BLACKASH
BUSHFIRE CONSULTING

Bushfire Constraints & Opportunities Assessment

Bargo Employment Lands Study Area

Prepared for

Wollondilly Shire Council

16 November 2022 | Version 1.2

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Project Name:	Employment Land Rezoning – Technical Study – Bargo
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Disclaimer

Contents

1. Abbreviations

APZ	Asset protection zone
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas AS 3959:2018*
BAL	Bushfire Attack Level
NCC	*National Construction Code*
BSA	Bushfire safety authority
EP&A Act	*Environmental Planning & Assessment Act 1979*
EPA Reg	*Environmental Planning and Assessment Regulation 2000*
GTA	General terms of approval
PBP	*Planning for Bush Fire Protection 2019*
RF Act	*Rural Fires Act 1997*
RFS	NSW Rural Fire Service
RFR	*Rural Fires Regulation* 2013
SFPP	Special fire protection purpose

2. Glossary

AS3959	Australian Standard AS 3959 Construction of buildings in bushfire-prone areas, Standards Australia, 2018, that outlines construction standards applicable to residential developments in bush fire prone areas
Bushfire Prone Area	An area of land that can support a bushfire or is likely to be subject to bushfire attack.
Bush fire safety authority	An approval of the Commissioner of the RFS required for a subdivision for residential or rural residential purpose or for a special fire protection purpose listed under section 100B of the RF Act.
Infill Development	Refers to the development of land by the erection of or addition to a residential building (or buildings) which does not require the spatial extension of services including public roads, electricity or water and is within an existing allotment.
Short Fire Run	Small or narrow parcels of vegetation that are less likely to support fully developed bushfires are referred to as a short fire run (SFR).

3. Property, Proposal & Summary

Address:	Bargo Employment Lands Study Area 560-690 Arina Road, Bargo NSW 2574 Lots 23-29 & 31-36 DP 10196; and Lots A & B DP 354366
Type of development:	Technical study to inform a Planning Proposal for employment lands
NCC Categorisation	N/A

4. Introduction

Wollondilly Shire Council (WSC) have commissioned Blackash Bushfire Consulting (Blackash) to prepare a Bushfire Opportunities and Constraints Assessment as Stage 2 of the Employment Lands Rezoning Proposal Technical Study (study). The purpose of the study is to ascertain the suitability of selected lands for light industrial and compatible uses that enable new business opportunities and existing business expansion, to facilitate longer term employment uses for Wollondilly. WSC have provided the study location as part of works already performed in the Wollondilly Employment Land Strategy. **Figures 1 & 2** show the study area location.

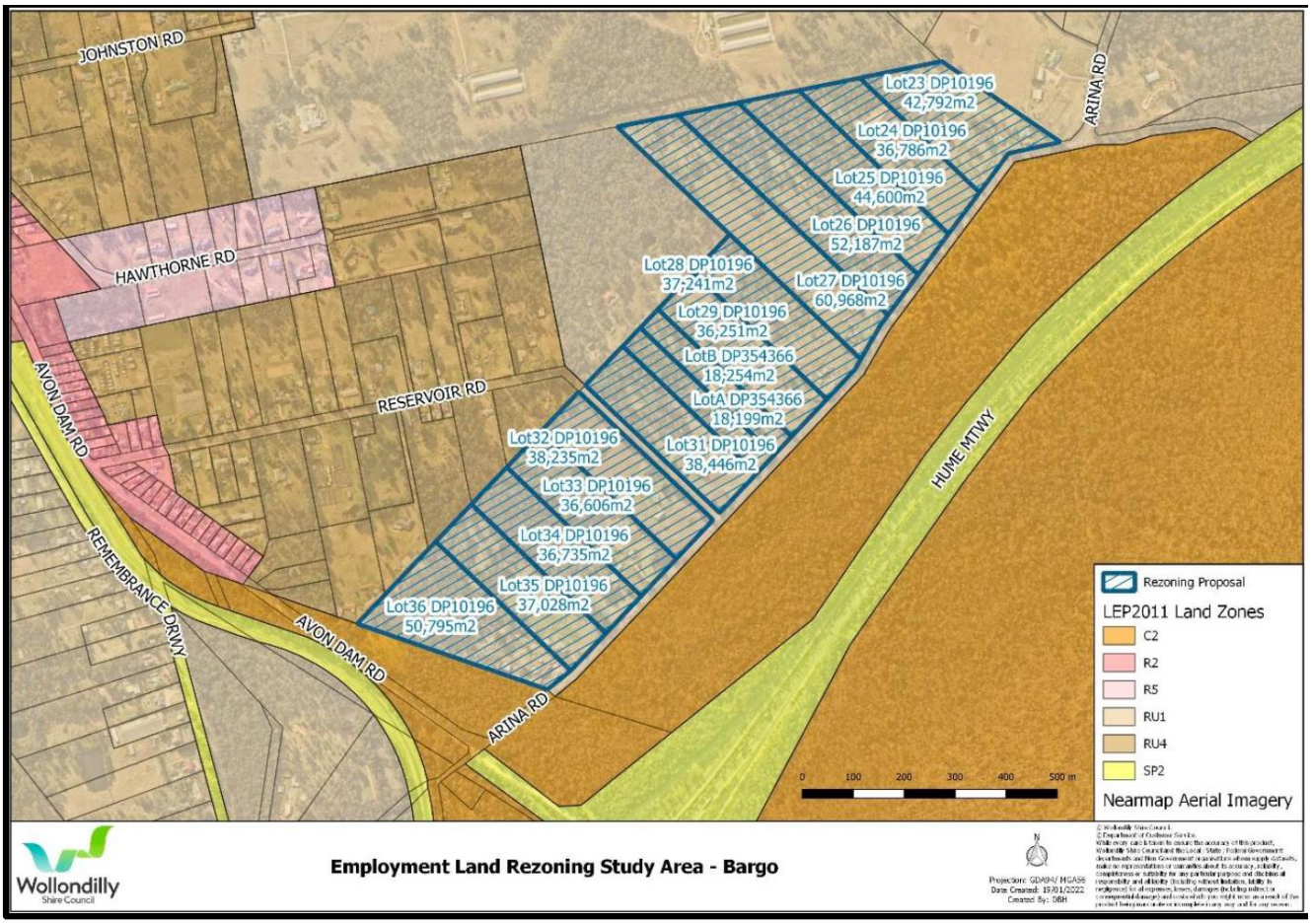

Figure 1: Bargo study area and current zoning

This assessment has been prepared by David Lemcke (Senior Planner & Bushfire Specialist) & Lew Short, Principal Blackash Bushfire Consulting (Level 3 FPAA BPAD-A Certified Practitioner No. BPD-PA-16373) who is recognised by the NSW Rural Fire Service (RFS) as qualified in bushfire risk assessment and has been accredited by the Fire Protection Association of Australia as a suitably qualified consultant to

