushfire hazard within 100m of the site occurs to the north as forest and within the drainage reserve. A performance-based assessment has been undertaken in accordance with AS3959-2018 Appendix B - Detailed Method 2.

**Table 4-1: Bushfire Assessment**

Direction from Development	Vegetation classified within 140m	Effective Slope (within 100m)	APZ to be provided
North	Hunter Macleay DSF	Downslope 3.57 degrees	19m APZ is established by perimeter road to the North
North	Freshwater wetlands	Downslope 0 – 5 degrees	>18.5m provided by road reserve to the North of the lots
East	Residential Development	N/A	N/A
South	Residential Development	N/A	N/A
West	Managed land	N/A	N/A



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## 5 DWELLING DESIGN & CONSTRUCTION

In 2018, the Council of Standards approved the revised Australian Standard AS3959-2018 Construction of buildings in bushfire prone areas (AS3959-2018). This standard was published by Standards of Australia on 13 November 2018 and replaces the 2009 version of the document.

AS3959-2018 was formally adopted by the BCA as the national standard in March 2020. The BCA 2010 references AS3959 as the deemed-to-satisfy (DTS) solution for construction requirements in bush fire prone areas for NSW

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/m<sup>2</sup>.

(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/m<sup>2</sup>.

(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/m<sup>2</sup>.

(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/m<sup>2</sup>.

(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/m<sup>2</sup>.



## 5.1 Determination of Bushfire Attack Levels

Using a FFDI of 100, the information relating to vegetation, slope and according to Table 2.4.2 of AS3959-2018 and PBP, Table 5-1 and Figure 5-1 illustrates the required BALs for future dwellings within the lots.

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

Vegetation Type and Direction	Separation Distance	Bushfire Attack Level (BAL)	Assessment Method
Hunter Macleay DSF over downslope 3.57 degrees	19-<27m	BAL-29	AS3959-2018 Appendix B-Detailed Method 2 Sect 3 & 7 of AS3959 and Sect 7.5 of PBP.
	27-<38m	BAL-19	AS3959-2018 Appendix B-Detailed Method 2 Sect 3 & 6 of AS3959 and Sect 7.5 of PBP.
	38-<100m	BAL-12.5	AS3959-2018 Appendix B-Detailed Method 2 Sect 3 & 5 of AS3959 and Sect 7.5 of PBP.
	>100m	BAL-LOW	No Requirements
Freshwater wetlands over downslope 0 – 5 degrees	6-<8m	BAL-29	Sect 3 & 7 of AS3959 and Sect 7.5 of PBP.
	8-<12m	BAL-19	Sect 3 & 6 of AS3959 and Sect 7.5 of PBP.
	12-<100m	BAL-12.5	Sect 3 & 5 of AS3959 and Sect 7.5 of PBP.
	>100m	BAL-LOW	No Requirements

