BUSHFIRE HAZARD ASSESSMENT & MANAGEMENT PLAN

114 Eggersdorf Road, Ormeau For FPC7 Pty Ltd

April 2022

PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL

Application No: COM/2021/255

Dated: 11 May 2022

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

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1. INTRODUCTION

1.1. BACKGROUND

Wolter Consulting Group (WCG) has been engaged by FPC7 Pty Ltd to prepare a Bushfire Hazard Assessment and Management Plan for the property located at 114 Eggersdorf Road, Ormeau (hereafter referred to as the Subject Site). The 3.8 ha site comprises of single land parcel identified as Lot 4 on SP254945 and is located within the City of the Gold Coast (CoGC) Local Government Area, approximately 25km north-west of the Gold Coast's Central Business District. Currently, the land parcel is utilized for large lot residential purposes with broad areas generally considered as unimproved.

1.2. PURPOSE OF THE REPORT

This Bushfire Hazard Assessment and Management Plan (BMP) has been prepared to support a development application to CoGC for the reconfiguration of one (1) lot into 37 lots with associated infrastructure, connective roads and formalized park land. The plan has also been prepared in compliance with the Building Code of Australia with respect to the future construction of residential buildings associated with the application.

The plan has been prepared in compliance with the Building Code of Australia with respect to the future construction of residential buildings associated with the application, with the requirements of the CoGC City Plan, requirements of **Bushfire Hazard Assessment & Management Plan – 114 Eggersdorf Road, Ormeau**

the State Planning Policy, AS3959:2018 and the SPP Technical Reference Guide *Bushfire Resilient Communities*..

1.3. OBJECTIVES OF THE ASSESSMENT

The objectives of this report are:

- To identify bushfire hazard constraints associated with the proposed development.
- To quantify the bushfire hazard potential of vegetation associated with the site and its surrounds.
- To identify and quantify the potential exposure and risk of future site users.
- To provide mitigation options in order to reduce the identified bushfire threat.
- To demonstrate compliance with the relevant regulatory framework.
- To inform potential site end-users of the threat and management strategies to reduce the bushfire threat.

1.4. KEY DEFINITIONS

The subject site is defined as Lot 4 on SP254945.

The **development footprint** is defined as the area identified to construct all infrastructure related to the proposal.

The study area is land located within approximately 100m of the subject site.

The locality is land located within an approximate 2km radius of the subject site.



1.5. OUTLINE OF THE ASSESSMENT

This BMP has been structured to provide information consistent with the requirements of the CoGC *City Plan*, the methodologies detailed in Leonard *et al (2014)* and AS3959:2018 (Standards Australia 2018).

The BMP is structured as follows:

- Subject Site environmental setting overview.
- Description of the development proposal.
- Detail of Bushfire regulatory framework regulating the site.
- Assessment of current available information regarding the bushfire hazard.
- An assessment of the reliability of information garnered from desktop assessment.
- Risk Assessment.
- Hazard mitigation measures.
- Assessment of compliance with the relevant regulatory framework; and
- Summary and recommendations.



2. SITE ANALYSIS

2.1. SITE LOCATION AND CHARACTERISTICS

The subject site contains currently contains one residential dwelling and related ancillary and recreation structures. Vegetation throughout the lot is comprised of a mix of native, landscape and weed species with the majority located in retained bushland at the southern-most aspect of the site represented by an extension of the Stewart's Road – Pimpama River Reserve.

2.2. SITE TOPOGRAPHY

Review of 1.0m contours for the subject site and study area was undertaken to determine AS3959-2009 slope classifications. The southern area of the subject under which the hazardous vegetation lies holds slopes varying between 5.3° and 8.9° placing it within the $<5^{\circ}$ - 10° slope category. These areas hold a dominant southerly aspect. The balance of the site displays easterly aspects that range between 9.3° and 11.3° placing them conservatively within the in the $<10^{\circ}$ - 15° slope category, however, no hazardous vegetation is associated with these areas.

2.3. CURRENT LAND USES

The site is currently used for residential purposes and contains one residential dwelling and ancillary structures. Access to the property is currently facilitated via Eggersdorf Road and Jacqueline Bay Road.

2.4. SURROUNDING LAND USES

The subject site is located within a mosaic of freehold residential land parcels of various scales to the north, east and west. Retained vegetation areas associated with the Pimpama River are located to the south, south-west and south-east of the site.





3. DEVELOPMENT PROPOSAL

The development application seeks a Development Permit for Reconfiguration of a Lot. The following specifics detail the proposed development.

- 37 new residential allotments.
- Local Park recreation area.
- Open Space areas retaining native vegetation.
- Stormwater treatment infrastructure; and
- Road networks including two (2) through roads traversing east-west through the site.

Refer to Figure 2 to view the Development Proposal



Ground Floor First Floor Notes (Applies to all Lots) (p) denotes line of partico (g) denotes line of garage (w) denotes line of wall Building Loca nvelope notes FRONT 4.0m 4.0 (w) 3.0 (p) 5.5 (g) and SIDE BOUNDARY De 2.0m 1.5m elopes / veran setback dal REAR 2.0m 2.0m Se Table for LOTS SECONDARY FRONTAGE des 3.0m 3.0m Refer to BUILT TO BOUNDARY Build sters. 0.0m n/a

PoD Notes (Applies to all Lots)

General 1. Dwelling houses are to be undertaken in accorr Development (PoD), and the Development Approv with this Plan 0

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itios may be vided that the 9 e located closer he patio is locate and not enclosed.
 beyond the approved setback lilding location envelopes are wher underground services or tr ther

 No structure unless approved subject to future identified for rel 6. The Built to built to this boundary is and are to complete the structure of the sub-this boundary is with the ack table i inclu d the ' are c' ded ' a height of wall a height of wall built to considered to be a wall n the Plan of Developme

Site Site Cov 0 60% 0 the total site area for Dwelling

are nent that

adjacent to and accessed 9. Private open space are minimum overall area of 2 10. All private open space structures to the dwelling a drying facilities, rainwater t 25 tanks and hot water systems as shall be provided rom an indoor living ahall have a minimu d exclusive of ancillary e, satellite dishes, clott ns etc. dimension of 4.0 and

Garages 11. The reduction resign and landscr '-reetscap of the visual impact of garages is encouraged through aping so that garages do not dominate the lot

and Street um building

Front Appearance height is two storeys (9.0m). porporate a veranda, porch, entry portico.

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 to the front of the .
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 Each dwelling shall if
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with QDC NMP1.1, r dwelling.

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be 5

Redding 24. A variety of roof shapes is encouraged. 25. The roof of a dwelling shall incorporate two or diffi single roof pane covering the dwelling is not permitted) root pla

Bin Storage 26. Dwelling houses shall be a minimum 1.5m clear from one boundaries as measured to the wall, or the garage shall incorp boundaries as measured to the wall, or the garage shall incorp its back wall giving access to the rear of the dwelling house. of the orate a side

Legend

- Site Boundary

- ----- Garage Setback Locations ■■■■ Retaining Walls

- Approximate Driveway Locations locations nominated)
- 4 Alternative Driveway Locations Built to Boundary Wall Location
- lillside Blocks
- Split Level Blocks

- Standard Blocks

- Hoad
- Open Space/Park (Lot 901)

- Environmental Reserve (Lot 900) Mapped Biodiversity Corridor (COGC
- tes Base line work sourced from QSpatial. Inced from Stantec. All data is approxim and retaining walls
- , 1m nate o m contours only.
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4. **BUSHFIRE REGULATORY FRAMEWORK**

4.1. STATE PLANNING POLICY

In QLD, bushfire legislation, along with all other forms of development related regulation is regulated under the framework of the PA Act which represents the principal planning instrument governing all planning matters state-wide (DILGP 2017).

Under the framework of the PA Act development regulation is driven by the QLD State Planning Policy (SPP) that identifies matters of state interest (State of Queensland 2017). Pursuant to the requirements of the PA Act all local government entities are required to incorporate the matters of state interest within local government planning instruments. Proposed development that is to be located within an identified bushfire hazard area is identified within the SPP as a matter of state interest (included under the title of Natural Hazards, risk and resilience) and as such the SPP represents the primary planning instrument (subordinate to the PA Act) related to bushfire hazard area as (State of Queensland 2017):

An area that is:

- a) An area identified by a local government in its planning scheme as a bushfire hazard area on the basis of a fit for purpose bushfire study; or
- b) An area shown on the SPP Interactive Mapping System as a bushfire hazard area.

Given the above definition, both the State and Local Government have the ability under the SPP to identify and map bushfire hazard areas as a development constraint (Leonard *et al* 2009).