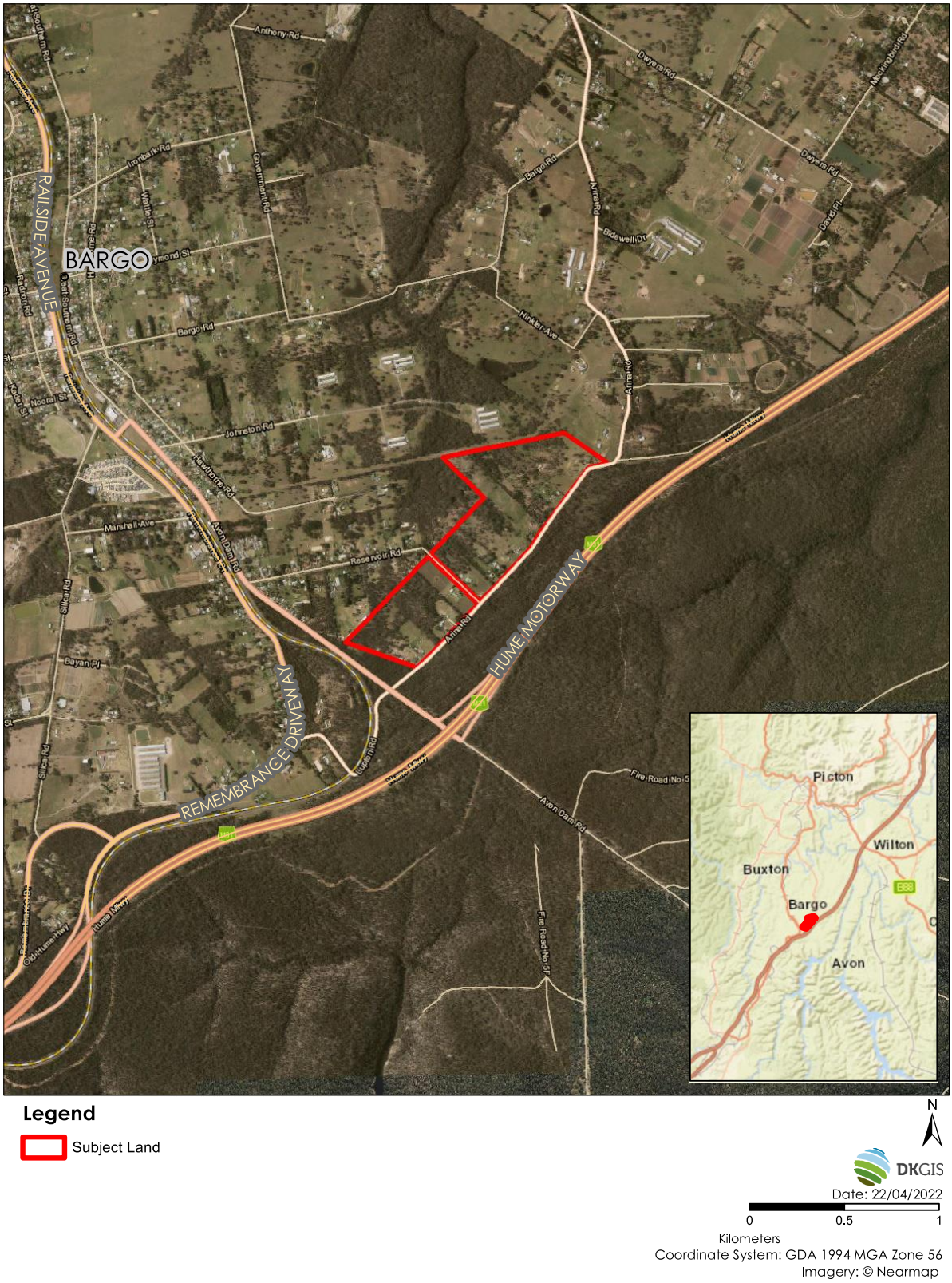

Figure 2: Location

undertake alternative solution proposals. A site inspection of the surrounding area was completed on 20 May 2022.

The site, while large, has potential to be impacted by bush fire fronts from several directions. The proposal is located on land mapped by Council as being bushfire prone. As such, the proposal is subject to the requirements of Section 9.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) which requires Council to consult with the Commissioner of the NSW RFS and to take into account any comments by the Commissioner. Direction 4.4, Planning for Bushfire Protection identifies matters for consideration for planning proposals that will affect, or are in proximity to land mapped as bushfire prone. This ties in with the new Strategic Planning requirements within PBP.

Bush fires are an intrinsic part of the NSW landscape. They are a natural hazard to which both rural and urban communities are exposed, and which are capable of inflicting tremendous consequences on communities and the sustainability of ecosystems. The consequences of bush fires can be significant in terms of lives lost, psychosocial impact, infrastructure and asset loss and the opportunity cost on the environment and other values to reduce risk and manage fuel.

The likelihood of bushfires, longer bushfire seasons and extreme bushfire behavior associated with intense weather occurring in NSW is predicted to rise due to climate change. As fire threat increases, disaster risk reduction and adaptation policies will play a critical role in reducing risks to people and their assets. Longer fire seasons will reduce the window of opportunity for planned burning. The importance of strategic planning is crucial to ensure that new development is able to meet the requirements of PBP.

