
Bushfire management plan

Proposed development | 81-161 Christensen Road | Stapylton | Queensland
Prepared for Burnside Developments Pty Ltd and Yellowstone Investments Pty Ltd | 23 April 2021

Bushfire management plan

Final

Report 21029 | Burnside Developments Pty Ltd and Yellowstone Investments Pty Ltd | 23 April 2021

Prepared by Robert Janssen

Position Managing principal

Signature



Date 23 April 2021

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Document control

Version	Date	Prepared by	Reviewed by
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Disclaimer

Notwithstanding the precautions adopted in this report, it should always be remembered that bushfires burn under a range of conditions. An element of risk, no matter how small always remains, and although AS 3959-2018 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.

It should be noted that upon lodgement of a development application, council and/or the fire service may recommend additional construction requirements.

Although every care has been taken in the preparation of this report, Land and Environment Consultants Pty Ltd accept no responsibility resulting from the use of the information in this report.

1 Introduction

Land and Environment Consultants Pty Ltd (**LEC**) was engaged to undertake a site-specific bushfire hazard assessment and to prepare a bushfire management plan for the proposed material change of use (**MCU**) – commercial tenancies 3-6 on lot 1 (**proposed development**) at 81-161 Christensen Road, Stapylton, properly described as part of lot 334/SP193431. The proposed development area (**the site**) is identified as lot 1 on the approved subdivision plan (Proposal Plan S0204-P7A) provided at Appendix 1.

An application for a development permit will be made for the proposed development under the Gold Coast City Plan 2016.

The site is identified as a bushfire hazard area by the Gold Coast City Plan 2016 *Bushfire hazard overlay map* (**Bushfire hazard overlay map**). Therefore, the application for a development permit is subject to assessment and compliance with outcomes of the Gold Coast City Plan 2016 *Bushfire hazard overlay code* (**Bushfire hazard overlay code**).

The bushfire management plan has been prepared in accordance with the Gold Coast City Plan 2016 *Bushfire management plans* (**Bushfire management plan policy**) and documents the site-specific bushfire hazard assessment for the site and demonstrates how the proposed development will comply with outcomes of the Bushfire hazard overlay code. It includes:

- an introduction (this section) and description of methods and information resources used for the preparation of this bushfire management plan;
- description of the site and the proposed development;
- site-specific bushfire hazard assessment;
- identification of bushfire hazards associated with the site and the proposed development;
- radiant heat exposure assessment;
- a plan for mitigating bushfire hazards; and
- assessment of the proposed development against the Bushfire hazard overlay code.

1.1 Method

To meet requirements of the Bushfire management plan policy the following steps were undertaken:

- review of the Bushfire hazard overlay map on Gold Coast City Council's online mapping system and the Queensland regional ecosystem map, vegetation hazard class (**VHC**) map, severe fire weather map and fire history map on the Queensland Fire and Emergency Services online mapping system (**Catalyst**);
- inspection of land within 100 metres (**m**) of the site for vegetation characteristics, current land management practices, slope, and evidence of previous fires;
- site-specific bushfire hazard assessment in accordance with the method in *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019) (**Bushfire resilient communities**);
- radiant heat exposure assessment using the Fire Protection Association of Australia *BAL calculator V4.8* (**BAL calculator**) which models the 'method 2' bushfire attack level (**BAL**) assessment procedure in the *Australian Standard for Construction of Buildings in Bushfire Prone Areas* (**AS 3959-2018**); and
- assessment of the proposed development against the Bushfire hazard overlay code.

Aerial imagery of the site was accessed online from Google Earth to assist in validating observations and measurements made during the site assessment.

1.2 Suitably qualified person

This bushfire management plan was prepared by Robert Janssen who is a suitably qualified and experienced bushfire management consultant.

Robert is the managing principal at LEC and has over 20 years of experience in bushfire planning and operations. He has prepared bushfire management plans for residential, commercial and industrial property developments, utilities, government facilities and conservation estates.

Robert's formal qualifications as an environmental scientist and consulting experience are coupled with 10 years of experience as a nationally accredited fire-fighter with the national parks and wildlife service in New South Wales and Queensland.

2 Description of the site and the proposed development

This chapter provides a description of the site and the proposed development.

2.1 Site description

The location of the site is shown on Figure 2.1. It is 3.385 hectares and is currently used for an industrial purpose.

Industrial development adjoins the north and west boundaries of the site. An access easement and detention basin adjoin the east boundary of the site and a gravel maintenance track and bushland vegetation associated with Sandy Creek adjoin the south boundary.

The site is accessed from Christensen Road which is a dual lane public road capable of accommodating emergency vehicles.

