

LOGAN CITY COUNCIL

APPROVED DOCUMENT

This is an approved document for Development Application

MCUI/36/2018



Bushfire Hazard Assessment and Management Plan



Ingenia Communities

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Chambers Flat

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Definitions

Term	Definition
Bushfire assessment area	Development footprint located Lot 31 on RP848575 and part of Lot 21 on RP804908 (southern extent) (i.e. Area 3)
Bushfire assessment buffer	Bushfire assessment area plus 150 m assessment buffer
Development footprint	'Site layout plan - cabin option' developed by RPS (DWG no. 126720-15A, dated 16/07/18)
The site	659-667 and 609-657 Chambers Flat Road, Chambers Flat (Lot 31 on RP848575 and Lot 21 on RP804908 respectively)

Abbreviations

Abbreviation	Description
AS 3959-2009	Australian Standard: Construction of buildings in bushfire prone areas
BAL	Bushfire Attack Level
BCA	National Construction Code 2016: Building Code of Australia
BHAMP	Bushfire Hazard Assessment and Management Plan
DILGP	Department of Infrastructure, Local Government and Planning (abolished)
E2M	E2M Pty Ltd
GIS	Geographic Information Systems
GPS	Global Positioning System
LCC	Logan City Council
Logan PS	Logan Planning Scheme 2015
Planning Act	<i>Planning Act 2016</i>



Abbreviation	Description
Planning Regulation	<i>Planning Regulation 2017</i>
SPP	State Planning Policy (July 2017)
VC	Vegetation community
VHC	Vegetation Hazard Class
RE	Regional Ecosystem
RPS	RPS Group Plc



1 Introduction

1.1 Project background

Ingenia Communities is seeking to extend upon the partially constructed Chambers Pines Lifestyle Village Relocatable Home Park located at 609-657 Chambers Flat Road, Chambers Flat (Lot 21 on RP804908). The extension will be primarily located on 659-667 Chambers Flat Road (Lot 31 on RP848575) with several additional dwellings located along the southern boundary of Lot 21 on RP804908 (herein referred to as 'bushfire assessment area') (refer to Figure 1). The site (i.e. Lot 21 on RP804908 and Lot 31 on RP848575) is located within the Logan City Council (LCC) Local Government Area and is zoned as 'Emerging community' under the *Logan Planning Scheme 2015 (v5.1)* (Logan PS).

The site is subject to both State and Local bushfire prone area mapping, as such, the proposed development is required to be informed by a site-specific bushfire hazard assessment. This Bushfire Hazard Assessment and Management Plan (BHAMP) has been based on the provided 'Site layout plan - cabin option' developed by RPS (DWG no. 126720-15A, dated 16/07/18) (herein referred to as the 'development footprint').

1.2 Scope and objectives

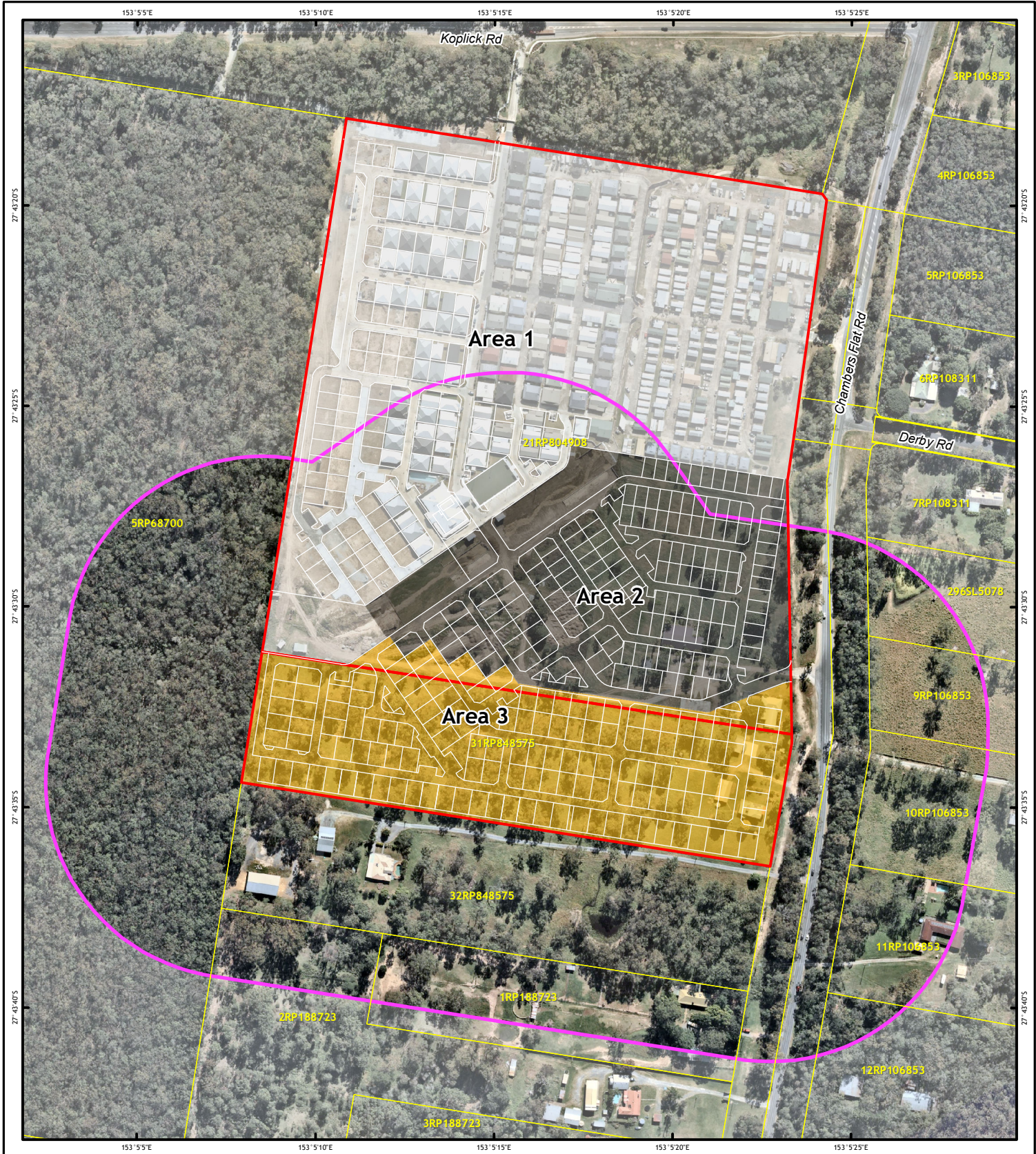
E2M Pty Ltd (E2M) has been engaged by Ingenia Communities to undertake a bushfire hazard assessment to support a development application for the proposed extension. The objectives of this assessment are to:

- identify bushfire related risk factors associated with the placement of the development footprint, including likely direction of bushfire attack, hazard scores associated with existing and proposed (where relevant) vegetation on and surrounding the site, and planning separation from potential hazards; and
- recommend appropriate measures of protection to mitigate the risk posed by the assessed Bushfire Attack Level (BAL) in accordance with the State Planning Policy (SPP), Australian Standard (AS) 3959-2009 (Standards Australia Committee FP-020 2011) and Bushfire Hazard Overlay Code (Logan PS).

This BHAMP addresses relevant State and Local regulatory requirements and has been undertaken in accordance with the requirements of the Bushfire Hazard Overlay Code and Planning Scheme Policy 6 - Management of bushfire hazard (PSP 6) (Logan PS), with consideration given to the desired outcomes of the SPP (July 2017) and associated guideline¹.

¹ *State Planning Policy - State Interest Guideline: Natural Hazards, risks and resilience* (April 2016). The updated guideline is yet to be released.





Legend

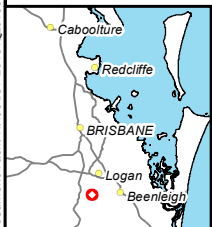
- Development Footprint
- Site
- Cadastrate
- Bushfire Assessment Buffer (150m)



Scale 1:4,000 (A4)

0 50 100 150
Metres

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator



Notes:
Aerial Imagery: © Nearmap 2018
Cadastrate: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014

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FIGURE 1: SITE LOCATION AND PROPOSED DEVELOPMENT FOOTPRINT

Bushfire Hazard Assessment
Chambers Flat Road, Chambers Flat

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1 of 1	QEJ18067	A

1.3 Site description

The site comprises ~20 ha of residentially disturbed land, including:

- the partially constructed Chambers Pines Lifestyle Village Relocatable Home Park within the northern portion of Lot 21 on RP804908; and
- residential dwellings and associated auxiliary structures (incl. a dam) within the south-eastern and eastern sections of Lot 21 on RP804908 and Lot 31 on RP848575 respectively.

Residual areas support either scattered canopy trees with a maintained understorey or cleared land dominated by exotic grass or herbaceous species. The site is bound by Chambers Flat Road to the east, residential development to the south and undeveloped land to the west and north.

1.4 Proposed development

The proposed development includes the establishment of a Relocatable Home Park at 609-657 and 659-667 Chambers Flat Road, Chambers Flat (Lot 21 on RP804908 and Lot 31 on RP848575 respectively). The Relocatable Home Park forms an extension to the partially constructed Chambers Pines Lifestyle Village Relocatable Home Park located on Lot 21 on RP804908.

