CLARKE DOWDLE & ASSOCIATES
DEVELOPMENT CONSULTANTS
SURVEYORS • PLANNERS • ECOLOGISTS • BUSHFIRE CONSULTANTS

BUSH FIRE ASSESSMENT REPORT

For the proposed manufactured home estate at

303 BLACKHEAD ROAD, HALLIDAYS POINT, NSW

(LOT 3 in DP 242332)

January 2020

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DOCUMENT TRACKING

Project Location	303 Blackhead Road, Hallidays Point
Date	31/01/2020
Prepared by	Ashley Dowdle
Reviewed by	Kristan Dowdle
Approved by	Kristan Dowdle
Status	FINAL
Version	3

1.0 INTRODUCTION

Clarke Dowdle & Associates has been engaged to conduct a Bush Fire Assessment Report (BFAR) on the property located at 303 Blackhead Road, Hallidays Point, NSW. The proposal is for the creation of a manufactured home estate. This assessment was performed in January 2020 and is an amendment to a previous version performed in August 2018. This BFAR was conducted in accordance with the procedures and methods recommended in the NSW Rural Fire Service published document '*Planning for Bushfire Protection'* (PBP).

This (BFA) is an amended report to a previous application and serves to identify issues relating to the condition of the site as part of the level of assurance required for consent by Mid-Coast Council to the Development Application (DA) pertaining to the proposed development on the site. A BFAR is required as the site falls within a Bushfire Prone Area as identified by Mid-Coast Council.

The proposed development involves the creation of a Manufactured Home Estate within a designated bushfire prone area. These types of developments are identified under Clause 46(a) - *Rural Fires Regulation 2008* are classed as a *Special Fire Protection Purpose* (SFPP) which are integrated under the *Environmental Planning and Assessment Act.*

This report will form the basis for providing an assessment of the bushfire protection requirements for the development and will provide recommendations on the provision of Asset Protection Zones, accessibility, water supplies and construction standards of future developments within the site.

1.1 Proposed Development

The proposed development will involve the creation of a manufactured home estate. The proposal also includes the construction of an office manager's residence, community centre, bowling green, and men's shed on the north-western portions of the site. The development will also include lands dedicated to council for the construction of sporting ovals and facilities to the south-east.

The site will be provided main road access via Coastal View Drive to the north with additional access for emergency vehicles via Blackhead Road to the south.

As the development will include 198 long term sites, the following clause from the *RFS Fast Fact-Holiday Parks* is relevant;

It should be noted that holiday parks may cater for both short term transient and long-term accommodation. The RFS views long term accommodation as exceeding 6 weeks in duration and considers that long term occupants will be familiar with their surrounds, safe refuge areas and escape routes. As such, long term accommodation within holiday parks may be treated as residential development under certain circumstances

Therefore the 198 long term sites will be classed as similar to a residential subdivision due to these sites being occupied by permanent residents, rather than a special fire protection development.

Figure 1 provides a site plan of the proposal.

Figure 1: Proposed Development Site Plan

2.0 OBJECTIVES AND SCOPE OF THE ASSESSMENT

The primary objectives of this report are to:

- Outline the degree of bushfire hazard currently affecting the site;
- Outline the degree to which any identified bushfire hazard can be managed;
- Indicate the potential of the site to provide a safe development;
- Provide recommendations for the provision of Asset Protection Areas and Construction standards;
- Review the accessibility of the site; and
- Identify any pre-existing bushfire protective measures such as roads and creeks.

In order to achieve the above objectives, the following work was conducted:

- Compilation and review of site information including a site detail plan, topographic map, aerial photograph and site photographs;
- Review of appropriate guidelines including Australian Standard AS3959-2009 '*Construction of Buildings in Bushfire Prone Areas'* and PBP;
- Inspection of the proposed development site and surrounding areas to assess the topography, slopes, aspect, drainage vegetation and adjoining land usage;
- Identification of any existing bushfire protection advantages such as roads, creeks and sporting ovals; and
- Visual appraisal of bushfire hazard and risk to the site.

3.0 LEGISLATION

This report has been prepared in accordance with the following legislation and planning requirements:

- *Environmental Planning and Assessment Act, 1979*,
- *Rural Fires Act, 1997 (Amended)*, Sections 63 (1) and 63 (2) and 100B
- *Planning for Bushfire Protection* (NSW Rural Fire Service, 2006).

4.0 SITE IDENTIFICATION AND DESCRIPTION

4.1 Site Identification and Location

The subject site is located at 303 Blackhead Road, Hallidays Point (Lot 3 in DP 242332). The site is in the Local Government Area (LGA) of Mid-Coast Council (Fire Danger Index-80).

