



# Bushfire Management Plan

79-99 Courtney Drive, Upper Coomera

Lots 188-192 on RP173728

Gold Coast City Council, Qld

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Prepared for:

**HB Land Pty Ltd**

C/- Zone Planning Group

**PLANS AND DOCUMENTS referred to in the  
DEVELOPMENT APPROVAL**

Application No: **COM/2019/82** .....

Dated: **16 May 2023** .....

**Development shall comply with the  
conditions of approval as detailed in the  
Decision Notice and Council's Planning  
Scheme, Local Laws and Planning Policies**



## Proviso

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It should be noted that the recommendations within this BMP have been formulated based on site conditions at the time of writing and utilising current best-practise hazard and impact assessment methodologies, and have been developed to reduce the potential severity of impacts on the proposed development in the event of a bushfire emergency rather than prevent impacts altogether. No guarantee is provided or assumed that the area will not be affected by bushfire at some time.



## Contents

<b>1.0 INTRODUCTION</b> .....	4
<b>1.1 Subject Site</b> .....	5
<b>1.2 Proposed Development</b> .....	6
<b>2.0 Bushfire Hazard Assessment</b> .....	6
<b>2.1 Current Bushfire Hazard Mapping</b> .....	7
<b>2.2 On-Site Hazard Assessment</b> .....	8
2.2.1 Site Inspection & Findings .....	9
2.2.2 Vegetation Classification .....	10
2.2.3 Potentially Hazardous Vegetation .....	12
2.2.4 Potential Fire Runs .....	13
<b>3.0 Bushfire Risk Mitigation Measures</b> .....	14
<b>3.1 Asset Protection Zones</b> .....	14
3.1.1 Performance Outcomes .....	14
<b>3.2 Bushfire Attack Level – Minimum Distance Assessment</b> .....	15
3.2.1 Waterway/Drainage Reserves & Bushfire Hazard .....	18
3.2.2 Bushfire Attack Level Determination .....	19
<b>3.3 Landscaping and Vegetation Management</b> .....	20
<b>3.4 Emergency Access &amp; Egress</b> .....	21
<b>3.5 Fire Trails</b> .....	21
<b>3.6 Water Availability for Fire-Fighting Purposes</b> .....	22
<b>3.7 Open Space Management</b> .....	22
<b>3.8 Advice to New Residents</b> .....	22
<b>4.0 Recommendations and Conclusions</b> .....	24



## INTRODUCTION

Wollemi Eco-Logical has been commissioned to undertake a Site Specific Bushfire Hazard Assessment and to prepare a Bushfire Management Plan for a proposed development on the subject site (**Figure 1**).

This report aims to assess the Bushfire Hazard and risk to the proposed development with regard to the Queensland State Government Single State Planning Policy - Part E (SPP 2017), the Bushfire Resilient Communities Technical Reference Guide (QFES, 2019), the *Gold Coast City Council, Bushfire Hazard Overlay Code (8.2.3)*, and the *Australian Standard – Construction in Bushfire Prone Areas (AS3959-2018)*. These documents detail both the State and Council interest in Bushfire Hazard with regard to determining suitability of development applications.

The potential Bushfire Hazard acting on the proposed development, is informed by vegetation composition and extent, slope and industry standard fuel load classifications, and assessment methodologies. Bushfire Risk Mitigation Measures are subsequently detailed in order to demonstrate compliance with Councils Planning Scheme Performance Outcomes, and to inform the safety of people and property in the event of a bushfire emergency.

This BMP has been prepared by a suitably qualified and experienced, Environmental Scientist, with over 22 years relevant experience in Environmental Management, with specialist Bushfire Planning and Design expertise in South East Queensland.



## 1.1 Subject Site

**Address:** 79-99 Courtney Drive, Upper Coomera

**Titles:** Lots 188-192 on RP173728

**Local Government:** Gold Coast City Council

**Total Area:** 18,849ha

**Zoning:** Rural Residential - Emerging Community

**Topography:** The site is undulating, predominantly sloping downslope from the south and eastern property boundaries to the north through northwest at up to 5 degrees, with a downslope to the south-eastern site extent.

**Current Use:** Rural Residential land uses.

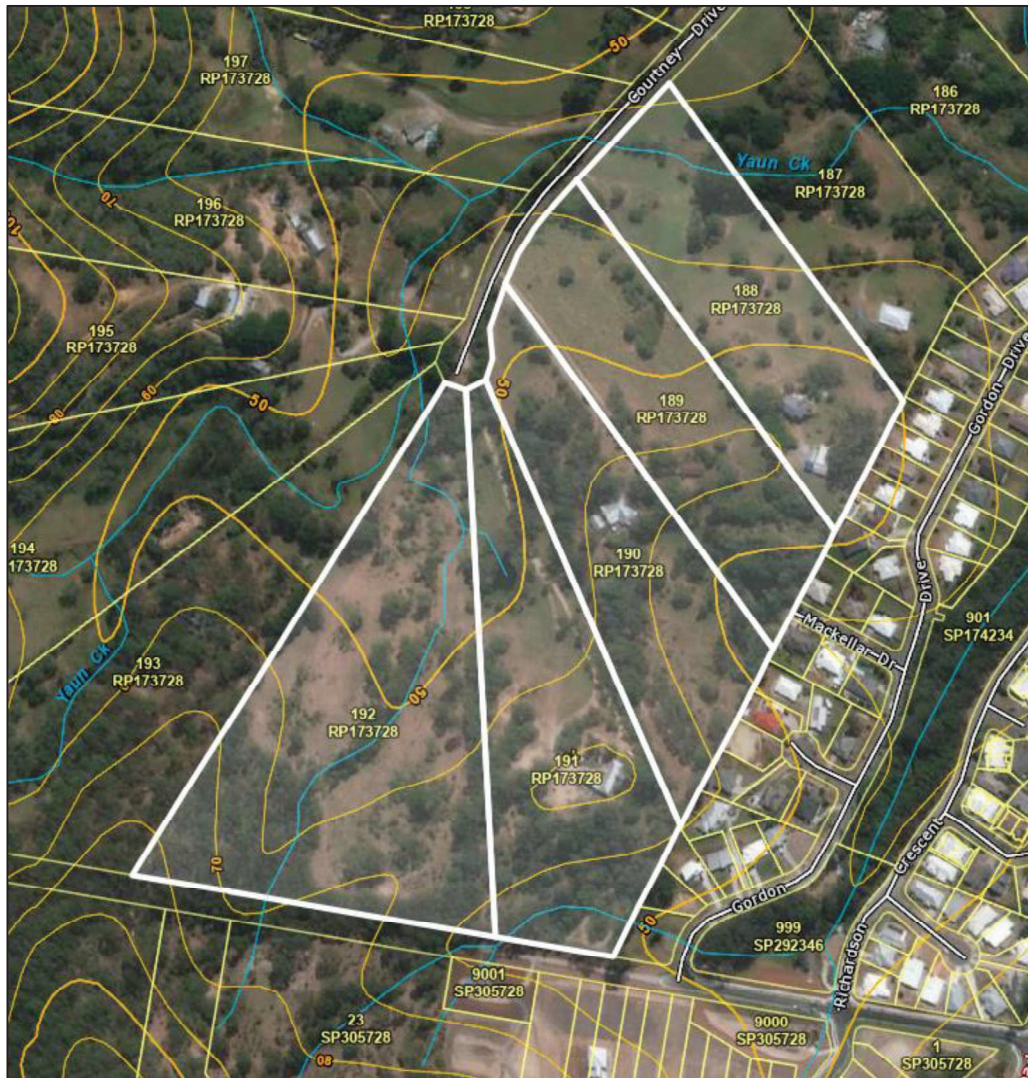


Figure 1: Subject Site



## 1.2 Proposed Development

It is understood a new 196 Residential Lot Subdivision is proposed to be constructed on the subject site. The proposed development layout is represented in **Figure 2**.

