BUSHFIRE THREAT ASSESSMENT

FOR
PROPOSED RESIDENTIAL SUBDIVISION
AT
NEILSON STREET
EDGEWORTH

Prepared by:

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Prepared for:	**Edgeworth Developments**
Reference No.	Neilson Street, Edgeworth
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Disclaimer

Not withstanding 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 Edgeworth Developments to undertake Bushfire assessment over land at Lots 1 and 2 DP 1011589, Neilson Street, Edgeworth, within the Lake Macquarie City Council Local Government Area (the site).

The report has been undertaken in accordance with Planning for Bushfire Protection 2006 (PBP 2006), AS3959-2009 Construction of Buildings in Bush Fire Prone Areas and the addendum to appendix 3 of PBP 2006.

The proposal is for a residential subdivision which includes the creation of access roads and detention basins / drainage ponds (the proposal). 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 of 20m are required between any future dwelling within the proposed subdivision and the Open Forest to the north and east of the site. These APZs will be comprised of the proposed Perimeter Road along the northern boundary and proposed Perimeter Road and detention basins along the eastern boundary of the site.

- Bushfire Attack Levels (BALs) shall be determined under Section 79BA of EP&A Act for each individual dwelling upon application. Refer to Section 5 of this report for further information.

- All property access roads shall be designed in accordance with PBP. Property access roads should be designed in accordance with section 4.1.3; Access (2) – Property Access of PBP (RFS, 2006). This will be determined under Section 79BA of EP&A Act for each individual dwelling upon application.

- Any proposed development be linked to the existing mains pressure water supply and that suitable hydrants be clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure should comply with AS2419.1, 2005.

Provided the recommendations stated within this report are implemented in full then Firebird ecoSultants Pty Ltd is of the opinion that the proposed subdivision is able to meet the aims and objectives of PBP (RFS, 2006).

Yours faithfully
Firebird ecoSultants

Sarah Jones
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Terms & Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419 -2005	Australian Standard – Fire Hydrant Installations
AS3959-2009	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
BTA	Bush Fire Threat Assessment
EPA Act	*NSW Environmental Planning and Assessment Act 1979*
FDI	Fire Danger Index
FMP	Fuel Management Plan
ha	hectare
IPA	Inner Protection Area
LGA	Local Government Area
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection 2006
PSC	Port Stephens Council
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

Firebird ecoSultants Pty Ltd has been engaged by Edgeworth Developments to undertake a Bushfire assessment over land at Lots 1 and 2 DP1011589, Neilson Street, Edgeworth, within the Lake Macquarie City Council Local Government Area (the site) (Figure 1-1). The proposal is for a residential subdivision along with the creation of access roads and a detention basin / drainage pond (the proposal).

The proposal is for a residential subdivision as defined within Chapter 4.1.1 of Planning for Bushfire Protection 2006 and this report has been prepared in accordance with the requirements of section 91 of the *Environment Planning and Assessment Act* and 100B *Rural Fire Act*.

This BTA is suitable for submission with a Development Application and provides information on measures that will enable the development to comply with 'Planning for Bushfire Protection' (NSW RFS, 2006), hereafter referred to as PBP (RFS, 2006).

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)*.

1.1 Site Particulars

Locality:	Neilson Street, Edgeworth NSW 2285
LGA:	Lake Macquarie
Forest Danger Index:	100FDI
Current Land Use:	Large cleared areas from previous industrial rezoning with the remainder of the area consisting of natural bushland.
Climate / Fire History:	The site lies within a geographical area with a Fire Danger Index (FDI) rating of 100. Extreme bushfire weather is therefore associated with long periods of drought, high temperatures, low humidity and gusty often north-westerly winds.

1.2 Legislative Requirements

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

- Section 100b of the RFS Act 1997;
- PBP (RFS, 2006); and
- AS3959-2009 Construction of Buildings in Bushfire Prone Areas.