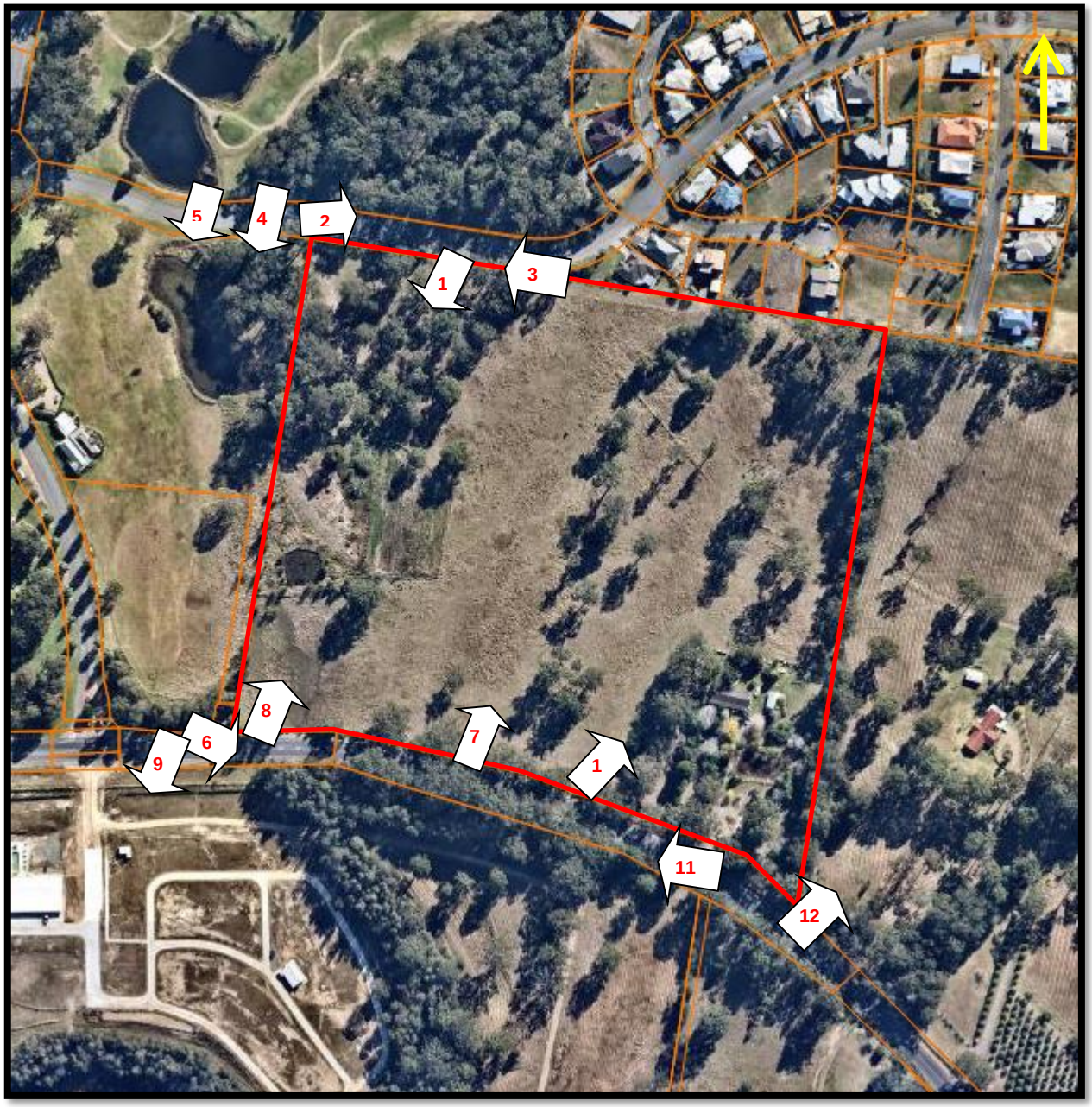

Figure 2: Aerial Photograph of the site (site boundary bordered in red)
Source: Nearmap, 2020

The site is a large rural/residential parcel of land and land conditions within the site consists of:

- An existing dwelling on the south-eastern portions
- Predominantly cleared and managed lands/grasslands throughout the site
- A number of trees scattered throughout the property with grasslands existing beneath.

The site will be connected to the town-reticulated supply of water and the mains electrical grid. The site will be provided access via Coastal View Drive to the north and Blackhead Road to the south.

4.2 Bushfire Prone Mapping

The site has been mapped by Mid-Coast Council as being bushfire prone. The site has been mapped as being partially within the bushfire buffer (yellow) and partially containing Category 1 (red) vegetation. Figure 3 outlines this.