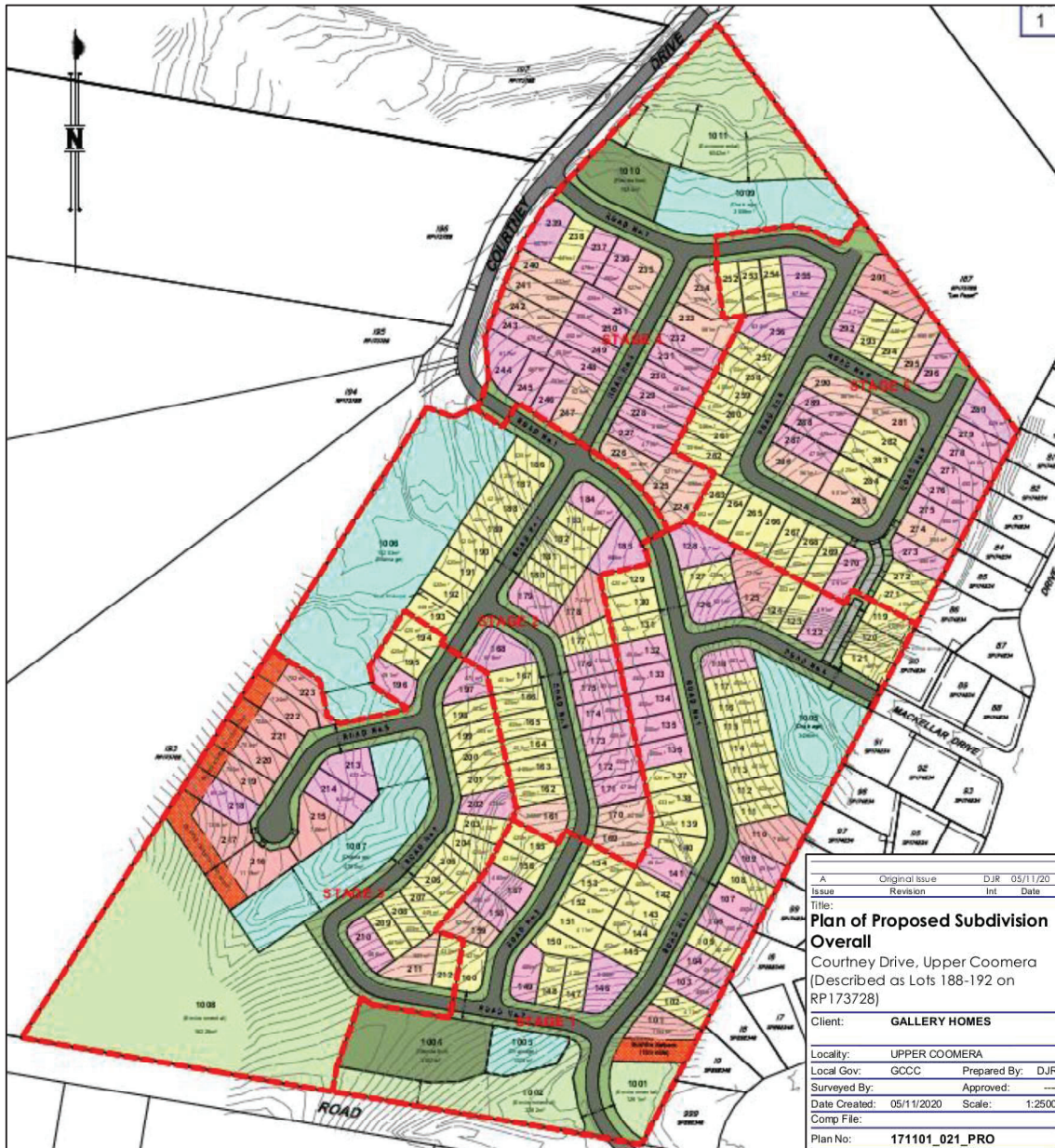


Figure 2: Proposed Development Layout

## 2.0 Bushfire Hazard Assessment

The prevalence of Bushfire in the landscape is dependent on vegetation type and fuel load available to sustain a bushfire. Bushfire intensity and rate of spread are influenced by fuel load, (including type and extent of vegetation), topography and to a lesser extent aspect. Land

uses surrounding potentially hazardous vegetation, and consequently the connectivity of vegetation communities, all influence the potential for a bushfire to develop and be sustained.

## 2.1 Current Bushfire Hazard Mapping

On review of current State Bushfire Hazard Overlay Mapping, as maintained by the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) the site is mapped as being within a Potential Bushfire Hazard area (**Figure 3**).

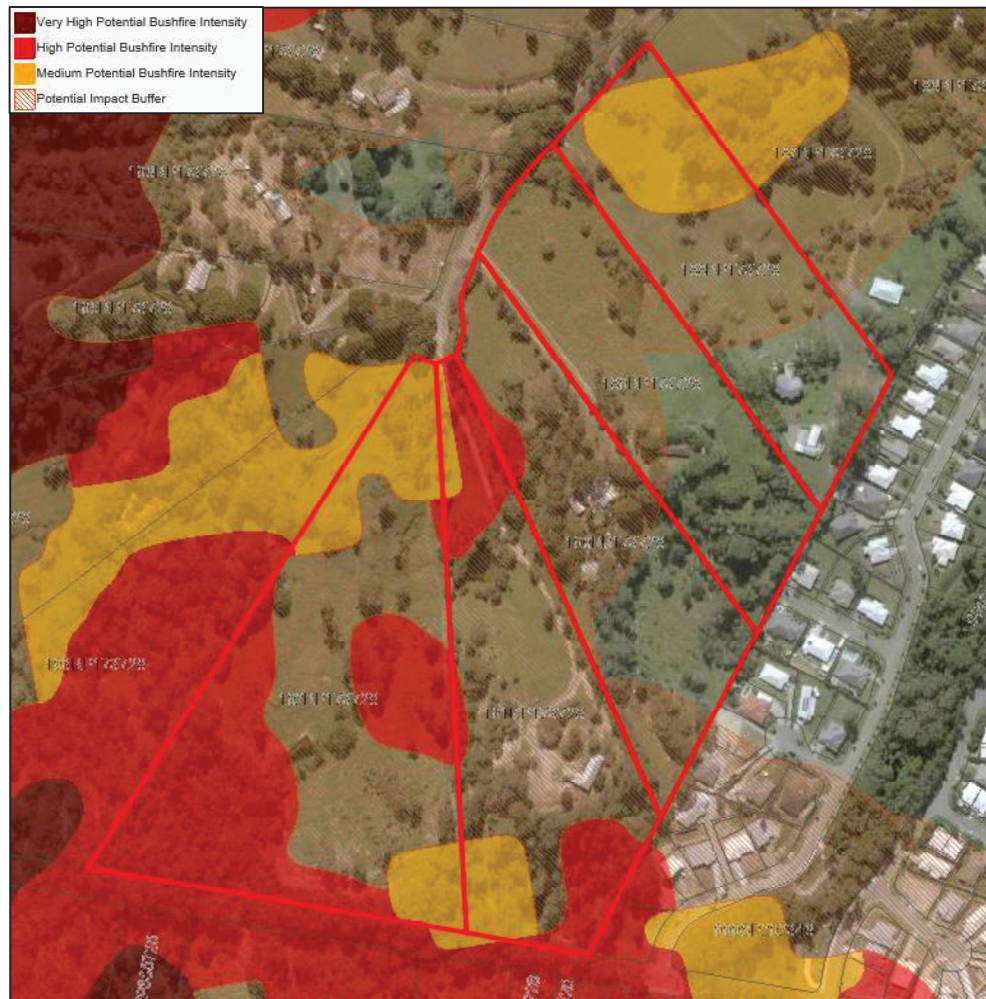


Figure 3: State Bushfire Hazard Overlay Mapping

It is noted that Council Bushfire Hazard Overlay Mapping is consistent with current State mapping as represented in Figure 3. To verify the Bushfire Hazard mapping, a Site-Specific Bushfire Hazard Assessment is triggered, and is addressed below.