A resilience-based approach focused on community wellbeing, liveability and sustainability through strategic planning and sound bush risk management is essential. The NSW planning system recognises that not all areas should be developed, and that consideration is to be given to limiting or excluding incompatible development in bushfire affected areas commensurate with the level of risk. This assessment tests, in broad terms the bush fire constraints and opportunities of the subject site.

5. Site Characteristics and Zoning

The Bargo Employment Lands study area is located at 560-690 Arina Road, Bargo NSW 2574, which are legally known as Lots 23-29 & 31-36 DP 10196; and Lots A & B DP 354366. The study area is approximately 60 hectares in size and is currently occupied by a mix of cleared and developed rural properties and significant areas of native vegetation.

The study area is zoned under the Wollondilly Local Environmental Plan 2011 as RU1 – Primary Production, with the bushland to the east and south of the site zoned C2 Environmental Conservation, and the areas adjoining to the north and west a mixture of RU1 and RU4 – Primary Production Small Lots.

The site is located approximately 2 km southeast of the Bargo shopping area and railway station and immediately adjacent to the M31 Hume Motorway (M31) corridor. The study area is well located with respect to transport options with the Avon Dam Road interchange heading towards Sydney within 450m of the southern end of the site, and local connections to the Old Hume Highway / Remembrance Driveway and the M31 to the south. Bargo is a significant urban centre in the Wollondilly LGA with a population of 4516 people at the 2021 Census.

The site is bordered to the east by Arina Road which is a sealed two lane road of approximately 8 metre wide carriageway set in a 20 metre wide road reserve. East of Arina Road is a bushland corridor of 230-280m width and then the M31. To the east of the motorway is the significant Upper Nepean State Conservation Area (UNSCA) and further large areas of bushland managed for the protection of the Sydney water catchment. To the south the study area is immediately bounded by a bushland corridor which is related to the overall NSW State agency landholdings associated with the M31. Further south of Avon Dam Road is the main Great Southern Railway Line, and then predominantly more bushland associated with the transport corridor and then extending into the National Park.

West of the site the development pattern is predominantly large lot residential and both current and former small lot primary production, with lots generally ranging from 1-2 hectares and a mixture of cleared and native vegetation. Further to the west the pattern becomes more urbanised as it approaches the township of Bargo. On the western side of Bargo, approximately 4-5 km from the study area there are large areas of bushland being the Bargo State Conservation Area and Nattai National Park. These natural areas were heavily impacted by the Green Wattle Creek Fire in the 19/20 bushfire season. North of the site there are larger primary production operations, significant areas of bushland predominantly related to the Dogtrap Creek riparian areas and buffers to primary production. This more fragmented landscape continues north to Picton and the wider rural settings of south western Sydney.

Figure 3: View along Arina Road looking north from Avon Dam Road intersection - note significant bushland opposite site to the east, and on the southern boundary of the study area.

Figure 4: View from site into C2 Zoned bushland on the east side of Arina Road - note high fuel loads and lack of active management

Figure 5: Typical view into study area with a mixture of cleared areas and retained bushland

The opportunities and constraints analysis identifies bushfire issues that should be considered and prioritised to reduce the risk of bushfire impact at the site and to meet the bushfire legislative provisions that the development proposal must respond to. The analysis can be used in the planning and design process where the information is weighed up to determine what is most pertinent to the future proposed zoning pattern.

Opportunities are those site characteristics that may encourage certain types of use or development. Constraints are those characteristics that might limit or restrict use. These will inform the ability of a site to be utilised having regard to bushfire issues, bushfire safety and compliance with NSW Rural Fire Service (RFS) document *Planning for Bushfire Protection 2019* (PBP).

6. Strategic planning for bushfires

All new development of Bush Fire Prone Land (BPL) must comply with PBP. Land use planning is widely recognised as an important measure for limiting future vulnerabilities and losses in areas of new development and a critical element for building disaster resilient communities. The physical design and layout of communities and settlements are central to the many functions that sustain the social, economic and environmental support systems for the community. Land use planning provides the opportunity to manage new growth and residual risk resulting from new development by complying with legislation and standards, limiting or modifying the location of new development and influencing its layout. This can limit both the impacts of new development on natural systems, ecosystem services and hazards and the flow on impacts on the existing community, as well as limiting the impacts that natural hazards can have on new development and its users.

The *National Strategy for Disaster Resilience* (2011)[1] recognises that strategic planning is essential in creating safer and sustainable communities. In keeping with the policy and intent of government at all levels. Priority outcomes of Section 3.6 include:

- *All levels of decision making in land use planning and building control systems take into account information on risks to the social, built, economic and natural environments.*

Comprehensive consideration of bushfires and risks in the NSW planning system needs sound understanding of the landscape context and risks, as well as clarity on risk management principles and on the approach to strategic planning and development controls that will adequately mitigate identified risks. Where there are competing policy objectives, such as biodiversity conservation and fuel reduction, an agreed methodology or guidance is critical.

As such, planning decisions must be based on the best available evidence and rigorous merits-based assessment to ensure that new development is not exposed to unacceptable risk from bushfire. The framework provided within PBP provides the minimum requirements for new development within bushfire prone areas.

The importance of sound land use planning has been recognised in most significant bushfire inquiries, including Natural Disasters in Australia which noted that land use planning that considers natural hazard risks is the single most important mitigation measure in preventing future disaster losses in areas of new

[1] NSDR https://www.homeaffairs.gov.au/emergency/files/national-strategy-disaster-resilience.pdf

development, and that planning, and development controls must be effective, to ensure that inappropriate developments do not occur[2].

The final Bushfire Technical Study report focuses on disaster resilience which means planners, hazard leaders, emergency managers and other built environment professionals can contribute to:

- understanding and anticipating bushfire risks before they happen and developing more resilient land use and built form tailored to address bushfire risks, and
- minimising the increase in risks to people and disruptions to social and economic functions when a disaster strikes by ensuring compliance with state requirements for new development in Bushfire Prone Areas

The final report will demonstrate a balanced approach provided within the NSW framework for new development in Bush Fire Prone Areas. This recognises the need to protect human life and provide safe operating environment for fire and emergency services, while having due regard to environmental impacts, development potential of land and the need to cater for growing populations. The final report will include consideration of landscape scale risk using a decision support tool developed by Blackash.