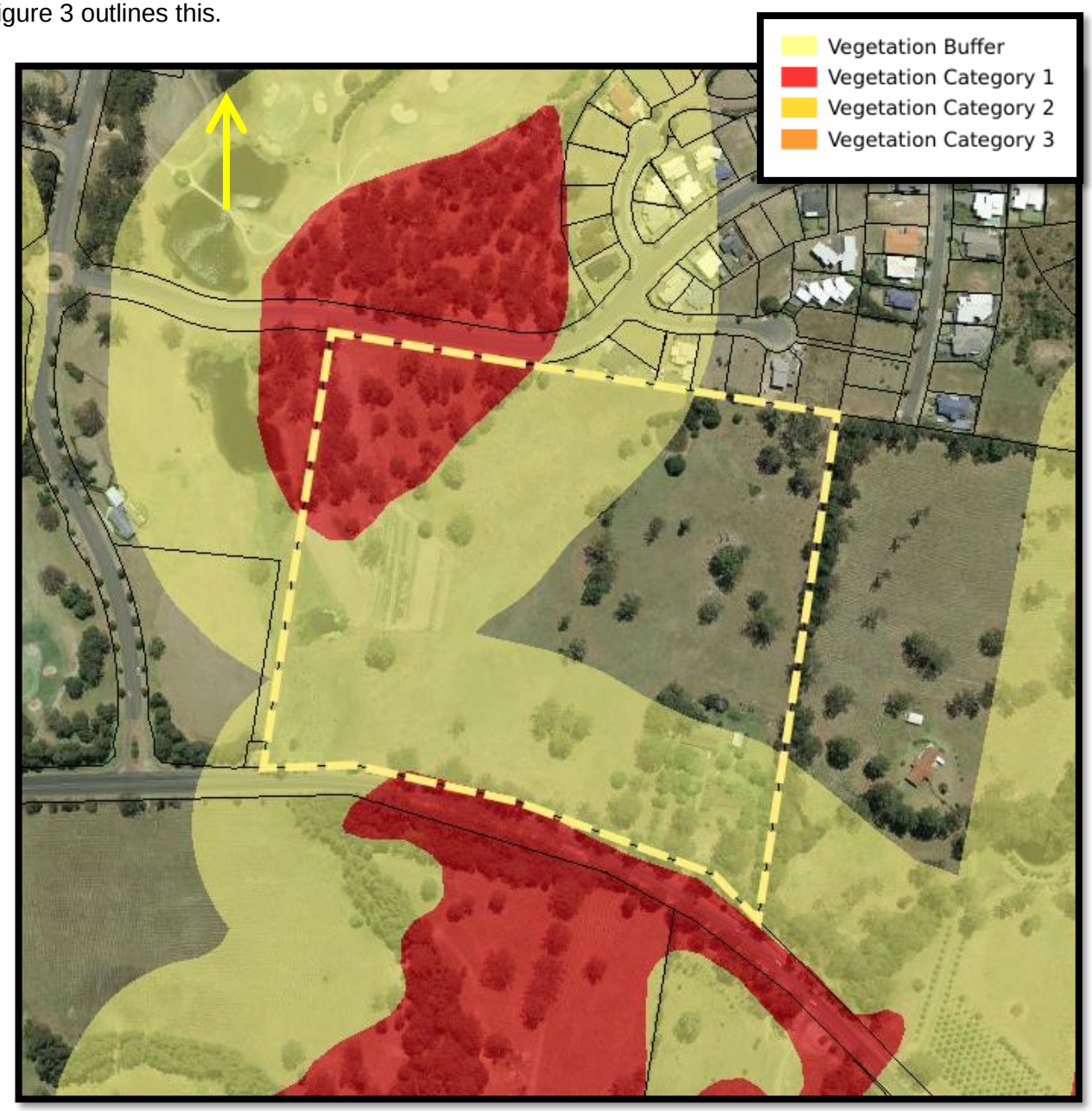

Figure 3: Bushfire Mapping (site bordered in blue)
Source: Department of Planning, 2020

4.3 Surrounding Vegetation

A site inspection was conducted in June, 2018 and the surrounding land and vegetation found within 140m of the site are detailed below (See Figure 5).

4.3.1 Non-Hazard Facing Aspects

North-East

The surrounding land on this aspect is occupied by developed residential allotments containing predominately managed curtilage throughout. Therefore, this aspect is deemed not to contain a bushfire hazard.

West
The surrounding land on this aspect has been dedicated to Mid-coast council for parklands of which will contain managed curtilage throughout. Therefore, this aspect is deemed not to contain a bushfire hazard.

4.3.2 Hazard Aspects

North/North-west
To the north of the site beyond Coastal View Drive, is a small portion of vegetation that meets with the Keith (2004) description of '*dry sclerophyll forest'*. This vegetation will be assessed as **Forest** as per PBP.

It is noted that this portion of land is subject to an approved subdivision (330/2015/DA) of which, when constructed, will remove the hazardous vegetation.

North-West
To the north-west of the site and existing in the adjoining allotment is a small area of vegetation bordering a dam. As can be seen in figure 4 this small area was calculated to be less than 1 Ha in size and therefore in accordance with Section A2.3 in PBP, can be considered as a 'remnant' and will be assessed as equivalent to a **Rainforest**.

South
To the south of the site beyond Blackhead Road is a narrow strip of vegetation. As can be seen in figure 5 this narrow strip provides a fire run of less than 50m directly towards the site from this aspect and in accordance with Section A2.3 in PBP, can be considered as a 'remnant' and will be assessed as equivalent to a **Rainforest**.

East
To the east and directly adjoining the site are unmanaged areas of grasslands. In accordance with conversion table 3.7 in Addendum: Appendix 3 in PBP, the vegetation will be assessed as **Grassland** as per PBP.

It is noted the adjoining land parcel of land is subject to an approved subdivision (567/2011/DA) of which, when constructed, will remove the hazardous vegetation.

Figure 4: Remnant Vegetation Area
Source: Nearmap, 2020

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Note: See figure 2 for photograph location and direction.

4.4 Effective Slope

PBP states in A2.3(b) that effective slope is;

'the gradient within the hazard (vegetation) which will most significantly influence the fire behaviour of the site having regard to vegetation class found.'