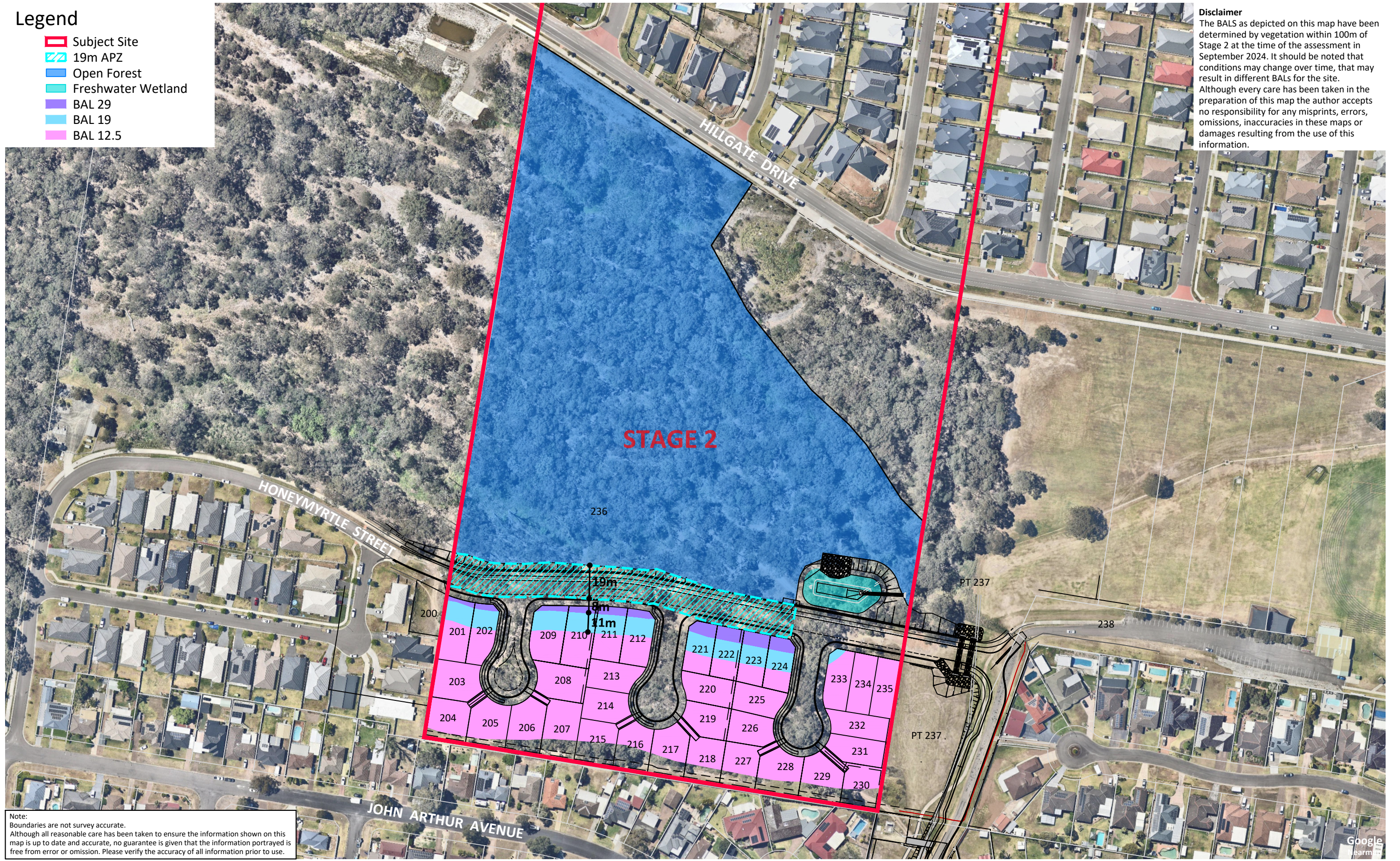
Given, the information in Table 5-1 above any future dwellings within the lots will be able to comply with AS3959-2018. These will be subject to further assessment under Section 4.14 of the EP&A Act depending on location of future dwellings and retained vegetation within the site.



**Legend**

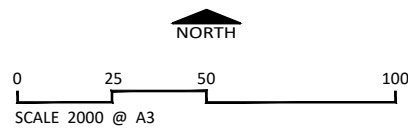
- ▭ Subject Site
- ▨ 19m APZ
- ▭ Open Forest
- ▭ Freshwater Wetland
- ▭ BAL 29
- ▭ BAL 19
- ▭ BAL 12.5

**Disclaimer**  
 The BALS as depicted on this map have been determined by vegetation within 100m of Stage 2 at the time of the assessment in September 2024. 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.



**FIGURE 5-1: BUSHFIRE ATTACK LEVELS**

CLIENT Client  
 No.530 Raymond Terrace Road Thornton  
 DATE 29 September 2024



Firebird ecoSultants Pty Ltd  
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## 6 COMPLIANCE

The following Table 6-1 outlines how the proposed subdivision complies with the provisions of PBP 2019.

**Table 6-1: Compliance with the Provisions of PBP 2019**

	Acceptable Solutions	Compliance with Acceptable Solutions	Performance Criteria	Compliance with Performance Criteria
<b>Asset Protection Zones</b>	> APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	N/A – see performance criteria.	> potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m <sup>2</sup> on each proposed lot.	Complies – an APZ of 19m has been provided to the North based on AS3959-2018 Appendix B-Detailed Method 2 using Hunter Macleay DSF fuel loads and a downslope of 3.57 degrees. Refer to Appendix C for Radiant Heat Calculations.
	> APZs are managed in accordance with the requirements of Appendix 4.	Complies – APZ is established by perimeter road to the North.	> APZs are managed and maintained to prevent the spread of a fire towards the building.	N/A
	> APZs are wholly within the boundaries of the development site	Complies – APZ occurs wholly within the boundaries of the development site.	> the APZs is provided in perpetuity	N/A
	> APZs are located on lands with a slope less than 18 degrees.	Complies – slope on lands is less than 18 degrees.	> APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	N/A