Legislative Framework

The landuse planning framework as it relates to landuse planning and bushfire in NSW is embedded in the EP&A Act, the *Rural Fires Act 1997* (RF Act), *Rural Fires Regulation* 2013 (RFR) which is articulated through PBP.

Strategic Planning Phase

The EP&A Act sets out the laws under which planning in NSW takes place. The main parts of the EP&A Act that relate to development assessment and approval are Part 3 (Planning Instruments) and Part 4 (Development Assessment).

EP&A Act Section 9.1 provides for the Planning Minister to direct councils to apply certain standards (detailed in the Direction) when preparing Planning Proposals for consideration. These Directions cover a range of practice areas and carry legislative weight.

[2] Ellis, S et al (2004) National Inquiry on Bushfire Mitigation and Management (p.92)

Planning Direction 4.4 Planning for Bush Fire Protection (Appendix 3) requires Council to consult with the Commissioner of the NSW Rural Fire Service when preparing a Planning Proposal and consider any comments made. Importantly, a Planning Proposal must:

(a) have regard to Planning for Bush Fire Protection 2019
(b) introduce controls that avoid placing inappropriate developments in hazardous areas; and
(c) ensure that bushfire hazard reduction is not prohibited within the APZ.

Chapter 4 of PBP controls Strategic Planning, and details what must be included in a Strategic Bushfire Study (SBS). The SBS must be considered by Council, before any Planning Proposal to amend an LEP can be submitted to the Department of Planning and Environment (DPE). The SBS will be considered by DPIE as part of the Gateway Determination. This determines whether the Planning Proposal should proceed further, or not, towards becoming an Environmental Planning Instrument (EPI).

7. Bushfire Risk Management Plan

The Wollondilly-Wingecarribee Bush Fire Management Committee (BFMC) has prepared the *Wollondilly-Wingecarribee Bush Fire Risk Management Plan 2017* (BFRMP). This is a strategic document that identifies community assets at risk, rates the relative risks and sets out a five-year program of coordinated multi-agency treatments to reduce the risk of bush fire to the assets. Treatments may include such things as mechanical hazard reduction (e.g., slashing, mowing), hazard reduction burning, grazing, community education and fire trail maintenance. The BRMP uses a state-wide methodology to risk assess all assets across the state consistently. The BRMP was last updated in 2016.

The Wollondilly-Wingecarribee BFMC covers 525,700 hectares. Land tenure and land use are critical for context, with 61.5% of the BFMC area being National Park and Sydney Catchment Authority land, 3.5 % Forest NSW, and only 31% of land privately owned and used for a variety of urban, rural residential and primary industry purposes.

The BRMP (p.9-10) outlines the following:

Climate and bush fire season

The typical climate in the Wollondilly/ Wingecarribee BFMC area is variable due to topographical and altitudinal differences. The low altitudinal areas north of the highlands experience a warm temperate climate with peak rainfall in the summer and autumn months.

The bush fire season in this area is generally from August to December but can extend to March depending on the onset of summer rainfall. South of the highlands is considerably higher in altitude and experience a relatively cool temperate climate with predominantly summer rainfall and the bush fire season generally runs from October to March.

Prevailing weather conditions associated with the bush fire season in the Wollondilly/ Wingecarribee BFMC area usually coincide with strong southwest to northwest winds and influenced by drought and rainfall conditions. There are also frequently dry lightning storms occurring during the bush fire season.

Population and demographic information

The population of the Wollondilly/ Wingecarribee BFMC area is approximately 90,000 people. The major population centres are Bundanoon, Moss Vale, Bowral, Mittagong, Picton, The Oaks, Tahmoor, and Warragamba. The following issues have been identified within the Wollondilly/ Wingecarribee BFMC area as potentially impacting on the ability of certain sections of the community to prepare themselves for bush fire:

- *Residents of non-English background form a small percentage of the population and are generally dispersed throughout the LGAs.*
- *There are eighteen (18) villages and four (4) large towns that form part of an extensive urban interface with considerable bushland. This is compounded by a major state highway and the Sydney to Melbourne rail line traversing parallel to adjacent bushland interface.*
- *Tourism has a major effect on the local economy.*
- *Close proximity to major urban centres of southwest Sydney and the Illawarra exposes the area to many land owners commuting in and out of the highlands. A significant number of landowners also do not reside within the boundaries of the BFMC area.*

History of bushfire frequency and ignition cause

The Wollondilly/ Wingecarribee BFMC area has on average 400 bush and grass fires per year, of which a number can be considered to be major fires.

A number of major fires have started in the inhabited areas of the BFMC and travelled in an easterly direction impacting on catchments. Most other major fires have ignited in the west associated with storms and have coincided with extensive dry periods coupled with hot westerly winds.

The main sources of ignition in the Wollondilly/ Wingecarribee BFMC area are:

- *Lightning strikes associated with typical summer storm weather patterns*
- *Arson including dumping of vehicles in bushland*
- *Pile burns escaping private residents' properties*

The site is located south of the main Bargo township parallel to the M31 motorway and has significant areas of bushland immediately adjoining to the south and southeast sides of the site and much larger areas to the south separated by the motorway and local roads. These areas are heavily timbered with a categorisation of forest in accordance with PBP.

Major fires in the Sydney basin are driven by hot and dry winds from the west to northwest, with major flareups and damage associated with strong south to southwest wind changes. The potential for extreme bushfire weather driving large scale and intense bushfires into the local area is significant.

The configuration of the land and adjoining unmanaged bushland provides a risk that the site may be isolated by high intensity fire from the south, however this is lessened by the location of the Bargo township to the north. The site location and existing bushland lends itself to be heavily impacted by the most intense bushfires being driven by strong southerly winds. There is potential for the site to be impacted from four sides with prolonged bushfire attack in the form of ember attack, smoke, radiant heat and direct flame contact.