In regards to the site, the effective slopes for each hazard facing were inspected and calculated through topographic mapping as sourced by NSW Spatial Services (1m contours). This data has a stated accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal. The effective slope measured 100m from the proposed development for the hazard facing aspects are;

North: **1° Up Slope**
North-West: **0-5° Down Slope**
South: **0-5° Down Slope**
East: **Flat/Cross Slope**

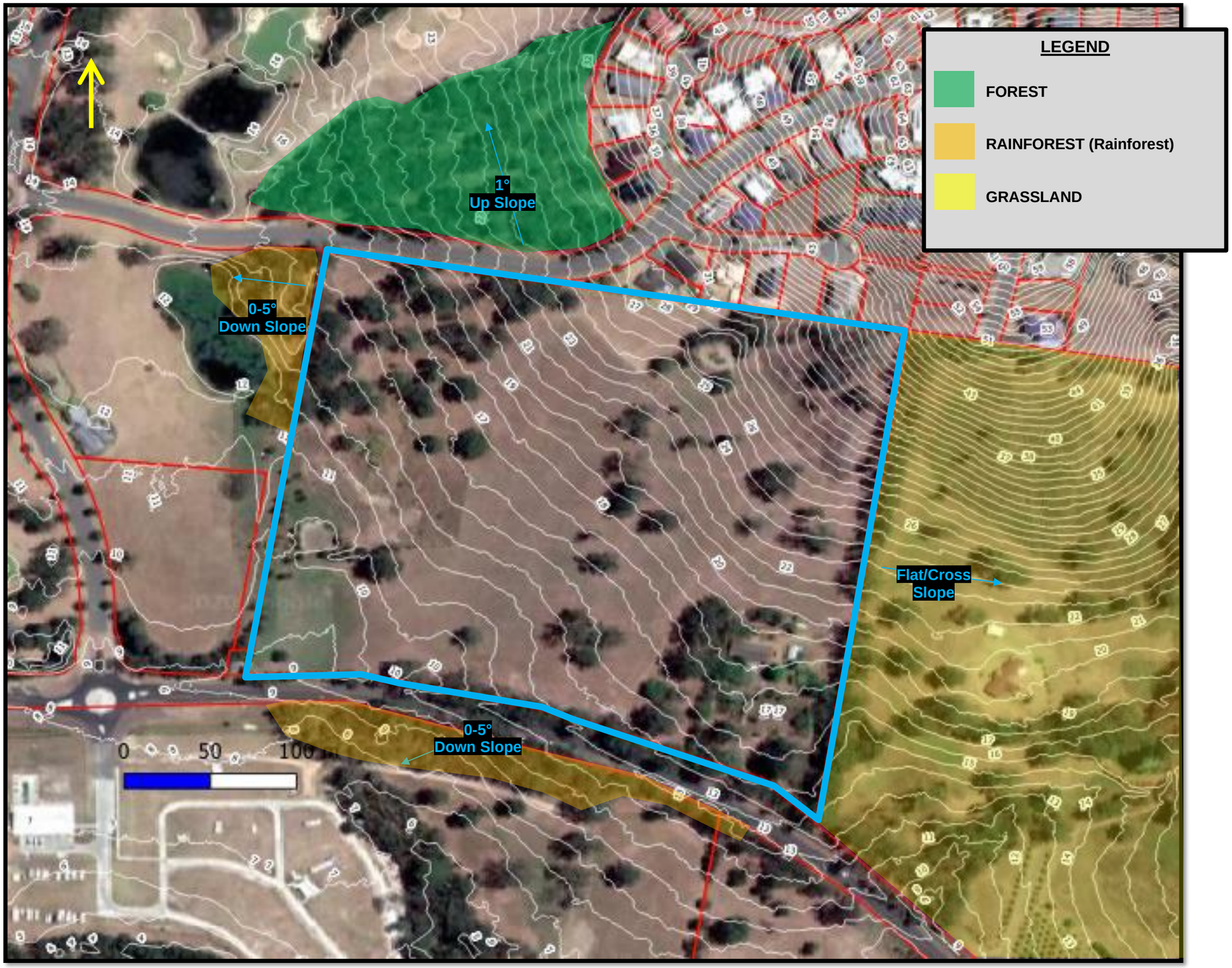


Figure 5: Bushfire Site Plan (site bordered in red)
Source: Google Earth Pro/ NSW Spatial Services, 2020

5.0 BUSHFIRE RISK ASSESSMENT

5.1 Background Information

This bushfire assessment follows the methods and procedures recommended in PBP. This document provides concepts for (via a NSW State variation to the BCA) Class 1, 2, 3 buildings, Class 4 parts of buildings, some Class 10 structures and Class 9 buildings that are Special Fire Protection Purposes (SFPP) (AS3959-2009) in bushfire prone areas and gives guidance on planning and development control processes in relation to bushfire protection measures. The document also provides a methodology for determining setback distance and Bushfire Attack Levels (BAL) required in development for residential purposes that are found to fall in areas designated as bushfire-prone.

5.2 Asset Protection Zones

Appendix 2 of PBP provides a methodology for determining the Asset Protection Zone (APZ) required for any given proposed development. APZ's describes the distance between the proposed development (the asset) and the hazard (the bushland) and vary according to topography and vegetation type. PBP states that the primary purpose of an APZ is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures within the development.

A summary of the APZ's required for each aspect is provided in Table 1. Further details as to the theory behind APZ's are contained in Appendix A.