Section 5.1.1 below discusses the State Government assessment of bushfire hazard for the subject site.

4.2. COCG CITY PLAN

Notwithstanding the above, at a functional level, Local Government planning schemes provide the actual development constraints and opportunities within their development codes and zoning considerations. Each LGA has its own interpretation of the SPP guidelines but all are designed to represent the state interest in this, and all state interest matters. The site is subject to the provisions of the *CoGC City Plan* and in particular the Section 8.2.3 of the City Plan Bushfire Hazard Overlay Code with its primary purpose to appropriately manage the potential bushfire risk associated with new assessable developments.

Section 5.1.2 below discusses the State Government assessment of bushfire hazard for the subject site.

4.3. AUSTRALIAN STANDARD 3959-2018

Australian Standard 3959:2018 (Construction of buildings in bushfire prone areas) requires all new habitable structures built in a bushfire prone area to undertake a Bushfire Attack Level assessment in order to nominate appropriate



BAL construction levels. It is to be noted that detailed construction methods and materials are beyond the scope of this report as this detail is typically addressed as a component of detailed building design certified under private building certification in accordance with the Building Code of Australia (BCA). However, the methods and standards in AS3959:2018 enable a best practice method of adequately addressing bushfire risk mitigation during the development approval stage.

5. BUSHFIRE HAZARD ASSESSMENT

5.1. DESKTOP ASSESSMENT

5.1.1. SPP BUSHFIRE HAZARD AREAS

Mapping produced for the QLD SPP identifies the subject site as holding *High Potential Bushfire Intensity* associated with retained vegetation along the Pimpama River at the south of the study area. A large proportion of this vegetation wil be retained within the development. Polygons associated with the 100m *Potential Impact Buffer* also affect the proposed areas of development. Refer **Figure 3** below for extract of the SPP mapping.

Figure 3: SPP Bushfire Planning Assessment SEQ region (DILGP 2017)



5.1.2. CITY PLAN BUSHFIRE HAZARD OVERLAY MAPPING

The CoGC City Plan bushfire hazard overlay code mapping mirrors the QLD SPP mapping with *High Potential Bushfire Intensity* indicated within areas of retained vegetation. However, the large cleared area that currently is utilised for grazing purposes is indicated as *High*



potential hazard suggesting the mapping may require review. Notwithstanding this difference, the area in question will be subject to development should approval be retained.

Refer **Figure 4** below for extract of the CoGC Bushfire Hazard Overlay mapping.



Figure 4: COGC Planning Scheme Bushfire Hazard Overlay Mapping

5.1.3. VEGETATION COMMUNITY ASSESSMENT AND FUEL LOADS

In order to determine the vegetation communities present that have potential to contribute to the bushfire hazard, the Department of Resources (DoR) Regional Ecosystem mapping database (Version 12.0 - March 2021) was interrogated.

Retained areas of bushland at the south extent of the site are recognised as regulated vegetation. RE 12.11.3 (*Eucalyptus siderophloia, E. propinqua +/- E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides* open forest on metamorphics +/- interbedded volcanics) is represented within the subject site, extending down towards the Pimpama River where it transitions into a narrow riparian fringe of RE12.3.20 (*Melaleuca quinquenervia, Casuarina glauca +/- Eucalyptus tereticornis, E. siderophloia* open forest on low coastal alluvial plains) approximately 35m from the southern boundary. On the site the area of RE12.11.3 includes non-regulated vegetation (regrowth) on and around its edges to varying widths. The balance of the site and study area is classified as Non-Remnant pursuant to the VMA.





Figure 5: Regional Ecosystem designations across the subject site and study area

5.1.4. SLOPE ASSESSMENT

Review of 1.0m contours for the subject site and study area was undertaken to determine AS3959-2009 slope classifications. The southern area of the subject under which the hazardous vegetation lies holds slopes varying between 5.3° and 8.9° placing it within the $<5^{\circ}$ - 10° slope category. These areas hold a dominant southerly aspect. The balance of the site displays easterly aspects that range between 9.3° and 11.3° placing them conservatively within the in the

 ${<}10^{\rm o}{\text{-}}\ 15^{\rm o}$ slope category, however, no hazardous vegetation is associated with

these areas.

Figure 6: Study Area Slope Assessment (2D model)





Figure 7: Study Area Slope Assessment (3D model)



Figure 8: QFES Fire Weather Severity VO1



5.1.5. FIRE WEATHER SEVERITY

In accordance with AS3959-2009 S.2.2.2 Table 2.0, the regional Fire Danger Index for Queensland is nominated as FDI 40. However, review of relevant data developed by Queensland Fire and Services (QFES) in conjunction with CSIRO suggests that regional specific FDI value of 53 is appropriate for the site. This value anticipates both future climate trends to year 2050 and anticipates a 5% annual exceedance probability (AEP). As such use of FDI 53 is considered as a conservative approach to this assessment.



5.2. RELIABILITY ASSESSMENT

On-ground assessment and ground truthing of the desktop details was undertaken by WCG's senior fire analyst on the 25th March 2021. The following sections detail the outcomes of this assessment.

5.2.1. FUEL AREA ASSESSMENT

An assessment of the identified retained vegetation areas on the site and within 100m of the site was undertaken to identify potential fire hazard to the proposed development. **Table A** below details the adopted fuel areas.

| Fuel Area | Description | Location |
|--------------|---|---|
| HA1 | Areas associated with RE12.11.3 and with characteristic slopes <5°-10° | Southern site area |
| HA2 | Areas associated with RE12.3.20 and with slopes characteristic slopes $<5^{\circ}$ -10 $^{\circ}$ | Southern study area Pimpama River fringe 35m beyond southern site boundary |

Table A: Adopted Fuel Areas

5.2.2. FUEL AREA DESCRIPTIONS

The following section details the areas defined as individual fuel areas and provides an assessment/verification of their potential bushfire hazard classification based upon either a qualitative assessment of fuel characteristics and/or potential fire-line intensity (kW/m).

Fireline intensity measures the rate that a fire would consume fuel energy per unit time per unit length of fire front and is based upon the following equation (in accordance with DILGP 2016 'Fit for Purpose" approach):

$$PFI = 0.62 PFL^{2} x FFDI exp (0.069 Slope)$$
(Equation 1¹)

The resultant fire-line intensity values are then compared with the DILGP 2016 Potential Bushfire Hazard Classes (**Table B** below) to transparently assess the Fuel Areas potential hazard to the proposed development.

| Hazard Class | Potential Fireline Intensity |
|--------------|------------------------------|
| 1. Very High | 40,000+ kW/m |
| 2. High | 20,000 – 40,000kW/m |
| 3. Medium | 4,000 – 20,000kW/m |
| 4. Low | 0 – 4,000kW/m |

Table B: Potential bushfire hazard classes (adopted from DILGP 2016).

¹ Where PFI = Potential Fire Line Intensity (kW/m), PFL = Potential Fuel Load (tonnes/ha), FFDI = Fire Weather Severity and Slope = Maximum slope (°)



Unless otherwise detailed the following references have been adopted for this assessment.

| Variable | Reference |
|-------------------------------|--------------------------------------|
| Vegetation Hazard Class (VHC) | DILGP 2016 |
| Potential Fuel Load (PFL) | QFES 2019 |
| Slope (°) | LIDAR Qld Government |
| Fire Weather Intensity (FFDI) | QFES 2013, Leonard <i>et al</i> 2014 |

Table C: Data Sources for PFI assessment.

To confirm (or otherwise) that VHC fuel loads within the study area conform with published data, measurement of fuel loads present was conducted in accordance with the methodology described by Hines *et al* (2010). Fuel accumulation plots were located within the community and within each plot location, sub sampling units were measured from the plot centre point to develop concentric rings 10m and 20m in radius within which sampling was conducted as **Table D** details below.

| Fuel Layer | Sampling Area |
|-------------------|-----------------------------------|
| Bark fuel | 20m radius ring from centre point |
| Elevated fuel | 10m radius ring from centre point |
| Near surface fuel | 10m radius ring from centre point |
| Surface fuel | 10m radius ring from centre point |

Table D: Sampling sub-units adopted as per methodology of Hines *et al* (2010)In order to provide an adequate representation of the variability of surface fuelswithin the sampling plots, ten (10) data points were randomly located within

each sub-unit. These ten (10) data points were then averaged to provide a nominal depth of the litter layer.