LEGEND

SUBJECT SITE

TITLE: PROPOSED SUBDIVISION OF LOT 1 AND 2 DP1011589
NEILSON STREET EDGEWORTH
EDGEWORTH DEVELOPMENTS AND MOITS

FIGURE 1.1 - LOCATION MAP

High Definition Design Drafting
KEVIN URANE 0412009891

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No	Amendment	Drawn	Date
7	DCP ISSUE	KU	15.12.15
6	COUNCIL ISSUE	KU	9.10.15
8	DA ISSUE	KU	14.01.16

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1.3 Description of the Proposal

This assessment has been undertaken for a proposed residential subdivision of Lots 1 and 2 DP1011589, Neilson Street, Edgeworth. Refer to Appendix A for proposed subdivision plans.

1.4 Objectives of Assessment

This assessment has been undertaken in accordance with Clause 46 of the *Rural Fire*s. 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);
- Construction standards and design (Bushfire Attack Levels);
- Appropriate access standards for residents, fire-fighters, emergency workers and those involved in evacuation;
- Adequate water supply and pressure, and utility services;
- Emergency management arrangements for fire protection and / or evacuation; 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 of map vegetation cover and extent;
- Desk-top analysis of existing data; and
- Analysis of information collected via ecological field survey by Nicholas Alexander conducted on 25th August 2015.

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, 2006).