2.2 Proposed development

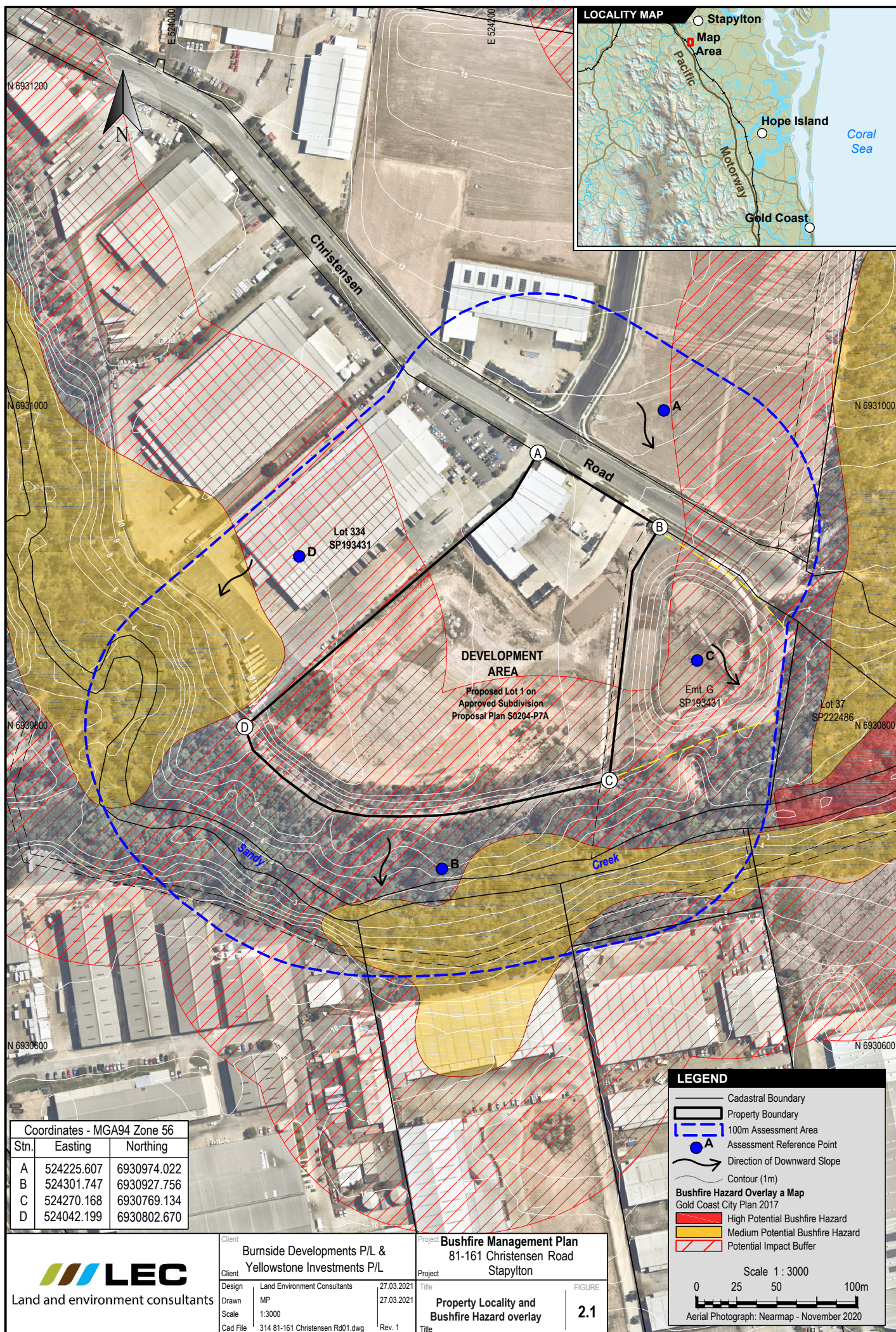
The proposal plan for the proposed development is provided at Appendix 2 and shows the layout of office and warehouse tenancies, common access driveways and carparking areas.

Offices and a warehouse building for tenancies 1 and 2 are existing and part of the common access driveway has already been constructed.

The proposed development will be connected to mains water and the reticulated hydrant system in the Christensen Road reserve.

2.3 Bushfire hazard overlay map

The Bushfire hazard overlay map of the site is shown on Figure 2.1. Verification of bushfire hazard areas shown on the Bushfire hazard overlay map is provided via the site-specific bushfire hazard assessment in Section 3.4.



3 Bushfire assessment

This chapter provides details of the desktop review, site assessment and site-specific bushfire hazard assessment.

3.1 Severe fire weather

The severe fire weather map in Catalyst indicates the 5 % annual exceedance probability forest fire danger index (**FFDI**) for the site is 53.

This FFDI value has been used for the site-specific bushfire hazard assessment in Section 3.4 and the radiant heat exposure assessment in Section 5.7.

3.2 Fire history

Fire history data in Catalyst indicates 1 fire has been recorded near the site during the past 10 years. The fire was broadscale and occurred in bushland vegetation east of the site but was contained before it reached the site.

3.3 Site assessment

LEC inspected land within 100 m of the site on 16 March 2021. Observations were recorded about current land use and management, vegetation characteristics, slope of land and evidence of previous fires.

The locations of site assessment reference points are shown on Figure 2.1. Table 3.1 provides a summary of observations associated with site assessment reference points and their features are shown in Photographs 3.1-3.4

Table 3.1 Site observations

Assessment reference point	Catalyst VHC	Ground truthed VHC	Notes
A	VHC 41.4 <i>Low grass or tree cover in a built-up area (VHC 41.4)</i>	VHC 42.6 <i>Nil to very low vegetation cover (VHC 42.6)</i>	Christensen Road and land being developed for industrial purposes (Gold Coast City Council application reference MIN/2020/494)
B	VHC 10.1 <i>Spotted gum dominated open forests (VHC 10.1)</i> , VHC 22.1 <i>Melaleuca open forests (VHC 22.1)</i> and VHC 40.4 <i>Low grass or tree cover in rural areas (VHC 40.4)</i>	VHC 10.1	8 m wide management access clearing with a gravel access track and bushland vegetation in the 100 m wide Sandy Creek corridor.
C	VHC 41.4	VHC 40.4	Management access clearing and vegetation on the embankment batters of a detention basin.
D	VHC 41.4	VHC 42.6	Industrial development with driveways, hardstand and warehouse buildings.