5.2.2.1. HAZARD AREA 1 (HA1)

Fuel area one (FA1) is represented by areas of retained bushland identified as RE12.11.3 and possess slopes that are downhill of the development area and are greater than 5 ° but less than 10° in inclination. HA1 is identified on **Figure 9**. These vegetation communities are present in their natural (or near to natural) condition but do hold a northern edge with vegetation of reduced complexity dominated by *Allocasuarina littoralis* (River She Oak). This results in a surface fuel layer of leaves from the species with an arrangement that would likely reduce the flammability of the layer. As such data obtained from edge areas may be confounding to the assessment and as such will be disregarded form fuel load assessment. Use of the data obtained from within the remnant vegetation unit polygon is considered to be conservative and appropriate to assume a worst case scenario.

Plates 1-2 provide visual representation of typical vegetation and fuel characteristics of HA1 area.



Plates 1-2 : HA1 Fuel Load Characteristics





The results from the HA1 fuel accumulation plot are provided in Table E below.

| | Averag | e fuel loads (t/ha | ha) | | | | |
|----------------------------------|--------|--------------------|--------------|----------|------|-------|--|
| | S | NS | S/NS | Elevated | Bark | Total | |
| Fuel Load contribution (t/ha) | 12.6 | 4.3 | 16.9 | 3 | 1 | 20.9 | |
| Hines 2010 Fuel Hazard Rating | High | High | Very High | High | Mod | High | |

Table E: Fuel Accumulation Plot Results – HA1

Fuel accumulation data suggests an overall fuel load of 20.9t/ha that when compared to QFES published fuel loads (QFES 2019) indicates slightly reduced fuel loads than the ten-year fuel accumulation data reported by QFES.

Table F below provides an assessment of the potential fire-line intensity of HA1in accordance with **Equation 1**.

| Fuel Area | VHC | PFL (t/ha) | Slope (⁰) | FFDI | PFI (kW/m) | Hazard Class | |
|--|-----|------------|------------------------|------|------------|--------------|--|
| HA1 | 9.1 | 30.9* | 8.9 | 53 | 39,219 | HIGH | |
| * Adapted from site data inclusive of 10 t/ba to account for cappy fuel for fire run | | | | | | | |

* Adopted from site data inclusive of 10 t/ha to account for canopy fuel for fire run <100m.

 Table F: HA1 Bushfire Intensity Assessment

As can be seen the ground truthed hazard classification for HA1 is considered as *'High'* and as such conforms to that detailed in both the State Hazard Mapping and the CoGC *City Plan* Bushfire Hazard Overlay Mapping.



5.2.2.2. HAZARD AREA 2 (HA2)

Hazard area two (HA2) is represented by the narrow fringe of RE12.3.20 bordering the Pimpana River to the south of the study area and possesses a slope downhill of the development area approximately 6.2 $^{\circ}$ in inclination. HA2 is identified on **Figure 9**.

No fuel accumulation plots were conducted within this hazard area thus the fuel loads published by QFES (2019) have been adopted.

For HA2 It is not considered appropriate to apply an additional 10 t/ha fuel to account for canopy load given that no vegetation capable of supporting a fire front is located downhill of this hazard area (separated by the Pimpama River) thus engagement of the canopy is highly unlikely.

Table G below provides an assessment of the potential fire-line intensity of HA2 in accordance with **Equation 1** and based upon the fuel loads published by the QFES.

| Fuel Area | VHC | PFL (†/ha) | Slope (⁰) | FFDI | PFI (kW/m) | Hazard Class |
|-----------|------|------------|------------------------|------|------------|--------------|
| HA2 | 22.1 | 28.4 | 6.2 | 53 | 26,340 | HIGH |

Table G: HA2 Bushfire Intensity Assessment

As can be seen the ground truthed hazard classification, HA2 is considered as a '*High*' hazard and as such **conforms** to that detailed in both the State Hazard Mapping and the CoGC *City Plan* Bushfire Hazard Overlay Mapping.

5.2.2.3. LOW FUEL AREAS

Areas within and adjoining the subject site that meet one or more of the following variables conform with S.2.2.3.2 of AS3959-2018 where the potential hazard is considered as *Low* and as such are exempt from further assessment.

- Area subject to regular maintenance and associated with residential areas including maintained parklands.
- Windbreaks
- Areas dedicated to buildings and structures and residential landscaping.
- Areas that have been cleared of vegetation including those currently under construction.
- Developed land consisting predominantly of hardstand areas.
- Roads; and
- Areas dedicated to agricultural cropping.

5.2.3. GROUND TRUTHED FUEL AREA HAZARD SUMMARY

Table H below summarizes the ground truthed hazard classifications of all FuelAreas relevant to this assessment.

| Fuel Area | VHC | PFL (†/ha) | Slope (⁰) | FFDI | PFI (kW/m) | Hazard Class |
|-----------|------|------------|------------------------|------|------------|--------------|
| HA1 | 9.1 | 30.9 | 8.9 | 53 | 39,219 | HIGH |
| HA2 | 22.1 | 28.4 | 6.2 | 53 | 26,340 | HIGH |

 Table H: Hazard Reliability Assessment Results

Figure 9 provides a visual representation of the Fuel Areas and the associated hazard classifications.



6. **RISK ASSESSMENT**

6.1. NATURE OF SITE ACTIVITIES

Given the proposal is for a residential development, activities likely to result are anticipated to be typical for a small residential area. No specific activities that are likely to be undertaken that would represent specific increased hazard to bushfire occurrence, however, it is accepted that fire incidents can be proportionate to the population of any given area. Given this, the proposed development may result in:

- Accidental ignition of fire within retained bushland; and
- Potential arson related activities resulting in retained bushland ignition.

Conversely, there is also a potential for reduction of bushfire occurrence associated with development of the site. The presence of a larger population locally will increase the detectability of potential ignition within the retained bushland area or surrounds allowing a more rapid emergency response to be enlisted.

6.2. POTENTIAL RESIDENT POPULATION

With the creation of 37 residential land parcels it can be assumed that 2-4 residents would likely populate each land parcel resulting in a potential resident population of approximately 148 people.



6.3. EMERGENCY RESPONSE

The nearest QFES station is the Ormeau Rural Fire Station located at 31 Upper Ormeau Road, Kingsholme approximately 4.4km via the fastest route from the subject site. Travel time from the station in general traffic conditions is estimated at eight (8) minutes. Assuming resource availability, response time of this scale can be considered as providing an optimal chance for extended first attack suppression and as such would be considered as adequate first response resource availability for the proposed development.



6.4. BUSHFIRE WEATHER & ANTICIPATED DIRECTION OF ATTACK

Westerly winds in the morning shifting to easterly in the afternoon have been recorded as the predominant annual wind directions for the area (nearest data Logan water treatment plant) approximately 17km north-west of the subject site) as provided in **Figure 10** below.



During the peak fire season (i.e. typically September through December) these predominant wind directions persist however some increase from influence from the north and north easterly directions can be interpolated. Western winds during the summer months would be expected to increase temperatures and decrease humidity increasing the FDI of the area on a daily time scale. This assessment has adopted a conservative FDI of 53 and as such is considered to have anticipated these daily variations to FDI. The study area presents in a location that is somewhat isolated from other substantial external fire threat areas. The predominant areas of threat reside to the west of the site but are characterized by relatively narrow or small patches of vegetation (for example the retained vegetation south of Ormeau Village). Importantly, connective vegetation that is likely to provide a substantial fire run to the site is only present in a non-connected manner within several land parcels to the east. The threat from this direction is considered as minimal given the predominant winds during fire season are unlikely to advance a fire (or embers) towards the site. Directly south of the site the Pimpama River Reserve holds connective vegetation and predominant slopes may advance a fire in this vegetation toward the site. However, the extent of vegetation associated with the river corridor is limited and the proximity of emergency services here would likely result in rapid suppression should ignition occur. Additionally, the mitigation measures provided in this report assume a fire advancing from this direction resulting in a risk that would be considered as tolerable.

Given the predominate winds during fire season, a substantial fire front from the west would represent some risk to be considered. Whilst direct attack is not possible given the distance to any substantial areas of hazard and the substantial urban matrix and other barriers between the site, a substantial fire may have potential to create spot fires within vegetation in proximity of the site. Whilst an ember fire scenario is unlikely (given ember fire modelling suggests a maximum distance of 100m to retain the threat of mobile embers), the effects of spotting may have the result of a fire front igniting within the vegetation hazard areas



identified within this assessment. Thus, the mitigation measures provided herein are designed to reduce the potential threat to a tolerable level.

6.5. MOBILITY & INGRESS / EGRESS CAPACITY

Currently, the plan of development indicates two main access routes to the development area that can be considered as separate entities. The northern road to provided is distinctly separate to the southern connection road and is outside the area of influence of the bushfire hazard. The southern access route is located adjoining HA1 and will act as a separation buffer (16m wide) to the potential fire hazard and will allow emergency services access for fire-fighting response.