The extension is primarily located within Lot 31 on RP848575, however, minor changes are also proposed within the southern portion of Lot 21 on RP804908 which is subject to the existing approval MCUI/33/2015/B. To align with the project town planning report prepared by RPS, the site has been split in to three distinct areas which identify changes in lot area, integration with the existing development and the new sites within the development (refer to Figure 1). Descriptions of the areas are as follows:

- **Area 1** - existing residential development which will remain unchanged
- **Area 2** - existing approved layout on Lot 21 on RP804908 which will undergo minor changes (MCUI/33/2015/B); and
- **Area 3** - proposed extension primarily located on Lot 31 on RP848575 and part of Lot 21 on RP804908.

1.5 Legislative context

1.5.1 State Planning Policy (July 2017)

Supporting the Planning Act, the purpose of the SPP is to guide State and Local government in land-use planning and development by defining the Queensland Government's policies about matters of state interest, to which there are 17 arranged under five themes:

- liveable communities
- mining and extractive resources
- water quality
- natural hazards, risk and resilience; and
- strategic airports and aviation facilities.

Local governments must consider the state interest and reflect appropriately when amending local planning schemes and in some cases, assessing development applications.

Under the safety and resilience to hazards theme, the state's interest is to ensure that natural hazards are properly considered in all levels of the planning system. This includes the avoidance of natural hazard



areas or the mitigation of risks to an acceptable or tolerable level. The SPP is supported by the *SPP - State interest guideline - Natural hazards, risk and resilience* (SPP guideline) (April 2016), *Technical manual - Evaluation report: Bushfire Hazards* (April 2016) and *Technical manual: A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments* (April 2016) (DILGP) which identify the outcomes sought by the State and application when planning development within a *bushfire hazard area (bushfire prone area)*². Furthermore, the SPP Interactive Mapping System includes bushfire hazard area (bushfire prone area) mapping which is based on the methodologies outlined in Leonard *et al.* 2014.

1.5.2 National Construction Code 2016: Building Code of Australia

The *National Construction Code 2016: Building Code of Australia* (BCA) details technical provisions pertaining to the design and construction of buildings and other structures throughout Australia (The Australian Building Codes Board). Ten primary building classes, including several sub-classes, are defined within the BCA. Part G5 of the BCA identifies that where a building is going to be constructed within a designated bushfire prone area, it must *be designed and constructed to reduce the risk of ignition from a bushfire*. This, however, is only applicable to:

- Class 1³, Class 2⁴ or Class 3⁵ buildings; or
- a Class 10a⁶ building or deck associated with Class 1-3 buildings.

Beyond these classes, there are some instances where the BCA identifies provisions for special use buildings such as Class 9b buildings (i.e. trade workshop, laboratory or the like), public transport buildings, farm buildings and farm sheds (Section H, BCA 2016).

1.5.3 Australian Standard: Construction of buildings in bushfire-prone areas (AS 3959-2009)

Where development is proposed within bushfire prone areas, AS 3959-2009 specifies construction requirements to improve resistance to bushfire attack (i.e. reduce the risk of ignition). Construction specifications are based on heat flux exposure thresholds which have been categorised into six Bushfire Attack Levels⁷ (BAL):

- BAL-LOW
- BAL-12.5
- BAL-19

² is land that is potentially affected by significant bushfires, including: vegetation likely to support a significant bushfire; and adjacent land that could be subject to impacts from a significant bushfire (i.e. potential impact buffer) (Part G, SPP).

³ A single dwelling being a detached house, or one or more attached dwellings, each being a building, separated by a fire-resisting wall, including a row house, terrace house, town house or villa unit; A boarding house, guest house, hostel or the like with a total area of all floors not exceeding 300 m², and where not more than 12 reside, and is not located above or below another dwelling or another Class of building other than a private garage (Queensland Building and Construction Commission).

⁴ A building containing two or more sole-occupancy units each being a separate dwelling (Queensland Building and Construction Commission).

⁵ A residential building, other than a Class 1 or 2 building, which is a common place of long term or transient living for a number of unrelated persons (Queensland Building and Construction Commission).

⁶ A private garage, carport, shed or the like (Queensland Building and Construction Commission).

⁷ A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire (AS 3959-2009).



- BAL-29
- BAL-40; and
- BAL-Flame Zone (FZ).

These categories are expressed in kW/m², as such, the lower the category value the lower the radiant heat. The highest level of bushfire attack is BAL-FZ, which indicates direct exposure to flames.

Determining a BAL rating for a proposed development can be ascertained using either Method 1 (Clause 2.2, AS 3959-2009) or Method 2 (Appendix B, AS 3959-2009). Method 1 is a simplified procedure, whereas Method 2 is more detailed and is utilised when a more specific result is required. Both methods have been deemed to satisfy the requirements of the BCA.

As identified within Section 1.5.2, construction requirements identified within AS 3959-2009 are only applicable to Class 1, Class 2 or Class 3 buildings, or a Class 10a building or deck associated with Class 1-3 buildings.

1.5.4 Australian/ New Zealand Standard: Risk management - Principles and guidelines (AS/NZS ISO 31000:2009)

Risk assessments incorporate the consequences of natural hazard events, such as bushfires, and incorporate exposure, vulnerability and tolerability of an asset (infrastructure) to the risks associated with a bushfire. The outcomes of risk assessments identify whether the level of risk to the proposed development is acceptable, tolerable or intolerable as defined by the SPP guideline. As identified in Section 1.5.1, it is a requirement of the state that local planning instruments identify bushfire hazard areas so that the risk⁸ associated can either be avoided or mitigated to an acceptable or tolerable level.

The SPP guideline identifies that natural hazard (bushfire) risk assessments should be consistent with AS/NZS ISO 31000:2009 which provides principles and generic guidelines on risk management. To identify risk levels at a local scale, the SPP guideline identifies that local planning instruments need to incorporate a 'fit for purpose' risk assessment approach consistent with AS/NZS ISO 31000:2009. This includes the incorporation of the state-wide bushfire hazard mapping methodologies included in the *Technical Manual: A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments* (technical manual) (April 2016).

The bushfire hazard mapping methodology included in the technical manual allows for the incorporation of local variables (causes and sources of risk) such as vegetation hazard classes (incl. associated potential fuel loads), slope and fire weather severity (Leonard *et al.* 2014). In accordance with AS/NZS ISO 31000:2009, the resulting output is categorised into three levels of risk including Very high potential bushfire intensity, High potential bushfire intensity and Medium potential bushfire intensity (i.e. bushfire prone areas). Following the identification of Very high potential bushfire intensity, High potential bushfire intensity and Medium potential bushfire intensity areas, a Potential impact buffer of 100 m is applied.

The technical manual risk assessment methodology should be used within local planning instruments as a trigger to initiate specific planning and building controls. This includes code requirements such as construction and design requirements and acceptable, tolerable or intolerable radiant heat exposure levels. Where local planning instruments have not appropriately reflected the SPP, being developed on superseded material, the technical manual is to be used to identify bushfire hazard areas.

⁸ Defined as the effect of uncertainty on objectives (AS/NZS ISO 31000:2009)



1.5.5 Logan Planning Scheme 2015 (v5.1)

The purpose of the Bushfire Hazard Overlay map OM - 03.01, under the Logan PS (LCC), is to reflect SPP State and Local level interests by identifying designated bushfire prone areas. Where assessable development is proposed on land mapped as containing bushfire prone areas, a site-specific bushfire hazard assessment prepared in accordance with the Bushfire Hazard Overlay Code and Planning scheme policy 6 - Management of bushfire hazard (PSP 6) (Logan PS) is required.

Part 2 of the Logan PS identifies that the Natural hazards, risk and resilience state interest has been integrated, however, this is based on a superseded version of the SPP (July 2014). As PSP 6 requires confirmation of bushfire prone areas to be undertaken in accordance with (Leonard *et al.* 2014), it has been assumed that the Bushfire Hazard Overlay map OM - 03.00 has been developed using that same methodology. In any case, SPP mapping was updated on 3 July 2017 in conjunction with the release of the Planning Act and SPP (July 2017). This results in a variation between bushfire prone area (bushfire hazard) sub-category extents.

The SPP - state interest guidance material for Natural hazards, risk and resilience: Bushfire, which supports the current SPP (July 2017) bushfire prone area mapping, is yet to be released. As such, verification of the presence, or otherwise, of bushfire prone areas in this BHAMP has been undertaken in accordance with available SPP (April 2016) guidance material, specifically the *Technical Manual: A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments* (technical manual) (April 2016) which incorporates (Leonard *et al.* 2014).

Although Section 1.5.2 identifies that only certain classes of buildings require specific construction provisions when located within a bushfire prone area, there may be instances where Council requires an assessable development to undertake a bushfire hazard assessment to identify proximity to classified vegetation and thus the level of risk associated. That is, identifying whether or not the development will be exposed to an unrealistic level of risk, which is often associated with direct exposure to flames from the fire front (i.e. BAL-FZ and BAL-40).