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Landscaping	› landscaping is in accordance with Appendix 4; and fencing is constructed in accordance with section 7.6.	Will comply	› landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	N/A
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Access (General Requirements)	<ul style="list-style-type: none"> <li>&gt; property access roads are two-wheel drive, all-weather roads;</li> <li>&gt; perimeter roads are provided for residential subdivisions of three or more allotments;</li> <li>&gt; subdivisions of three or more allotments have more than one access in and out of the development;</li> <li>&gt; traffic management devices are constructed to not prohibit access by emergency services vehicles;</li> <li>&gt; 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;</li> <li>&gt; all roads are through roads;</li> <li>&gt; 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;</li> <li>&gt; where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;</li> </ul>	<p>Complies – roads within the subject site are designed to comply with the acceptable solution.</p>	<ul style="list-style-type: none"> <li>&gt; firefighting vehicles are provided with safe, all-weather access to structures.</li> </ul>	<p>N/A</p>
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	<ul style="list-style-type: none"> <li>&gt; where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and</li> <li>&gt; 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.</li> </ul>			
	<ul style="list-style-type: none"> <li>&gt; 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/</li> <li>&gt; causeways are to clearly indicate load rating.</li> </ul>	Complies – roads within the subject site are designed to comply with the acceptable solution.	> the capacity of access roads is adequate for firefighting vehicles.	N/A



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	<ul style="list-style-type: none"><li>&gt; hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;</li><li>&gt; hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and</li><li>&gt; there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.</li></ul>	Will comply	<ul style="list-style-type: none"><li>&gt; there is appropriate access to water supply.</li></ul>	N/A
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Perimeter Roads	<ul style="list-style-type: none"> <li>&gt; are two-way sealed roads;</li> <li>&gt; minimum 8m carriageway width kerb to kerb;</li> <li>&gt; parking is provided outside of the carriageway width;</li> <li>&gt; hydrants are located clear of parking areas;</li> <li>&gt; are through roads, and these are linked to the internal road system at an interval of no greater than 500m;</li> <li>&gt; curves of roads have a minimum inner radius of 6m;</li> <li>&gt; the maximum grade road is 15 degrees and average grade of not more than 10 degrees;</li> <li>&gt; the road crossfall does not exceed 3 degrees; and</li> <li>&gt; a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</li> </ul>	<p>Complies – perimeter road is provided to the North that complies with the requirements of the acceptable solution.</p>	<ul style="list-style-type: none"> <li>&gt; 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.</li> </ul>	N/A
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Non-Perimeter Roads	<ul style="list-style-type: none"> <li>&gt; minimum 5.5m carriageway width kerb to kerb;</li> <li>&gt; parking is provided outside of the carriageway width;</li> <li>&gt; hydrants are located clear of parking areas;</li> <li>&gt; roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;</li> <li>&gt; curves of roads have a minimum inner radius of 6m;</li> <li>&gt; the road crossfall does not exceed 3 degrees; and</li> <li>&gt; a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</li> </ul>	<p>Complies – all roads within the subject site are designed to comply with the acceptable solution.</p>	<ul style="list-style-type: none"> <li>&gt; access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.</li> </ul>	N/A
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Property Access	<ul style="list-style-type: none"> <li>&gt; 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.</li> </ul> <p><b>In circumstances where this cannot occur, the following requirements apply:</b></p> <ul style="list-style-type: none"> <li>&gt; minimum 4m carriageway width;</li> <li>&gt; 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;</li> <li>&gt; a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;</li> <li>&gt; provide a suitable turning area in accordance with Appendix 3;</li> <li>&gt; curves have a minimum inner radius of 6m and are minimal in</li> </ul>	<p>N/A - 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>	<ul style="list-style-type: none"> <li>&gt; firefighting vehicles can access the dwelling and exit the property safely.</li> </ul>	<p>N/A</p>
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	<p>number to allow for rapid access and egress;</p> <ul style="list-style-type: none"><li>&gt; the minimum distance between inner and outer curves is 6m;</li><li>&gt; the crossfall is not more than 10 degrees;</li><li>&gt; maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and</li><li>&gt; a development comprising more than three dwellings has access by dedication of a road and not by right of way.</li></ul> <p><b>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 property access roads in addition to the above.</b></p>			
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	<ul style="list-style-type: none"> <li>&gt; reticulated water is to be provided to the development where available;</li> <li>&gt; a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and</li> <li>&gt; static water supplies shall comply with Table 5.3d.</li> </ul>	Complies	<ul style="list-style-type: none"> <li>&gt; adequate water supplies are provided for firefighting purposes.</li> </ul>	N/A
	<ul style="list-style-type: none"> <li>&gt; fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005;</li> <li>&gt; hydrants are not located within any road carriageway; and</li> <li>&gt; reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.</li> </ul>	Will Comply	<ul style="list-style-type: none"> <li>&gt; water supplies are located at regular intervals; and</li> <li>&gt; the water supply is accessible and reliable for firefighting operations.</li> </ul>	N/A
	<ul style="list-style-type: none"> <li>&gt; fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.</li> </ul>	Will Comply	<ul style="list-style-type: none"> <li>&gt; flows and pressure are appropriate.</li> </ul>	N/A
	<ul style="list-style-type: none"> <li>&gt; all above-ground water service pipes are metal, including and up to any taps; and</li> <li>&gt; above-ground water storage tanks shall be of concrete or metal.</li> </ul>	Will Comply	<ul style="list-style-type: none"> <li>&gt; the integrity of the water supply is maintained.</li> </ul>	N/A