The overall design of the internal road network maximises alternate connections with the exception of two (2) Cul-de sac configurations servicing Lots 24-34 in the south and Lots 1-11 in the north. Whilst the proposed Cul-de sacs are not a preferable design for bushfire protection the northern Cul-de sac is located outside the range of influence of the hazardous vegetation and as such is considered as risk adverse. The southern cul-de-sac arrangement falls within the potential influence of HA1. Whilst not optimal the road network does provide alternative east or south evacuation routes from the Cul-de sac enabling alternative evacuation options. Additionally, given the proximity of emergency response services a rapid response time from QFES,would be expected to increase the potential of first response success thus reducing the need for evacuation. This is particularly relevant given the Small/narrow potential fire **Rushfire Hazard Assessment 8 Management Plan — 114 Engersdorf Road Ormedu**

front with relatively short fire run that would be expected from an outbreak in the retained vegetation. As such the risk associated with the Cul-de sac design is considered as tolerable with respect to the potential hazard.

6.6. BUSHFIRE SEVERITY MODELLING

In order to anticipate and risk assess the potential severity of a bushfire attack from hazardous vegetation, the predetermined variables for vegetation characteristics, slope values and relative fuel loads have been utilised to model key fire parameters which are detailed in **Table I** below. It is to be noted that a fire advancing from HA2 would have to pass through HA1 making the potential effects from HA2 somewhat irrelevant to the assessment.



| Hazard Area 1 fire scenario. | | | | | |
|---|------------------------|---|--|--|--|
| FDI-53; PFL/SFL — 30.9/20.91/ha; Slope — 8.9°, Veg — Forest (9.1) | | | | | |
| Parameter | Value | Method utilized | | | |
| Fire Intensity | 39,219 kW/m | Byram, 1959 | | | |
| Rate of Spread | 1.32 km/h | Macarthur 1973; Noble et al. 1980 | | | |
| Flame length | 19.6m | Noble <i>et al.</i> 1980 | | | |
| Flame Width | 100m | | | | |
| Radiant Heat flux @ 0m | 111.7kW/m ² | Drysdale, 1999, Sullivan <i>et al.</i> , 2003, Douglas & Tan, 2005 | | | |
| Hazard Area 2 fire scenario. | | | | | |
| FDI-53; PFL/SFL - | – 28.4/18.4 t/ha; SI | ope — 6.2 ⁰ , Veg — Forest (9.1) | | | |
| Parameter | Parameter | Parameter | | | |
| Fire Intensity | 26,340kW/m | Byram, 1959 | | | |
| Rate of Spread | 1.1 km/h | Macarthur 1973; Noble et al. 1980 | | | |
| Flame length | 15.0m | Noble <i>et al.</i> 1980 | | | |
| Flame Width | 100m | | | | |
| Radiant Heat flux @ 0m | 111.7kW/m ² | Drysdale, 1999, Sullivan et al., 2003, | | | |

Table I: Predictive fire severity modelling results

7. HAZARD MITIGATION MEASURES

Bushfire hazard mitigation requires an integrated approach consisting of a variety of best practice, mutually supportive protection measures to provide protection against bushfire attack. The following sections provide such an integrated approach for the proposed development.

Figure 11: Bushfire attack mechanism on houses (source: DELWP 2017)

FORMS OF BUSHFIRE ATTACK FLAME CONTACT FROM FIRI FRONT EMBER ATTACK RADIANT HEAT LOCALISED FLAME CONTACT EXTREME FIRE BEHAVIOUR · May occur from the hazard Occurs from the brizard in Occurs from the bazard in Occurs from the hozard in Occurs from fire behaviour in in very close proximity to close proximity to a building close proximity to a building close proximity to a building the surrounding landscape (up to 150 metres). (up to 50 metres). a building (nearby trees, (150 metres) including where it interacts neighbouring houses). with the hazard in close The heat you can feel from a Direct flame contact from Direct fiame contact from a proximity to a building. May occur from fire behaviou firm individual elements such fire front where vegetation is it as vegetation, fences ar a mostly natural state (such as Arises in high risk landscopes in the surrounding landscope Can ignite surfaces without in national parks). with long fire runs, steep structures. Most common way houses flame contact or ember attack topography and vegetation in Occurs when a building is catch fire during a bushfire Ories out vegetation ahead Burning elements may arrive from neighbouring land. a mostly natural state. · Decurs when small burning of a bushfire so that it burns in close proximity to the vegetation Influenced by fuel loads and twigs, leaves and bark are more readily. Can docur in areas where the drought conditions. parried by wind, landing in an vegetation is modified or is May arise in lower risk areas (such as from a local park) Associated with high around a building. managed as a garden. or in higher risk areas (larger temperatures, wind, cyclonic · Can happen before, during Not direct flame contact from vegitated areas such as winds, lightning. and after a bushfire a moving fire front. forests and coastal reserves) Extreme ember attack will occut Associated with weather as seen on Black Saturday Any fire that starts and takes hold will be so intense that life safety may be seriously compromised.

Douglas & Tan, 2005



7.1. DWELLING SETBACK REQUIREMENTS

Site specific fire modelling undertaken in accordance with **Method 2 of AS3959:2018** predicts the radiant heat flux of a wildfire outbreak in the specified hazard areas. Radiant heat flux is a value of the heat energy expressed from the fire front and is utilised to determine adequate dwelling setbacks and any associated construction considerations that may be required in order to adequately reduce the potential for dwellings to ignite under wildfire conditions. As can be seen on **Figure 12**, the proposed development has been designed with consideration to mitigation measures so that all lots contain a developable building envelope that is exposed to a maximum radiant heat flux of 29kW/m². It can also be seen from modelled results that radiant heat flux at the boundary of a percentage of the proposed land parcels falls below 10kW/m².

Minimum construction standards are discussed further in **Section 7.2** below. The following table (**Table J**) provides the results of radiant heat flux modelling and associated minimum setback distances from hazardous vegetation unit HA1. As a fire advancing from HA2 would need to pass through HA1 to affect the proposed land parcels it is not considered as necessary to predict the effects of radiant heat emitted from HA2. Results are provided visually on **Figure 12**.

| Bushfire Attack Level (BAL) | Distance from edge of hazard vegetation | | |
|-----------------------------|---|-------------------------------|--|
| Hazard Area 1 | AS3959:2018 Method 1 (FDI 50) | AS3959:2018 Method 2 (FDI 53) | |
| BAL – 29+ | 0m - <24m | 0m-<21.3m | |
| BAL - 29 | 24m - <34m | 21.3m-<30.3m | |
| BAL - 19 | 34m - <46m | 30.3m-<41.5m | |
| BAL – 12.5 | 46m - 100m | 41.5m-<48.5m | |
| BAL – 10 | NA | >48.5m-100m | |

Table J: BAL assessment and AS3959:2018 method comparison

Comparison of Method 1 vs. Method 2 indicates that the conservative estimate of setback requirements favours Method 1 analysis. However, Method 2 provides a greater accuracy in regard to slope, fuel loads and adoption of an appropriate FFDI for site specific conditions. As such, the method 2 analysis has been adopted for this assessment.

Construction within BAL-29+ zones is considered as an unacceptable risk and as such a minimum distance for construction of residential dwellings (@BAL29) is required as follows.

• 21.3m for lots adjoining vegetation unit HA1.

Under the proposal this is generally achieved via the provision of a variety of mitigation treatments including:



- Development of manicured park area adjoining the hazardous vegetation unit HA1 that provides a low fuel buffer area to the development (refer detail in Section 5.2.2.3).
- Provision of minimum 16m wide perimeter road adjoining the low fuel manicured park area; and
- Design of lot configuration to maximize distance between hazardous vegetation.

Proposed land parcels beyond these minimum setbacks are subject to the AS3959:2018 construction standards as detailed in **Section 7.2** below.

7.2. MINIMUM CONSTRUCTION STANDARD

Based upon the results of radiant heat flux modelling and the visual representation of this provided on Figure 12, a number of proposed lots are potentially affected by radiant heat and potential ember attack from wildfire outbreak. As such, minimum construction standards for habitable dwellings on affected lots will be required as can be seen on Figure 12 and summarised below in Table K. Table K provides the scenario for worst case placement of a dwelling on affected land parcels but it is relevant to note that lower BAL construction requirements are achievable. As such, the final BAL construction level on each land parcels is to be determined during the BA process.

| Proposed Lot | Minimum Construction Requirement* |
|-------------------------------|------------------------------------|
| 20-23 & 35-37 | BAL 29 |
| 24 | BAL12.5 |
| 15-19, 25-27 & 30-33 | BAL 10 - landscape treatments only |
| * Assumes worst case scenario | for position of habitable dwelling |

Table K: Minimum construction standards for affected structures

A radiant heat exposure level of 10kW/m² falls below the threshold for piloted ignition of dry timber and failure of plain glass (QFES, 2019) thus construction standards to prevent ignition and other forms of building failure are unnecessary for proposed land parcels falling below the 10Kw/m² extent. Additionally, the radiant heat levels predicted have not considered the residential housing to be located between the locations beyond BAL10 and the edge of hazardous vegetation. This housing will act as a heat barrier from the fire so much so that a predicted BAL10 rating is considered as a significant over estimation of the true levels that would be expected. Additionally, a radiant heat level of 10kW/m² falls below the threshold for piloted ignition of dry timber and failure of plain glass (QFES, 2019) thus construction standards to prevent ignition and other forms of building failure are unnecessary.