6.3 Bushfire Attack Level (BAL)

The bushfire risk to property depends on the vegetation type, slope and proximity of vegetation to the proposed development, and can be classified as BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL FZ as outlined in AS3959-2009 and PBP. The categories of bushfire attack were determined for the vegetation conditions currently existing on the site and adjacent areas. Following the identification of the bushfire attack category for each aspect, the site will be assessed according to vegetation that presents the highest level of bushfire attack risk. AS3959-2009 provides two methods to determine complying Bushfire Attack Levels, these are the **Simplified Procedure-Method 1** (deemed-to-satisfy) and **Detailed Method for Determining the Bushfire Attack Level-Method 2 (Alternate Solution).**

Table 1 provides an assessment through Method 1 for the north-eastern, southern and western hazards and the through Detailed Assessment Method 2 in AS3959-2009 for the north-eastern aspects which involved the following inputs

North

- Forest Vegetation (PBP Fuel loads 25 tonnes/hectare)
- Fire Danger Index (FDI) - 80
- The effective slope of 1° Up Slope
- An APZ/ site slope of Flat/0° (Road pavement)
- A Flame Width of 100m

The level of bushfire attack then determines the construction standards necessary for the proposed development. These protective construction measures are outlined in Australian Standard AS3959-2009.

The APZs and BALs required for each of the sites of the proposed development are summarised in Table 1.

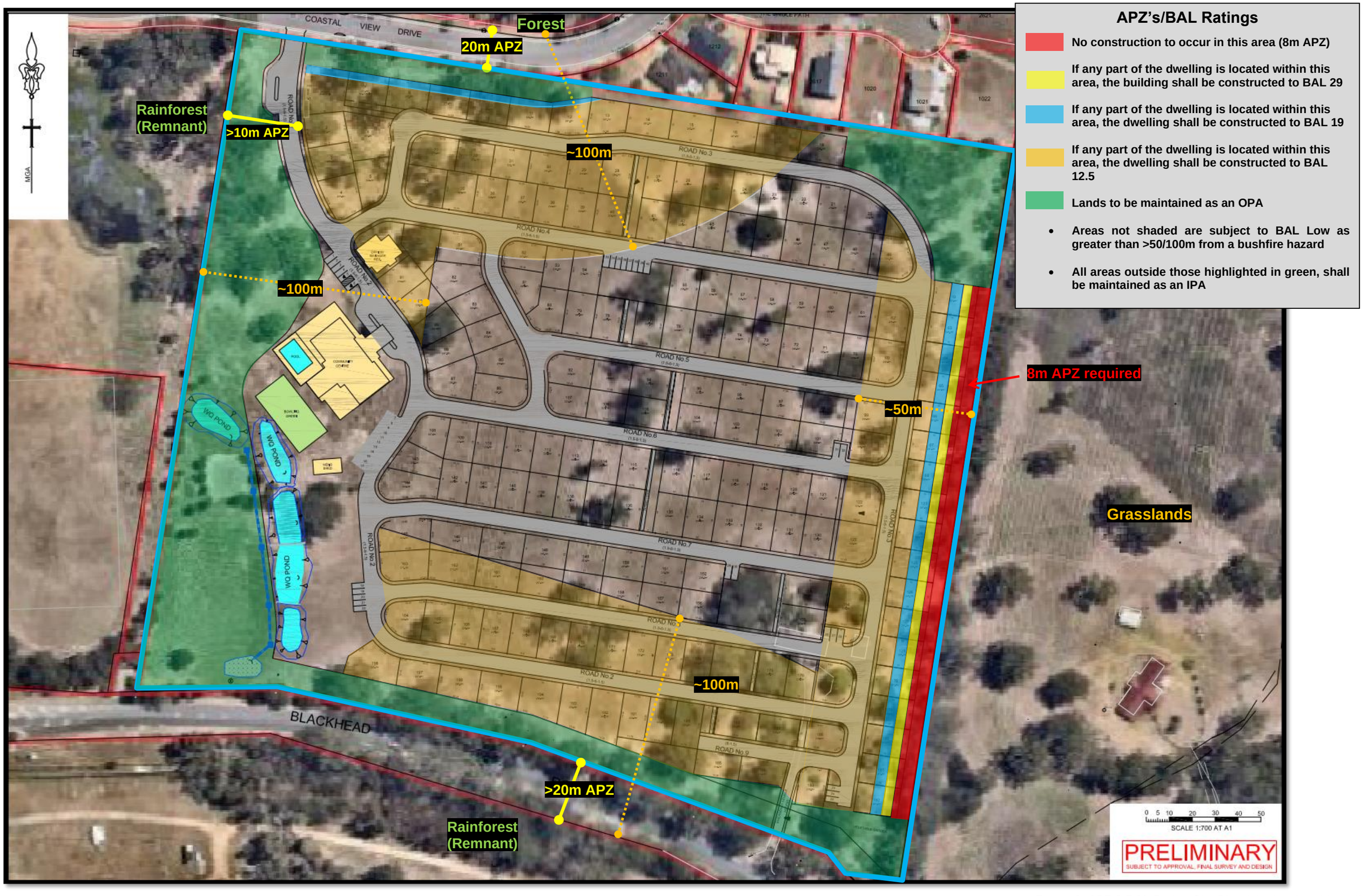
It is noted that upon the construction of the approved developments upon the adjoining lots to the north and west of the site (330/2015/DA & 567/2011/DA), the existing bushfire hazard/s will be removed and therefore the BAL ratings outlined would not be applicable.