<b>Electricity Services</b>	<ul style="list-style-type: none"> <li>&gt; where practicable, electrical transmission lines are underground;</li> <li>&gt; where overhead, electrical transmission             <ul style="list-style-type: none"> <li>&gt; lines are proposed as follows: lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and</li> <li>&gt; 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.</li> </ul> </li> </ul>	<p>Will Comply</p>	<ul style="list-style-type: none"> <li>&gt; location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.</li> </ul>	<p>N/A</p>
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<b>Gas Services</b>	<ul style="list-style-type: none"> <li>&gt; 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;</li> <li>&gt; all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;</li> <li>&gt; connections to and from gas cylinders are metal;</li> <li>&gt; polymer-sheathed flexible gas supply lines are not used; and</li> <li>&gt; above-ground gas service pipes are metal, including and up to any outlets.</li> </ul>	<p>Will Comply</p>	<ul style="list-style-type: none"> <li>&gt; location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.</li> </ul>	<p>N/A</p>
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## 7 CONCLUSION & RECOMMENDATIONS

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 site.

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

- APZs are required to be implemented for the proposed residential subdivision in accordance with Table 4-1 and Figure 4-1. This is based on AS3959-2018 Appendix B-Detailed Method 2 using Hunter Macleay DSF fuel loads to the North and a downslope of 3.57 degrees.
- Assessment in accordance with AS3959 and the PBP (section 5 of this report) 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.
- A perimeter road has been provided to the North to separate potential bushfire hazard from future residential development. The proposed perimeter road provides through access / egress to the subject site. Non-perimeter roads have incorporated suitable turning circles and do not extend for more than 200m in length. All future development will have direct access to a public road <70m in length.
- 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 (2005).

Provided the recommendations stated above are implemented in full Firebird ecoSultants Pty Ltd is of the opinion that the proposed development is able to meet the aims and objectives of PBP (RFS, 2019).

Yours faithfully

**Firebird ecoSultants**



Sarah Jones

B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas)