Notwithstanding the construction aspects discussed above, ember density models suggest that mitigation options are provided to all dwellings within 100m of hazardous vegetation. As such, proposed lots that fall between the 10kW/m²



extent and 100m will require mitigation in the form of landscaping treatments to prevent potential ember ignition.

As can be seen from **Table K** and **Figure 12**, all proposed lots have opportunity for development of a habitable dwelling subject to minimum construction standards (as per AS3959:2018).

| Radiant heat flux (kW/m²) | Potential effects |
|------------------------------|--|
| | unpiloted ignition of timber walls and fences |
| Greater than | direct flame contact likely |
| 40 | extreme levels of radiant heat |
| | failure of toughened glass |
| 29-40 | direct flame contact possible, extreme levels of radiant heat |
| | unpiloted ignition of some timber species after prolonged exposure (e.g. several minutes)²⁹ |
| 19 | failure of screened float glass |
| 16 | blistering of skin with > 5 seconds exposure |
| 12.5 | failure of plain glass |
| 12.5 | piloted ignition of dry timber elements after prolonged exposure (e.g. several minutes)³⁰ |
| | fabrics inside a building could ignite spontaneously with long exposure |
| 10 | critical limit for emergency services – firefighters cannot operate |
| | life threatening with < 1 minute exposure in protective clothing. |
| 7 | fatal to an unprotected person after exposure for several minutes |
| 4.7 | firefighter in protective clothing will feel pain (60 seconds exposure) |
| 3 | firefighters can operate for a short period (10 minutes) |
| | pain is felt on bare skin after 1 minute exposure (non-fatal) |
| 2 | firefighters with protective clothing can withstand this exposure level for a few minutes however, they are likely to experience rise in core body temperature |
| 1 | maximum for indefinite skin exposure |
| 0.5 | direct sunlight at noon on a bright sunny day |

 Table L: Effects of radiant heat exposure (Source: QFES, 2019)

7.3. ASSET PROTECTION ZONE

Asset Protection Zones (APZ) are the most effective defense against radiant heat and flame exposure. Given that all proposed lots have the capacity to hold a habitable dwelling with a worst case scenario of radiant heat exposure at or around 29kW/m², dedication of Asset Protection Zones is not considered as necessary. However, should proposed Lots 20-23 and proposed Lots 35-37 desire to construct dwellings to BAL19, dedication of a building envelope will be required as per the detail provided on **Figure 9**.

In this event each APZ is to be managed in accordance with the following specifications that reflect an Outer Protection Area (OPA) in which any landscaping will maintain minimum connection of vegetation in the vertical plane (e.g. Vegetation development underneath tree canopy will be removed on a regular basis). This condition is to remain for the lifespan of the development. It is to be noted that there is potential for individual specimen tree retention within the APZ assuming the following criteria is maintained:

- All landscaping is to comply with the specifications provided in Section
 7.4 below.
- Flammable materials are to be removed from within the proximity of vulnerable building components including (but not limited to) windows, decks and eaves.



- Establish non-flammable ancillary structures such as pools, tennis courts, maintained lawns and paths within the affected lots are located between the dwelling and the hazardous vegetation.
- Combustible, non-habitable structures (such as sheds) are located as far from habitable structures as practicably possible. Where possible they are to be located adjoining less hazardous vegetation areas.
- Paths/driveways are to be composed of non-combustible materials (e.g. clay, concrete, pebbles, gravel); and
- The use of non-combustible fencing throughout the APZ.

In general, all lots affected by minimum construction standards (BAL 29 to BAL 12.5) are to be managed with an IPA that extends a minimum of 10m from the habitable dwelling (once constructed). The IPA is to be maintained in accordance with the specification provided above.

7.4. LANDSCAPING SPECIFICATION

Any landscaping components for all affected lots including those between BAL10 and 100m from hazardous vegetation will appropriately consider:

- Utilizing plant species known for their low combustibility. Low combustion
 potential plant species have high moisture content, lack of volatile oils,
 large fleshy leaves and bark types that are held closely to the tree.
- Plant species are to be arranged so that minimum connection of branches and leaves is achieved in both the horizontal and vertical planes.

- No plant or tree structures are to come into contact with both dwellings and non-habitable structures.
- No trees are to be allowed to overhang habitable dwellings.
- Use of non-flammable mulches is preferable particularly within 3m of structures both habitable and non-habitable.
- Regular removal of fine fuels (e.g. sticks, leaves and other flammable fuels)
 from yard areas during fire weather periods.

Appendix A provides a list of Australian native plant species that are known to be preferable for landscaping within bushfire hazard areas.

7.5. SERVICES SUPPLY

The proposed development will be connected to reticulated town supply and as such is considered adequate for fire response purposes. Compliance with the specific requirements of the QFES Fire Hydrant and Vehicle Access Guidelines (2015) will be required to ensure marking of hydrant locations and adequate access is provided.

Electricity supply to the development will be subsurface.



7.6. ACCESS ARRANGEMENTS & QFES MINIMUM SPECIFICATIONS

In the current scenario Proposed lots 19-37 will be accessed via a single road extending through the site from the south to connect to Riparian Way to the east. This connection provides for a cul-de-sac servicing proposed lots 24-34.

Whilst constrained access/egress to lots accessing the Cul-de sac is not an optimal scenario for egress from the site during a wildfire event, given the low density of land parcels involved with the development in this area it is considered that this constraint can be appropriately managed with construction based and vegetation management based methods of mitigation. This is particularly relevant with the two-way option for the connective Riparian way section of road to be constructed that would effectively double egress capacity.

Given the above, construction of the proposed Riparian Way connection Road and associated Cul-de sac will require the following minimum dimensions and other relevant considerations:

- Constructed driveways to proposed land parcels do not exceed a total length of 200m.
- The entire length of all roads and access driveways are to be all weather trafficable by 2WD vehicles.
- All access driveways must be a minimum formed width of 4m (inclusive of gates).

- All proposed roads and access driveways must achieve 4m vertical clearance to any overhead obstructions and 5m clearance to all powerlines (if above ground).
- The proposed road and access driveways must be constructed to achieve a maximum gradient of 12.5%; and
- The access driveway must have a minimum 15t surface rating to allow urban fire emergency appliances access.

Ongoing management of the proposed road and residential lot site access will be an integral measure to ensure the access remains trafficable during an evacuation event. Essential management activities to this end include:

- Ongoing maintenance of 1m width to both sides of the 5m formed access clear of vegetation.
- Ongoing maintenance of a minimum vertical clearance of 4m to any overhanging tree branches / vegetation.

7.7. OPEN SPACE MANAGEMENT

Open space retained at the south of the proposed development will be handed over to council for ongoing management. Two distinct areas are proposed within the open space area. Koala habitat areas that are to be retained in their natural configuration and a formalised park area to be located to the north of the bushland patch that represents LOW hazard conditions in accordance with



AS3959:2018. Review of landscape concept designs for the park area confirm the LOW hazard fuel conditions will be provided.

7.7.1. BUSHLAND MANAGEMENT

In its current state the bushland area is near to natural condition, however, numerous areas hold a variety of weed species that have high potential to act as ladder fuels drawing a fire front into the canopy. Additionally, near surface fuel loads consisting of exotic grass species (such as Buffalo Grass) have potential to increase fire intensity during controlled and uncontrolled fire events. As such, the treatment and removal of non-native ladder fuels (i.e. *Lantana camara*) and exotic grass species are to represent a priority ongoing management requirement within the Koala Habitat Area. Specific care should be applied to retain all native components of the vegetation to prevent degradation of the Koala Habitat Area.

Fuel reduction burning within the KHA should only be considered in accordance with the DES fire guidelines. The following is extracted from the Queensland Herbarium (2021) Regional Ecosystem Description Database (REDD). Version 12 (March 2021) (DES: Brisbane) in relation to burn recommendations within RE 12.11.3.