## 2.2 On-Site Hazard Assessment

This site-specific Bushfire Hazard Assessment and Management Plan, references: *State Planning Policy (SPP) – Natural Hazards, Risk & Resilience – Bushfire* (DSDMIP 2019); *A new methodology for state-wide mapping of bushfire prone areas in Queensland*. CSIRO, Australia. (2014)<sup>1</sup>; the Bushfire Resilient Communities Technical Reference Guide (QFES, 2019)<sup>2</sup>; the Bushfire Attack Level (BAL), Building setback requirements and Construction Standards as per the Australian Standard AS 3959- 2018 - *Construction of buildings in bushfire prone areas*<sup>3</sup>; and current industry best-practice assessment and Risk Mitigation Measures in compliance with the SPP Assessment Benchmarks where triggered.

Additionally, this BMP will address the requirements of the proposed development against *Gold Coast City Council, Bushfire Hazard Overlay Code (8.2.3)* with regard to the proposed development.

Two key features of the landscape strongly contribute towards the behaviour of bushfires:

1. Vegetation community structure/composition

The structure and composition of vegetation communities determine the rate at which dry fuel accumulates. Some vegetation communities protect fuel from drying out in all but extreme bushfire seasons, making the vegetation susceptible to very destructive bushfires, whilst other vegetation communities may expose fuels to drying and therefore be frequently available for burning.

2. Slope

As a general rule, bushfire intensity and the rate of spread of bushfires rises in proportion to slope, with bushfires burning faster uphill and slower downhill. Studies have shown that the speed and intensity of fires moving up slopes generally doubles every 10 degrees of slope. Steeper slopes also increase the difficulty of constructing ring roads and firebreaks and limit the access for emergency crews.

Several investigative tools were utilised to determine the site specific bushfire hazard risk including:

- A review of local aerial photography;
- A review of site and local topography;
- Review of site development plan;

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<sup>1</sup> This methodology updates the calculations apparent in the Australian Standard AS3959: 2018 based on current fire weather modelling and includes detailed Vegetation Hazard Classes, used to inform State-wide Mapping.

<sup>2</sup> The Bushfire Resilient Communities Technical Reference Guide (QFES, 2019), supports the SPP 2019 by providing technical guidance for bushfire hazard assessment and bushfire management Planning.

<sup>3</sup> The Australian Standard AS3959: 2018 defines Fire Danger Index as the chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long and short term drought effects.





- A review of DERM Regional Ecosystem Mapping; and
- An inspection of the site.

The risk assessment comprised an analysis of the site and the surrounding lands (i.e. within 100m) to determine characteristic bushfire risk based on Vegetation Hazard Classifications for vegetation within 100m of the site.

### 2.2.1 Site Inspection & Findings

A site inspection was completed on the 31<sup>st</sup> August 2017 to verify the bushfire hazard mapping over the site and surrounds. All vegetated areas of the site and within 100m of the proposed development site were assessed during the site investigations.

A summary of the findings of the site inspection is provided:

1. Site access is via Courtney Drive, a formed public bitumen road bordering the northwest of the majority of the site. Courtney Drive is accessed from the east via Reserve Road, a major arterial road, linking the Pacific Motorway in the east.
2. The site is located in a Rural Residential setting, with established dwellings and rural land uses on site and to the west, south and north. Extensive emerging residential development is located immediately to the east of the site, and further afield to the northeast.
3. Site topography is undulating with the lots 188 – 192 generally sloping upslope from Courtney Drive to the southern and eastern extents of the property boundaries (respectively) at up to 5 degrees. Lot 188 contains an overland flow path through the north-western portions of the lots and subsequently slopes downhill from Courtney Drive to the northeast in this locality. Adjacent properties to the south of Lots 191 and 192 slope up to the south. Adjacent properties to the east slope downslope at approximately 7 degrees, and properties on the western side of Courtney Drive slope up to the southwest through west to northwest respectively.
4. Regulated Vegetation as maintained by Qld Department of Natural Resources & Mines (DNRM), maps a small area adjacent the south-western boundary of Lot 192 as containing Regional Ecosystem (RE) 12.11.5 (dominate), described as '*Corymbia citriodora subsp. variegata, Eucalyptus siderophloia, E. major open forest on metamorphics ± interbedded volcanics*' (Refer **Figure 5**).

Site assessment generally confirmed the vegetation present in this locality (southwest) to be reflective of the described RE, all-be-it fragmented and with variable foliage projective cover. The remainder of site vegetation consisted of: small patches of fragmented native vegetation, consisting of limited dominant species (i.e. mature Eucalypt sp.) and relatively high percentage of acacia; scattered trees and shrubs (predominantly Eucalypt and acacia); dominant, predominantly maintained grazing land throughout; ornamentals and exotics associated with existing residences, and exotic species, predominantly lantana, and introduced grasses.



5. Adjacent vegetation to the north consists predominantly of managed grazing land, with scattered trees, and ornamentals as associated with an established residential dwelling and rural residential land use.
6. Adjacent vegetation to the east is limited to scattered trees, ornamentals and maintained grass as associated with established, and under construction, residential dwellings.
7. Adjacent vegetation to the south consists of a narrow (east/west) strip of Eucalypt species in the road reserve, with patches of native and regenerating vegetation and predominantly unmanaged grazing land further south. Vegetation to the southeast has been removed for adjacent subdivision development.
8. Adjacent vegetation to the west within 100m is consistent with site vegetation, being scattered trees and shrubs over maintained grazing land, and ornamental associated with residential land uses.

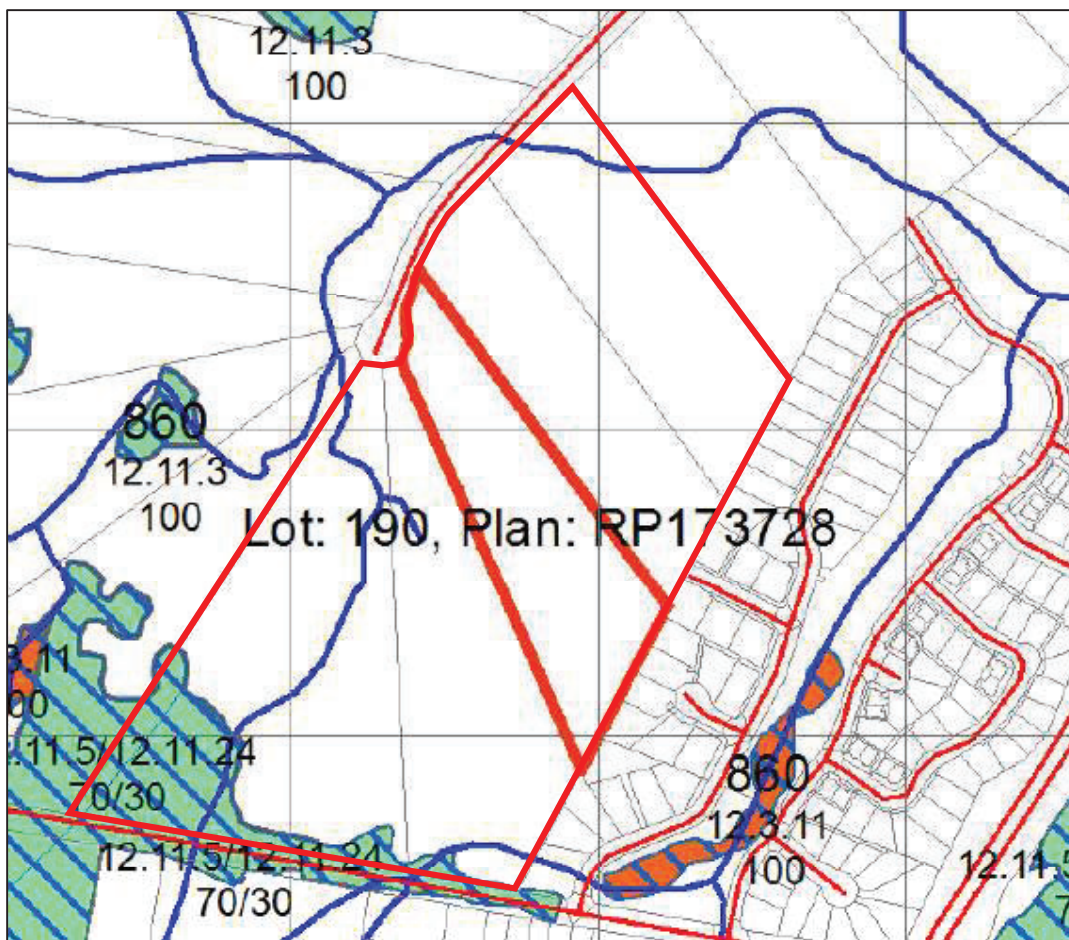


Figure 5: Regional Ecosystem Mapping

## 2.2.2 Vegetation Classification

The structure and composition of vegetation communities determine the rate at which dry fuel accumulates. Some vegetation communities protect fuel from drying out in all but extreme bushfire seasons, making the vegetation susceptible to very destructive bushfires,