**BPAD-A Certified Practitioner (BPD-PA-26512)**

Ecologist / Bushfire Planner



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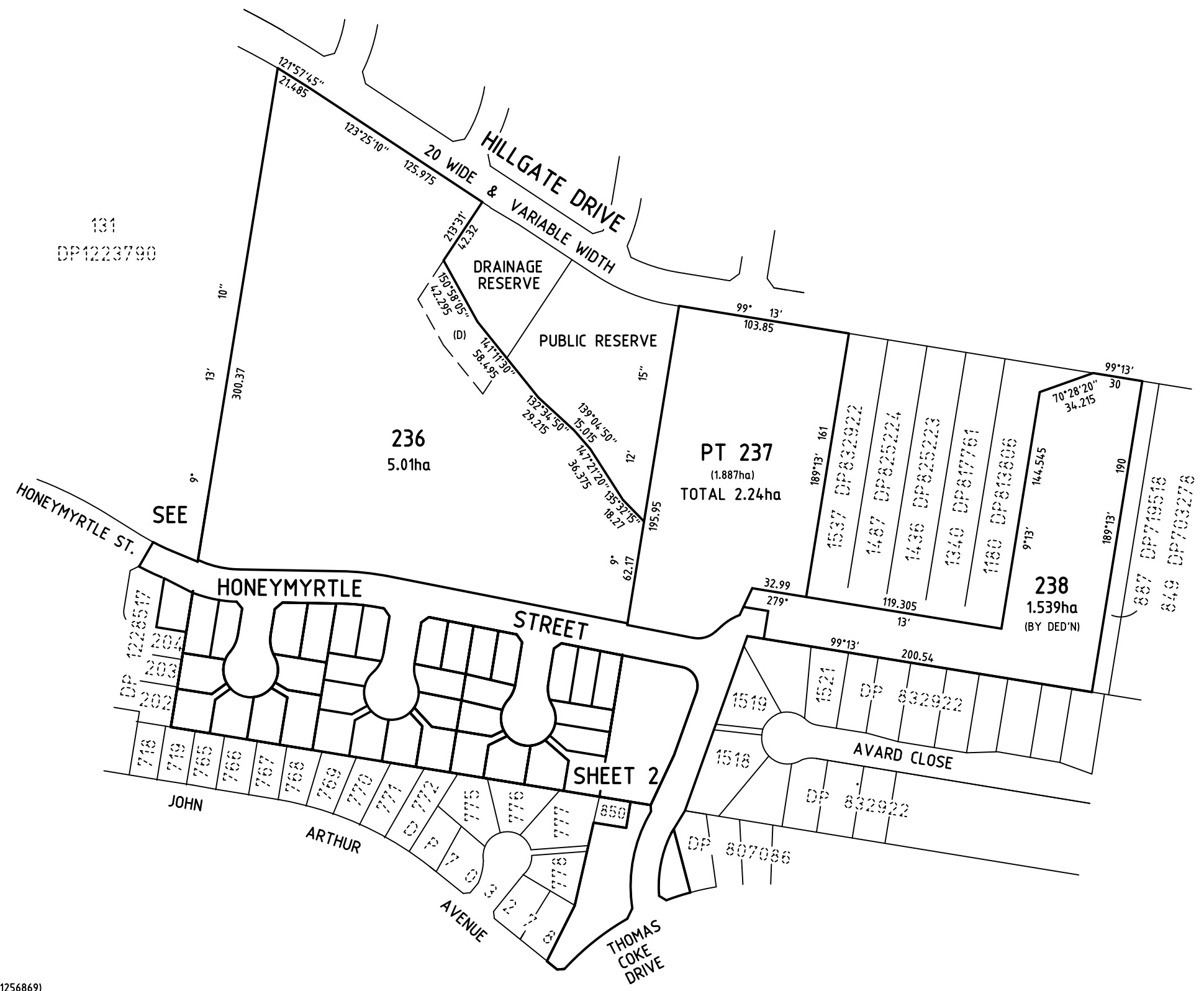
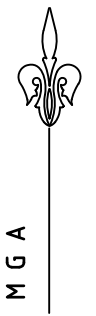
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# APPENDIX A PROPOSED PLANS



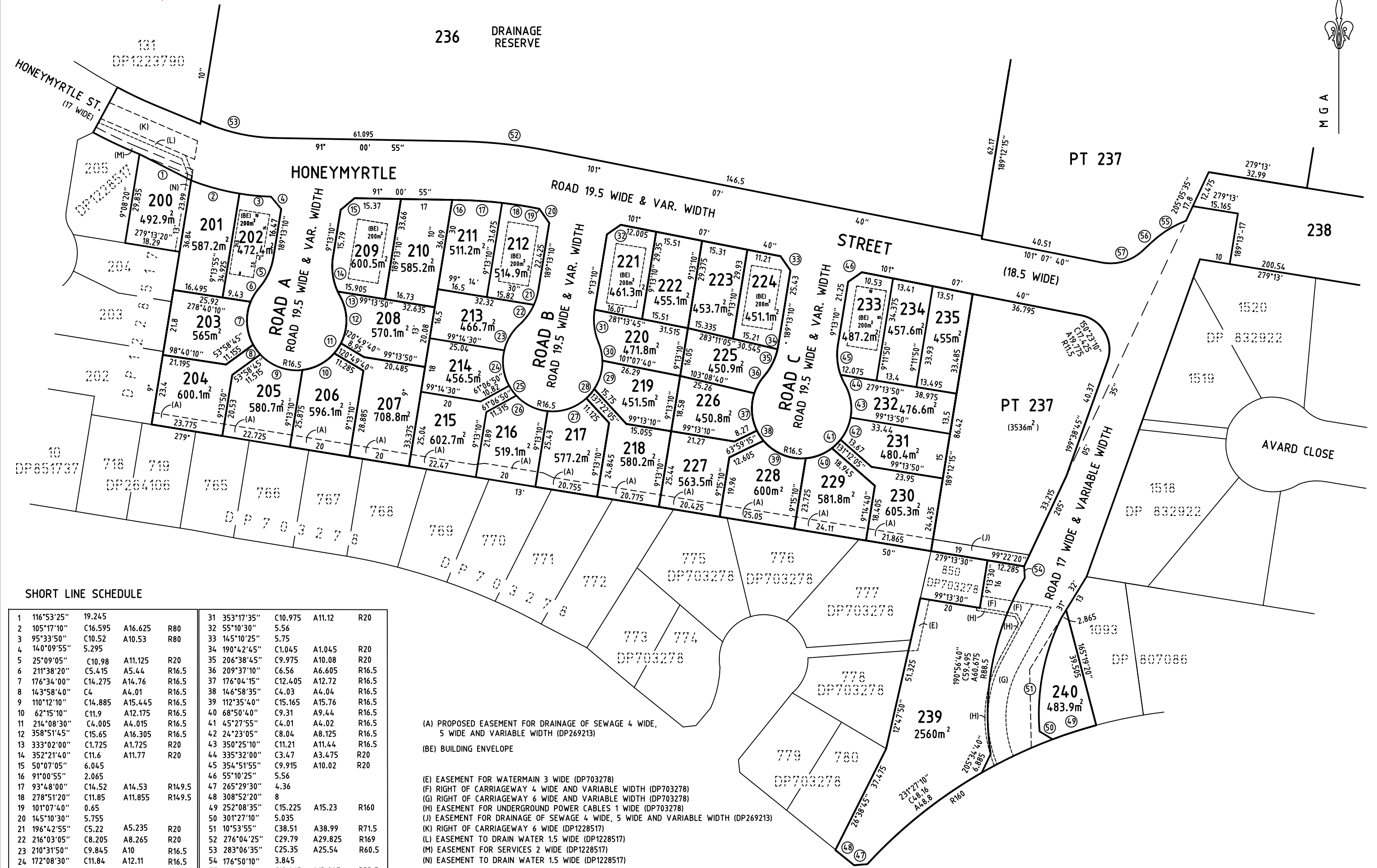
ALL DIMENSIONS, AREAS AND EASEMENTS ARE APPROXIMATE ONLY AND SUBJECT TO FINAL SURVEY.