SEASON: Summer to winter. INTENSITY: Plan for low to moderate. Unplanned occasional high intensity wildfire will occur. INTERVAL: 4-8 years maintains a healthy grassy system. 8-20 years for shrubby elements of understorey. STRATEGY: Aim for 40-60% mosaic burn. Needs disturbance to maintain RE structure (eucalypt overstorey with open understorey of predominantly nonrainforest species). Any moist sclerophyll that is relatively open with a mixture of grasses and shrubs should be a priority for fire management to retain RE structure. ISSUES: Frequent fire is needed to maintain understorey integrity, keeping more mesic species low in the profile of the understorey so that other species can compete. A grassy system is especially important for species such as the eastern bristlebird and its habitat. It is essential that wildfires are not the sole source of fire in this ecosystem. High intensity fires occur periodically through time, however frequent low to moderate intensity fires will create the disturbance required to keep the understorey diverse. A follow-up burn soon after a high intensity wildfire can be considered to reduce germinating mesic species. This RE may contain a high number of rare and threatened plant species (e.g., Acomis acoma, Corchorus cunninghamii, Marsdenia coronata and Sophora fraseri) which require appropriate fire management.

Given the relatively small area of vegetation to be retained within the site (i.e. 6,535m²), it is recommended that where hazard reduction burning is planned it is undertaken in conjunction with adjoining land parcels to the east and south to ensure that the vegetation community is looked at as a whole and not compartmentalised resulting in adverse impacts to the community ecology.

Prior to hazard fuel reduction burns (if deemed necessary by land management) it is imperative that suitably qualified Fauna Spotter Catcher survey the area for the potential presence of Koala. If observed, fuel reduction activities are to be re-scheduled until the animal has moved on.



7.8. RESIDENTS ACTIONS

It is integral that all affected end-users of the development (i.e. residents) are made aware of this plan in order to be able to implement the recommended mitigation measures.

Additionally, all residents of affected lots are to develop a Bushfire Survival Plan that considers stay and defend or evacuation options. Templates for such plans can be found at <u>https://www.ruralfire.qld.gov.au/BushFire_Safety/Pages/Create-your-bushfire-survival-plan.aspx</u>.





8. COMPLIANCE ASSESSMENT

8.1. ASSESSMENT AGAINST LOCAL PLANNING SCHEME CODE

The proposed development is constrained by the CoGC City Plan bushfire hazard overlay mapping. As such, Section 8.2.3 of the City Plan Bushfire Hazard Overlay Code performance outcomes apply to the proposal. Refer **Table M** below for our response to the code's performance outcomes and acceptable solutions.



Table M: Compliance assessment against S. 8.2.3 of the CoGC City Plan

| Performance outcomes | Acceptable outcomes | Comments |
|---|--|---|
| Part B — Assessable Development Benchmarks Table 8.2.3.2 Bushfire Hazard O | Iverlay Code | |
| PO1 In a bushfire hazard area, the fire mitigation methods used at the site are adequate for the bushfire hazard of the individual site, having regard to: (a) vegetation type; (b) slope; (c) aspect; (d) bushfire history; (e) conservation values of the site; (f) ecological restoration, including forest succession; (g) ongoing maintenance; (h) climate change; and (i) on site and off-site¹ fire hazard implications. ¹Note: This includes potential hazard from land up to 10kms away from the site. For example, how might large tracts of forest away from the site impact on the bushland that surrounds the site. | AO1 A written assessment by a suitably qualified and experienced bushfire management consultant confirms that the site is not in a bushfire hazard area. OR The development complies with an approved Bushfire management plan prepared in accordance with SC6.3 City Plan policy – Bushfire management plans. OR The development complies with an existing approved Bushfire management plan as referenced within the approved reconfiguration of a lot. Note: Prior to: (a) plan sealing for a Reconfiguration of a lot; or (b) the issue of a Building final or Certificate of classification for Building work; or | AO1 – Complies This plan has been prepared in accordance with SC6.3 City Plan policy – Bushfire Management Plans |



| | | 🗾 Planning 📅 Urban Design 🌚 Landscape 💭 Environment 🎊 |
|--|--|---|
| Performance outcomes | Acceptable outcomes | Comments |
| PO2 In a bushfire hazard area, development: (a) does not result in a high concentration of people living, working or congregating in a bushfire hazard area; (b) does not result in the bulk manufacture or storage of hazardous materials; and (c) essential' community infrastructure is able to function effectively during and immediately after a bushfire event. | AO2 The following land uses are not located in a bushfire hazard area: (a) Childcare centre; (b) Community care centre; (c) Community use; (d) Development involving the manufacture or storage of hazardous material in bulk; (e) Educational establishment; (f) Hospital; (g) Residential care facility; (h) Retirement facility; (i) Rooming accommodation; (j) Sport and recreation uses; (k) Tourist park; and (m) Utility installation (waste management facilities). AND In a bushfire hazard area permitted essential community infrastructure is designed to function effectively during and immediately after bushfire events, as demonstrated in a Bushfire management plan. | AO2 – Complies No vulnerable uses or essential uses as listed are proposed under the development. |



| Performance outcomes | Acceptable outcomes | Comments |
|--|---|---|
| PO3 In a bushfire hazard area, developments, including lot layout are designed to avoid bushfire hazard and provide safe sites for people, property and buildings. Editor's note – The development should be located: (a) 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 (a) so that elements of the development least susceptible to fire are sited closest to the bushfire hazard | AO3.1 Development, Lots and/or building envelopes are not located within bushfire hazard areas. OR The development is located in accordance with the approved Bushfire management plan as referenced within the approved reconfiguration of a lot. OR The development is designed to adequately demonstrate that the risk to life and property is minimised to achieve acceptable levels and ensure ongoing site management. | AO3.1 – Complies This report provides information to adequately demonstrate that risk to life and property is reduced to a tolerable level and provides mitigation measures and management strategies for potentially affected lots |
| | AO3.2 The development design incorporates bushfire radiation zone/s that: (a) use existing or natural fire breaks & minimise the need to clear native vegetation; (b) do not impact matters of environmental significance; (c) are located entirely within the boundaries of the private property of the development site; and (d) incorporates landscaping species that are less likely to exacerbate a bushfire event. | AO3.2 - Complies (a) No requirement for impacting existing vegetation are associated with the management strategies detailed in this assessment (b) No requirement for impacting existing vegetation are associated with the management strategies detailed in this assessment (c) With the exception of separation provided by the proposed road connection all APZ requirements are located within the boundaries of single lots. (d) Details of appropriate landscaping species are provided herein. |
| PO4 In a bushfire hazard area, when designing for bushfire hazard mitigation the lot layout must avoid impacts on matters of environmental significance. | AO4 Development design, Lot size, and layout avoids impact on matters of environmental significance and minimises impacts such as fragmentation, habitat loss and edge effects for any matters of environmental significance. | AO4 - Complies No requirement for impacting existing vegetation are associated with the management strategies detailed in this assessment |



| Performance outcomes | Acceptable outcomes | Comments |
|---|---|--|
| PO5Development uses fencing that:(a) does not contribute to the spread of bushfire;(b) facilitates the safe movement of fauna; and(c) provides access for fire-fighting purposes. | AO5 Fences are constructed: (a) using non-combustible or fire-retardant materials within 20m of any building used for accommodation; (b) that do not impede the safe movement of fauna (where applicable); and (c) has gates that can be freely accessed for fire-fighting purposes (if applicable). | AO5 – Not Applicable (a) Not applicable. (b) Not applicable. (c) Not applicable. |
| PO6 In a bushfire hazard area, vehicular access (including internal roads) 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. | AO6.1 The development design incorporates a perimeter road that: (a) is located between the boundary of the lots and/or buildings and the adjacent natural area and/or bushfire hazard area; (b) has a minimum cleared width of 20m; (c) has a constructed minimum road width of 6m; (d) has a maximum gradient of 12.5%; (e) is constructed to an all-weather standard; and (f) is constructed to ensure all culverts and bridges have a minimum load bearing of 15 tonnes (if applicable). | AO6.1 - Conforms (a) The proposed development includes a through connection road located adjoining the bushfire hazard providing separation to residential land parcels. (b) The road providing separation has a design width of 16m including verge areas. This design is considered as adequate to support adequate ingress and egress for residents and emergency vehicles. (c) Finished pavement width of the proposed road is approximately 9m in width. (d) Proposed road will not exceed the recommended gradient. (e) The constructed road will be all weather suitable. (f) NA. Culverts and/or bridges are not required. |
| | AO6.2 The road design is capable of providing access for fire-fighting and | AO6.2 – Complies Minimum road standards are to be complied |