whilst other vegetation communities may expose fuels to drying and therefore be frequently available for burning.

Vegetation communities surrounding the proposed development were referenced against mapped RE’s in the general vicinity, and Vegetation Hazard Classifications and Potential Fire-line Intensity calculations as detailed in Leonard et al (2014), and reflected in the BRCTRG 2019. Potential Fuel Load calculations were undertaken on site to validate vegetation classifications and subsequently potential bushfire hazard to the proposed development.

Vegetation ecotones result in varying fuel load availability. Subsequently, vegetation communities have been referenced against predominant vegetation with highest fuel loads with regard to potential sources of Bushfire Hazard posed to the proposed development. Observed vegetation communities are described in **Table 1**. It is understood that the majority of site vegetation within the proposed development footprint and associated site infrastructure will be removed for the purpose of the development. Note: Retention of individual trees and small patches of vegetation within the development site as per the proposed site layout is considered in the following determinations.

Table 1 Vegetation Hazard Classifications

Direction of Bushfire Hazard	Vegetation Description (Sub-Unit – if relevant)	DNRM Regional Ecosystem (ref. RE)	Vegetation Hazard Class (CSIRO, 2014)	Potential Fuel Load (t/ha)	Potential Fire-line Intensity (kw/m)	Potential Bushfire Hazard
North: Existing Lot 187SP173728	Managed rural residential land, small patch of vegetation, scattered trees (SU1)	NA	Class 40.4 Continuous low grass or tree cover	5/ha	830	LOW
Northern extent of Site (Yuan Court)	To be revegetated as woodland (SU2)	NA	Class 10. Spotted gum dominated woodland	18t/ha	10,647	Medium
East: All Lots	Managed vegetation, established residential development (SU3)	NA	Class 16: Mixture of Urban Classes	5t/ha	830	LOW
South of Lot 191RP173728	Cleared land under construction (SU4)	NA	Class 16: Mixture of Urban Classes	5t/ha	830	LOW
Southeast corner within Lot 191Sp173728	Fragmented Eucalypt woodland (understood to be rehabilitated (SU5)	NA	Class 10. Spotted gum dominated woodland	18t/ha	10,647	Medium
South/ Southwest & West of existing lot 192SP173728	Fragmented Eucalypt Forest (SU6)	RE: 12.11.5	Class 10.1 Spotted gum dominated open forests	20.8t/ha	14,217	Medium
West: Existing Lots 188 & 191SP17372 & northwest of Lot 192SP17372	Managed Grazing land, scattered trees, rural residential land uses (SU7)	NA	Class 40.4 Continuous low grass or tree cover	5/ha	830	LOW

Vegetation Hazard classification as described in **Table 1**, are visually represented in **Figure 6**.

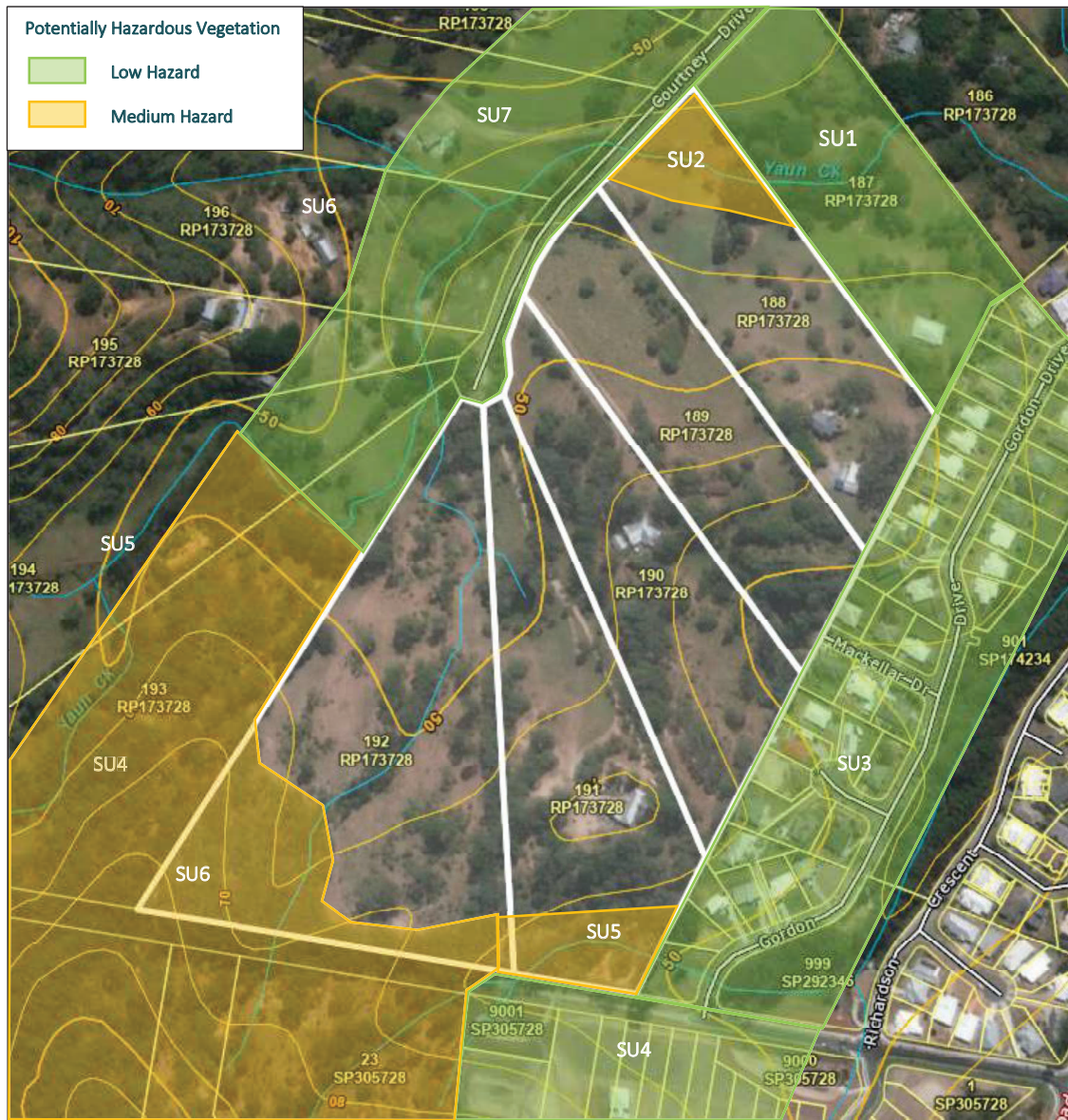


Figure 6: Vegetation Hazard Classification

### 2.2.3 Potentially Hazardous Vegetation

Based on the above assessment, vegetation posing a Medium Potential Bushfire Hazard to the proposed development is present to the South through West of current Lot 192SP173728 (SU6), and within a small patch on the southeast extent of Lot 191 SP173728, associated with a waterway corridor (SU5). It is also understood a small patch of vegetation associated with Yuan Court in the northern extent of the site is understood to be rehabilitated as part of the proposed development (SU2). These vegetation communities have the potential to carry moderate fuel loads and subsequently present a potential Bushfire Hazard to the proposed development.