(D) EASEMENT TO DRAIN WATER 64.1 WIDE (DP1256869)

<p>SURVEYOR Name: REBECCA LYN JONES Date: Reference: 224173_ST2_DP</p>	<p>PLAN OF SUBDIVISION OF LOT 425 IN DP1262858, LOT 848 IN DP703278, LOT 1094 IN DP807086, LOT 8884 IN DP786883, LOT 1538 IN DP832922 AND LOT 206 IN DP1228517</p>	<p>LGA: MAITLAND Locality: THORNTON Reduction Ratio: 1:2000 Lengths are in metres</p>	<p>REGISTERED</p>	
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ALL DIMENSIONS, AREAS AND EASEMENTS ARE APPROXIMATE ONLY AND SUBJECT TO FINAL SURVEY.



SHORT LINE SCHEDULE

1	116°53'25"	19.245			
2	105°17'10"	C16.595	A16.625	R80	
3	95°33'50"	C10.52	A10.53	R80	
4	140°09'55"	5.295			
5	25°09'05"	C10.98	A11.125	R20	
6	211°38'20"	C5.415	A5.44	R16.5	
7	176°34'00"	C14.275	A14.76	R16.5	
8	143°58'40"	C4	A4.01	R16.5	
9	110°12'10"	C14.885	A15.445	R16.5	
10	62°15'10"	C11.9	A12.175	R16.5	
11	214°08'30"	C4.005	A4.015	R16.5	
12	358°51'45"	C15.65	A16.305	R16.5	
13	333°02'00"	C1.725	A1.725	R20	
14	352°21'40"	C11.6	A11.77	R20	
15	50°07'05"	6.045			
16	91°00'55"	2.065			
17	93°48'00"	C14.52	A14.53	R149.5	
18	278°51'20"	C11.85	A11.855	R149.5	
19	101°07'40"	0.65			
20	145°10'30"	5.755			
21	196°42'55"	C5.22	A5.235	R20	
22	216°03'05"	C8.205	A8.265	R20	
23	210°31'50"	C9.845	A10	R16.5	
24	172°08'30"	C11.84	A12.11	R16.5	
25	144°05'50"	C4.03	A4.04	R16.5	
26	116°28'00"	C11.62	A11.875	R16.5	
27	71°36'30"	C13.55	A13.96	R16.5	
28	40°21'15"	C4.03	A4.04	R16.5	
29	16°04'10"	C9.795	A9.945	R16.5	
30	348°04'50"	C6.135	A6.17	R16.5	
31	353°17'35"	C10.975	A11.12	R20	
32	55°10'30"	5.56			
33	145°10'25"	5.75			
34	190°42'45"	C1.045	A1.045	R20	
35	206°38'45"	C9.975	A10.08	R20	
36	209°37'10"	C6.56	A6.605	R16.5	
37	176°04'15"	C12.405	A12.72	R16.5	
38	146°58'35"	C4.03	A4.04	R16.5	
39	112°35'40"	C15.165	A15.76	R16.5	
40	68°50'40"	C9.31	A9.44	R16.5	
41	45°27'55"	C4.01	A4.02	R16.5	
42	24°23'05"	C8.04	A8.125	R16.5	
43	350°25'10"	C11.21	A11.44	R16.5	
44	335°32'00"	C3.47	A3.475	R20	
45	354°51'55"	C9.915	A10.02	R20	
46	55°10'25"	5.56			
47	265°29'30"	4.36			
48	308°52'20"	8			
49	252°08'35"	C15.225	A15.23	R160	
50	301°27'10"	5.035			
51	10°53'55"	C38.51	A38.99	R71.5	
52	276°04'25"	C29.79	A29.825	R169	
53	283°06'35"	C25.35	A25.54	R60.5	
54	176°50'10"	3.845			
55	238°18'10"	C12.965	A13.045	R33.5	
56	227°08'45"	4.695			
57	254°08'10"	C14.07	A14.605	R15.5	