The road design is capable of providing access for fire-fighting and other emergency vehicles, in accordance with SC6.11 City Plan policy – Land development guidelines, Section 2 – Transport network standards.



| Douformance outcomes | Assentable outcomes | Planning (†) Urhan Design 12) Lundscape 💭 Environment 🧥 Sun |
|--|--|---|
| Performance ourcomes | | Comments |
| PO7 In a bushfire hazard area, the development layout is designed to avoid the requirement to clear vegetation to achieve risk reduction. | AO7 The Bushfire management plan details the required extent of vegetation clearing and landscaping and where required modify development design and/or lot layout to minimise clearing of vegetation. | AO7 – Complies No requirements for impacting existing vegetation are associated with the management strategies detailed in this assessment. |
| PO8 For areas to be dedicated to Council as open space, management strategies to mitigate bushfire risk must be identified. | AO8 The Bushfire management plan contains a separate section detailing management strategy for areas to be dedicated to Council that can be included within the Open space management plan. | AO8 Section 7.7 of this management plan provides management strategies associated with hazard prevention within dedicated open space areas. The strategies proposed are limited to provision of guidance in relation to controlled burning of the bushland should it ever be undertaken. This strategy is not a strict requirement to achieve the overall outcomes of this plan. |
| PO9 In a bushfire hazard area, fire trails must be provided to: (a) enable access for fire fighters, residents and equipment; (b) contribute to (where required) bushfire radiation zone(s); (c) mitigate against bushfire hazard; and (d) allow access for hazard reduction management programs. Note: fire trails should be located, constructed and maintained with due regard for landscape and ecological values and should not result in soil disturbance or erosion. | AO9.1 Fire trails are located on public land (including public open space areas) to facilitate access for fire brigades. OR Fire trails located on private property are located as close as possible to the property boundaries and the adjoining bushfire hazard area, and an access easement is granted in favour of City of Gold Coast and Queensland Fire and Emergency Services. Note: Design and construction of all fire trails located on land to be dedicated to the City as Conservation Estate are in accordance with SC6.3 City Plan policy – Bushfire management plans, Section 3.5(f). For other fire trails, AO9.2 – AO9.6 apply. | AO9.1 – Performance based outcome Given the scale and environmental values of the vegetation to be retained within the proposed development as open space, it is considered that the provision of fire trails within the bushland is unnecessary to facilitate effective access. The provision of the perimeter road will be adequate to manage the bushland area in the following manner relevant to the Performance Outcome. (a) The perimeter road enables adequate access to the retained bushland given the overall width is approximately 100m. Being Core Koala Habitat the development has been sensitively designed with the effort to minimise clearing of the KHA as per the requirements of State Code 25. Whilst it is acknowledged that clearing exemptions exist for the creation of fire trails will intensify the magnitude of KHA impacts where not necessary to prevent impacts from |



| Performance outcomes | Acceptable outcomes | Comments |
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| | | the bushfire hazard. Creation of 6m wide fire trail (as per minimum specification of AO9.2) would result in substantial fragmentation of the retained koala habitat on site that directly conflicts with the requirements of PO2 of State Code 25. Additionally, creation of the break would result in removal of approx. 15% of the overall habitat area retained on site. We do not consider this to be a positive outcome for the ecology of the site nor a necessary requirement for ongoing bushfire management. (b) Again, the proposed perimeter road reduces radiation of heat to land parcels to an adequate scale in order to construct a dwelling on each land parcel of no more than BAL29 standard. (c) Refer b above. (d) Refer c above. |
| | AO9.2 The fire trail has: (a) a minimum cleared width of 6m; (b) a minimum of 4.8m vertical clearance; (c) a cross fall of no greater than 10 degrees; (d) a minimum formed width of 4m; (e) a maximum gradient of 12.5%, with adequate drainage to prevent soil erosion and minimise ongoing trail maintenance; and (f) culverts and/or bridges with a minimum load bearing of 8 tonnes (if applicable). | AO9.2 – NA Fire trails are not proposed through retained vegetation. |
| | AO9.3 Vehicular links are provided along the fire trail either to existing fire trails or roads, and these links are designed having regard to the topography of the site, fire fighter safety and the need to regularly access water supplies. Note: where possible, these links should be at intervals of approximately 200m | AO9.3 – NA Fire trails are not proposed through retained vegetation. |



| Performance outcomes | Acceptable outcomes | Comments |
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| | AO9.4 The fire trail has vehicular access at each end, and links either to existing fire trails or public roads. | AO9.4 – NA Fire trails are not proposed through retained vegetation. |
| | AO9.5 The fire trail provides turning areas for fire-fighting appliances. The turning bay can be either: (a) a turning circle; (b) a 'T' shaped turning bay; or (c)a 'Y' shaped turning bay. | AO9.5 – NA Fire trails are not proposed through retained vegetation. |
| | AO9.6 The fire trail provides areas for vehicles to pass or turn at intervals of not more than 200m and with a maximum grade of 5% (1 in 20). | AO9.6 – NA Fire trails are not proposed through retained vegetation. |
| PO10 In a bushfire hazard area, the development maintains the safety of people and property by ensuring that the water supply is reliable and has sufficient flow and pressure requirements for fire-fighting purposes at all times. | AO10.1 The development is proposed in a bushfire hazard area, and reticulated water is supplied in accordance with SC6.11 City Plan policy – Land development guidelines, Section 6 – Water supply and sewerage reticulation standards | AO10.1 – Conforms The proposed development will be supplied with reticulated water to the appropriate standards. |
| | AO10.2 Development involving new or existing buildings with a gross floor area of greater than 50m ² , each lot has a reliable reticulated water supply that has sufficient flow and pressure characteristics for fire-fighting purposes at all times. It must have a minimum pressure and flow of 10 litres a second at 200 kPa | AO10.2 -Conforms The proposed development will be supplied with reticulated water to the appropriate standards. |
| PO11 | A011.1 | AO11.1 – Performance based outcome |



| Performance outcomes | Acceptable outcomes | Comments |
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| In a bushfire hazard area, the development maintains the safety of people and property by ensuring that an adequate water supply for fire-fighting purposes is provided. | For development with a combined GFA less than 500m² where one or more buildings are proposed, dedicated fire-fighting water storage is provided to protect each individual building. Each dedicated fire-fighting water storage must have a volume of water not less than 10,000 litres for each building, be provided within 10m of each building and be: (a) a separate tank that is either below ground level or of non - flammable construction; or (b) a reserve section in the bottom part of the main water supply tank that is either below ground level or of non -flammable construction. Note: dedicated fire-fighting water storage is in addition to water supply for household use and does not include swimming pools, creeks and dams. | The proposed development will be supplied with reticulated water to the appropriate standards. |
| | A011.2 | AO11.2– Performance based outcome |
| | For development that proposes one or more buildings with a combined GFA greater than 500m ² there is no acceptable outcome provided. | The proposed development will be supplied with reticulated water to the appropriate standards. |
| PO12 | A012 | A012 – NA |
| In a bushfire hazard area, all fire-fighting water storage tanks, including domestic water supply tanks, are fitted with the standard rural fire brigade fittings. | The outlet pipe is 50mm in diameter, fitted with a 50mm male camlock (standard rural fire brigade fitting) and an isolating valve. | The proposed development will be supplied with reticulated water to the appropriate standards. |
| PO13 | AO13.1 | AO13.1 – NA |
| In a bushfire hazard area, water storage provided for fire- fighting purposes is safely located and accessible at all times. | The water supply outlet is located at least 9m from any potential fire hazards, such as venting gas bottles and combustible structures. | The proposed development will be supplied with reticulated water to the appropriate standards. |
| | A013.2 | AO13.2 – NA |
| | A safe and accessible hard stand area capable of accommodating a fire fighting vehicle is provided not more than 3m from the water supply outlet. | The proposed development will be supplied with reticulated water to the appropriate standards. |



| Performance outcomes | Acceptable outcomes | Comments |
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| PO15 Development in a bushfire hazard area must provide adequate fire-fighting water storage. This infrastructure must be provided on public land so as to be readily accessible to fire brigades for hazard reduction and fire-fighting purposes. | AO14.1 Where public water supplies (e.g. fire hydrants or public water storage) do not exist, water supply tanks are provided for fire-fighting purposes on public land within the development. The water tanks must: (a) Be installed on land dedicated to Council; (b) hold a volume of at least 22,500 litres per every 20 dwellings; (c) be of concrete construction; and (d) have an outlet pipe of 50mm in diameter, fitted with a 50mm male camlock (standard rural fire brigade fitting) and an isolating valve. | AO14.1 – NA The proposed development will be supplied with reticulated water to the appropriate standards and will conform with all relevfant hydrant supply requirements. |
| | AO14.2 Development on public land provides a safe and accessible hardstand area capable of accommodating a fire fighting vehicle not more than 3m from the water supply outlet | AO14.2 - Complies Appropriate access will be required within the public land. This can be conditioned within relevant development approval conditions. |
| | | |
| PO16 Development does not cause: (a) an unacceptable risk to people, property and the environment due to the impact of bushfire on hazardous chemicals; (b) excess danger or difficulty to emergency services for emergency response or evacuation. | AO15 Development involving the storage, handling or manufacture of hazardous chemicals is not located within a Bushfire hazard area. | AO15 – NA Activities involving the storage, handling or manufacture of hazardous chemicals are not proposed pursuant to the proposed development. |
| PO17 | AO16 | AO16 – Complies This report will represent material provided to the end users of the proposed development. |