Table 1: Asset Protection Zone/BAL Summary

Aspect	Vegetation[1] within 140m of development	Effective Slope of Land	APZ required in accordance with PBP[2]	BAL Rating based on setback[3]
North	Forest	1° Up Slope	20m	**>23.6m–<33.2m – BAL 19 >33.2m–<100m – BAL 12.5 (Refer to Method 2 Calculations)[4]**
North-East & West	Managed Lands	-	-	BAL LOW
North-West	Rainforest (Remnant)	0-5° Down Slope	10m	**17m–<24m – BAL 19 24m–<100m - BAL 12.5**
South	Rainforest (Remnant)	0-5° Down Slope	10m	**>24m- BAL 12.5**
East	Grasslands	Flat/Cross Slope	-	**<8m – No Construction 8m–<12m – BAL 29 12m–<17m – BAL 19 17m–<50m – BAL 12.5**

Notes for Table 1:

- (1) Refer to Keith (2004) and Table A2.1 *PBP*
- (2) Refer to Table A2.5 *PBP* for Residential and Rural Residential Subdivision Developments
- (3) Refer to Table 2.4.3 in AS3959-2009
- (4) Refer to Method 2 Calculations below and Appendix A



APZ's/BAL Ratings

- **No construction to occur in this area (8m APZ)**
- **If any part of the dwelling is located within this area, the building shall be constructed to BAL 29**
- **If any part of the dwelling is located within this area, the dwelling shall be constructed to BAL 19**
- **If any part of the dwelling is located within this area, the dwelling shall be constructed to BAL 12.5**
- **Lands to be maintained as an OPA**
  - **Areas not shaded are subject to BAL Low as greater than >50/100m from a bushfire hazard**
  - **All areas outside those highlighted in green, shall be maintained as an IPA**

Figure 6: APZ & BAL Rating Site Plan (site bordered in red)
Source: Nearmap, 2020

6.0 PERFORMANCE CRITERIA COMPLIANCE

The following table outlines the proposed subdivision's compliance or otherwise with each of the performance requirements and acceptable solutions provided in Section 4.1.3 and 4.2.7 of PBP.

6.1 Asset Protection Zones

In relation to Asset Protection Zones, PBP states;

'Intent of measures: to provide sufficient space and maintain reduced fuel loads, so as to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with a building.

The following compliance table summarises the specific areas for performance requirements, acceptable solution and performance compliance of the proposal for APZ's

Table 2- Performance Compliance Table Summary for APZ's

PBP Performance Requirement	Acceptable Solution	Performance Compliance
In relation to asset protection zones: • radiant heat levels at any point on a proposed building will not exceed 29 kW/m2	APZs are provided in accordance with Appendix 2.	Yes - APZs comply with these minimum requirements.
	APZs are wholly within the boundary of the development site.	The APZ's required are located within and on developed/ cleared lands and are deemed to provide compliance.
APZs are managed and maintained to prevent the spread of a fire towards the building.	In accordance with the requirements of Standards for Asset Protection Zones (RFS 2005).	Yes - can be made a condition of consent.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	The APZ is located on lands with a slope of less than 18°.	Yes-complies

As outlined within table 1 the proposed development will be provided with APZ's that meet and/or exceed the required APZ's as stipulated in Table A2.4 in PBP.

6.1.1 Environmental Considerations

Mid-Coast Council has stated that due to ecological impacts, specifically impacts to Koala Habitat, vegetation removal must be minimised. To address this, it has recommended that the areas shown in green in Figure 6, be maintained as Outer Protection Area (OPA). This will allow the retention of trees (30% canopy coverage), however, we also keep fuel loads low so as not to provide a bushfire hazard to the proposal. The management of these areas as an OPA is further justified as the site does not adjoin large areas of vegetation that would allow for a significant fire pathway toward the proposal. Also due to the approved subdivisions upon the adjoining parcels of lands to the north and west will remove the existing hazards currently present.

6.2 Access-Public and Internal Roads

In relation to internal roads, PBP states;

'Intent of measures: to provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area.'

The following compliance table summarises the specific areas for performance requirements, acceptable solution and performance compliance of the proposal for Internal Roads.

Table 3- Performance Compliance Table Summary for Internal/Public Roads

PERFORMANCE CRITERIA (PBP: Section 4.2.7)	ACCEPTABLE SOLUTION	PERFORMANCE COMPLIANCE
internal road widths and design enable safe access for emergency services and allow crews to work with equipment about the vehicle.	Internal roads are two-wheel drive, sealed, all-weather roads;	Yes, Can Comply
	Internal perimeter roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions;	Proposed development complies. See Comments below
	Roads are **through** roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	Complies
	traffic management devices are constructed to facilitate access by emergency services vehicles.	Can Comply
	a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.	Can Comply
	curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.	Can Comply.
	the minimum distance between inner and outer curves is six metres.	Can Comply.
	maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees.	Complies
	crossfall of the pavement is not more than 10 degrees.	Complies
	roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge).	Complies
	roads are clearly sign-posted and bridges clearly indicate load ratings	Can Comply
	the internal road surfaces and bridges have a capacity to carry fully-loaded firefighting vehicles (15 tonnes).	Can Comply

The development will contain internal roads which will be provided with a 6m wide trafficable width, however, there will be 1.5m clear on either side which would allow for a trafficable width of 9m. These widths and road designs are deemed to comply with PBP.