Photograph 3.1 VHC 42.6 at A



Photograph 3.2 VHC 10.1 at B



Photograph 3.3 VHC 40.4 at C



Photograph 3.4 VHC 42.6 at D

3.4 Potential bushfire intensity calculations

The potential bushfire intensity of assessment reference points was determined using the Queensland Public Safety Business Agency *Potential Bushfire Intensity Calculator* (version November 2014) which is an Excel spreadsheet calculator that models the site-specific bushfire hazard assessment method in Bushfire resilient communities.

Part B of the SPP Natural Hazards, Risk and Resilience Technical Manual – A ‘fit-for-purpose’ approach in undertaking natural hazard studies and risk assessments (DILGP 2016) defines bushfire hazard classes as follows:

- very high – potential bushfire intensity > 40,000 kilowatts/m;
- high – potential bushfire intensity 20,000-40,000 kW/m;
- medium – potential bushfire intensity 4,000-20,000 kW/m; and
- non bushfire hazard - potential bushfire intensity <4,000 kW/m.

Results of potential bushfire intensity calculations which determine the bushfire hazard class of assessment reference points shown on Figure 2.1 are presented in Table 3.2.

Table 3.2 Potential bushfire intensity

Assessment reference point	Ground truthed VHC	Potential fuel load (t/ha) ¹	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
A	VHC 42.6	2	0	131	Non-bushfire hazard class
B	VHC 10.1	20.8	5	20,074	High
C	VHC 40.4	5	0	822	Non-bushfire hazard class
D	VHC 42.6	2	0	131	Non-bushfire hazard class

Notes 1 potential fuel load taken from Bushfire resilient communities

3.5 Bushfire hazard areas

Results of the potential bushfire intensity calculations determined that the proposed development is within the potential impact buffer of a high potential bushfire intensity area at assessment reference point B. Therefore, the proposed development is in a bushfire hazard area and must be designed to achieve compliance with outcomes of the Bushfire hazard overlay code.

4 Bushfire hazards associated with the site

This chapter identifies bushfire hazards associated with the site.

4.1 Fire danger season

The fire danger season in South-east Queensland starts in August, peaks in September and begins to fall in November, but will remain elevated until consistent summer rainfall occurs. Typically, the worst fire weather conditions will be experienced during the fire danger season when the wind direction is from the north or west.

Fire danger ratings (**FDR**) provide advice about the level of bushfire threat on a day. An FFDI of 53 is commensurate with a 'severe' FDR and will be associated with hot, dry and windy conditions. If a bushfire starts and takes hold during a severe FDR, it will be difficult to control and fast moving in large areas of bushland vegetation.

4.2 Fire history

As discussed in Section 3.2, fire history data indicates 1 fire has been recorded east of the site during the past 10 years. Therefore, it is considered possible that the proposed development could be subject to bushfire attack in the future.

4.3 Potential direction of bushfire attack

The potential direction of bushfire attack on the proposed development is from the south where VHC 10.1 occurs in the Sandy Creek corridor. This bushfire attack scenario is further assessed in Section 5.7.

4.4 Potential bushfire hazard from adjacent land use

The site is surrounded by industrial development which based on the fire history data discussed in Section 4.2 is not a bushfire hazard to the proposed development.

4.5 Water and access for emergency services

The proposed development has access to mains water and a public road network which is capable of accommodating emergency vehicles.

5 Bushfire hazards associated with the proposed development

This chapter identifies potential bushfire hazards associated with the proposed development.

5.1 Siting and design

The proposed development will be designed to mitigate the risk of the bushfire hazards determined by the site-specific bushfire hazard assessment in this bushfire management plan.

The proposed development will be accessed via Christensen Road.

5.2 Vulnerable uses

The proposed development does not include 'vulnerable uses' as defined by the Bushfire hazard overlay code.

5.3 Essential community infrastructure

The proposed development does not include 'essential community infrastructure' as defined by the Bushfire hazard overlay code.

5.4 Storage and handling of hazardous chemicals

The proposed development does not involve the manufacture or storage of hazardous chemicals in bulk.

5.5 Access and egress

Efficient access for emergency services and the evacuation of the site will be provided via the existing road connection to Christensen Road.

The gravel maintenance tracks along the south boundary of the site and along the east boundary of the site within the detention basin provide access for rural fire brigade vehicles.

5.6 Fire-fighter water supply

The proposed development will be connected to mains water and will have an appropriately designed reticulated hydrant system.

5.7 Radiant heat exposure

This bushfire management plan seeks to demonstrate an alternate solution to the Bushfire hazard overlay code by way of compliance with the radiant heat exposure outcome for industrial development in the SPP *Bushfire prone area code* (**SPP bushfire prone area code**) in the *Natural hazards, Risk and Resilience – State Planning Policy State Interest guidance material* (DSDMIP 2019).

The SPP bushfire prone area code requires industrial development to be separated from bushfire hazard areas by a distance which achieves a radiant heat flux level $\leq 29 \text{ kW/m}^2$ at lot boundaries or development footprints within proposed lots.