Vegetation in the immediate vicinity of the proposed development and in all other directions has been classified as having a Low Potential Bushfire Hazard to the proposed development. However, it is noted that determined low threat vegetation within 100m of designated bushfire hazard area, will require assessment against the Australian Standard for *Construction of buildings in bushfire prone area (AS3959-2018)* to ensure compliance. This is particularly relevant for Lots within 100m of proposed rehabilitation activities.

#### 2.2.4 Potential Fire Runs

In Queensland, wildfires can occur at any time of the year, however the fire season usually coincides with progressive drying following the autumn rain season, peaking during the spring months of more severe fire weather, and concluding with the arrival of more regular storm events and rain in late spring and summer. On the east coast, this peak fire season is characterised by frequent dry northerly to westerly winds and lower humidity. Furthermore, there is a low likelihood of a severe bushfire developing under south to easterly winds, which generally facilitate high humidity, cooler land temperatures and periods of rainfall.

It is also important to assess the length of fire run to grasp an understanding of the scale of fires that may be able to eventuate in a particular area. The length of fire run influences the area in which a fire has to develop and reach its potential maximum intensity for the conditions prevailing at the time of the fire. Fire runs less than 1km in length may be safely regarded as having a lesser risk than longer fire runs.

Fire runs may be modified by natural features such as creeks, swampy wet areas, rock formation or wet vegetation types depending on weather conditions and how dry the fuel is. Fire runs may also be limited by roads, cleared/developed areas, firebreaks or active intervention of fire suppression techniques such as lighting of backing fires from control lines. Understanding Fire Runs is an important tool in managing Bushfire Hazard and potential impacts to people and property in the event of a bushfire emergency.

#### *Potential Fire Runs*

Potential fire runs to the proposed development to the southwest is well connected to relatively contiguous forest vegetation communities >2km in length in areas. Fire runs from this direction are downslope to the proposed development, with potential to slow the spread of bushfire. However, continuity and extent of vegetation is considered sufficient to support the development of a bushfire (i.e. Wildfire) developing to full intensity in this locality.

The following section details Bushfire Risk Mitigation measures to be implemented on the site to address the Bushfire Hazard and compliance requirements acting on the proposed development.

## 3.0 Bushfire Risk Mitigation Measures

The following section describes Bushfire Risk Mitigation measures, recommended to be utilised at the subject site to reduce the risk of Bushfire impacting on people and property.

The scope of proposed Bushfire Risk Mitigation Measures have been drawn from the following sources:

- the *Queensland State Government Single State Planning Policy - Part E (SPP 2017)*;
- the *Bushfire Resilient Communities Technical Reference Guide (QFES,2019)*;
- the *Gold Coast City Council, Bushfire Hazard Overlay Code (8.2.3)*; and
- the Australian Standard (AS 3959- 2018) - *Construction of buildings in bushfire prone areas*.

The intent of the above legislation is to protect people and premises in the event of a bushfire emergency, through achieving acceptable Performance Outcomes for the development given the identified bushfire hazard. Performance Outcomes are generally achieved by appropriate separation of a development from bushfire hazard, appropriate access for fire-fighting vehicles, and appropriate construction standards of buildings. Additional factors are detailed where considered appropriate.

### 3.1 Asset Protection Zones

Asset protection zones (APZ's) provide a defensive tool to assist in the reduction of potential bushfire impact to people and property situated in bushfire prone areas. APZ's are the most strategically valuable defence against radiant heat and flame, and to a lesser extent, embers.

Whilst APZ's should prevent buildings from being subjected to direct contact from flames, and reduced levels of radiant heat in the event of a bushfire, building construction standards will also be key to ensuring the performance of buildings subjected to ember attack. Bushfire Attack Level for the proposed development is determined in **Section 3.2**.

Based on the above Bushfire Hazard Assessment, APZ's may be required adjacent the proposed development. These are detailed in the following section.

#### 3.1.1 Performance Outcomes

APZ and setback distances have not been prescribed in the SPP 2017. The SPP refers to provision of appropriate defensible space between dwellings and medium or above Bushfire Hazard. The *Gold Coast City Council, Bushfire Hazard Overlay Code* does not prescribe separation distances from potentially hazardous vegetation, aside from fire trail provisions for development adjacent bushfire hazard areas (refer **Section 3.5** below). Consequently, the required setbacks (APZ's) detailed in the AS3959-2018, with regard to building construction standards are considered appropriate to mitigate the identified bushfire hazard to the



proposed development and consequently meeting the intent of the GCCC Planning Scheme Performance Outcome and the SPP as a result.

Subsequently, the **Table 2** details the requirements for setbacks for the proposed development, in order to comply with the performance outcomes of the Australian Standard (AS3939-2018) and specified Building Construction Standards, with regard to the Medium Potential Bushfire Hazard acting on the site from the west to southwest of the site.

**N.B.** Where 'Exclusions for Low Threat Vegetation' criteria as per the AS3959-2018 are applicable, relevant vegetation will be classified as Low Threat for the purpose of BAL determination.

APZ's have been determined for individual proposed lots, potentially exposed to Bushfire Hazard, with regard to minimum known setbacks to individual Lots, and Building Setback Provisions within proposed Lots. It is noted that Asset Protection Zones have been proposed within the proposed Lots 216-223, and Lot 101, as represented in Figure 2, and as requested by Councils, including IR dated 12<sup>th</sup> July 2019.

It should be noted that planning provisions in Queensland specify BAL-29 construction standards are considered the maximum acceptable requirement for new residential subdivision developments. Consequently, this will be used to inform the following APZ's and BAL determinations for the proposed development.

Subsequently, the following section details the minimum distance required to achieve a Maximum BAL-29 for the proposed development. These calculations are subsequently used to inform required APZ distances adjacent the proposed development, in order to comply with the performance outcomes of the Australian Standard (AS3959-2018) and the intent of the GCCC Bushfire Hazard Overlay Code.

### 3.2 Bushfire Attack Level – Minimum Distance Assessment

Australian Standard 3959 (2018) Construction of buildings in bushfire-prone areas provides minimum construction standards for new dwellings in designated Bushfire Prone Areas. The construction standards are intended to improve the performance of buildings subjected to burning debris, radiant heat or flame contact. The AS3959- 2018 methodology prescribes Bushfire Attack Levels (BAL's) to the facades of proposed buildings to which corresponding construction safety standards are applied. AS3959-2018 defines Bushfire Attack Levels as:

*'A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, which is the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire.'*



In accordance with the Australian Standard – Construction of Buildings in Bushfire-prone Areas (AS 3959, 2018), a Minimum Distance Assessment of the required construction standards for the proposed development has been undertaken based on the potential Bushfire Hazard adjacent the proposed development location as detailed above (refer **Table 1**).

This assessment has been based on the following assumptions:

- A Fire Danger Index (FDI) of 53 (QFES 2020);
- Proposed development will be located in the layout as represented in **Figure 2**.
- Adjacent assessable vegetation communities have been classified as detailed in Table 1, as per the AS 3959 – 2018;
- Fuel load calculations (Method 2 BAL) for potentially hazardous vegetation adjacent the proposed development to the southeast and north (SU2 & 5) has been determined as reflective of ‘Class 10.2 Spotted gum dominated open forests’ with 18t/ha fuel load potential.
- Fuel load calculations (Method 2 BAL) for potentially hazardous vegetation adjacent the proposed development to the south through west (SU6) has been determined as reflective of ‘Class 10.1 Spotted gum dominated open forests’ with 20.8t/ha fuel load potential.
- Fuel load calculations (Method 2 BAL) for dwellings adjacent Drainage corridors 1006 & 1007 has been determined as reflective of ‘Class 40.4 Continuous low grass or tree cover’ with 5t/ha fuel load potential.
- Slope is predominantly upslope of SU5, and a relative downslope of ~5 degrees adjacent SU4.