It is also noted that the proposed development will create an emergency access and egress road which will be located on the south-eastern boundary.

6.3 Access- Fire Trails

In relation to Fire Tails, PBP states;

'Intent of measures: to provide suitable access for fire management purposes and maintenance of APZs.'

No fire trails are proposed as part of the application.

6.3 Services – Water, electricity and gas

In relation to services, PBP states;

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

The following compliance table summarises the specific areas for performance requirements, acceptable solution and performance compliance of the proposal for Water Supplies, Gas and Electricity.

Table 4- Performance Compliance Table Summary for Water Supply

PERFORMANCE CRITERIA (PBP: Section 4.2.7)	ACCEPTABLE SOLUTION	COMMENTS
Water Supplies (reticulated) **Water supplies are easily accessible and located at regular intervals**	Access points for reticulated water supply to SFPP developments incorporate a ring main system for all internal roads.	Can comply and will form part of the conditions detailed within the Bush Fire Safety Authority
	Fire hydrant spacing, sizing and pressures comply with AS 2419.1- 2005. Where this cannot be met the RFS will require a test report of the water pressures anticipated by the relevant water supply authority, once development has been completed. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles	
	The provisions of public roads in section 4.1.3 in relation to parking are met.	
Electricity Services **location of electricity services will not lead to ignition of surrounding bushland or the fabric of buildings or risk to life from damaged electrical infrastructure**	Electrical transmission lines should be installed underground	Can comply and will form part of the conditions detailed within the Bush Fire Safety Authority
Gas services **location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings**	Reticulated or bottled gas is installed and maintained in accordance with AS 1596 and the requirements of relevant authorities. Metal piping is to be used. All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation. If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used	Can comply and will form part of the conditions detailed within the Bush Fire Safety Authority

6.4 Emergency Evacuation and Planning

In relation to emergency evacuation and planning, PBP states;

'Intent of measures: to provide suitable emergency and evacuation (and relocation) arrangements for occupants of special fire protection purpose developments.'

The following compliance table summarises the specific areas for performance requirements, acceptable solution and performance compliance of the proposal for Public Roads

Table 5- Performance Compliance Table Summary for emergency evacuation and planning

PERFORMANCE CRITERIA (PBP: Section 4.2.7)	ACCEPTABLE SOLUTION	PERFORMANCE COMPLIANCE
an Emergency and Evacuation M Management Plan is approved by the relevant fire authority for the area.	an emergency/evacuation plan is prepared consistent with the RFS Guidelines for the Preparation of Emergency/Evacuation Plan.	Can comply and will form part of the conditions detailed within Bush Fire Safety Authority
	compliance with AS 3745-2002 (now A3745-2010) 'Emergency control organisation and procedures for buildings, structures and workplaces' for residential accommodation'.	
	compliance with AS 4083-1997 (now AS4083-2010) 'Planning for emergencies - for health care facilities'.	Not Applicable
suitable management arrangements are established for consultation and implementation of the emergency and evacuation plan.	an Emergency Planning Committee is established to consult with residents (and their families in the case of aged care accommodation and schools) and staff in developing and implementing an Emergency Procedures Manual.	Can comply and will form part of the conditions detailed within the Bush Fire Safety Authority
	detailed plans of all Emergency Assembly Areas including "onsite" and "offsite" arrangements as stated in AS 3745- 2010 are clearly displayed, and an annual (as a minimum) trial emergency evacuation is conducted.	

7.0 RECOMMENDATIONS

The subject site falls within a bushfire prone area as deemed by Mid-Coast Council therefore the requirements of PBP apply. This bushfire assessment has followed the methodology and procedures recommended in the PBP document.

This Bush Fire Assessment Report: concluded that the proposed development may comply with the performance criteria for PBP if the proposed acceptable solutions and recommendations are implemented. These items are outlined below.

7.1 Asset Protection Zones

- A minimum APZ of 8m along the eastern boundary of the site. No development should occur within this area. This APZ may be removed once the adjoining lands are developed.
- Fuel management within the entire site, **excluding those areas highlighted in green in figure 6 of this report,** shall be maintained as an Inner Protection Zone (IPA) and RFS guidelines: *Standards for Asset Protection Zones* (NSW RFS, 2005) and mee with the following criteria;

  Inner Protection Area (IPA)

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

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

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

- Fuel management within **those areas highlighted in green in figure 6 of this report,** shall be maintained as an Outer Protection Zone (OPA) and RFS guidelines: *Standards for Asset Protection Zones* (NSW RFS, 2005) and mee with the following criteria;

  Outer Protection Area (OPA)

  Trees*:*
  - *tree canopy cover should be less than 30%*
  - *trees should have canopy separation*

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

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

7.2 Construction Standards

- Building construction standards for the proposed manufactured home estate are to be applied in accordance with *Australian Standard AS3959-Construction of buildings in bushfire-prone areas* with additional construction requirements as listed within Section A3.7 of Addendum Appendix 3 (PBP) as outlined and depicted in Table 1 & Figure 6 of this report.
- As stated, upon the construction of the approved developments on the adjoining lots to the north and west of the site (330/2015/DA & 567/2011/DA), the existing bushfire hazard/s will be removed and therefore the BAL ratings outlined in Figure 6 & Table 1 would not be applicable.