As discussed in Section 4.3, the potential direction of bushfire attack on the proposed development is from the south where VHC 10.1 occurs in the Sandy Creek corridor. The radiant heat profile of this bushfire attack scenario was assessed using the BAL calculator. Inputs used in the BAL calculator and outputs from the BAL calculator are provided at Appendix 3.

Results indicate that a setback of 13.2 m from assessment reference point B is required to achieve a radiant heat flux level $\leq 29 \text{ kW/m}^2$.

It is considered appropriate for the 8 m wide vegetation clearing outside the south boundary of the site to be included in the setback along the south boundary of the site because it has a gravel maintenance track that will limit the growth of grass and woody vegetation and it will be periodically maintained by City of Gold Coast Council.

6 Bushfire mitigation plan

This chapter identifies mitigation measures that will be implemented as part of the proposed development to comply with outcomes of the Bushfire hazard overlay code.

It is the total of the mitigation measures in this chapter that will reduce the risk of bushfire hazards to a tolerable level. Failure to implement all actions in their entirety could result in an increased level of exposure to the bushfire hazards.

6.1 Setbacks from bushfire hazard areas

The 29 kW/m² radiant heat flux contour from the high potential bushfire intensity area at assessment reference point B is shown on Figure 6.1 and demonstrates that the development footprint of the MCU application achieves a radiant heat flux ≤ 29 kW/m². Figure 6.1 also demonstrates that the development footprint of the MCU application achieves a radiant heat flux ≤ 29 kW/m² from vegetation on the embankment batters of the detention basin adjacent the east boundary of site.

There will be no storage of plant, equipment or materials within the 29 kW/m² radiant heat flux contour along the south boundary of the site.

Pedestrian access will be maintained for emergency services around development footprints at all times.

Fencing and retaining walls will be constructed with non-combustible or fire resisting materials.

6.2 Landscaping around development footprints

Landscaping around development footprints will be designed in accordance with *Bushfire Resilient Building Guidance for Queensland Homes* (QRA 2020) which will ensure that it provides a low fuel hazard area with discontinuous fuels that 'disrupts an advancing fire front and prevents isolated fires from developing to a size that could threaten' the proposed development footprint.

The bushfire resilience of the site will be increased by:

- planning a strategic garden layout;
- minimising the use of combustible garden materials, ie combustible mulches and timber garden edging; and
- choosing appropriate plantings which have characteristics that make them less likely to burn readily.

Plant selection should favour species with the following characteristics:

- well suited to local growing conditions;
- high moisture content;
- open and loose branching with sparse leaves;
- course texture;
- wide, flat and thick leaves;
- smooth bark; and
- low levels of oils, waxes and resins.

Over time garden plantings may become diseased, stressed or die and become more flammable as moisture content decreases. Therefore, regular maintenance of gardens must be carried out, including:

- maintaining grass at a height < 10 centimetres;

- removing dead plants and fallen branches;
- clearing ground fuel from underneath plants;
- replacing plants that die or become diseased;
- keeping plants well hydrated through watering and use of non-flammable mulch;
- removing any fine or dead material that may accumulate in plants; and
- removing weeds.

6.3 Access and evacuation

The common driveway will be designed and constructed in accordance with required outcome R03 *access requirements* of the Bushfire hazard overlay code.

Site access and egress and a turnaround area within the site are identified on Figure 6.1.

6.4 Fire-fighting water supply

The proposed development will be connected to mains water and the reticulated hydrant system in the Christensen Road reserve.

The connection to mains water and the reticulated hydrant system will be designed and constructed to comply with required outcome R05 *water supply requirements* of the Bushfire hazard overlay code.

With regards to the reticulated hydrant system, where there are differences between required outcome R05 *water supply requirements* of the Bushfire hazard overlay code and the *Australian Standard – Fire hydrant installations system design, installation and commissioning (AS 2419.1-2017) Appendix B*, the higher level standard should prevail.

6.5 Service installation

Services, ie water, electricity and gas, will be installed underground.

If mains gas is installed, it will be in accordance with the *Australian Standard for the Storage and Handling of LP Gas* (AS 1596-2014) and the requirements of relevant authorities. In addition, metal piping will be used exclusively.

6.6 Hazardous chemicals

The proposed development will not involve the manufacture or storage of hazardous chemicals in bulk.

7 Conclusion

This bushfire management plan has been prepared by a suitably qualified person and is in general accordance with the Bushfire management plan policy.

A site-specific bushfire hazard assessment confirmed that the site is affected by bushfire hazard and that the proposed development is subject to compliance with outcomes of the Bushfire hazard overlay code.

Mitigation measures that will be implemented as part of the proposed development are specified in Chapter 6. With the implementation of these mitigation measures, the proposed development is 'accepted development' for the purpose of the Bushfire hazard overlay code.

An assessment of the proposed development against required outcomes RO2-RO6 in Part A of the Bushfire hazard overlay code is provided at Appendix 4.