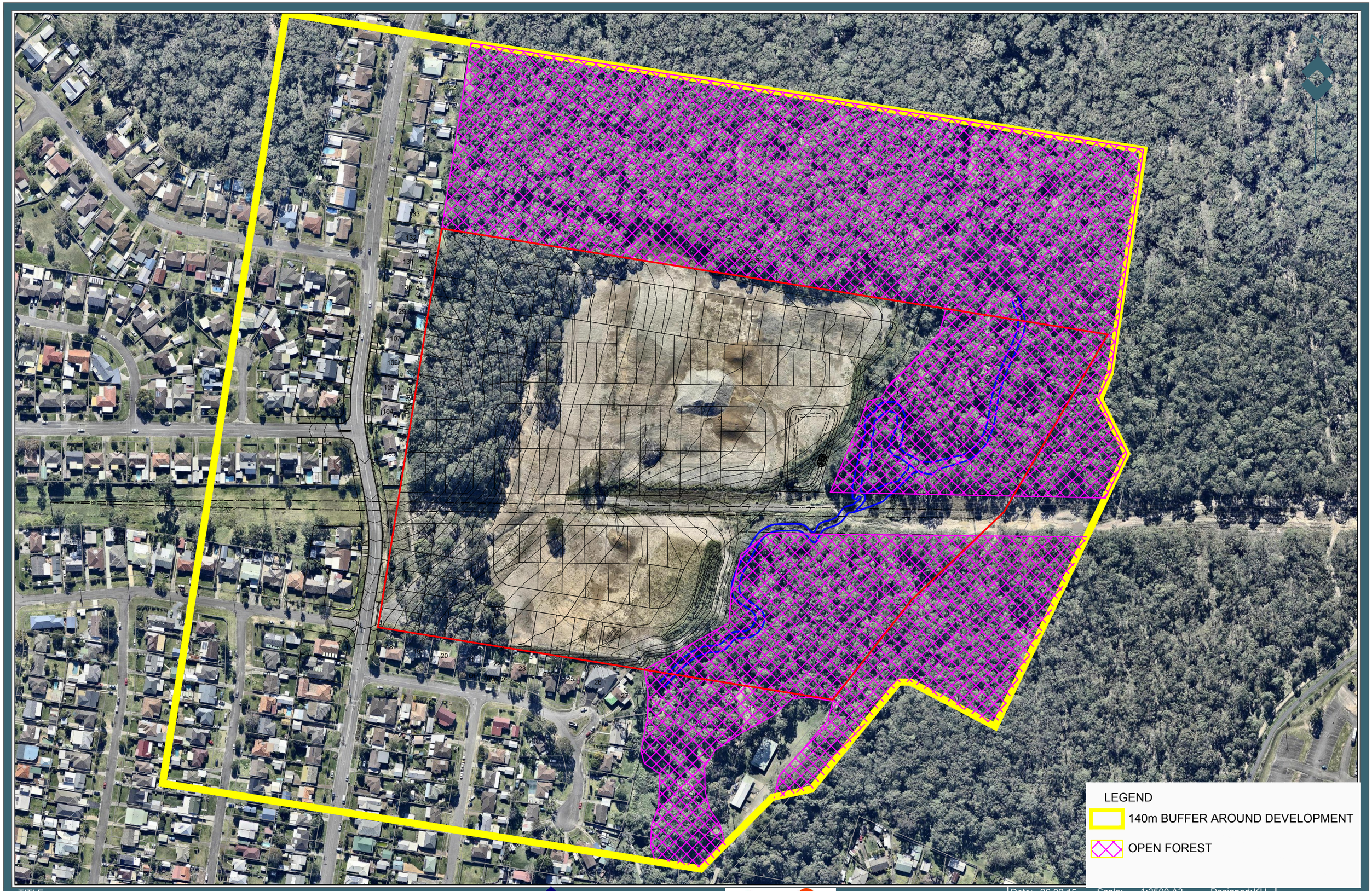
3.1 Vegetation Assessment

In accordance with PBP (RFS 2006), 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 and Figure 3-1.

Table 3-1: Vegetation Classification

Direction	Vegetation Type	Distance from Site Boundary
North	Open Forest	Approximately 20m as proposed Perimeter Road occurs between the Open Forest and the site.
East	Open Forest	Approximately 20m as proposed Perimeter Road occurs between the Open Forest and the site
South	Developed / Managed Land	Adjacent
West	Developed / Managed Land	Adjacent



TITLE: PROPOSED SUBDIVISION OF LOT 1 AND 2 DP1011589
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EDGEWORTH DEVELOPMENTS AND MOITS

FIGURE 3.1 - VEGETATION MAP

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3.2 Effective Slope Assessment

In accordance with PBP (RFS 2006), an assessment of the slope affecting the bushfire behaviour was undertaken for a distance of 100m from the edge of the lot boundaries in the direction of the bushfire hazard.

The slopes leading away from the site have been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site. Refer to Table 3-2 for Vegetation and Slope Assessment for the site.

Table 3-2: Vegetation & Slope Assessment

Direction from Site	Vegetation	Slope Vegetation occurs on
North	Open Forest	Cross-slope
East	Open Forest	Upslope
South	Developed / Managed Land	N.A
West	Developed / Managed Land	N.A

4 BUSHFIRE ATTACK ASSESSMENT

4.1 Bushfire Assessment

The site lies within Lake Macquarie Local Government Area and therefore is assessed under a FDI rating of 100. Using the methodology outlined in Appendix 2 of PBP, and the results from the Site Assessment (section 3 of this report) the deemed to satisfy APZ requirements for future dwellings within the proposed lots and any bushfire hazard is detailed in Table 4-1 and Figure 4-1.

Table 4-1: Bushfire Attack Assessment for the Site

Direction from Development	Vegetation classification within 140m	Effective Slope (within 100m)	APZ to be provided	Assessment Method
North	Open Forest	Cross-slope	20m	PBP 2006 requires that a 20m APZ be established
East	Open Forest	Upslope	20m	PBP 2006 requires that a 20m APZ be established
South	Developed / Managed Land	N.A	N.A	PBP 2006 does not require an APZ
West	Developed / Managed Land	N.A	N.A	PBP 2006 does not require an APZ