Additional parameters used to determine the minimum distances for relative BAL ratings are detailed in the following Table/s.

Table 2: BAL Requirements - Potentially Hazardous Vegetation: Southeast & North (SU2 & 5)

Calculated November 17, 2020, 11:46 am (MDC v.4.8)			
77-99 Courtney Drive, Upper Coomera - SE SU4			
Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	53	Rate of spread	1.25 km/h
Vegetation classification	Woodland	Flame length	10.33 m
Surface fuel load	14 t/ha	Flame angle	59 °, 69 °, 76 °, 80 °, 82 ° & 90 °
Overall fuel load	18 t/ha	Elevation of receiver	3.01 m, 2.93 m, 2.31 m, 1.43 m, 0.86 m & 0 m
Vegetation height	n/a	Fire intensity	11,692 kW/m
Effective slope	5 °	Transmissivity	0.881, 0.868, 0.849, 0.831, 0.821 & 0.764
Site slope	10 °	Viewfactor	0.5901, 0.4382, 0.2924, 0.1976, 0.159 & 0.0428
Flame width	40 m	Minimum distance to < 40 kW/m <sup>2</sup>	7.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m <sup>2</sup>	10.6 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m <sup>2</sup>	15.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m <sup>2</sup>	20.7 m





Table 3: BAL Requirements - Potentially Hazardous Vegetation: South through West (SU6)

79-99 Courtney Drive, Upper Coomera - SW/W (SU5)			
Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	53	Rate of spread	1.03 km/h
Vegetation classification	Forest	Flame length	9.23 m
Surface fuel load	16.3 t/ha	Flame angle	54 °, 64 °, 72 °, 77 °, 79 ° & 84 °
Overall fuel load	20.8 t/ha	Elevation of receiver	3.73 m, 4.14 m, 4.39 m, 4.49 m, 4.53 m & 4.59 m
Vegetation height	n/a	Fire intensity	11,140 kW/m
Effective slope	0 °	Transmissivity	0.883, 0.869, 0.849, 0.826, 0.8129999999999999 & 0.743
Site slope	0 °	Viewfactor	0.5916, 0.4345, 0.2932, 0.1984, 0.1611 & 0.0441
Flame width	100 m	Minimum distance to < 40 kW/m <sup>2</sup>	7.7 m
Windspeed	n/a	Minimum distance to < 29 kW/m <sup>2</sup>	10.5 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m <sup>2</sup>	15.5 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m <sup>2</sup>	22.6 m

Table 4: BAL Requirements – Adjacent Drainage Reserved 1006 & 1007 – SE Lots 213-216 & West Lots 186-196

79-99 Courtney Drive, Upper Coomera - Adj. Drainage corridors			
Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	53	Rate of spread	0.36 km/h
Vegetation classification	Woodland	Flame length	2.97 m
Understorey fuel load	5 t/ha	Flame angle	56 °, 67 °, 75 °, 80 °, 82 ° & 87 °
Total fuel load	5 t/ha	Elevation of receiver	1.14 m, 1.24 m, 1.25 m, 1.19 m, 1.14 m & 0.55 m
Vegetation height	n/a	Fire intensity	943 kW/m
Effective slope	2 °	Transmissivity	0.897, 0.892, 0.884, 0.873, 0.866 & 0.8129999999999999
Site slope	2 °	Viewfactor	0.5846, 0.4186, 0.2816, 0.1856, 0.1504 & 0.0402
Flame width	40 m		
Windspeed	n/a		
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

In accordance with AS 3959 (2018), the required setbacks (APZ's) to achieve the maximum required Bushfire Attack Level rating for the proposed development on the subject site has been determined. A summary of these setbacks is provided in **Table 5**, with respect to the immediately exposed Lots adjacent potentially hazardous vegetation. **N.B.** It is noted that no APZ's are required adjacent the proposed drainage reserves due to the very low potential bushfire hazard posed by these areas.

Table 5: BAL Minimum Setback Requirements Summary – APZ's

Elevation	Setback Required for Specific BAL Ratings			
	BAL – 12.5	BAL - 19	BAL - 29	BAL - 40
Southeast & North (SU2 & SU5)	≥20.7m	≥15.2m	≥10.6m	≥7.9m
West through South – Lots 216-223 (SU6)	≥22.6m	≥15.5m	≥10.5m	≥7.7m
Adjacent Drainage corridors 1006 & 1007 (i.e. SE Lots 213-216 & West Lots 186-196)	NA	NA	NA	NA

Based on this assessment, currently proposed setbacks adjacent Lots are sufficient to achieve maximum BAL-29 ratings for the proposed development.

**N.B.** Based on discussions with Council, an APZ of on the eastern elevation of Lot 216 is proposed in order to act as an additional buffer within the Lot from potential hazard to the south.

### 3.2.1 Waterway/Drainage Reserves & Bushfire Hazard

The proposed development includes constructed waterways/drainage reserves identified as Lots 1006 and 1007, located on the southwest and west of the site. These areas are functional drainage reserves, constructed as rock lined swales as represented in **Figure 7**.

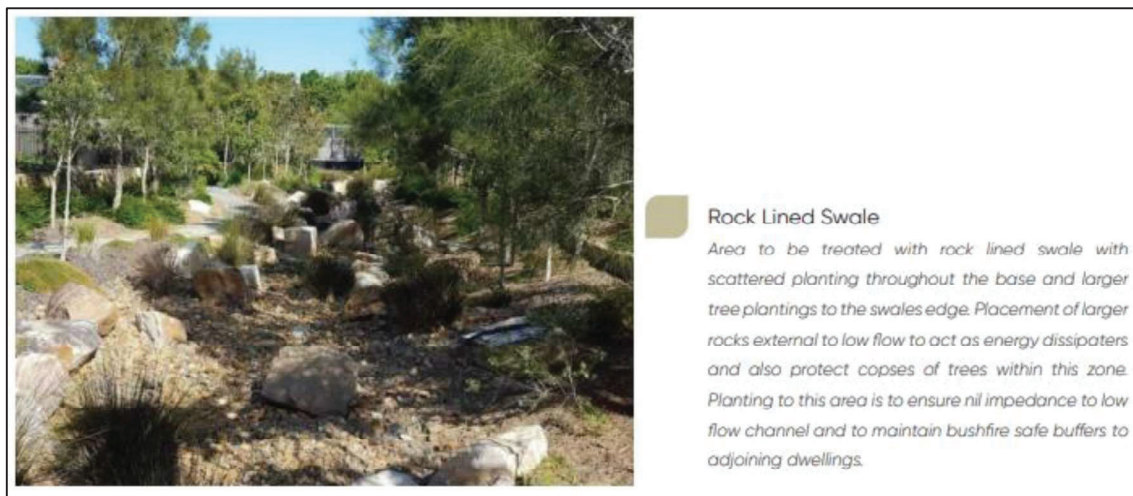


Figure 7: Waterway/Drainage Reserve Treatments

Importantly, the intended vegetative treatments of these areas are to compliment the function of the waterway and are not to be revegetated reflective of adjacent RE composition and structure. This vegetation is to be utilising low volatility, functional vegetation including *Lomandra spp*, and *Lophostemon spp*, both of which are listed as fire-resistant species In accordance with the Bushfire Resilient Building Guidance for Queensland Homes.

As these reserves are functional and heavily rocked areas, they will function as ephemeral waterways with minimal potential for recruitment at all reflective of the structure and composition of adjacent forest and woodland communities. Vegetation treatments within these 'drainage' areas will naturally be limited to low potential fuel load accumulation areas, by virtue of the construction, rock treatments, revegetation activities and natural cleaning out of ground based fuel load accumulation during rainfall/overland flow events. This is particularly relevant to the southeast of Lots 216-213, due to the connection of adjacent hazardous vegetation to the south, and to the west of Lots 186-196.