References

Australian Building Codes Board (ABCB) 2019, *National Construction Code Series, Building Code of Australia Class 2 to Class 9 Buildings, Volume 1*, Australian Government and States and Territories of Australia, February 2019

Australian Building Codes Board (ABCB) 2019, *National Construction Code Series, Building Code of Australia Class 1 and Class 10 Buildings, Volume 2*, Australian Government and States and Territories of Australia, February 2019

Queensland Department of Infrastructure, Local Government and Planning (DILGP) 2016, *Queensland State Planning Policy Natural Hazards, Risk and Resilience Technical Manual – A ‘fit-for-purpose’ approach in undertaking natural hazard studies and risk assessments*, April 2016

Queensland Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) 2019, *Natural Hazards, Risk and Resilience – Bushfire, State Planning Policy – state interest guidance material*. December 2019

Queensland Fire and Emergency Service (QFES) 2019, *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest ‘Natural Hazards, Risk and Resilience – Bushfire’*, October 2019

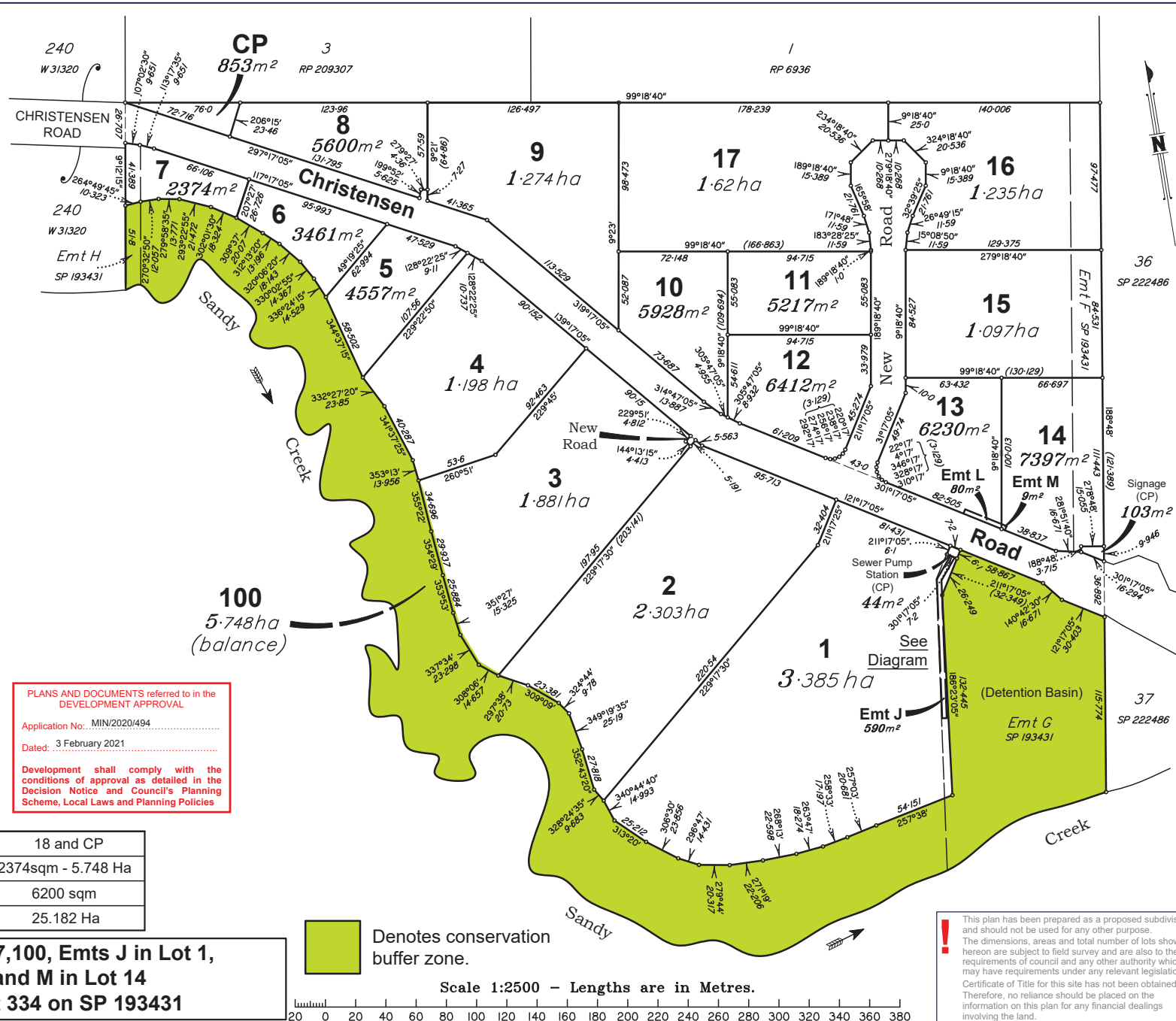
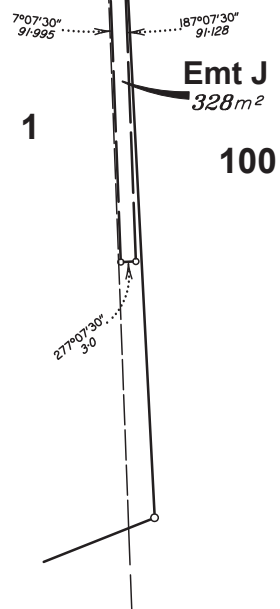
Queensland Reconstruction Authority (QRA) 2020, *Bushfire Resilient Building Guidance for Queensland Homes*, July 2020

Standards Australia Limited (Standards Australia) 2014, *Australian Standard 1596-2014 - Storage and Handling of LP Gas*, May 2014

Standards Australia Limited (Standards Australia) 2017, *Australian Standard 2419.1-2017 – Fire hydrant installation, System design, installation and commissioning*, November 2017

Standards Australia Limited (Standards Australia) 2018, *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas*, Fourth edition, November 2018