- (A) PROPOSED EASEMENT FOR DRAINAGE OF SEWAGE 4 WIDE, 5 WIDE AND VARIABLE WIDTH (DP269213)
- (BE) BUILDING ENVELOPE
- (E) EASEMENT FOR WATERMAIN 3 WIDE (DP703278)
- (F) RIGHT OF CARRIAGEWAY 4 WIDE AND VARIABLE WIDTH (DP703278)
- (G) RIGHT OF CARRIAGEWAY 6 WIDE AND VARIABLE WIDTH (DP703278)
- (H) EASEMENT FOR UNDERGROUND POWER CABLES 1 WIDE (DP703278)
- (J) EASEMENT FOR DRAINAGE OF SEWAGE 4 WIDE, 5 WIDE AND VARIABLE WIDTH (DP269213)
- (K) RIGHT OF CARRIAGEWAY 6 WIDE (DP1228517)
- (L) EASEMENT TO DRAIN WATER 1.5 WIDE (DP1228517)
- (M) EASEMENT FOR SERVICES 2 WIDE (DP1228517)
- (N) EASEMENT TO DRAIN WATER 1.5 WIDE (DP1228517)

<p><b>SURVEYOR</b> Name: REBECCA LYN JONES Date: Reference: 224172_ST2_DP</p>	<p>PLAN OF SUBDIVISION OF LOT 425 IN DP122858, LOT 848 IN DP703278, LOT 1094 IN DP807086, LOT 8884 IN DP786883, LOT 1538 IN DP832922 AND LOT 206 IN DP1228517</p>	<p>LGA: MAITLAND Locality: THORNTON Reduction Ratio: 1:800 Lengths are in metres</p>	<p>REGISTERED</p>
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# 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](http://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:

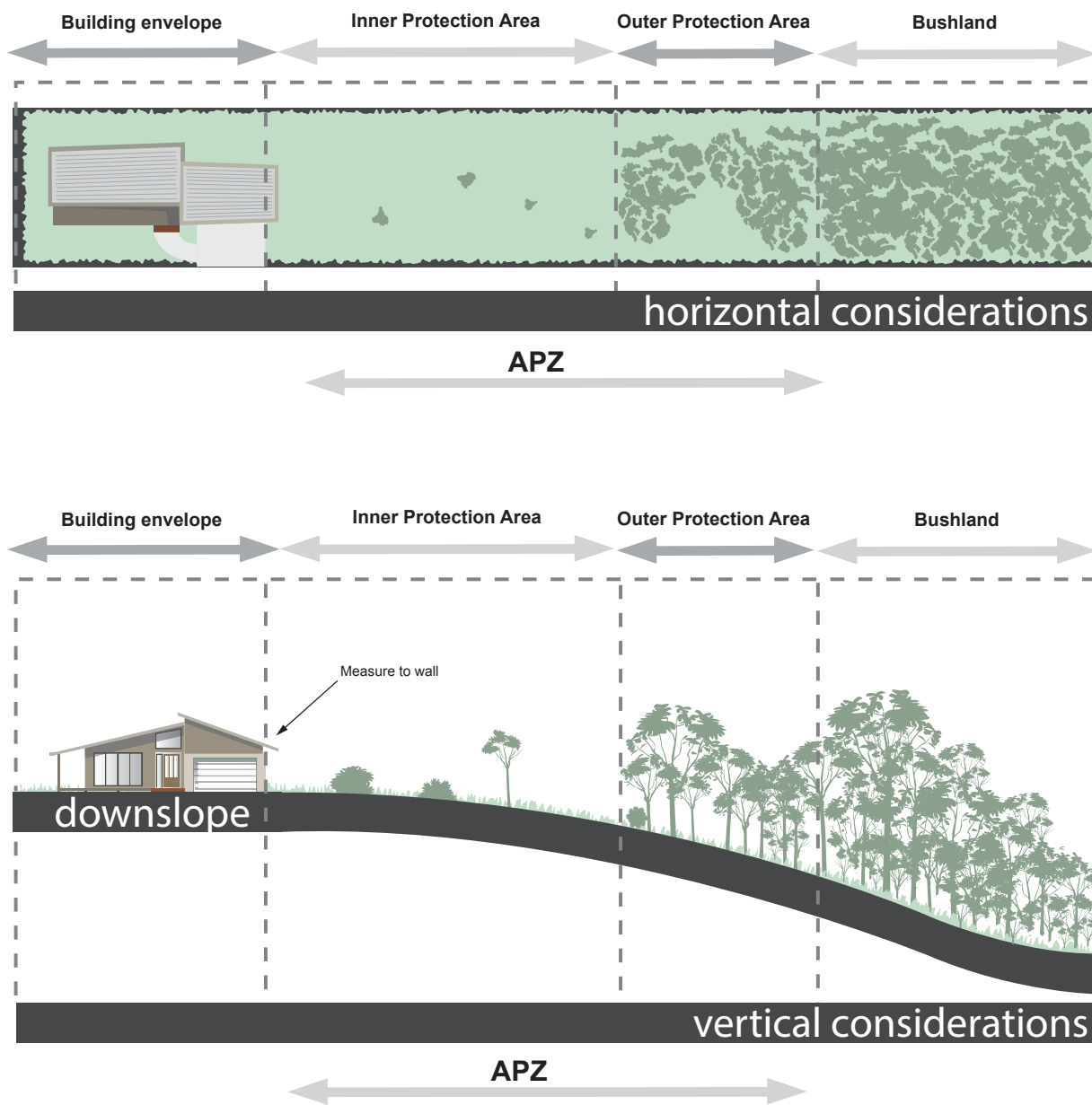
- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