BRMP references to the Planning Proposal site

The BRMP considers Human Settlement Assets at a broad scale of towns, suburbs, villages, or localities. The Planning Proposal site is identified within the wider Human Settlement Asset No. 400 (**Figure 6**). Broadly, the larger the number the lower the risk identified in the BRMP. The BRMP risk rates the asset as **NA – Low Risk**, arriving at the rating by considering the likelihood of bushfire spreading and impacting on assets in this group as "Unlikely" and the consequence as "Minor" (**Figure 7**). In comparison the villages of Buxton and Balmoral to the west are noted as asset groups No. 4 & No. 12 and rated as Extreme Risk. However, this is in significant part due to the presence of limited assets within the study area. New assets will likely change the risk profile.

Figure 6: Extract from Wollondilly-Wingecaribee BRMP 2017

Map Ref No.	Asset type	Asset sub type	Asset name	Asset Location	Display area	Likelihood	Consequence	Risk	Priority	Treatment number
399	Human Settlement	Residential	Thirlmere	Thirlmere	Tahmoor	Unlikely	Moderate	Low	NA	298;6;321;326
400	Human Settlement	Residential	Bargo East		Tahmoor	Unlikely	Minor	Low	NA	103;113;160;212

Figure 7: Extract from Risk Register Wollondilly-Wingecaribee BRMP 2017

8. Planning for Bushfire Protection Requirements

The Aim of and Objectives of PBP (p. 10) overall are:

> *All development on BFPL must satisfy the aim and objectives of Planning for Bush Fire Protection (PBP).*
>
> *The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.*
>
> *The objectives are to:*
>
> - *afford buildings and their occupants protection from exposure to a bush fire;*
> - *provide for a defendable space to be located around buildings;*
> - *provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;*
> - *ensure that appropriate operational access and egress for emergency service personnel and occupants is available;*
> - *provide for ongoing management and maintenance of BPMs; and*
> - *ensure that utility services are adequate to meet the needs of firefighters.*

PBP focuses very strongly on the protection of residential development and development with particularly vulnerable residents or occupants. Chapter 3 of PBP explains the different Bushfire Protection Measures (BPM) and how they work in combination to achieve an acceptable risk managed outcome. Chapter 8 of PBP details the requirements for Other Development, which includes commercial and industrial development.

8.1. Bushfire Protection Measures

PBP promotes detailed site analysis and the application of a combination of BPMs to achieve an acceptable outcome.

The BPMs work in combination to provide a suite of measures that meet the Aim and Objectives of PBP, and requirements of Chapter 8 of PBP. The BPMs are shown in **Figure 8**.

Appropriate combinations depend upon the type of development, and the specific geographic location and site circumstances. New commercial /industrial precincts have some advantages to manage these costs effectively and meet RFS requirements. These relate to typical access standards for large vehicles, plant and equipment, stormwater management, and setbacks for amenity and impact reduction on adjoining areas.

For example, Wollondilly Development Control Plan 2016 (WDCP) *Volume 7 – Industry and Infrastructure* specifies a number of standards that effectively require significant separation between future industrial/commercial development and adjoining land uses whether rural or conservation. Such setbacks when combined with perimeter roads designed for heavy vehicles provide the basic measures to support the intent of PBP to provide separation and good access.

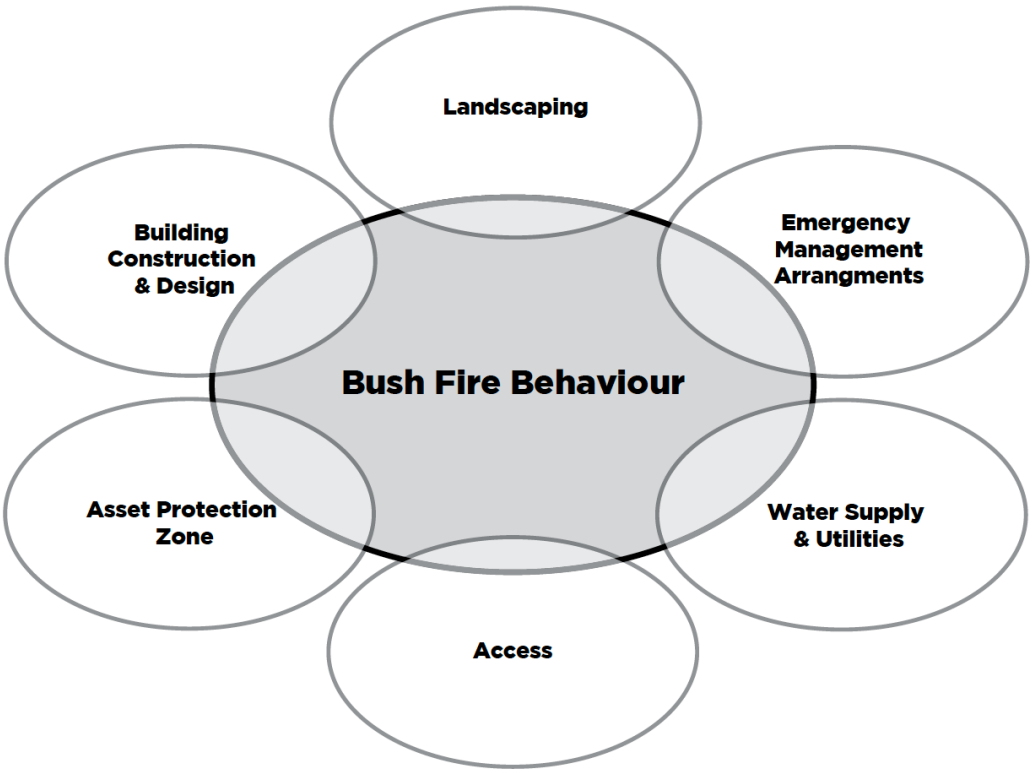

Figure 8: Bushfire Protection Measures in combination (PBP p.26)

8.2. PBP Chapter 8 – Other Development

The specific objectives of Chapter 8 and relevant sections are reproduced below as **Figure 9**:

8.1 Introduction

There are other developments where bush fire provisions or requirements need to be applied, that align with the unique features of the development type.

In order to comply with PBP the following conditions must be met:

- satisfy the aim and þbjectives of PBP outlined in Chapter 1;
- consider any issues listed for the specific purpose for the development set out in this chapter; and
- propose an appropriate combination of BPMs.

It is important to ensure that a defendable space is provided for the size and scale of the development. Proposed measures must operate in combination to minimise the impact of bush fire and ensure that access and services are adequate.