2 Methods

2.1 Desktop assessment and legislative review

A desktop assessment and legislative review was undertaken to identify overlay mapping and code requirements under the SPP and Logan PS. The review included:

- *Planning Act 2016* (Planning Act) (Qld)
 - *Planning Regulation 2017* (Planning Regulation) (Qld)
 - State Planning Policy (SPP) (July 2017)
 - Development Assessment Mapping System (Department of State Development, Manufacturing, Infrastructure and Planning)
- Logan Planning Scheme 2015 (v5.1) (Logan PS)
 - Bushfire Hazard Overlay Code
 - Planning Scheme Policy 6 - Management of bushfire hazard
 - Logan Planning Scheme Interactive Mapping
- *National Construction Code 2016: Building Code of Australia* (BCA)
- *Australian Standard: Construction of buildings in bushfire-prone areas* (AS 3959-2009)

2.2 Field assessment

A field survey of the site was conducted by E2M Fire Protection Association Australia - Bushfire Planning and Design Level 1 Accredited Bushfire Practitioner, Nicole Nesvadba, on 25 July 2018. The survey included:

- recording the floristic structure, composition and condition of vegetation communities located within the bushfire assessment area (i.e. Area 3 plus a 150 m assessment buffer)
- assessment of slope under classified vegetation
- determination of the aspect of the site; and
- identification of waterway and wetland features within the site (if applicable).

A Trimble Nomad Global Positioning System (GPS) device was utilised to delineate the extent of vegetation communities and record local attributes within and adjacent to the site. Captured data was validated, mapped and assessed using a geographical information system, whereby the development footprint and observed features and extents were overlaid on the relevant regulatory mapping (GDA94/MGA zone 56).

2.3 Bushfire hazard assessment

Utilising the recorded outcomes of the field assessment, a Bushfire Hazard Assessment (BHA) and subsequent BAL review was carried out in accordance with the SPP and associated technical manual⁹, Bushfire Hazard Overlay Code and PSP 6 (Logan PS).

⁹ *Technical Manual: A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments* (April 2016)



The BHA and subsequent BAL review were based on the 'Site layout plan - cabin option' developed by RPS (DWG no. 126720-15A, dated 16/07/18). The bushfire assessment, however, only included Area 3 (refer to Section 1.4). The proposed layout changes beyond this extent on Lot 21 on RP804908 (i.e. Area 2) are minor and as such, the outcomes of the approved Bushfire Management Plan prepared by RPS Australia East Pty Ltd (dated 15/05/15) are still applicable.

2.4 Bushfire Attack Level

Determination of the BAL associated with the development footprint and classified vegetation was undertaken in accordance with AS 3959-2009, specifically Method 2 (AS 3959-2009 - Appendix B). This includes identification of the following input values:

- relevant Fire Danger Index (FDI)
- vegetation classification
- surface and overall fuel load
- distance of the development footprint from classified vegetation; and
- effective slope of land under classified vegetation.

AS 3959-2009 defines BAL as *being a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire*. As such, the outcomes of the assessment and associated BAL construction requirements are only applicable to proposed buildings and/or assets; not the entire development footprint.



3 Results

3.1 Desktop assessment and legislative review

3.1.1 State Planning Policy (July 2017)

The SPP Interactive Mapping System mapping indicated that the site contains the following sub-categories of bushfire hazard area (bushfire prone area):

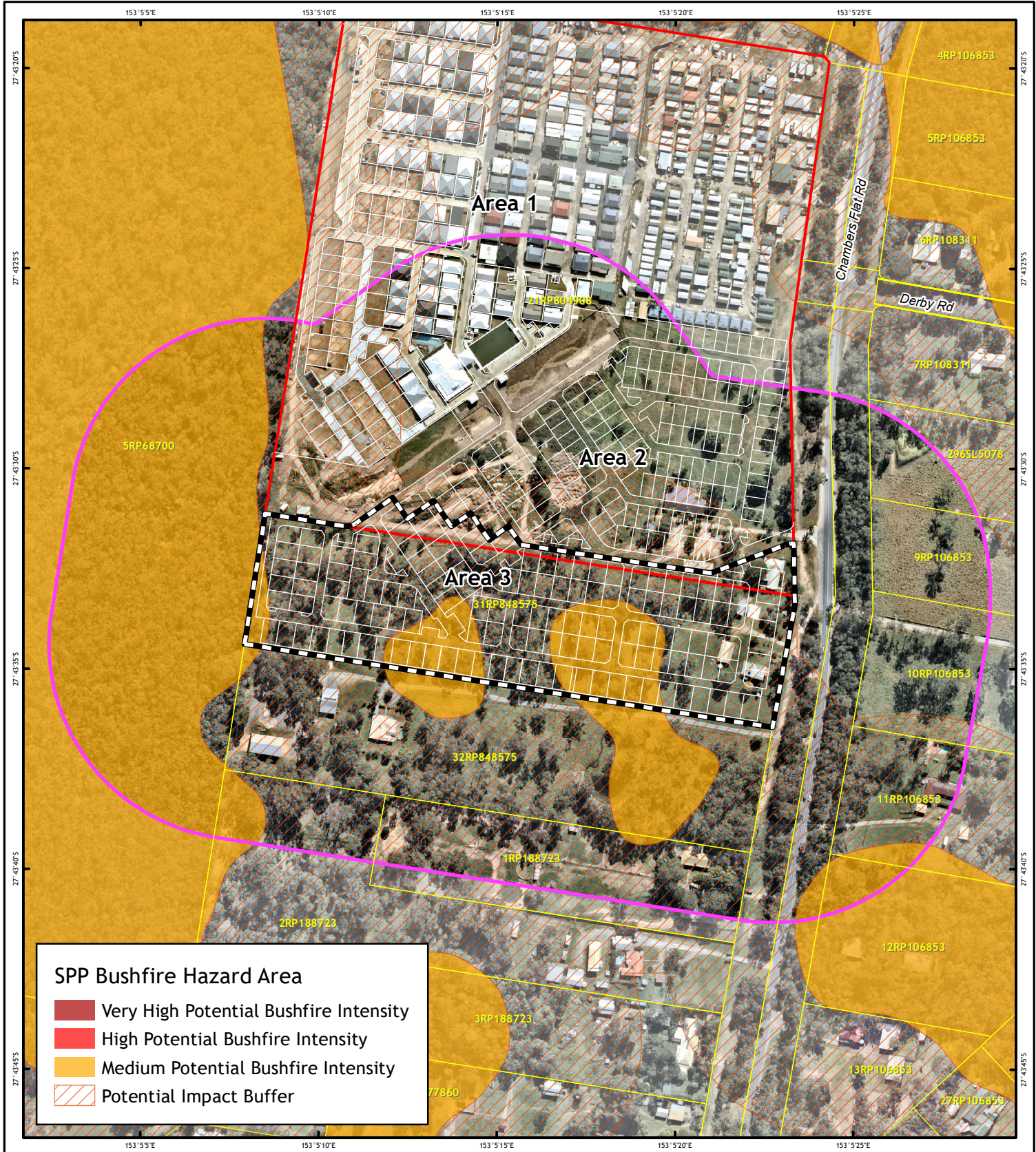
- Medium potential bushfire intensity; and
- Potential impact buffer.

The SPP mapping has been indicated in Figure 2.

3.1.2 Logan Planning Scheme 2015 (v5.1)

The Logan Planning Scheme Interactive Mapping tool identified that sections of the site contain Bushfire hazard - potential impact buffer sub-category areas (Bushfire Hazard Overlay map OM - 03.00). The Bushfire Hazard Overlay mapping has been indicated in Figure 3.





SPP Bushfire Hazard Area

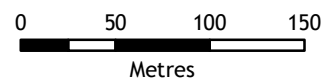
- Very High Potential Bushfire Intensity
- High Potential Bushfire Intensity
- Medium Potential Bushfire Intensity
- Potential Impact Buffer

Legend

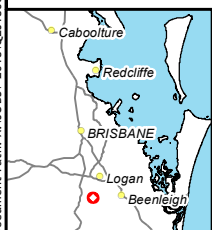
- Development Footprint
- Site
- Cadastre
- Bushfire Assessment Area
- Bushfire Assessment Buffer (150m)



Scale 1:4,000 (A4)



Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator



Notes:
Aerial Imagery: © Nearmap 2018
Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014
SPP: © DNRME 2018