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.

# APPENDIX C RADIANT HEAT CALCULATIONS



# NBC Bushfire Attack Assessment Report V4.0

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 29/10/2024

Assessment Date: 29/10/2024

Site Street Address: Stage 2 Thornton, Thornton

Assessor: Sarah Jones; Firebird Eco

Local Government Area: Maitland

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: veg to the north

## Vegetation Information

Vegetation Type: Hunter Macleay DSF

Vegetation Group: Dry Sclerophyll Forests (Shrub/Grass)

Vegetation Slope: 3.57 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): 38

## 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 12.5

Peak Elevation of Receiver(m): 8.13

Radiant Heat(kW/m<sup>2</sup>): 12.12

Flame Angle (degrees): 74

Flame Length(m): 16.92

Maximum View Factor: 0.201

Rate Of Spread (km/h): 2.15

Inner Protection Area(m): 31

Transmissivity: 0.793

Outer Protection Area(m): 7

Fire Intensity(kW/m): 27317



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**Run Description:** veg to the north

---

**Vegetation Information**

**Vegetation Type:** Hunter Macleay DSF

**Vegetation Group:** Dry Sclerophyll Forests (Shrub/Grass)

**Vegetation Slope:** 3.57 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

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**Site Information**

**Site Slope** 0 Degrees

**Site Slope Type:** Downslope

**Elevation of Receiver(m)** Default

**APZ/Separation(m):** 27

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**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

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**Program Outputs**

**Level of Construction:** BAL 19

**Peak Elevation of Receiver(m):** 7.95

**Radiant Heat(kW/m2):** 18.77

**Flame Angle (degrees):** 70

**Flame Length(m):** 16.92

**Maximum View Factor:** 0.301

**Rate Of Spread (km/h):** 2.15

**Inner Protection Area(m):** 21

**Transmissivity:** 0.82

**Outer Protection Area(m):** 6

**Fire Intensity(kW/m):** 27317

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**Run Description:** Veg to the North

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**Vegetation Information**

**Vegetation Type:** Hunter Macleay DSF

**Vegetation Group:** Dry Sclerophyll Forests (Shrub/Grass)

**Vegetation Slope:** 3.57 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

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**Site Information**

**Site Slope** 0 Degrees

**Site Slope Type:** Downslope

**Elevation of Receiver(m)** Default

**APZ/Separation(m):** 19

---

**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

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**Program Outputs**

**Level of Construction:** BAL 29

**Peak Elevation of Receiver(m):** 7.54

**Radiant Heat(kW/m2):** 28.31

**Flame Angle (degrees):** 63

**Flame Length(m):** 16.92

**Maximum View Factor:** 0.44

**Rate Of Spread (km/h):** 2.15

**Inner Protection Area(m):** 15

**Transmissivity:** 0.846

**Outer Protection Area(m):** 4

**Fire Intensity(kW/m):** 27317

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