8.3.10 Commercial and industrial development

Commercial and industrial development on BFPL is captured by EP&A Act s.4.14 where a manager's residence is included in the proposal. Where no residential component is included, commercial and industrial development is addressed through the aim and objectives of PBP (see Chapter 1 of this document).

A suitable package of BPMs should be proposed commensurate with the assessed level of risk to the development. The scale of the development and numbers of people likely to be occupying the building will be directly relevant to the BPMs proposed.

The provisions within Chapter 7 of this document should be used as a base for the development of a package of measures. Each development will be assessed on its own individual merits.

8.3.1 Buildings of Class 5 to 8 under the NCC

Under the building classification system within the NCC, Class 5 to 8 buildings include offices, shops, factories, warehouses, public car parks and other commercial and industrial facilities.

The NCC does not provide for any bush fire specific performance requirements for these particular classes of buildings. As such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions, however compliance with AS 3959 and the NASH Standard must be considered when meeting the aims and objectives of PBP.

Whilst bush fire is not captured in the NCC for Class 5-8 buildings, the following objectives will be applied in relation to access, water supply and services, and emergency and evacuation planning:

- to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation;
- to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development;
- to provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building; and
- provide for the storage of hazardous materials away from the hazard wherever possible.

The general fire safety construction provisions of the NCC are taken as acceptable solutions however construction requirements for bush fire protection will need to be considered on a case-by-case basis.

Where a mixed use development is proposed to have a SFPP component, an appropriate mix of BPMs should be applied consistent with the SFPP provisions in Chapter 6.

Figure 9: Extract of relevant sections from PBP Chapter 8 - Other Development

The PBP objectives overall and the objectives identified in Chapter 8 for commercial/industrial development focus attention on separation of development from the hazard; access; emergency management arrangements; and provision of suitable services to assist bushfire management. Most of these will be dealt with at the individual development application stage based on development type.

9. Bushfire Threat Assessment

9.1. Methodology

NOTE for FINAL VERSION:

This analysis below was completed prior to the results of the Biodiversity Technical Study and was undertaken with a baseline that assumed the entirety of the site being cleared.

The Biodiversity Technical Study has identified most of the site as having high ecological value with very limited opportunities to undertake the significant clearing needed to create large areas suitable for commercial/industrial development, including perimeter roads and asset protection zones.

Sections 1-9 of this report have not been amended post results of the Biodiversity Technical Study.

Sections 10-12 of this report have been amended to take account of the inability to undertake the very substantial clearing required for this site to be further considered in terms of bushfire risk management.

END NOTE.

PBP provides a methodology to determine the bushfire threat and commensurate size of any APZ that may be required to offset possible bushfire attack. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation. For new residential subdivision, APZ requirements are based on keeping radiant heat levels at new buildings below 29kW/m^2. Whilst no specific APZ standards are required for industrial/commercial development the residential standards provide a useful guide at Planning Proposal stage.

The following assessment is prepared in accordance with Section 100B of the RF Act, Clause 44 of the RF Reg and PBP. This assessment is based on the following resources:

- *Planning for Bush Fire Protection* (NSW RFS, 2019);
- Wollondilly Shire Council Bushfire Prone Land Map;
- Aerial mapping; and
- Detailed GIS and Site analysis.

The methodology used in this assessment is in accordance with PBP and is outlined in the following sections.

9.2. Bushfire Hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as APZ locations and dimensions and future building construction requirements in accordance with AS3959 (where applicable). The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site, and which determine the planning and building responses of PBP.

9.3. Fire weather

The fire weather is dictated by PBP and assumes a credible worst-case scenario and an absence of any other mitigating factors relating to aspect or prevailing winds. The site has a Fire Danger Index (FDI) of 100 as the Wollondilly LGA is within the Illawarra / Shoalhaven Fire Weather District per PBP.

9.4. Bushfire Prone Land

Bushfire prone land (BPL) is land that has been identified by council, which can support a bushfire or is subject to bushfire attack. BPL maps are prepared by the local council and certified by the Commissioner of the RFS. The BPL maps provide a trigger for the development assessment provisions and consideration of sites that are bushfire prone.

The study area is predominantly on designated BPL for the purposes of Section 10.3 of the EPA Act. The BPL Map generally reflects the onground hazard and relation to tenure and zoning (see **Figure 10**), with significant areas of Hazard vegetation shown both on and adjoining the site.

The site has Category 1 and Category 2 vegetation within it and is affected by surrounding Category 1 and Category 2 vegetation. The RFS revised *Guide for Bushfire Prone Land Mapping* (2015) introduced Category 3 vegetation for grassland areas. Councils map has not been updated to reflect these recent changes. Areas that are not directly adjacent to managed buildings would be categorised as Category 3 Bushfire Prone Land. A breakdown of the three designation is provided below (source RFS Bushfire Prone Mapping Guidelines p. 11)

> ***Vegetation Category 1***
> *Vegetation Category 1 is considered to be the highest risk for bush fire. It is represented as red on the bush fire prone land map and will be given a 100m buffer. This vegetation category has*

the highest combustibility and likelihood of forming fully developed fires including heavy ember production. Vegetation Category 1 consists of:

- *Areas of forest, woodlands, heaths (tall and short), forested wetlands and timber plantations.*