Appendix 1 Approved subdivision plan



Number of new lots	18 and CP
Lot sizes	2374sqm - 5.748 Ha
Area of New Road	6200 sqm
Total Site Area	25,182 Ha

**Proposed Lots 1-17,100, Emts J in Lot 1,
L in Lot 13 and M in Lot 14
Cancelling Lot 334 on SP 193431**

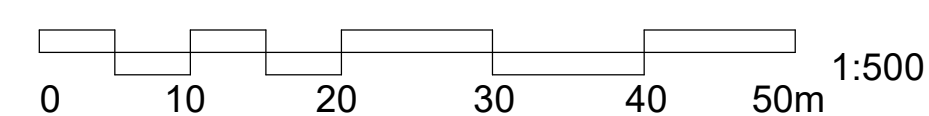
REVISIONS					ASSOCIATED CONSULTANTS:		SURVEYOR	DATE	16/06/2020	LEVEL DATUM:	CLIENT: King and Co	SITE:	SCALE	1:2500 (A3)
				C	A		DRAWN	PDR	CHECKED	AJS	N/A	Property Consultants	81-161 Christensen Road, Stapylton	PLAN REF: S0204-P7A
17/07/20	Amend boundaries and areas in Lots 3-5 and 100, remove Emt K				PDR	A								

Appendix 2 Proposal plan



PROXIMITY AT YATALA - MASTER PLAN

80 - 161 CHRISTENSEN ROAD SOUTH, STAYPLTON QLD



CLIENT	BURNSIDE SYNDICATE PTY LTD
PROJECT	PROXIMITY AT YATALA
REVISION	LOT 1 MASTER PLAN
PROJECT NO.	4896
DESIGNER NO.	AR-SK02
REV	A
DATE	25.02.21

32 Precision Street
Post Office Box 294
Salisbury QLD 4107
Phone 07 3274 4209
Fax 07 3875 1012

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Appendix 3 Radiant heat exposure calculations

Assessment reference point B

- Forest fire danger index - 53
- Vegetation - VHC 10.1 *Spotted gum dominated open forests*
- Total fuel load – 20.8 t/ha¹
- Understorey fuel load – 20.8 t/ha¹
- Slope –5° down slope
- Site slope – 0° slope
- Flame width –18.5 m (short-fire run of 100 m)

Note 1 Fuel load taken from *Bushfire resilient communities* (2019). The forest vegetation occurs in a 100 m wide drainage corridor which is surrounded by developed land. Therefore, this bushfire attack scenario is a short-fire run and has a calculated flame width of 18.5 m. AS3959-2018 assumes a full intensity fire involving overstorey fuel occurs when flame width reaches 100 m wide. Given that this bushfire attack scenario will not generate a full intensity fire involving overstorey fuel, the value for overall fuel load has been set to the same value as understorey fuel in the radiant heat flux model.

Short-fire run flame width calculations

Reference: New South Wales Rural Fire Service (NSW RFS) 2019, *Short Fire Run – Methodology for Assessing Bushfire Risk for Low Risk Vegetation*, May 2019

The shape and growth of a fire run can be determined mathematically and presented as an ellipse as shown in Figure 1.

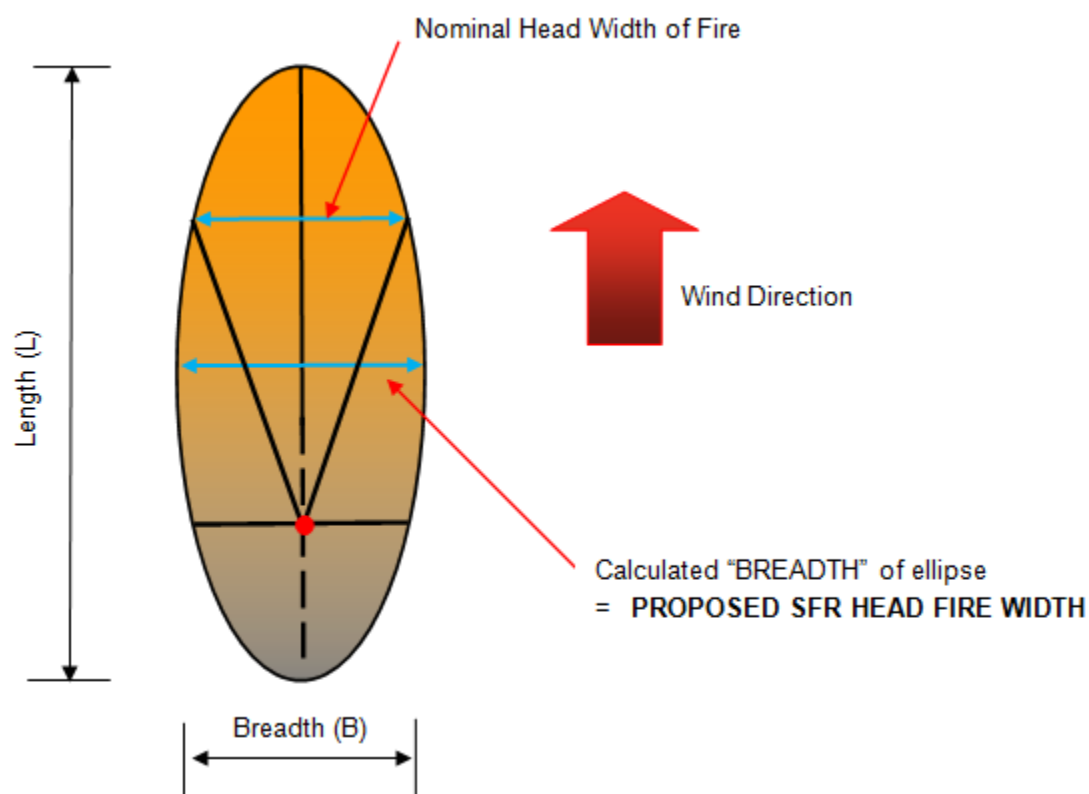


Figure 1 Schematic diagram of a simple elliptical fire growth model

The two basic dimensions of an elliptical fire outline are its length and breadth. The shape factor identified is more commonly referred to as the length-to-breadth ratio or L/B. The L/B ratio is determined by dividing the total fire length by the maximum fire width or breadth.