### **Potential Bushfire hazard of drainage reserves**

Given these areas are constructed drainage corridors with a specific planting pallet and density able to be achieved, it is considered that these drainage corridors are readily able to be implemented, as low threat areas. To support this, a classification of the revegetation treatments has been provided to demonstrate these corridors are Low Potential Bushfire Hazard Areas, and will not require maintenance of fuel load from a bushfire perspective. Consequently, potential fuel load accumulation of drainage reserves 1007 and 1006 are provided (**Table 5**) based on the known treatments as detailed above.

**Table 5: Vegetation Hazard Classifications – Drainage Reserves**

Direction of Bushfire Hazard	Vegetation Description (Sub-Unit – if relevant)	DNRM Regional Ecosystem (ref. RE)	Vegetation Hazard Class (CSIRO, 2014)	Potential Fuel Load (t/ha)	Potential Fire-line Intensity (kw/m)	Potential Bushfire Hazard
Drainage Reserves on Lots 1006 & 1007	Drainage Corridors – Sparse low threat vegetation	NA	Class 40.4 Continuous low grass or tree cover	<5t/ha	<1000	Low

It is also noted that narrow corridors or in-tact vegetation are able to be classified as low threat due to corridor filtering. Corridor filtering as per BRCTRG 2019, which specifies in Section 4.2.6, Step 3: To ‘remove narrow corridors and areas of continuous fuel <50m in width that are not sufficiently wide to support a fully developed flame front. These areas are less likely to ignite due to their disconnection with fuels that can carry running fire fronts...is likely to result in fireline intensity of <4000 kW/m, and this presents a low hazard to land use planning and development assessment’. Consequently, narrow corridors even when heavily vegetated are to be classified as low threat vegetation. The subject drainage corridors will not be heavily vegetated.

### **Ongoing management for bushfire of drainage reserves.**

Due to the above classification of the drainage corridors as Low Potential Bushfire Hazard areas, and due to exclusions for corridor widths <50m, the proposed drainage corridors of 1006 & 1007 will not require maintenance of fuel load from a bushfire perspective.

### **APZ’s adjacent drainage reserves**

This assessment has been undertaken on the premise that vegetation introduced to and maintained in Lot 1006 and 1007 will be of low volatility species. As per this assessment, no APZ’s are required adjacent the proposed drainage corridors.

## **3.2.2 Bushfire Attack Level Determination**

In accordance with the Australian Standard – *Construction of Buildings in Bushfire-prone Areas* (AS 3959, 2018), an assessment of the required construction standards for the proposed development of has been undertaken (**Table 2**).



Based on this assessment, the following Bushfire Attack Levels for individual Lots are applicable:

- **BAL-29:** Lots 101, 216-223 (refer Sections 3 & 7 in the AS3959-2018);
- **BAL-19:** Lot 186-196, 210, (refer Sections 3 & 6 in the AS3959-2018);
- **BAL-12.5:** Lots 102-107, 142-153, 157-160, 186-196, 204-209, 211-215, 232-241, 250-258, 291-294 (refer Sections 3 & 5 in the in the AS3959-2018);
- **BAL-LOW:** Lots 108-141, 154-156, 161-185, 197-203, 224-231, 242-249, 259-290, 295, 296 - refer Section 4 in the in the AS3959-2018);

Relevant Building Construction Standards, as detailed in the Australian Standard – Construction of Buildings in Bushfire-prone Areas (AS 3959, 2018), should be applied. The nominated construction standards should be reviewed by an experienced consultant/designer at the time of detailed building design. Should the proposed site layout or vegetation setbacks change, this may alter the determination of the required BAL.

**N.B.** It is recommended that Individual BAL assessments be undertaken by individual Lots at the time of detailed design to inform specific BAL requirements for each structure. This is to confirm vegetation classifications and setbacks of the proposed development to account for factors including vegetation treatments that are understood to be achieved by not in the control of this assessment.

### 3.3 Landscaping and Vegetation Management

The landscaping and ongoing management of vegetation in areas susceptible to Bushfire Hazard is an important tool to mitigate bushfire risk. Previously detailed APZ's/setback requirements should prevent buildings from being subjected to direct contact from flames, and reduced levels of radiant heat in the event of a bushfire. Please Note: Final Building footprint locations, and vegetation setbacks able to be achieved, will dictate final BAL ratings for individual dwellings of the proposed development.

The proposed development layout has considered potential bushfire hazard from the southwest to west and has revised preliminary designs to minimise vegetation clearing of the subject site where practical. Previously detailed bushfire hazard and setback recommendations have been made, particularly with regard to the establishment of appropriate setbacks to hazardous vegetation and the implementation of APZ's within Lots adjacent potentially hazardous vegetation.

Landscaping and vegetation retention adjacent proposed buildings should consider the following guidelines:

- Immediately adjacent proposed buildings should either be fully cleared and regularly maintained (i.e. lawn) or retain trees as clumps or islands and provide a tree canopy cover of less than 15% and tree canopies should be located greater than 2 metres from any part of the roofline of a building. Any trees should have lower limbs removed up to a height of 2 metres above the ground.



- Any landscaping performed on site shall maintain the APZ effectively free of available fuel. Landscaping plants may be used in this area so long as they are selected for their low combustibility, by virtue of high moisture content, low volatile oil content, high leaf mineral levels, large fleshy leaves, and absence of shedding bark. They should be placed so as to not provide either vertical or horizontal connectedness of plant material, and avoid overhanging rooflines or contact with flammable parts of buildings. Any planted trees should be of species which grow to over 2m, to maintain separation between lower canopy and the ground.
- Turf is to be maintained regularly to reduce the potential for long grass to fuel an advancing fire toward buildings.
- Revegetation activities in covenant areas, drainage easements and recreation areas of the site should utilise low volatility, locally endemic 'rainforest' species where appropriate to ensure future fuel load potential is minimised.

### 3.4 Emergency Access & Egress

New developments in bushfire prone areas should be serviced by safe access/exit points for both residents and emergency services personnel in the event of an emergency. Development should avoid entrapment potential, provide safe and effective access for emergency services vehicles and safe evacuation routes for occupants.

The *GCCC Bushfire Hazard Overlay Code (PO6)* prescribes '*vehicular access is designed to mitigate against bushfire hazard by ensuring adequate access for (a) fire-fighting and other emergency vehicles, and (b) the evacuation of residents and emergency personnel, during a bushfire event.*'

The proposed development layout contains perimeter roads, where possible, to separate the majority of the proposed lots from potential sources of bushfire hazard. Proposed Lots 101, 216-223 have been designed with APZ within the Lots boundaries, at Councils request. All Lots have direct access to proposed public roadways, and importantly in directions away from bushfire hazard and into Low potential bushfire hazard areas. Site access includes the existing established public road network to Courtney Drive to the northwest, proposed Mackellar Drive to the east a currently unnamed road to the southeast of the site.

Importantly, multiple access and egress routes are provided internally into designated Low Hazard areas. Consequently, it is considered that current access and egress is appropriate, for the proposed development.

### 3.5 Fire Trails

The *GCCC Bushfire Hazard Overlay Code (PO9)* prescribes '*in a bushfire hazard area, fire trails must be provided to: enable access for fire fighters, residents and equipment; contribute to bushfire radiation zones; mitigate against bushfire hazard; and to allow access for hazard reduction management programs.*'



The proposed development has been designed to exclude Fire Trails as requested by Council in Information Requested dated 12th July 2019. The proposed design layout appropriately separates proposed Lots from potential bushfire hazard by perimeter roads, recreation areas, and drainage reserves where practical. Asset protection zones within Proposed Lots 101 and 216-223 are deemed appropriate to separate proposed future dwellings from potential bushfire hazard, with regard to achievement of maximum BAL-29 construction standards, as detailed in this report.