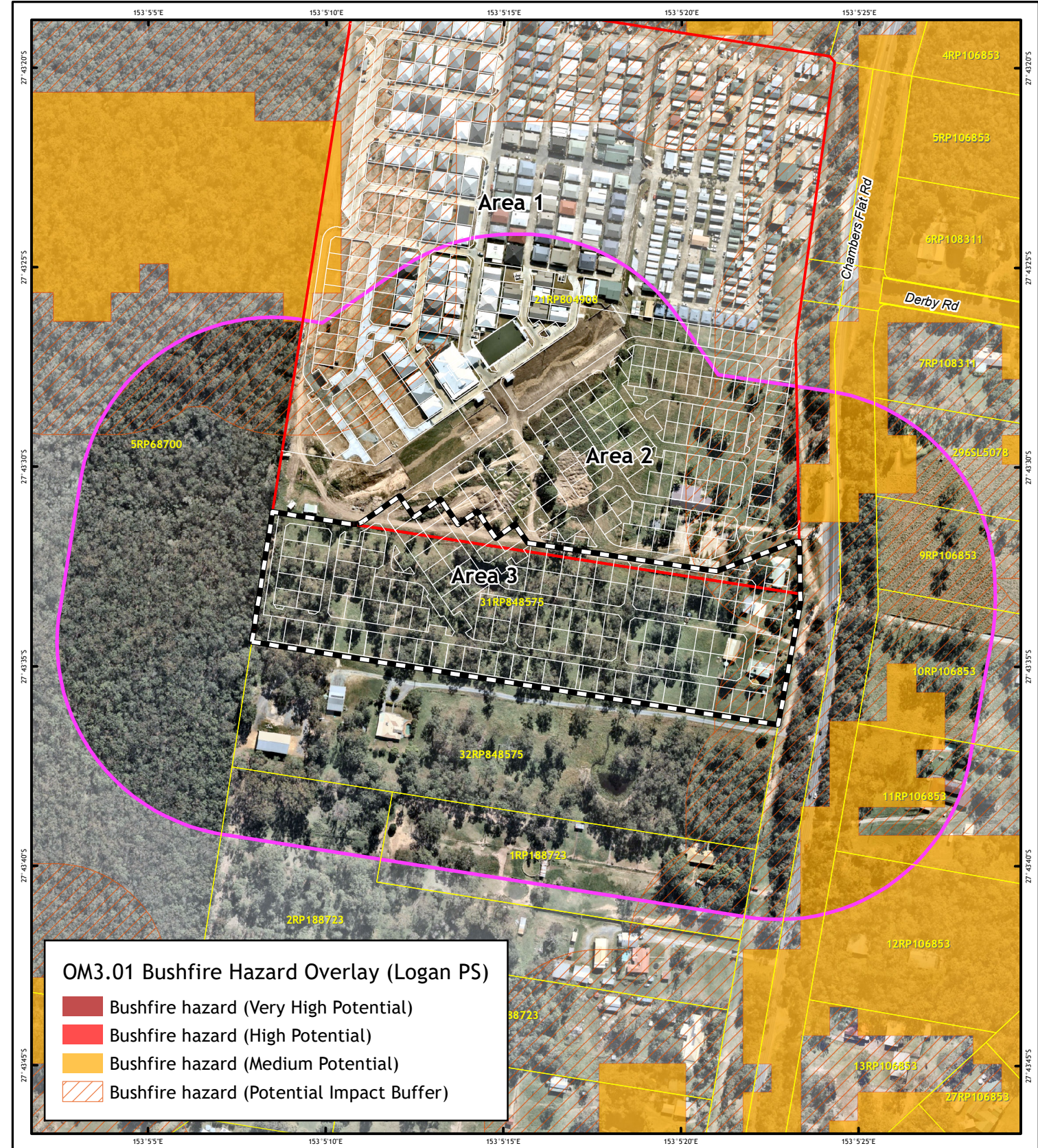
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FIGURE 2: SPP BUSHFIRE HAZARD AREA (BUSHFIRE PRONE AREA)

Bushfire Hazard Assessment
Chambers Flat Road, Chambers Flat

Map Number	Job Number	Rev
1 of 1	QEJ18067	A



OM3.01 Bushfire Hazard Overlay (Logan PS)

- Bushfire hazard (Very High Potential)
- Bushfire hazard (High Potential)
- Bushfire hazard (Medium Potential)
- Bushfire hazard (Potential Impact Buffer)

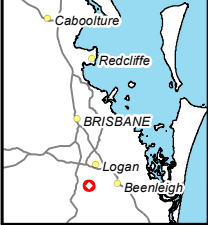
Legend

- Development Footprint
- Site
- Cadastre
- Bushfire Assessment Area
- Bushfire Assessment Buffer (150m)

Scale 1:4,000 (A4)

0 50 100 150 Metres

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator



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Road: © PSMA 2014
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FIGURE 3: BUSHFIRE HAZARD OVERLAY (LOGAN PS)

Bushfire Hazard Assessment
Chambers Flat Road, Chambers Flat

Map Number	Job Number	Rev
1 of 1	QEJ18067	A

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3.2 Field assessment

3.2.1 Vegetation communities

The outcomes of the field survey identified two areas of differing vegetation composition and structure (refer to Figure 4 for extents). To align with the descriptions provided within the technical manual and AS 3959-2009, the two vegetation communities (VCs) have been further sub-categorised. This allows for subsequent BHA and BAL assessment. Scientific names have been used for all plant species with introduced species identified with an ‘*’.

3.2.1.1 VC 1

Vegetation community 1 was characterised by nil to moderate vegetation cover in built-up areas.

The vegetation associated with VC 1 has been sub-categorised into the following two categories:

- VC 1A: built-up areas supporting nil to very low vegetation (e.g. urban development, roads etc.) (i.e. Vegetation Hazard Class (VHC) 42.6, exclusion 2.2.3.2(e), AS 3959-2009); and
- VC 1B: built-up areas supporting low to moderate tree cover with a maintained understorey (lawns). Vegetation within these areas is considered to be low threat (i.e. VHC 41.1, exclusion 2.2.3.2(f), AS 3959-2009); and VHC 39.2, exclusion 2.2.3.2(f), AS 3959-2009).

3.2.1.2 VC 2

Vegetation community 2 was comprised of woodland to open-forest¹⁰ areas with composition generally consistent with Regional Ecosystem (RE) 12.9-10.4. Identified canopy and sub-canopy species (~10-15 m, 10-30% canopy cover) included *Eucalyptus racemosa*, *E. seeana*, *Angophora leiocarpa*, *Corymbia intermedia*, *Lophostemon suaveolens*, *L. confertus*, *Melaleuca quinquenervia*, *Banksia integrifolia* and *Allocasuarina littoralis*, with emergents to ~18 m including *Eucalyptus racemosa* and *Angophora leiocarpa* (refer to Photo Plate 1). Shrub (~3-8 m) and understorey species generally consisted of *Banksia integrifolia*, *Acacia disparrima*, *A. concurrens*, *Alphitonia excelsa*, *Parsonia straminea*, *Syagrus romanzoffiana**, *Lantana camara**, *Pteridium esculentum*, *Urochloa decumbens**, *Entolasia stricta*, *Lomandra longifolia*, *Lepidosperma laterale*, *Eustrephus latifolius*, *Goodenia rotundifolia*, *Ghania sp.*, *Lobelia purpurascens*, *Imperata cylindrica*, *Ageratum houstonianum**, *Megathyrsus maximus**, *Melinis repens** and *Patersonia glabrata*.

To align with the technical manual and AS 3959-2009, VC 2 has been sub-categorised due to forest versus woodland and shrub structural differences¹¹:

- VC 2A: characterised by the presence of all vegetation strata layers, specifically including a higher density of shrub and understorey species such as *Acacia disparrima*, *A. concurrens*, *Lantana camara**, *Pteridium esculentum*, *Urochloa decumbens**, *Entolasia stricta* etc. (i.e. VHC 9.1; vegetation classification A, AS 3959-2009).
- VC 2B: areas consisting of scattered canopy species with a sparse shrub presence generally dominated by *Lantana camara** (i.e. VHC 9.2; vegetation classification B, AS 3959-2009).

¹⁰ As defined by Specht (1970)

¹¹ As defined by AS 3959-2009; effects modelled fuel loads



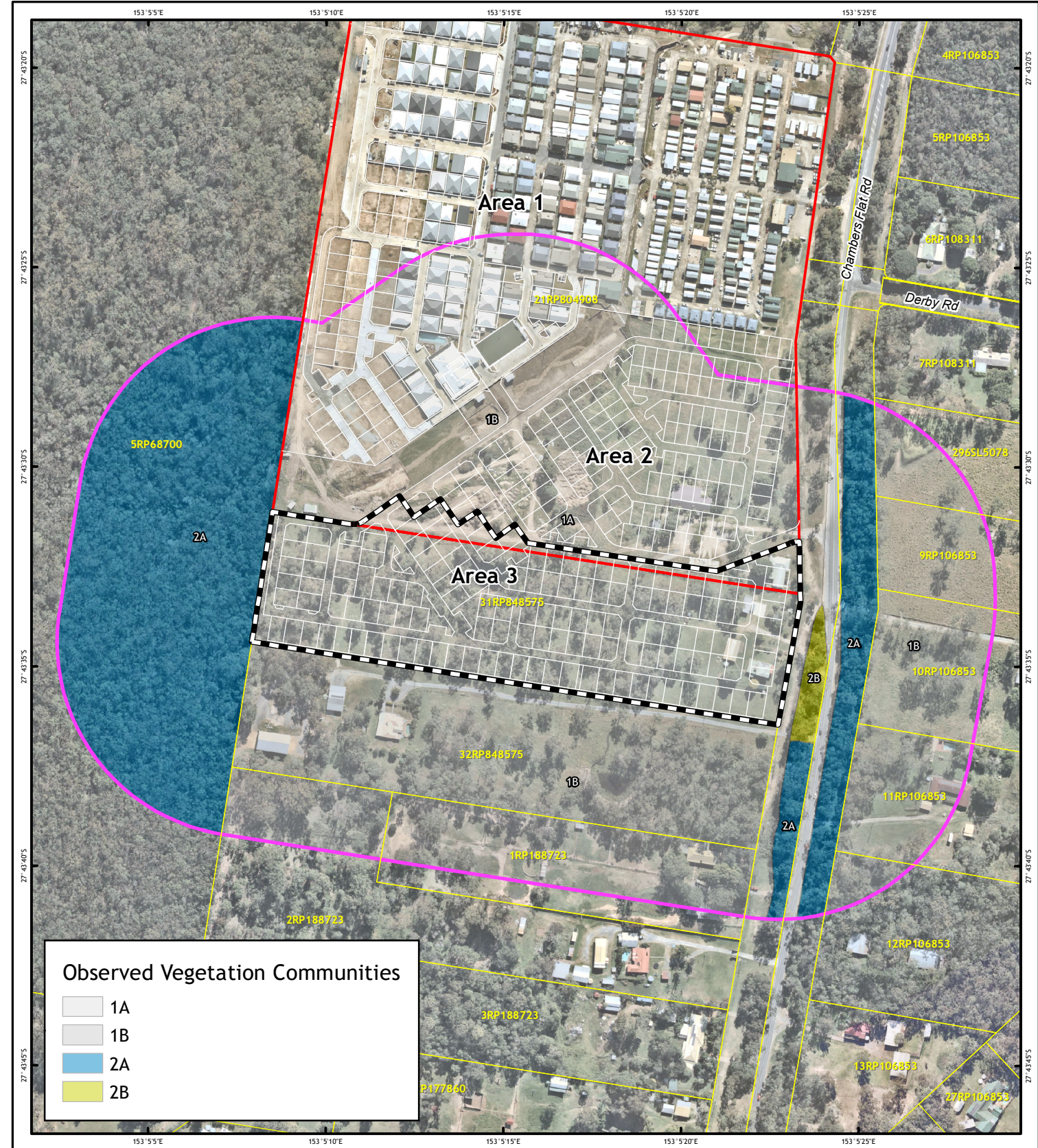


Photo Plate 1 - VC 2 - (top row, examples of VC 2A; bottom row, examples of VC 2B)

3.2.2 Slope and aspect

The landform of the site consists of gently undulating rises, with very low to low relief (~25-35 m) and a very gently inclined slope (~3%) (Speight 2009). Aspect across the site is north-eastern facing.