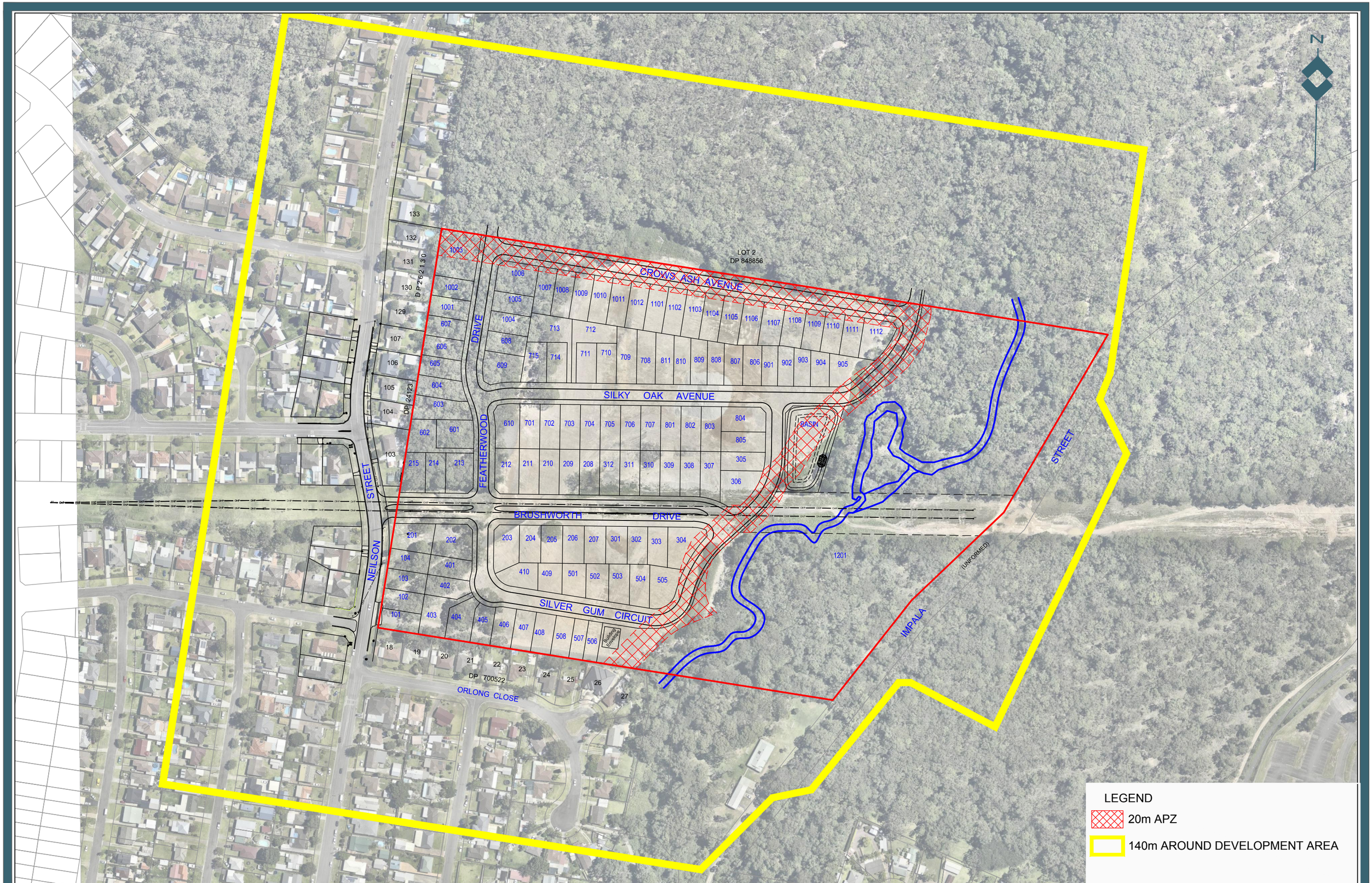

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FIGURE 4.1 - APZ MAP

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5 DWELLING DESIGN & CONSTRUCTION

On 6 March 2009, Council of Standards approved the revised Australian Standard AS3959-2009 *Construction of buildings in bushfire prone areas* (AS3959-2009). This standard was published by Standards of Australia on 10 March 2009 and replaces the 1999 version of the document.

AS3959-2009 was formally adopted by the BCA as the national standard on 1 May 2010. The BCA 2010 references AS3959-2009 as the deemed-to-satisfy (DTS) solution for construction requirements in bush fire prone areas for NSW. In order to clarify the NSW development approval process, the RFS has prepared an addendum to *Planning for Bush Fire Protection* 2006 (PBP) which replaces the existing Appendix 3. The addendum aligns PBP Appendix 3 with the BCA DTS separation distance requirements for the Bushfire Attack Levels (BAL) of AS3959-2009. It also maintains ember protection consistent with current requirements.