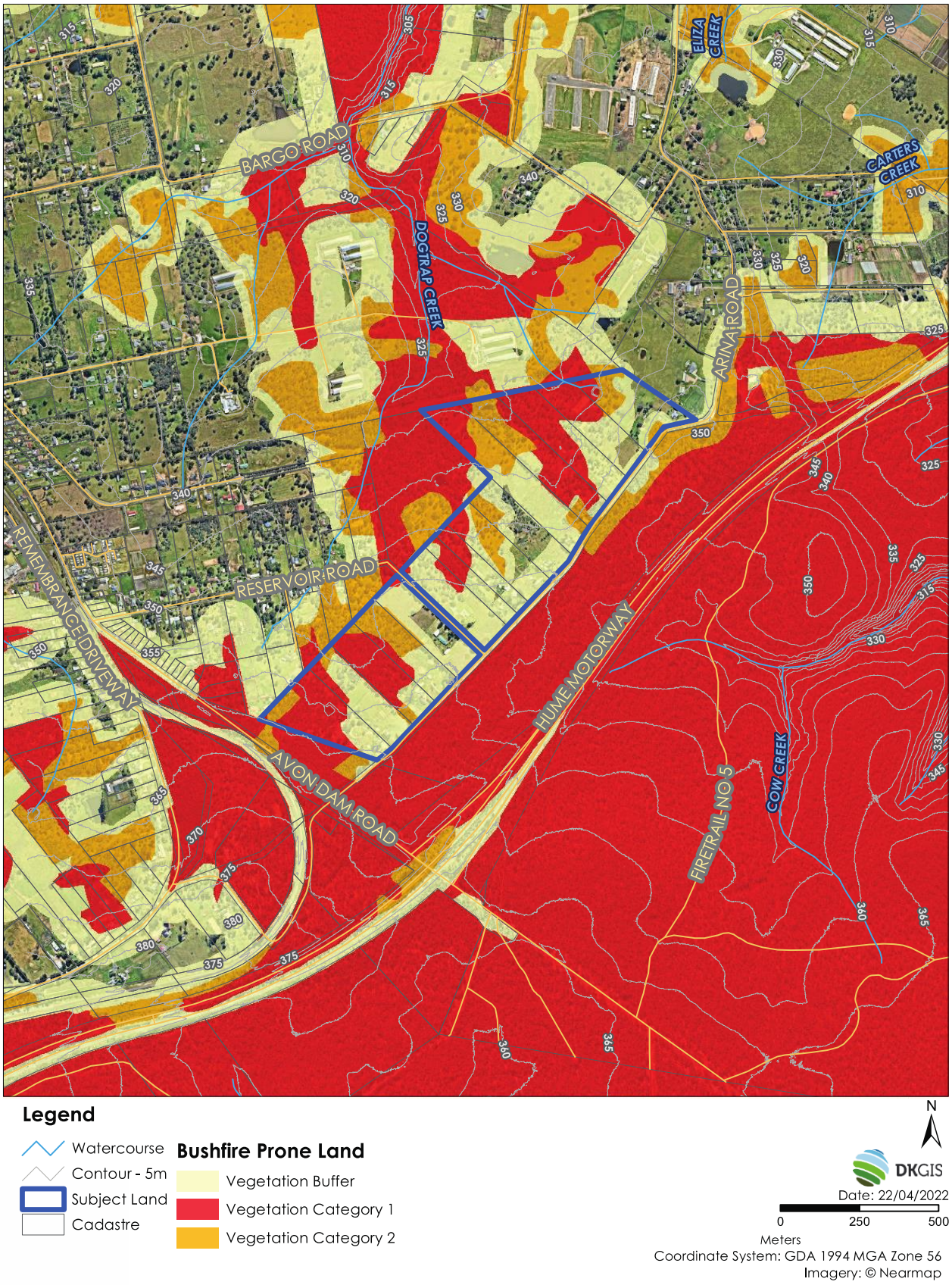

Figure 10: Bushfire Prone Land Map extract

Vegetation Category 2

Vegetation Category 2 is considered to be a lower bush fire risk than Category 1 and Category 3 but higher than the excluded areas. It is represented as light orange on a bush fire prone land map and will be given a 30 metre buffer. This vegetation category has lower combustibility and/or limited potential fire size due to the vegetation area shape and size, land geography and management practices. Vegetation Category 2 consists of:

- *Rainforests.*
- *Lower risk vegetation parcels. These vegetation parcels represent a lower bush fire risk to surrounding development and consist of:*
- *Remnant vegetation;*

Land with ongoing land management practices that actively reduces bush fire risk. These areas must be subject to a plan of management or similar that demonstrates that the risk of bush fire is offset by strategies that reduce bush fire risk; AND include:

- *Discrete urban reserve/s;*
- *Parcels that are isolated from larger uninterrupted tracts of vegetation and known fire*
- *paths;*
- *Shapes and topographies which do not permit significant upslope fire runs towards development;*
- *Suitable access and adequate infrastructure to support suppression by firefighters;*
- *Vegetation that represents a lower likelihood of ignitions because the vegetation is surrounded by development in such a way that an ignition in any part of the vegetation has a higher likelihood of detection.*

Vegetation Category 3

Vegetation Category 3 is considered to be medium bush fire risk vegetation. It is higher in bush fire risk than category 2 (and the excluded areas) but lower than Category 1. It is represented as dark orange on a Bush Fire Prone Land map and will be given a 30 metre buffer. This category consists of:

- *Grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands.*

9.5. Vegetation

Predominant Vegetation is classified by structure or formation using the system adopted by Keith (2004) and by the general description using PBP. Vegetation types give rise to radiant heat and fire behaviour characteristics. There are 7 vegetation formations (with sub-formations) identified in PBP.

The predominant vegetation has been determined over a distance of at least 140 metres in all directions from the proposed property boundary or building footprint on the site. Where a mix of vegetation types exist, the type providing the greater hazard is said to predominate. **Figure 11** shows the base assessment of the predominant vegetation as a mixture of Forest, Woodland, Grassland and managed land surrounding the site. There is an assumption that the entire site will be cleared for development until specific constraints are identified.

The amount of vegetation to be retained or managed within and external to the site will influence the future and potential risk to development, occupants and emergency services. Retained vegetation within the site that is not managed can provide fuel source features for fire penetration within the site. Often, tensions exist between the retention of vegetation and ecological values with the need to mitigate bushfire risk and comply with PBP.

The site is not connected to larger developed areas and would be considered isolated development. As such, the management of the Bushfire Protection Measures and the provision of asset protection zones and vegetation management may be required above what is required by PBP. The retention of vegetation within the site and access will need to be carefully weighed in the design process to minimise environmental impact while meeting the requirements of PBP. This will often require an iterative design process looking at a number of constraints for the site. It is likely, that the bushfire requirements at the site will clash with broader environmental outcomes that will need to be considered and balanced.