Observed Vegetation Communities

1A

1B

2A

2B

Legend

Development Footprint

Site

Cadastre

Bushfire Assessment Area

Bushfire Assessment Buffer (150m)

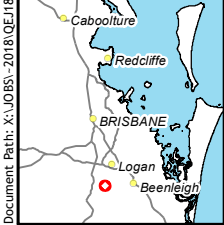
N

Scale 1:4,000 (A4)

0 50 100 150

Metres

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator



Notes:
Aerial Imagery: © Nearmap 2018
Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014

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e2m

FIGURE 4: OBSERVED VEGETATION COMMUNITIES

Bushfire Hazard Assessment
Chambers Flat Road, Chambers Flat

Map Number 1 of 1
Job Number QEJ18067
Rev A

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3.3 Bushfire hazard assessment

3.3.1 Pre-development scenario

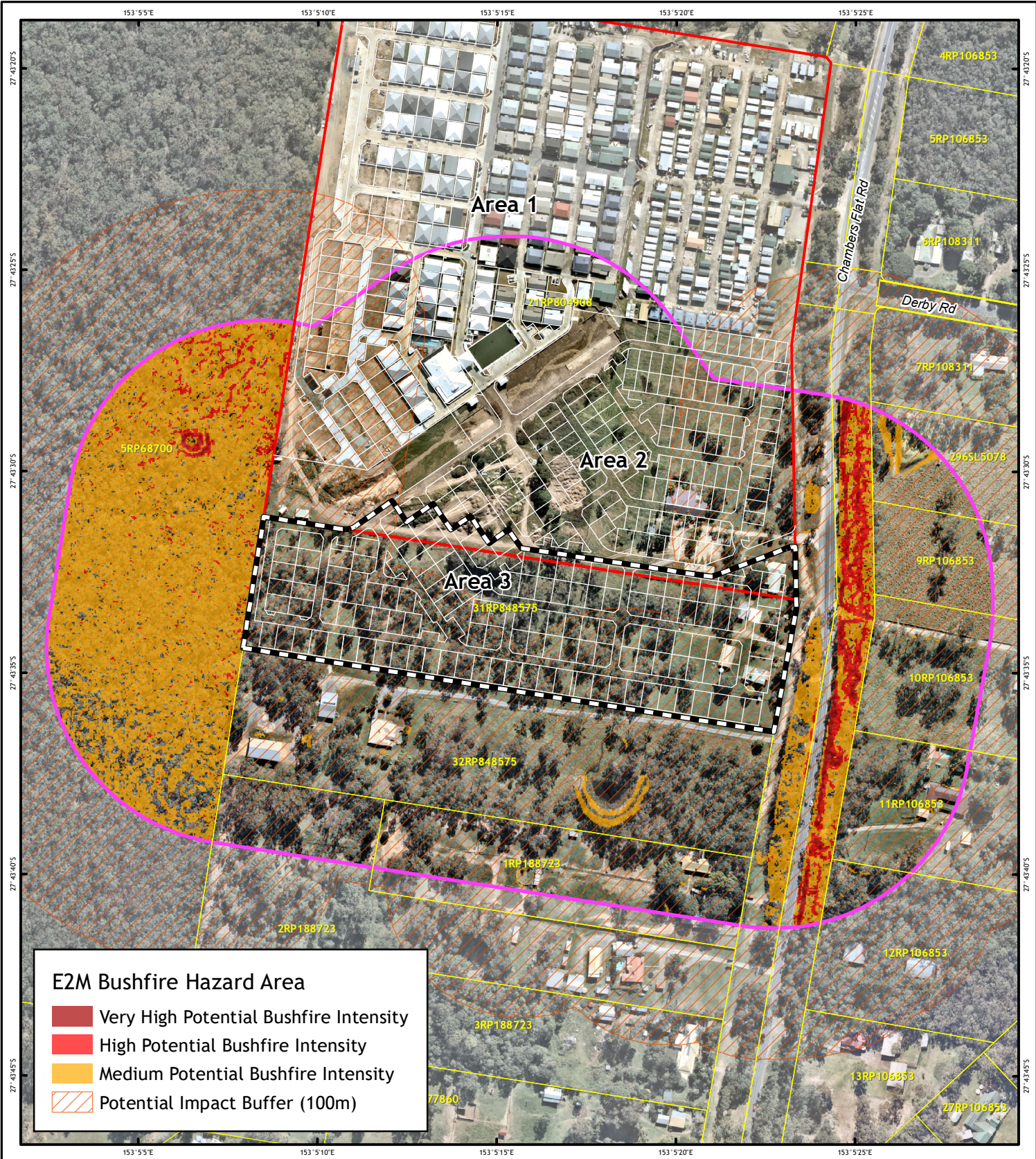
A 'pre-development scenario' BHA was undertaken to determine the existing bushfire prone (i.e. bushfire hazard) areas within the site and confirm, or otherwise, SPP mapping. The outcomes of the assessment identified that the site is located adjacent to classified vegetation, including Very high potential bushfire intensity, High potential bushfire intensity, Medium potential bushfire intensity and Potential impact buffer areas.

3.3.2 Post-development scenario

As the 'pre-development' scenario BHA identified Very high potential bushfire intensity, High potential bushfire intensity, Medium potential bushfire intensity and Potential impact buffer areas within and adjacent to the site, a 'post-development' BHA was undertaken to determine the level of bushfire risk to the proposed development footprint. This assessment was based on the assumptions that vegetation will be cleared or managed in a low-fuel state where impacted by the siting of the development footprint and land will be generally levelled through associated earthworks.

The outcomes of the 'post-development' scenario identified that sections of the development footprint are located the Potential impact buffer area (refer to Figure 5). As such, the development footprint and future building envelopes will require consideration regarding construction requirements, set-backs, Asset Protection Zones and bushfire hazard mitigation requirements.





E2M Bushfire Hazard Area

Very High Potential Bushfire Intensity

High Potential Bushfire Intensity

Medium Potential Bushfire Intensity

Potential Impact Buffer (100m)

Legend

Development Footprint

Site

Cadastre

Bushfire Assessment Area

Bushfire Assessment Buffer (150m)

N

Scale 1:4,000 (A4)

0 50 100 150

Metres

Coordinate System: GDA 1994 MGA Zone 56

Projection: Transverse Mercator

Notes:

Aerial Imagery: © Nearmap 2018

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FIGURE 5: 'POST-DEVELOPMENT' BHA MAPPING

Bushfire Hazard Assessment

Chambers Flat Road, Chambers Flat

Map Number 1 of 1

Job Number QEJ18067

Rev A

Document Path: X:\JOBS-2018\QEJ18067\GIS\QEJ18067_E2M_BHA.mxd

3.4 Bushfire Attack Level ('post-development')

Acceptable Outcome (AO) 2 of the Bushfire Hazard Overlay Code (Part 8.2.3, Logan PS) identifies that development is to ensure that the BAL of the nominated development footprint does not exceed BAL-29 (calculated in accordance with AS 3959-2009).

The BAL assessment, which was undertaken in accordance with AS 3959-2009, identified that various setbacks are required to achieve BAL-29 (refer to Table 1 and Figure 6). The length of the setback is dependent on the VC and additional factors such as effective slope.