Building design and the materials used for construction of future dwellings should be chosen based on the information contained within AS3959-2009, 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 AS3959-2009.

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 FDI = 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^2.

(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^2.

(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^2.

(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^2.

(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^2.

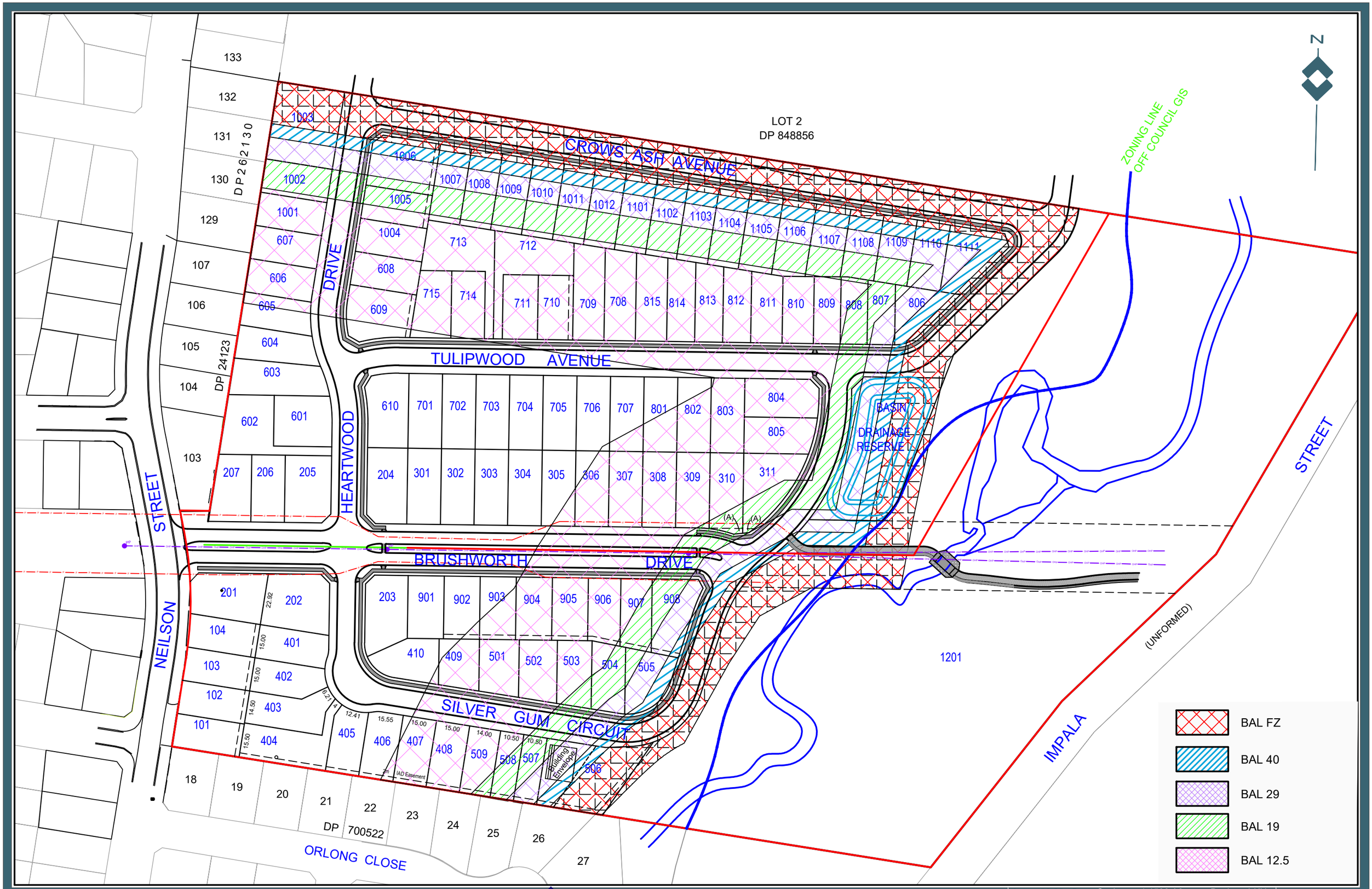
5.1 Determination of Bushfire Attack Levels