| Performance outcomes | Acceptable outcomes | Comments | | | | | | | | | |
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| In a bushfire hazard area, new residents/occupants of a development in a bushfire hazard area are informed about: (a) the potential bushfire hazard on their site; (b) their responsibility for fire management; (c) the measures required for ongoing fire hazard mitigation; and (d) emergency procedures during a bushfire or on bad fire weather days. | A copy of the Bushfire management plan, complete with the Queensland Fire and Emergency Services cover sheet and any other addendums is provided to each resident/occupant for their information. Note: the QFES cover sheet is attached to the approved Bushfire management plan and a notification will be placed on the property's rates notice. | | | | | | | | | | |



9. RECOMMENDATIONS

The following recommendations will ensure compliance with this assessment and management plan:

- The minimum BAL construction requirements detailed in Section 7.2 and indicated on Figure 12 are required for affected land parcels. BAL requirements for construction are to be placed on title including those required for landscaping-based mitigation measures.
- To achieve BAL29 affected lots are to maintain the following minimum distances from hazardous vegetation.
 - o 21.3m for lots adjoining vegetation unit HA1.
- To achieve BAL19 affected lots are to maintain the following minimum distances from hazardous vegetation.
 - 30.3m for lots adjoining vegetation unit HA1.
- If desired, to achieve BAL12.5 affected lots are to house BLE's of the following minimum distances from hazardous vegetation.
 - 41.5m for lots adjoining vegetation unit HA1.
- The final location of dwellings and the appropriate construction level of dwellings on Lots 20-24 and Lots 34-37 is to be confirmed and approved during the BA process by an independent building certifier and be in accordance with the setbacks/minimum construction requirements provided herein.

- All affected lots within 100m of hazardous vegetation consider landscaping specifications as follows:
 - Utilizing plant species known for their low combustibility. Low combustion potential plant species have high moisture content, lack of volatile oils, large fleshy leaves and bark types that are held closely to the tree.
 - Plant species are to be arranged so that minimum connection of branches and leaves is achieved in both the horizontal and vertical planes.
 - No plant or tree structures are to come into contact with both dwellings and non-habitable structures.
 - No trees are to be allowed to overhang habitable dwellings.
 - Use of non-flammable mulches is preferable particularly within
 3m of structures both habitable and non-habitable.
 - Regular removal of fine fuels (e.g. sticks, leaves and other flammable fuels) from yard areas during fire weather periods.
- Reticulated water supply must achieve a minimum pressure of 10l/sec at 200kPa;
- End users of the development must be provided with this management plan and be made aware of their obligations in order to satisfy the relevant provisions within.



10. SUMMARY

This report has identified that the published data regarding the potential bushfire hazard for the subject site is in part inaccurate. As such, vegetation providing a potential risk of bushfire has been identified and an assessment of risk-based factors of the proposed development undertaken.

As a result, two (2) areas of potential hazard have been recognized and an assessment of the proposed development layout conducted. In addition to the hazard vegetation, areas associated with managed vegetation have been identified (in the pre and post development context) with a hazard classification of *LOW* in accordance with AS3959:2018.

Numerous hazard mitigation measures have been identified to reduce the potential threat to a level that would be considered as tolerable. These include:

- Minimum construction levels for affected land parcels have been specified in accordance with BAL construction standards in AS3959:2018.
- Minimum road specification for limited access to the development to ensure adequate ingress for emergency services and egress for evacuation.
- Land management specifications for all lots within 100m of the hazard to reduce the risk of ember related ignition.
- Definition of minimum separation distances for dwellings to be constructed.

 Any landscaping components for all affected lots will appropriately consider:

The nomination of acceptable minimum construction standards for the affected lots in conjunction with other recommended mitigation measures demonstrate compliance with the CoGC City Plan Bushfire Hazard Overlay and by default the requirements of the QLD SPP.

As such, in regard to management of the site-specific bushfire hazard, and subject to the recommendations in this assessment we recommend that the proposed development be approved for development consent approval.

Please do not hesitate to contact us should you have any queries regarding the content of this assessment.

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11. REFERENCES

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Bushfire Hazard Assessment & Management Plan – 114 Eggersdorf Road, Ormeau

Appendix A Guide for fire resistant plant species



Appendix A — Fire Resistant Landscaping Species

| Hymenosporum flavum | Guioa semiglauca | Glochidion sumatranum | Glochidion ferdinandi | Callicoma serratifolia | Alectryon subcinereus | Elapocarnus reticularis | Acmena smithii | Acrotriche gagregata | Cupaniopsis anacaraiolaes | Acacia spp | Rapanea variabilis | Tristaniopsis laurina | Lophostemon confertus | Melia azedarach | Grevillea robusta | Brachychiton rupestris | Brachychiton bid will | Brachychiton acerifolius | | Plectranthus spp. | Sambucus australasica | Strelitzia spp | Dhotinia spp | Suzvaium enn | Melaleura nodoca | Eremophild spp | Atripiex spp | corred reflexa | Corrog roflova | Aloe spp | Kenneala rubicunda | Eremophila glabra | Myoporum insulare | Scaevola humilis | Scaevola aemula | Einadia nutans | Dichondra repens | Dianella lonaifolia | Diapalla castulad | Brachyscome spp | Lomandra multiflora | Lomandra longifolia | Lomandra laxa | Lomandra hystrix | Liriope muscari | Hardenbergia violacea | Carpobrotus glaucescens | Angianthus sp | Casuarina glauca prostrate | | Scientific Name | |
|---------------------|------------------|--------------------------|-----------------------|------------------------|-----------------------|-------------------------|----------------|----------------------|---------------------------|------------------------------------|--------------------|-----------------------|-----------------------|-----------------|-------------------|---------------------------|-----------------------|--------------------------|-------|--------------------------|-----------------------|-------------------------|-----------------------|--------------------------|---------------------------|--------------------------|--------------|----------------|--------------------------|--------------------|----------------------------|-------------------|-------------------|----------------------|------------------|-------------------|------------------|---------------------|---------------------|--------------------------|-------------------------|-----------------------|-----------------------|------------------|-----------------|-----------------------|-------------------------|---------------|----------------------------|--------------------------|-----------------|--|
| Native Frangipani | Guioa | Large Leafed Cheese Tree | Cheese Tree | Callicoma | Native Online | Rhupherry Ach | Lilly billy | | Nangrova Earn | Varieties of Acacia Filk, bilk, | Muttonwood | Water gum | Brush box | White Cedar | Silky Oak | Narrow Leafed Bottle Tree | Little Kurrajong | Flame Tree | Trees | Varieties of Plectrnthus | Native Elderberry | Varieties of Strelitzia | Variaties of Photinia | All Lilly pillie species | All Varieties of orevined | All Fuchsia push species | | | Shrubs Nativo Eucheia | All Aloe varieties | All All Strategy Coral Pea | Kalbarri carpet | Boobialla | Sandplain Fan Flower | Fairy Fan Flower | Climbing saltbush | Kidney Weed | Flax Lilv | Physics of Dampiera | Varieties of Brachyscome | Many Flowered Matt Rush | Spiny Headed Mat-rush | Broad Leafed Mat Rush | Green Mat-rush | Lilyturf | Purple Coral Pea | Pig Face | Kangaroo Paw | Prostrate She Oak | Ground Covers / Creepers | Common Name | |



Ficus spp Symplocos spp Stenocarpus sinuatus Podocarpus elatus

Varieties of Ficus Varieties of Symplocus Firewheel Tree Plum Pine

THIS FURTHER, WHEN EXPOSED PLANTS WILL IGNITE AND REPRESENT A POTENTIAL HAZARD. **RESISTANT SPECIES AND IS INTENDED** LIST IS NOT CONSIDERED **TO EXTREME HEAT OR FLAME CONTACT ALL** AS AN AS A GENERAL GUIDE ONLY. **EXHAUSTIVE** RANGE ę FIRE-

WOLTER consulting group