Table 1: BAL assessment (AS 3959-2009)

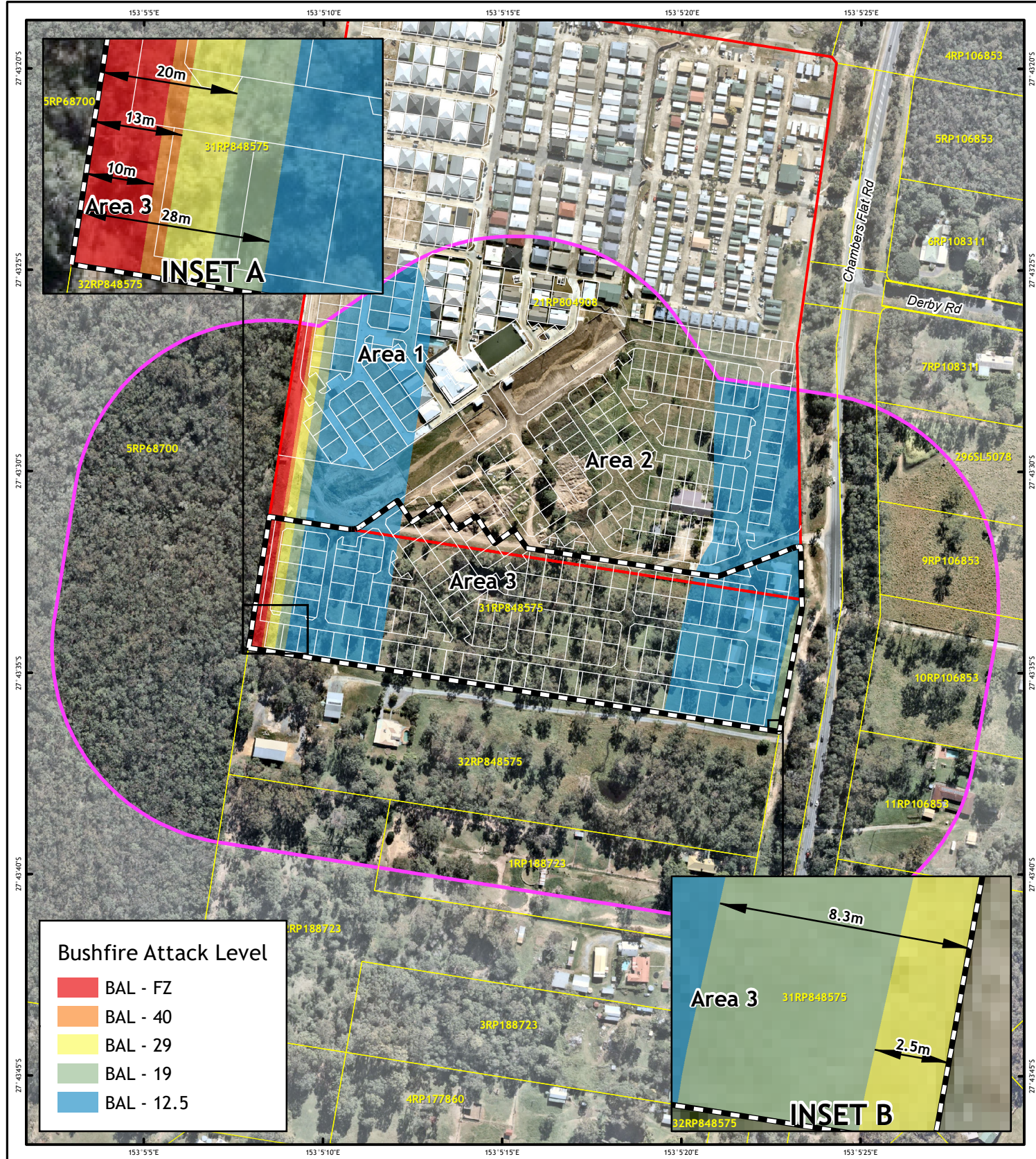
Obs. VC	Fire Danger Index (Qld)	Vegetation Classification	Effective Slope (°)	Setback from hazard (m)	BAL
VC 1A	40	Exclusion 2.2.3.2 (e) <i>Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.</i>	N/A	N/A	BAL-LOW
VC 1B / 1C	40	Exclusion 2.2.3.2 (f) <i>Low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, maintained public reserves and parklands, cultivated gardens, nature strips and windbreaks.</i> NOTE: Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).	N/A	N/A	BAL-LOW
VC 2A	40	Class A - Forest	Flat (0)	20-<28	BAL-19
				13-<20	BAL-29
				10-<13	BAL-40
VC 2B	40	Class B - Woodland	Flat (0)	13-<19	BAL-19
				9-<13	BAL-29
				6-<9	BAL-40

The outcomes of the BAL assessment identified that the development footprint is predominantly located within BAL-29 or lower threshold areas (refer to Figure 6). Six proposed lots (i.e. 429 to 434) located along the western boundary of Lot 31 on RP848575, however, are subject to BAL-40 which is greater than the recommended BAL-29. Nevertheless, as identified in Section 2.4, BAL construction requirements identified in AS 3959-2009 are only applicable to proposed buildings and/or assets; not the entire development footprint. That is, if future proposed building envelopes can be wholly sited within BAL-29 or lower (i.e. setback 1.5 m from their respective western boundaries) the requirements of the Bushfire Hazard Overlay Code (Logan PS) will be achieved.

Strategies to mitigate and management identified bushfire hazards have been included in Section 4.

Note: Lots not impacted by BAL buffer areas are considered to be BAL-LOW. The BAL-LOW category identifies insufficient risk to warrant specific construction requirements.





Legend

- Development Footprint
- Site
- Cadastre
- Bushfire Assessment Area
- Bushfire Assessment Buffer (150m)

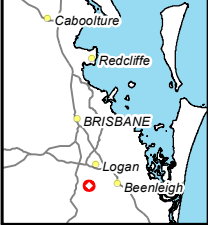


Scale 1:4,000 (A4)

0 50 100 150

Metres

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator



Notes:
Aerial Imagery: © Nearmap 2018
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FIGURE 6: BUSHFIRE ATTACK LEVEL ASSESSMENT

Bushfire Hazard Assessment
Chambers Flat Road, Chambers Flat

Map Number	Job Number	Rev
1 of 1	QEJ18067	A

4 Management and mitigation strategies

As it has been identified that the proposed development is subject to bushfire hazards, the following management and mitigation measures have been included to ensure that the risk is reduced to an acceptable or tolerable level. These have been described in accordance with the Bushfire Hazard Overlay Code, PSP 6 (Logan PS) and AS 3959-2009. Bushfire protection measures have also been adapted from *Planning for bushfire protection: a guide for councils, planners, fire authorities and developers* developed by the Rural Fire Service (2017a).

4.1 Separation from bushfire hazard areas

It is important to note that wildfires can break out at any time, however within Queensland, weather supporting critical fire hazard periods occur from late winter to early summer (Department of National Parks, Sport and Racing). As such, it is important to undertake management measures to reduce the risk of fire to assets such as buildings. The Asset Protection Zone (APZ) is an area surrounding an asset (e.g. building) that is managed to reduce bushfire hazard to an acceptable or tolerable level to mitigate the risk of life and property. The APZ can be separated into two management zones:

- Fuel Free Inner Zone (FFIZ) (inner 10 m); and
- Fuel Reduced Outer Zone (FROZ) (refer to Figure 7).

For the development to achieve BAL-29 (refer to Section 3.4), the edge of future building envelopes must be setback from hazardous vegetation. The inner 10 m and residual distance of the corresponding BAL buffers respectively form the FFIZ and FROZ of the APZ (refer to Figure 7 and Figure 8). Both to be retained and planted vegetation within the APZ is required to be sparse to very sparse¹² to ensure that the canopy is discontinuous. Furthermore, if possible, design features such as paths, driveways, open parking areas, lawns or manicured gardens should be incorporated to reduce the potential continuity (i.e. spread) of a fire.

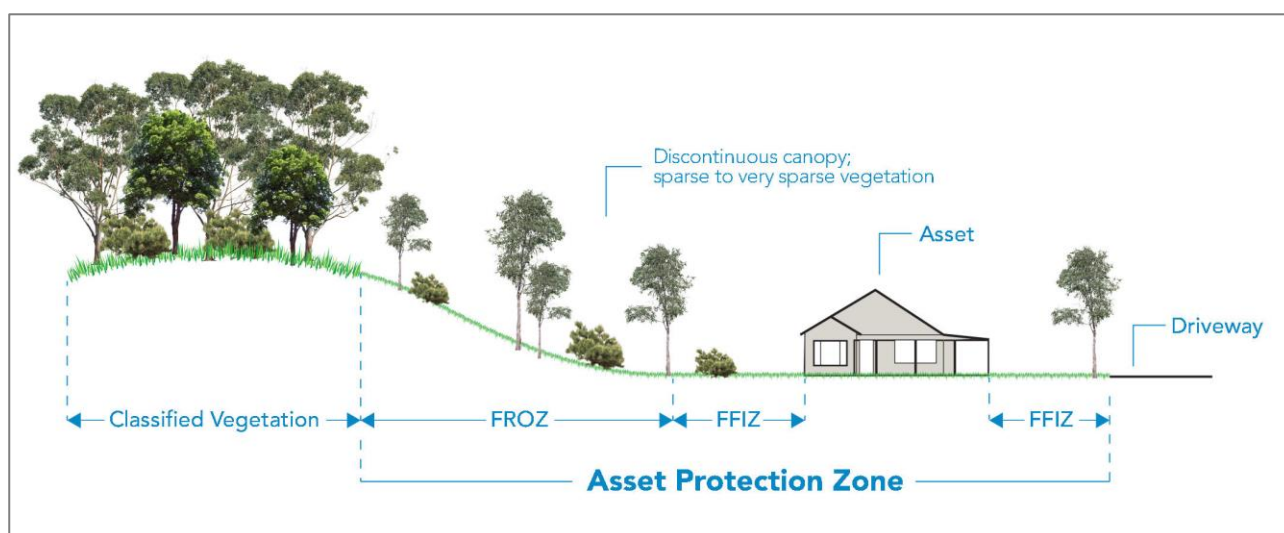


Figure 7: Asset Protection Zone

¹² As defined by Hnatuik *et al.* 2009. Foliage cover for sparse to very sparse is 10-30% and 0.2-10% respectively.