Using a FDI of 100, the information relating to vegetation, slope and according to Table 2.4.2 of AS3959-2009 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)	Construction Section
Open Forest occurs on land classified as cross-slope or upslope to the north and east of the site.	25-<35m	BAL-29	Sect 3 & 7 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
	35-<48m	BAL- 19	Sect 3 & 6 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
	48-<100m	BAL-12.5	Sect 3 & 5 of AS3959 and Sect A3.7 of PBP Addendum Appendix 3
	>100m	BAL-LOW	No Requirements

Any future dwelling within the site will need to be assessed under Section 79BA of EP&A Act which requires assessment in accordance with AS3959-2009.



TITLE: PROPOSED SUBDIVISION OF LOT 1 AND 2 DP1011589
NEILSON STREET EDGEWORTH
EDGEWORTH DEVELOPMENTS AND MOITS

FIGURE 5.1- BUSHFIRE ATTACK LEVEL

High Definition Design Drafting
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6 ACCESS

6.1 Public Roads

All lots will have direct access to the public road system. This ensuring that all residents evacuating the area can do in a safe manner in the opposite direction of any bushfire hazard and allow for emergency personnel to safely access the vegetation. Refer to attachment 1 for proposed lot layout.

The subdivision has been assessed against the acceptable solution and performance based assessment for Access (1) - Public Roads of PBP and the roads compliance with PBP is detailed in Table 1 below:

Table 6-1: Compliance with Access (1) - Public Roads in accordance with PBP

Performance Criteria	Acceptable Solutions	Compliance
The intent may be achieved *where:*		
▪ fire-fighters are provided with safe all weather access to structures (thus allowing more efficient use of fire fighting resources)	▪ public roads are two-wheel drive, all weather roads	Complies- all public roads will be two wheel drive all weather roads.
▪ public road widths and design that allow safe access for fire-fighters while residents are evacuating an area.	▪ urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle). ▪ the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas. ▪ traffic management devices are constructed to facilitate access by emergency services vehicles. ▪ public roads have a cross fall not exceeding 3 degrees. ▪ all roads are through roads. Dead	Complies – The proposed public road will comply with the acceptable solution.

Performance Criteria	Acceptable Solutions	Compliance
	end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard. ▪ curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress. ▪ the minimum distance between inner and outer curves is six metres. ▪ 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. ▪ there is a minimum vertical clearance to a height of four metres above the road at all times.	
▪ the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles.	▪ the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating.	Complies
▪ roads that are clearly sign- posted (with easily distinguishable names) and buildings/properties that are clearly numbered.	▪ public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression. ▪ public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire	Complies

Performance Criteria	Acceptable Solutions	Compliance
	suppression.	
▪ there is clear access to reticulated water supply	▪ public roads up to 6.5 metres wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. ▪ one way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.	Complies
▪ parking does not obstruct the minimum paved width	▪ parking bays are a minimum of 2.6 metres wide from kerb edge to road pavement. No services or hydrants are located within the parking bays. ▪ public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road.	Complies

6.2 Property Access

Property access roads should be designed in accordance with section 4.1.3; Access (2) – Property Access of PBP (RFS, 2006). This will be assessed under Section 79BA of EP&A Act for any future dwelling within the approved subdivision.

7 SERVICES

7.1 Water Supply & Pressure

The subject land will be serviced by reticulated water and will extend into the development area. 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).

7.2 Gas & Electricity Supply

Any gas services are to be installed and maintained in accordance with AS 1586. The relief valves of any gas cylinder located near the dwelling will be directed away from the buildings and away from combustible materials.