L/B ratio

The short-run fire head width represents the horizontal dimension of the view factor used in the BAL model. To calculate the short-run fire head width we need to determine the L/B ratio using the following equation:

$$L/B \text{ ratio} = 1.0 + 0.0012V^{2.154}$$

where

V = wind speed kilometres (km)/hour (hr) (AS 3959-2009 standard is 45 km/hr)

$$L/B \text{ ratio} = 1.0 + (0.0012 \times 45)^{2.154}$$

$$L/B \text{ ratio} = 5.4$$

Flame width

The breadth or short-run fire head width is determined by rearranging the L/B ratio equation.

If

$$L/B \text{ ratio} = 5.4$$

Then

$$B = L/5.4$$

Bushfire attack from potential maximum fire run of 100 m

$$B = 100/5.4$$

$$B = 18.5 \text{ m}$$



Calculated March 26, 2021, 3:35 pm (MDc v.4.9)

J21029

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	53	Rate of spread	1.82 km/h
Vegetation classification	Forest	Flame length	14.28 m
Understorey fuel load	20.3 t/ha	Flame angle	42 °, 47 °, 52 °, 57 °, 59 ° & 73 °
Total fuel load	20.3 t/ha	Elevation of receiver	4.77 m, 5.22 m, 5.62 m, 5.99 m, 6.12 m & 6.83 m
Vegetation height	n/a	Fire intensity	19,120 kW/m
Effective slope	5 °	Transmissivity	0.88, 0.869, 0.855, 0.84, 0.832 & 0.779
Site slope	0 °	Viewfactor	0.5907, 0.4378, 0.2897, 0.195, 0.1575 & 0.042
Flame width	18.5 m	Minimum distance to < 40 kW/m²	10.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	13.2 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	16.7 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	20.7 m
		Minimum distance to < 10 kW/m²	23.1 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

Appendix 4 Bushfire hazard overlay code assessment

Part A – Accepted development subject to requirements

Table 8.2.3-1 Bushfire hazard overlay code – for accepted development subject to requirements

	Required outcomes	Compliance assessment
Bushfire hazard	RO1 A written assessment by a suitably qualified and experienced bushfire management consultant confirms that the site is not in a bushfire hazard area for the purpose of accepted development. Or The development complies with an existing approved Bushfire management plan as referenced within the approved reconfiguration of a lot. Or Development is for a dwelling house that occurs on lot smaller than 1,000m² and is serviced by a reticulated water supply. Editor's note – Development will be required to comply with the <i>Building Code of Australia</i> and the standards of <i>AS 3959-2009 Construction of buildings in bushfire-prone areas</i>.	Does not comply with RO1 A site-specific bushfire hazard assessment was performed for the site in accordance with the method in <i>Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'</i> (QFES 2019) (Bushfire resilient communities) and confirmed that the site and the proposed development are affected by bushfire hazard. There is no existing approved bushfire management plan referenced with the approved reconfiguration of a lot. The proposed development is not for a dwelling house on a lot < 1,000 m².
Where development is not in accordance with RO1, RO2-RO6 apply		
	Required outcomes	Compliance assessment
Bushfire radiation zones	RO2 Development is located such that bushfire radiation zones are located entirely within the boundaries of the private property of the development site. Editor's note – Development should be located away from the most likely direction of a fire front (refer Figure 8.2.3.1 : Preferred house site location in Bushfire hazard areas) and so that the elements of the development least susceptible to fire are sited closest to the bushfire hazard. See Vegetation management code for bushfire radiation zone dimensions.	Complies with RO2 The bushfire management plan demonstrates compliance with the Queensland State Planning Policy <i>Bushfire prone area code (SPP bushfire prone area code)</i> in the <i>Natural hazards, Risk and Resilience – State Planning Policy State Interest guidance material</i> (DSDMIP 2019), which requires development footprints to be separated from bushfire hazard areas by a distance which achieves a radiant heat flux level $\leq 29 \text{ kW/m}^2$. The 29 kW/m² radiant heat flux contour is shown on Figure 6.1 of the bushfire management plan and demonstrates that the development footprints for the MCU applications