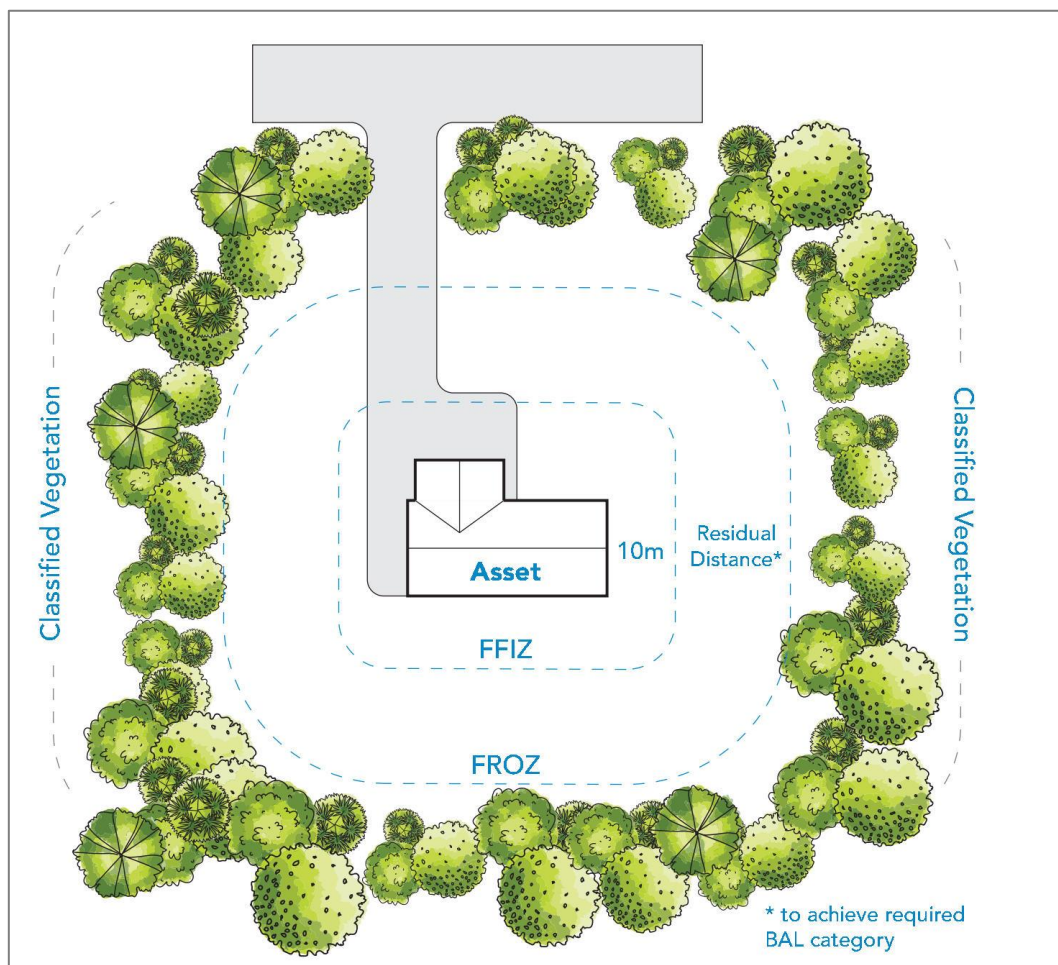


Figure 8: Requirements for Asset Protection Zones

4.1.1 Fuel Free Inner Zone

The FFIZ is known as the defensible space, which serves as an area immediately surrounding an asset where vegetation is modified and maintained to ensure a low fuel state. This reduces the effects of direct flame contact, fuel continuity and radiant heat associated with a bushfire. The area should be free of combustible items and obstructions.

The FFIZ should be regularly maintained to prevent the build-up of fuels. Examples of fuel control include:

- Raking or manual removal of leaf litter and bark (i.e. fine fuels).
- Mowing or slashing grass (including removal of cuttings).
- Removal or pruning of trees, shrubs and the understorey to ensure that:
 - vegetation is not located in front of vulnerable sections of the asset(s) such as window features; and
 - canopies do not overhang the asset(s).

4.1.2 Fuel Reduced Outer Zone

Similarly to the FFIZ, the FROZ is to be regularly maintained to ensure a reduced fuel state. The purpose of this area is to reduce the intensity of a bushfire, shield buildings from radiant heat and reduce ember attack. Tree retention or planting is beneficial within the FROZ as selectively retained vegetation can



absorb radiant heat, filter embers and reduce wind speed (Country Fire Authority 2011), however, it must be ensured that the trees and shrubs do not form a continuous canopy. Consequently, tree branches within two metres from the ground should be removed and shrubs retention at the base of trees should be minimised so to prevent the transfer of flames from ground fuels to the canopy.

The storage of flammable and combustible material within this area is to be managed to reduce the risk of providing additional fuel to a fire. Some examples of hazardous materials include woodpiles, garden mulch/ grass clipping stockpiles, flammable building materials and wooden sheds. If possible, these items should be stored in a cleared location away from any classified vegetation.

4.2 Construction standards

The outcomes of the BAL assessment identified that proposed lots 429 to 434 are exposed to BAL-40 along their respective western boundaries. Nevertheless, if future building envelopes can be wholly sited within BAL-29 (or lower), exposure to an acceptable or tolerable level of risk will be achieved. Where sited within a BAL threshold area, any future buildings will require construction in accordance with the relevant section of AS 3959-2009. That is, Section 3 and Section 5 (BAL-12.5) or 6 (BAL-19) or 7 (BAL-29). It must be noted, however, that the construction requirements of AS 3959-2009 are only applicable to Class 1-3 buildings or associated Class 10a buildings/decks (refer to Section 1.5.2).

In addition to AS 3959-2009 construction standards (where applicable), it should be ensured that gas and electricity utilities do not contribute to fire hazard risk or impede upon fire-fighting efforts. That is, the location or design of these services should not result in the potential ignition of vegetation or buildings (catalyst to combustion). Where practicable, electrical transmission and gas lines are to be located underground and metal piping should exclusively be used. If the use of reticulated or bottled gas is proposed, these should be installed and maintained in accordance with Australian / New Zealand Standard (AS/NZS) 1596:2014, shielded from any classified vegetation, kept clear of flammable materials and the safety valves should be directed away from the building.

4.3 Roads and fire maintenance trails

Access roads are to be developed in accordance with the Bushfire Hazard Overlay Code (Logan PS) and any other relevant development codes to allow for the safe and efficient access and egress of emergency services and evacuating residents. The maintenance and availability of the proposed access roads or fire maintenance trails must be ongoing. For example, overhanging vegetation should be trimmed back, gate access should be unrestricted, the capacity of road surfaces and any bridge / causeways need to be sufficient to support firefighting vehicles, roads are to be all-weather graded and two-wheel drive accessible (Rural Fire Service 2017b).

4.4 Fire-fighting requirements

In addition to the abovementioned access and egress requirements, adequate infrastructure to support fire-fighting must be provided. This includes the provision of an adequate water supply and fire hydrants as specified within the Bushfire Hazard Overlay Code (Logan PS). Examples of fire-fighting requirements include:

- Unhindered access to a fire-fighting water supply which must be located away from classified vegetation and hazardous materials (e.g. gas bottles). Further, a suitable hardstand area must be located next to the water supply.
- Underground and above-ground tanks need to incorporate relevant access holes and outlet pipes which meet standard rural fire brigade fitting requirements.



- Above-ground tanks must be manufactured using either concrete or metal and metal piping should exclusively be used.
- Fire hydrant design, spacing, sizing, flow and pressure is to be in accordance with the requirements of AS 2419.1:2005 and Queensland Urban Utilities standards.
- Fire hydrants must be located clear of parking areas / bay allocations / road carriageways.

4.5 Storage or handling of hazardous chemicals

The storage or handling of hazardous chemicals within the site must not result in an unacceptable risk to people, property and/or the environment. Furthermore, hazardous chemicals should not impose upon emergency services when responding to an emergency or evacuation. Where hazardous chemicals are proposed to be stored within a site, a Quantitative Risk Assessment to establish and assess the risk profiles (individual fatality and societal) should be undertaken by a qualified practitioner.

4.6 Landscaping

Landscaping is to be guided by the requirements of this BHAMP, with particular regard to Section 4.1 which requires the incorporation of two management zones surrounding the asset(s) (i.e. FFIZ and FROZ). Appropriately managed, retained and planted vegetation, can provide many benefits in bushfire prone areas including a reduction in fire intensity, wind speed, deflection and filtering of embers and sheltering from radiant heat. Conversely, improper management or landscaping could increase the risk of asset damage or loss from a bushfire event.

In addition to the fuel management examples listed in Section 4.1, the following fuel management strategies should be considered when developing a landscape plan:

- Avoidance of plants that are combustible or produce fine fuels (e.g. trees with fibrous or paper bark, produce ribbon bark, leaves with a high oil content, plants with fine foliage or branches (thickness ~1-2 mm) etc.)
- Ensure that vegetation placement is not located directly against an asset or near vulnerable sections such as window features, doors or decks.
- Ensure that vegetation is discontinuous vertically and horizontally. For example:
 - Vegetation should be planted/ retained in groups or islands which are to be broken up by design features such as paths or maintained lawns.
 - Minimise the retention or planting of shrubs beneath trees so to restrict the laddering of fire from ground fuels to the canopy.
- All materials against and around the asset(s) should be non-combustible.
- Ground covers should incorporate the use of succulents or herbaceous plants that are shade- or drought-tolerant perennials which maintain a high moisture content and have a low-growing habit.
- Use of shade-tolerant evergreen shrubs that have a moderately dense habit and retain little dead leaves or branches.
- Ensure that environmental or noxious weeds are actively managed and removed from the site.
- Development of a maintenance schedule which incorporates maintenance periods prior to and during the fire season (i.e. late winter to early summer).