8 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 of 20m are required between any future dwelling within the proposed subdivision and the Open Forest to the north and east of the site. These APZs will be comprised of the proposed Perimeter Road along the northern boundary and proposed Perimeter Road and detention basins along the eastern boundary of the site.

- Bushfire Attack Levels (BALs) shall be determined under Section 79BA of EP&A Act for each individual dwelling upon application. Refer to Section 5 of this report for further information.

- All property access roads shall be designed in accordance with PBP. Property access roads should be designed in accordance with section 4.1.3; Access (2) – Property Access of PBP (RFS, 2006). This will be determined under Section 79BA of EP&A Act for each individual dwelling upon application.

- Any proposed development be linked to the existing mains pressure water supply and that suitable hydrants be clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure should comply with AS2419.1, 2005.

Provided the recommendations stated within this report are implemented in full then Firebird ecoSultants Pty Ltd is of the opinion that the proposed subdivision is able to meet the aims and objectives of PBP (RFS, 2006).

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9 BIBLIOGRAPHY

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APPENDIX A PROPOSED SUBDIVISION PLANS

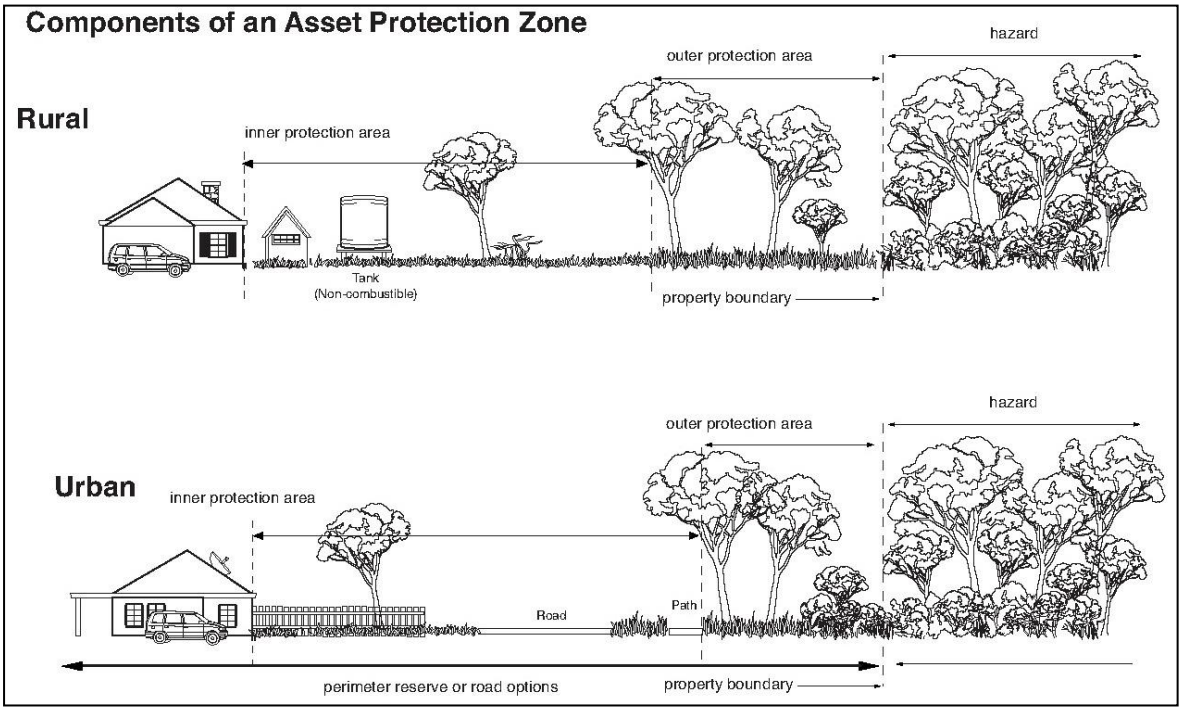
APPENDIX B ASSET PROTECTION ZONES

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). The respective IPA and OPA widths for the required APZs are as detailed in Table 5-1. 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 (PBO 2006)



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.