	Required outcomes	Compliance assessment
		achieve a radiant heat flux $\leq 29 \text{ kW/m}^2$. It is considered appropriate for the 8 m wide vegetation clearing outside the south boundary of the site to be included in the bushfire radiation zone along the south boundary of the site because it has a gravel maintenance track that will limit the growth of grass and woody vegetation and it is evident that it will be maintained in perpetuity by City of Gold Coast Council for access along the waterway corridor. There will be no storage of plant, equipment or materials within the 29 kW/m^2 radiant heat flux contour along the south boundary of the site. Pedestrian access will be maintained for emergency services around the development footprints at all times. Fencing and retaining walls will be constructed with non-combustible or fire resisting materials.
	Required outcomes	Compliance assessment
Access requirements	RO3 The access driveway for development in areas with reticulated water must have: a) a minimum cleared width of 6m and a height of 4.8m; b) a minimum formed width of 4m; c) a maximum gradient of 12.5% constructed to an all-weather standard; and d) a length of no greater than 70 m from the street to the dwelling; and e) culverts and/or bridges with a minimum load bearing of 15 tonnes (if applicable). Or The access driveway for development in areas without reticulated water must have: a) a minimum cleared width of 6m and a height of 4.8m; b) a minimum formed width of 4m; c) a maximum gradient of 12.5% with adequate draining to	Complies with RO3 The proposed development is in an area with water reticulation. As stated in Section 6.3 of the bushfire management plan, the common driveway will be designed and constructed in accordance with vehicle access requirements in RO3.

	Required outcomes	Compliance assessment
	prevent soil erosion and minimise ongoing maintenance; d) a length of no greater than 200 m from the street to the dwelling; and e) culverts and/or bridges with a minimum load bearing of 8 tonnes (if applicable).	
	Required outcomes	Compliance assessment
Emergency access	RO4 Where located on a property more than 25,000 m² in area, development must have: a) An existing public road that provides emergency access by separating the development site from hazardous vegetation and meets the minimum requirements of a fire trail. b) A public road network, or alternate emergency access on the development site that separates the development from the hazardous vegetation and meets the minimum requirements for a fire trail. Or where (a) and (b) have not been met: c) The development includes a fire trail which is contained wholly on the subject site and: I. separates the development from hazardous vegetation II. has a minimum formed width of 4m (as shall any gate across the trail), a minimum of 6m cleared of standing flammable vegetation, and a minimum of 4.8m vertical clearance above the trail. III. has passing bays (20 m long x 3 m extra trail width) or turning facilities every 200 m with adequate drainage and erosion control devices, IV. a gradient no greater than 12.5 %, a cross fall of no greater than 10 degrees and with access at each end of	Complies with RO4 The proposed development is accessible via an existing public road on its north boundary. Emergency access along/near the south and east boundaries of the site is provided by existing formed maintenance tracks which are in generally accordance with RO4c)I-VI. The west boundary of the site adjoins existing development which has no hazardous vegetation. Emergency vehicles will be able to operate on hardstand areas within the site.

	Required outcomes	Compliance assessment
	the fire trail from a public road; V. has gates that are easily accessed by Queensland Fire and Emergency Services (QFES); and VI. has suitable arrangements in place to ensure maintenance in perpetuity.	
	Required outcomes	Compliance assessment
Water supply requirements	RO5 All development involving a new or existing building with a gross floor area of 50m² or more must have: a) a reliable reticulated water supply that has sufficient flow and pressure characteristics for fire-fighting purposes at all times (minimum pressure and flow is 10 litres per second at 200 kPa); OR b) a dedicated fire-fighting water storage of not less than 10,000 litres for each individual building. The outlet pipe must be 50 mm in diameter, fitted with a 50 mm male camlock (standard rural fire brigade fitting) and an isolating valve; and c) is provided within 10 m of each building and is either below ground or of non- flammable construction; and d) the water supply outlet located at least 9 m from any potential fire hazards, such as venting gas bottles and combustible structures; and e) a safe and accessible hard stand area capable of accommodating a fire fighting vehicle is provided not more than 3 m from the water supply outlet; and f) the fire-fighting water storage is clearly identified by directional signage provided at the street frontage. Editor's note – dedicated fire-fighting water storage is in addition to water	Complies with RO5 The proposed development will be connected to mains water and the reticulated hydrant system in the Christensen Road reserve. As stated in Section 6.4 of the bushfire management plan, the connections to mains water and the reticulated hydrant system will comply with RO5 of the Bushfire hazard overlay code. With regards to the reticulated hydrant system, where there are differences between RO5 and the <i>Australian Standard – Fire hydrant installations system design, installation and commissioning (AS 2419.1-2017) Appendix B</i>, the higher level standard should prevail.

	Required outcomes	Compliance assessment
	supply for household use and does not include swimming pools, creeks and dams.	
	Required outcomes	Compliance assessment
Utility protection and hazardous materials	RO6 The development must ensure: a) mains gas supplies are installed in accordance with AS1596, the requirements of relevant authorities and metal piping is exclusively used; b) electricity supplies within the property are protected and are not vulnerable to falling trees or bushfire threatening the viability of transmission poles; And c) uses involving bulk storage or manufacture of hazardous materials as defined in the <i>Work Health and Safety Act 2011</i> do not occur in areas identified as medium, high or very high bushfire hazard or potential impact buffers.	Complies with RO6 Services, ie water, electricity and gas, will be installed underground. As stated in Section 6.4 of the bushfire management plan, if mains gas is installed it will be in accordance with RO6a). As stated in Section 6.6, the proposed development will not involve the manufacture or storage of hazardous chemicals in bulk.
Required outcomes		
Editor's note – Buildings in a designated Bushfire hazard area must meet requirements of the Building Code of Australia and the standards of AS 3959-2009 Construction of buildings in bushfire prone areas. Advisory note - Accepted development identified in the assessment tables as subject to requirements must comply with all the nominated requirements in this and other applicable codes.		