5 Conclusions

The outcomes of the bushfire hazard assessment identified that the development footprint is located adjacent to classified vegetation categorised as having Very high potential bushfire intensity, High potential bushfire intensity, Medium potential bushfire intensity in accordance with the *Technical manual - A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments* (April 2016). As sections of the proposed development footprint were identified as being within Potential impact buffer areas, a BAL assessment was undertaken to identify which heat flux exposure thresholds, if any, the proposed development footprint would be exposed to.

The outcomes of the BAL assessment identified that six proposed lots, 429 to 434, are subject to BAL thresholds greater than the recommended BAL-29. Nevertheless, as the requirements of AS 3959-2009 are only applicable to proposed buildings and/or assets, the proposed development can meet the requirements of the Bushfire Hazard Overlay Code (Logan PS) if future proposed building envelopes can be wholly sited within BAL-29 or lower (i.e. BAL-19 and BAL-12.5), which requires a 1.5 m setback along their respective boundaries (refer to Table 1, Section 3.4).

Management and mitigation measures have been included to ensure that the risk is reduced and maintained throughout all phases of the development.

Assumptions and Limitations

The following assumptions and limitations have been made in compiling this assessment:

- All recommendations are in reference to the 'Site layout plan - cabin option' developed by RPS (DWG no. 126720-15A, dated 16/07/18)
- The portion of the development footprint subject to this bushfire hazard assessment (i.e. Bushfire Assessment Area) includes the proposed development on Lot 31 on RP848575, in addition to modified layout areas located on Lot 21 on RP804908 (i.e. Area 3). Proposed layout changes beyond this extent on Lot 21 on RP804908 (i.e. Area 2) are minor and as such, the outcomes of the approved Bushfire Management Plan prepared by RPS Australia East Pty Ltd (dated 15/05/15) still apply.
- Areas of vegetation assumed to be cleared or managed in a low-fuel state must be treated in this way in perpetuity
- It has been assumed that the entire site will be cleared to facilitate the proposed development
- Vegetation Management Plans, Rehabilitation Management Plans and proposed landscaping treatments are to adhere to requirements of the BHAMP; and
- It is not the role of a Bushfire Planning and Design consultant to approve or make determinations on whether a building plan complies with AS 3959-2009 or BCA. This is the responsibility of the building surveyor.

This assessment has been made based on bushfire hazards within and adjacent to the site as the time of the assessment (July 2018).

The recommendations provided within this BHAMP incorporate appropriate actions to reduce the potential risk to life and risk of damage and/or harm to property in the event of a bushfire on or near the proposed development, however, these recommendations do not and cannot guarantee that the area will not be affected by bushfire.



6 References

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- Standards Australia Committee FP-020. (2011) *Australian Standard: Construction of Buildings in Bushfire-Prone Areas, AS 3959-2009 Ed.3.0*. Standards Australia Limited, Sydney.
- The Australian Building Codes Board. (2016) *National Construction 2016: Building Code of Australia - Volume One*. Commonwealth of Australia, Canberra.





Appendix A Code Response

A.2 Bushfire Hazard Areas Overlay Code response

Performance outcomes	Acceptable outcomes	Response
For accepted development (subject to requirements) and assessable development		
Location, design and siting of development		
PO1 Development is designed to: a. minimise risk of bushfire hazard; b. provide safe premises; c. create efficient emergency access for fire-fighting and other emergency vehicles. Note - Planning scheme policy 6-Management of bushfire hazard provides guidelines on how to achieve this outcome.	AO1 Development: a. does not increase the number of persons living in, or lots in, the Bushfire hazard area identified on Bushfire hazard overlay map-OM-03.00; or b. is on a site that a bushfire hazard assessment prepared in accordance with the methodology in planning scheme policy 6-Management of bushfire hazard determines is of low bushfire hazard.	Complies with AO1(b). This Bushfire Hazard Assessment and Management Plan has been prepared in accordance with the requirements of the Logan PS and SPP (August 2017).
PO2 Development is sited and constructed to minimise the bushfire hazard and maximise the protection of life and property from bushfire.	AO2 Development is located and constructed: a. where there is no bushfire management plan approved by an existing development approval: i. such that the bushfire attack level is less than or equal to BAL-29; ii. away from the most likely direction of a fire front; iii. so that elements of the development least susceptible to fire are sited closest to the bushfire hazard; iv. such that asset protection zones are sited on land with a slope less than 18 degrees;	Although the outcomes of the Bushfire Attack Level (BAL) assessment identified that six proposed lots, 429 to 434, are exposed to BAL thresholds greater than BAL-29 (i.e. BAL-40), if future building envelopes can be setback 1.5 m along their respective boundaries, siting within BAL-29 will be achieved. This can be conditioned by Council as a part of any development permit.



Performance outcomes	Acceptable outcomes	Response
	v. such that asset protection zones are entirely within the boundaries of the private property of the development site; or b. where an approved bushfire management plan directs development to be located. Note - BAL = Bushfire attack level is the radiant heat flux a building will experience during a bushfire and is a measure of heat energy impacting on a surface expressed as kW/m². BAL is calculated from the following factors; vegetation type, fuel loads, distance to vegetation, Forest Fire danger Index (FDI), flame length, fire behaviour/intensity and slope. BAL is used to determine the required construction level of a building and the size of asset protection zones (inner and outer radiation zones). Further information on calculating the BAL can be obtained from AS3959-2009. Editor's note - Asset protection zones are not located on slopes greater than 18 degrees to ensure maintenance is practical, soil stability is not compromised and the potential for crown/canopy fires is reduced. Editor's note - Planning scheme policy 6-Management of bushfire hazard contains guidance on the preparation of bushfire management plans.	
P03 Reconfiguring a lot ensures that lots are designed to minimise bushfire hazard and provide safe sites for people, property and buildings.	AO3 Lots: a. are suitable for people, property and buildings by: i. having a bushfire attack level less than or equal to BAL-29; or ii. containing a development envelope area that has a bushfire attack level less than or equal to BAL-29; b. provide asset protection zones that: i. are located on land with a slope less than 18 degrees;	Refer to above response.



Performance outcomes	Acceptable outcomes	Response
	ii. are located on the same lot.	
Vehicular access and fire maintenance trails		
P04 Access for fire management and evacuation is provided by access that: a. separates premises from adjoining vegetation; b. is safely accessible by fire fighting vehicles; c. has regular vehicular access points for bushfire management, response and evacuation; d. has regular vehicle passing and turning areas for bushfire management, response and evacuation; e. allows access at all times for fire fighting vehicles; f. allows for maintenance, burning off and bushfire response; g. has vehicular links to an alternative through road; h. is readily maintained. Editor's note - Planning scheme policy 6- Management of bushfire hazard provides details on alternative solutions for providing fire management access and evacuation.	A04 Access for fire management and evacuation is provided by vehicular access in the form of a perimeter road: a. with a minimum reserve width of 20 metres; b. located between the premises and adjoining vegetation; c. with a maximum gradient of 12.5 percent; d. constructed to otherwise comply with section 3.4-Movement infrastructure standards of planning scheme policy 5-Infrastructure; e. that has a layout that does not include a cul-de-sac.	Refer to Section 4.3. This can be conditioned by Council as a part of any development permit.
Water supply		
P05 Development has access to adequate water supply for fire fighting purposes.	A05 Development: a. is connected to a reticulated water supply scheme that has sufficient flow and pressure characteristics for fire fighting purposes at all	This can be conditioned by Council as a part of any development permit.



Performance outcomes	Acceptable outcomes	Response
	times with a minimum pressure and flow of 10 litres per second at 200kPa; or b. has an on-site water storage in accordance with Table 8.2.3.3.2, dedicated or retained for fire fighting purposes that is made of fire resistant materials and is: i. a separate tank; or ii. a reserve section in the bottom part of the main water supply tank. Editor's note - The requirement in AO5 is: in addition to the requirement for potable water supply/storage in AO2 in Table 9.4.3.3.2-Infrastructure code: self-assessable and assessable development.; reflected in AO5 in Table 9.4.3.3.2-Infrastructure code: self-assessable and assessable development.	
For assessable development		
Community infrastructure		
PO6 Community infrastructure is not located in a bushfire hazard area or is able to function effectively during and immediately after a bushfire event.	AO6 Community infrastructure is: a. not located in a Bushfire hazard area identified on Bushfire hazard overlay map—OM—03.00; or b. located to ensure that: i. the core services provided by the community infrastructure is able to function effectively during bushfire events; ii. access to the community infrastructure is not compromised by bushfire events; iii. the safe storage of valuable records, public records and items of cultural or historic	Not applicable.



Performance outcomes	Acceptable outcomes	Response
	significance is able to be maintained during a bushfire event.	
Hazardous materials		
P07 Public safety and the environment are not adversely affected by the adverse impacts of bushfire on hazardous materials including fuels, explosives and flammable chemicals manufactured or stored in bulk on premises.	A07 Hazardous materials: a. storage is in compliance with AS1940—The storage and handling of flammable and combustible liquids; b. manufacturing does not occur in a Bushfire hazard area on Bushfire hazard overlay map-OM-03.00.	This can be conditioned by Council as a part of any development permit.