### 3.6 Water Availability for Fire-Fighting Purposes

All development within bushfire hazard areas require adequate water supply for fire-fighting purposes in the event of a bushfire emergency. The *GCCC Bushfire Hazard Overlay Code* (PO10) prescribes 'a reliable reticulated water supply that has sufficient flow and pressure characteristics for fire-fighting purposes at all times' be achieved.

It is understood the proposed development site will be on a reticulated water supply and it is subsequently understood the indicated pressure and flow of 10L/Sec at 200 kPa (as per AO10.2) will be achieved on site. Verification of this via the utility provider is recommended.

### 3.7 Open Space Management

The *GCCC Bushfire Hazard Overlay Code* (PO8) prescribes '*for areas to be dedicated to Council as open space, management strategies to mitigate bushfire risk must be identified.*'

It is understood the Public Open Space (recreation) and drainage areas are proposed, as represented in Figure 2, and it is understood these areas, where relevant will be dedicated to Council as part of the proposed development (refer **Town Planning Report** for confirmation and full detail). Open Space areas with potential to contain potentially hazardous vegetation are limited to the southwest, southern and northern extents of the subject site, with the southwest containing forest vegetation, and the south and northern creek corridors understood to be rehabilitated with woodland vegetation communities.

Due to the extent and nature of the vegetation, specific bushfire management strategies are limited to the following:

- Maintaining a foliar separation to proposed development to ensure the above determined BAL ratings and APZ setbacks remain relevant into the future. In essence, ensuring separation distances used to determine BAL ratings are maintained free of potentially hazardous vegetation and fuel load accumulation.

### 3.8 Advice to New Residents

The *GCCC Bushfire Hazard Overlay Code* (PO16) prescribes '*...new residents/occupants of a development in a bushfire hazard area are informed about: (a) the potential bushfire hazard on their site; (b) their responsibilities for fire management; (c) the measures required for*



*ongoing fire mitigation; and (d) emergency procedures during a bushfire or on bad weather days.'*

Consequently, it is recommended that a copy of this Bushfire Management Plan, complete with a Queensland Fire and Emergency Services (QFES) cover sheet be provided to each resident/occupant of Lots where BAL ratings of **BAL-12.5** and above have been determined (refer Section 3.2.1).

Residents and occupants should be made aware of Queensland Fire & Emergency Service Website ([www.ruralfire.qld.gov.au](http://www.ruralfire.qld.gov.au)) for further information on bushfire preparation, and to the 'Tune In' section, for warnings in your area, and located here (current as at 17/11/2020):

[https://www.ruralfire.qld.gov.au/BushFire\\_Safety/Pages/tune-in-to-warnings.aspx](https://www.ruralfire.qld.gov.au/BushFire_Safety/Pages/tune-in-to-warnings.aspx)



## 4.0 Recommendations and Conclusions

This report details the assessment of Bushfire Hazard and risk mitigation measures acting on the proposed development, with consideration to the requirements of: the *Queensland State Government Single State Planning Policy - Part E* (SPP 2017); the *GCCC Bushfire Hazard Overlay Code*; and the Australian Standard (AS 3959- 2018) - *Construction of buildings in bushfire prone areas*.

This assessment has confirmed that vegetation posing a Medium Potential Bushfire Hazard to the proposed development is present to the South through West of current Lot 192SP173728 (SU6), and within a small patch on the southeast extent of Lot 191 SP173728, associated with a waterway corridor (SU5). It is also understood a small patch of vegetation associated with Yuan Court in the northern extent of the site is understood to be rehabilitated as part of the proposed development (SU2). These vegetation communities have the potential to carry moderate fuel loads and subsequently present a potential Bushfire Hazard to the proposed development.

Vegetation in the immediate vicinity of the proposed development and in all other directions has been classified as having a Low Potential Bushfire Hazard to the proposed development. However, it is noted that determined low threat vegetation within 100m of designated bushfire hazard area, will require assessment against the Australian Standard for *Construction of buildings in bushfire prone area (AS3959-2018)* to ensure compliance. This is particularly relevant for Lots within 100m of proposed rehabilitation activities.

The following Bushfire Risk Mitigation Measures, as detailed above, are considered appropriate to substantially mitigate the Bushfire Hazard acting on the proposed development:

- Asset Protection Zone (APZ) / setbacks widths have been determined for areas of the proposed development (refer Section 3.1). APZ's for proposed Lots 101, & 216-223 have been detailed as represented in the proposal plan. With the achievement of setbacks consistent with applicable BAL ratings, **no additional setbacks are considered required on any other Lots, including Lots adjacent drainage reserves.**
- BAL determination and Construction Standard requirements have been determined for the proposed development, with a maximum BAL-29 considered achievable. Highest applicable BAL ratings for individual Lots have been detailed, with recommendations for individual BAL ratings to be undertaken at the time of detailed dwelling design for bushfire prone Lots (refer Section 3.2).
- Vegetation management within the site, including within setbacks and APZ's have been detailed to ensure low fuel availability and reduced connectivity to buildings. It is further recommended that revegetation activities in drainage reserves and recreation areas be undertaken utilising low volatility species where appropriate (refer Section 3.3).
- Emergency Access & Egress of the proposed development has been detailed and is considered appropriate for the Bushfire Hazard acting on the site (refer Section 3.4).





- Fire Trail provisions within the development footprint have been discussed in order to comply with the *GCCC Bushfire Hazard Overlay Code* (PO9). In accordance with Councils request, no Fire Trails are proposed on public space (refer Section 3.5). Asset protection zones within Proposed Lots 101 & 216-223 is deemed appropriate to separate proposed dwellings from potential bushfire hazard, with regard to achievement of BAL construction standards as detailed in this report.
- Water Availability for Fire-fighting Purposes as per Councils Planning Scheme has been detailed (refer Section 3.6).
- Open Space Management recommendations have been made to assist Council to manage the potential bushfire hazard posed to the proposed development by Open Space land dedicated to Council (refer Section 3.7). and
- Advice to new residents/occupants by way of a copy of this Bushfire Management Plan, complete with a Queensland Fire and Emergency Services (QFES) cover sheet be provided to each resident/occupant for their information. This is applicable to Lots where BAL ratings of **BAL-12.5** and above have been determined (refer Section 3.2.1).

Residents and occupants should also be made aware of QFES website ([www.ruralfire.qld.gov.au](http://www.ruralfire.qld.gov.au)) for further information on bushfire preparation (refer Section 3.8)

With the achievement of the Bushfire Risk Mitigation Measures as detailed in this report, the proposed development is considered to be compliant with the specifications and intent of the *Queensland State Government Single State Planning Policy - Part E (SPP 2017)*, and the *Gold Coast City Council, Bushfire Hazard Overlay Code (8.2.3)*, and the *Australian Standard – Construction in Bushfire Prone Areas (AS3959-2018)*.

This assessment has been undertaken based on vegetative condition and bushfire hazards identified on and adjacent the subject site in November 2019.

It should be noted that the recommendations within this BMP have been formulated based on site conditions at the time of writing and utilising current best-practise hazard and impact assessment methodologies, and have been developed to reduce the potential severity of impacts on the proposed development in the event of a bushfire emergency rather than prevent impacts altogether. No guarantee is provided or assumed that the area will not be affected by bushfire at some time.

Site occupants should seek advice from the local fire authority every 5 years (as a minimum) to ensure the subject recommendations remain appropriate as site conditions and hazard assessment methodologies may change over time.

Bushfires are an intrinsic part of Australia's environment, are often unpredictable, and have potentially extremely serious consequences. All Queenslanders should be familiar with the official Bushfire Warnings system and have a completed Bushfire Survival Plan. Print ready guides for preparing a Bushfire Survival Plan and to assist in the interpretation of the official



Bushfire Warnings system are available for download from the Rural Fire Service Queensland website – <https://ruralfire.qld.gov.au/bushfires/>.

There are three formal Bushfire Warning levels:



**Advice**

Monitor conditions and review your bushfire survival plan.



**Watch and act**

Conditions are changing. Start taking action and follow your bushfire survival plan.



**Emergency Warnings**

You are in danger. Act on your bushfire survival plan now.