7.3 Property Access and Evacuation Safety

- All internal roads shall be constructed and design in accordance with Table 4.1 in PBP (AS2890.2-2002) and Section 4.2.7 of PBP.
- All turning areas are to comply with Section 4.1.3 (1) of PBP.

7.4 Emergency and Evacuation Management Plan

A Bushfire Evacuation Plan should be established for the manufactured home estate. This emergency/evacuation plan is to be prepared consistent with the *RFS Guidelines for the Preparation of Emergency/Evacuation Plan* and outline compliance with AS 3745-2010. This plan should address all buildings within the site and include information on, but not limited to, the following;

- Under what conditions and circumstances should the complex be evacuated (e.g. Large bushfire event);
- Where occupants will be evacuated to;
- Roles and responsibilities of persons coordinating the evacuation;
- Roles and responsibilities of persons remaining on site after the evacuation; and
- The procedure to contact emergency services (e.g. NSW Rural Fire Service) and inform them of the evacuation and where they will be evacuated to.

In addition, the following is recommended to the occupants of the manufactured home estate;

- It is recommended that the building occupants prepare a bushfire survival plan which addresses the option to leave early prior to bushfire impacting the site. Details on how to prepare this plan are provided by the NSW RFS website (http://www.rfs.nsw.gov.au/file_system/attachments/Attachment_BushFireSurvivalPlan.pdf)

- The landowner/manager are to be made aware of their liability to manage the development lands for the ongoing protection of themselves and their neighbours (refer to *Section 63(2) Rural Fires Act*).

7.5 Water and Utility Services Supply

- Water, electricity and gas supply for the entire development is to comply with Section 4.2.7 and 4.1.3 of PBP.

7.6 Landscape and Property Management

- The APZ's and site is recommended to be maintained to comply with Appendix 5 in PBP (see Appendix A of this report).

8.0 CONCLUSION

Clarke Dowdle & Associates were engaged to conduct a Bush Fire Assessment on the property located at 303 Blackhead Road, Hallidays Point. The original assessment was performed in July 2018 and this amended version was completed in January 2020 and was conducted in accordance with the procedures and methods recommended in '*Planning for Bushfire Protection'* (PBP). This report provides an updated version of a previous report based upon the altered surrounding conditions.

This report has outlined and provided recommendations as to how the proposal may comply with the aims and objectives of PBP as summarised below;

'Afford occupants of any building adequate protection from exposure to a bushfire'

APZs have been provided which comply with and/or exceed the minimum requirements of Appendix 2 of *PBP*. The future buildings will be constructed in accordance with *AS3959-2009*.

'Provide for a defendable space to be located around buildings'

APZs have been provided which comply with or exceed the minimum requirements outlined within Appendix 2 of PBP.

'Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition'

APZs have been provided in accordance with PBP and future building construction will be in accordance with AS3959-2009. Fuel management will occur in the APZ and will be managed by the owners.

'Ensure that safe operational access and egress for emergency service personnel and residents is available'

Access is to comply with the performance requirements outlined Table 4.1 in PBP (AS2890.2-2002) in Section 4.1.3 (1) of PBP.

'Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ'

Fuel management within the development can be undertaken by the land owners under the guide of NSW RFS publications such as *Standards for Asset Protection Zones* available from the RFS website at www.rfs.nsw.gov.au.

'Ensure that utility services are adequate to meet the needs of fire fighters (and others who may assist in bushfire fighting)'

Water supply, gas services and electricity are to comply with Section 4.1.3 of PBP.

The determining authorities and Rural Fire Service may suggest additional measures to be implemented with any planning and construction upon the subject site.

We would be pleased to provide further information on any aspects of this report.

For and on behalf of

Clarke Dowdle and Associates

Kristan Dowdle

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Grad Dip. Design in Bushfire Prone Areas
Environmental & Bushfire Consultant

Disclaimer

PBP States;
Notwithstanding the precautions adopted, it should always be remembered that bushfire burn under a wide range of conditions and an element of risk, no matter how small always remains.

AS 3959-2009 states;
It should be borne in mind that the measures contained in this standard cannot guarantee that the building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions.

This Bush Fire Assessment Report: provides the required information to assist Local Council and the Rural Fire Service in determining compliance in accordance with PBP and AS 3959-2009 and as stated above, this report does not guarantee that the proposal will withstand bushfire attack on every occasion.

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APPENDIX A RADIANT HEAT CALCULATIONS

Calculated July 20, 2018, 1:27 pm (MDc v.4.8)

303 Blackhead Road, Hallidays Point

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	1.79 km/h
Vegetation classification	Forest	Flame length	14.64 m
Surface fuel load	20 t/ha	Flame angle	53 °, 63 °, 71 °, 75 °, 77 ° & 82 °
Overall fuel load	25 t/ha	Elevation of receiver	5.84 m, 6.52 m, 6.92 m, 7.07 m, 7.13 m & 7.25 m
Vegetation height	n/a	Fire intensity	23,146 kW/m
Effective slope	-1 °	Transmissivity	0.872, 0.853, 0.827, 0.801, 0.788 & 0.727
Site slope	0 °	Viewfactor	0.5991, 0.4458, 0.3016, 0.2047, 0.1664 & 0.0452
Flame width	100 m	Minimum distance to < 40 kW/m²	12.2 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	16.3 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	23.6 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	33.2 m
		Minimum distance to < 10 kW/m²	39.3 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005