9.6. Slopes influencing bushfire

The 'effective slope' influencing fire behaviour approaching the sites has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the worst-case scenario slope where the vegetation occurs over a 100 m transect measured outwards from the development boundary or the existing/ proposed buildings.

The effective slopes for the site with the proposed subdivision layout are shown in **Figure 11**, and are a mixture of gentle upslopes, flat land and gentle downslopes of less than 5 degrees.

Figure 11: Slope and vegetation map

9.7. Asset Protection Zones

An APZ is a fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out.

An APZ is land that has vegetation removed or maintained to a level that limits the spread and impact of bushfire. This may include:

- developed land (residential, commercial, or industrial),
- permanent roads, bike paths, parking areas, golf course fairways, playgrounds, sports fields,
- vineyards, orchards, cultivated ornamental gardens and commercial nurseries,
- gardens and lawns within curtilage of buildings.

For new industrial/commercial subdivision there are no specific APZ requirements. However, the assessment at Planning Proposal stage can be guided by the radiant heat levels required for residential subdivision which require building envelopes for new lots below 29kW/m^2. As noted in section 8.2 of this report, these standards are not required for industrial/commercial development, however they are used as a proxy for this consideration of the suitability of the study area. These APZ can be considered a worst-case scenario requirement for analysis at the planning stage to help determine ultimate suitability of various sites. **Figure 12** depicts the impact of APZ on the study area using the residential standards. **Figure 12** is based on the assumption that all vegetation within the site will be managed as an APZ or will be removed. Retained vegetation will need to be reviewed and APZs buffered from these areas. Areas of retained vegetation within the site may need additional buffers if there is potential for road "pinch points" to be created which are impacted and may be cut by fire.

APZ must be practical to maintain ongoing and not clash with other values such as koala corridors or protection of particular threatened species. In the context of industrial/commercial development areas this is likely to mean the future APZ will be wholly provided for within a perimeter road reserve (including the carriageway and the future road verge to be managed by land owners and the Road Authority as suitable) and the front setbacks of future development lots. In practice, the outer edge of the future perimeter roads must be maintained by the roads authority, in this case WSC, with the expectation that the nature strip or verge will be maintained by future occupiers of the development lots.

Under S.63 (2) of the RF Act:

> *It is the duty of the owner or occupier of land to take the notified steps (if any) and any other practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of bush fires on or from, that land.*

Figure 12: Asset Protection Zones

9.8. Bushfire Attack Levels

The Bushfire Attack Levels (BAL) is a means of measuring the ability of a building to withstand attack from bushfire. The form of bushfire attack and the severity will vary according to the conditions (FDI, vegetation, slope and setback) on the site.

The BAL assesses 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 square metre, which is the basis for establishing the requirements for construction to improve protection of a building from potential attack by a bushfire, as defined in *Australian Standard AS 3959-2018 Construction of buildings in bushfire-prone areas* (AS 3959-2018).

The BAL ratings are used as the basis for establishing the requirements for construction to improve protection of a (proposed) building from potential bushfire attack. There are six BAL ratings in total: LOW, 12.5, 19, 29, 40 and FZ (see Appendix 2 for detail).

Figure 13 shows an indicative BAL assessment for the site based on the adjoining bushfire hazard to the development area.

9.9. Access

The objectives of PBP require all new development to:

> *Ensure that appropriate operational access and egress for emergency service personnel and occupants is available.*

The study area is well connected to the wider local and regional road network and therefore the provision of a suitable internal road network and perimeter road to the bushfire hazard will be able to meet the objectives. The provision of roads suitable for industrial/commercial purposes will ensure all relevant road standards in PBP can be met. The existing road network may be supplemented within the site. However, the adjoining road infrastructure is unlikely to change. The site itself, when developed will provide large buffers that provide refuge areas for occupants. Options are available to utilise the Hume Motorway and local roads to connect to larger centres such as Bargo that provide refuge areas.

Figure 13: Indicative Bushfire Attack Level (BAL) map

9.10. Water Supply & Utilities

The objectives of PBP require all new development to:

Ensure that utility services are adequate to meet the needs of firefighters..

Tables 5.3c and 5.3d of PBP (p. 47-48) detail the requirements for provision of water, electricity and gas services for residential development and provide performance criteria and acceptable solutions.

It is considered the provision of adequate water services and the location of electricity and gas supplies could be planned and managed to comply with PBP.

10. Constraints

The development constraints can generally be divided into two separate groups. The first group is referred to as site constraints and deals with the physical and legal characteristics of the site. The second group refers to design issues, which generally will be responding to the first group. As this report is looking at strategic planning issues and broader site development the specifics of future tenure and detailed design are not considered at this stage.

Major fires in the Sydney basin are driven by hot and dry winds from the west to northwest, with major flareups and damage associated with strong south to southwest wind changes. The potential for extreme bushfire weather driving large scale and intense bushfires into the local area is significant as evidenced by the Green Wattle Creek fire in 2019/20.

The key site constraint is substantial vegetation on adjoining and adjacent land creating a very high bushfire hazard to be managed around the study area. To the south and east of the site there are extensive tracts of public conservation lands that will be maintained as native vegetation into the future. These tracts of land allow the development of landscape scale fires of maximum intensity to potentially occur. The planning and design response to this vegetation is the key constraint to the study area, and this would require very extensive clearing in large extended areas to occur within the study area to have any chance of meeting the requirements of PBP.

The Biodiversity Technical Study has identified most of the site as having high ecological value with very limited opportunities to undertake the significant clearing needed to create large areas suitable for commercial/industrial development, including perimeter roads and APZ.

The use of perimeter roads and the provision of suitable separation from the bushfire hazard through APZ are the key planning and design methods to satisfy the requirements of Chapter 4 – Strategic Planning of PBP. The biodiversity constraints identified make it very unlikely that suitable perimeter roads of industrial / commercial standard, or suitable APZ can be established. The integration of these two technical study areas means, with respect to bushfire risk management, the site is unlikely to proceed further at planning proposal stage.

The study area topography combines with the vegetation to provide a significant bushfire risk and bushfire management issue. The consideration of bushfire within the strategic planning context will need to be worked through with the NSW RFS. The RFS have, since the introduction of the new strategic planning requirements within PBP, been cautious with Planning Proposals and development that seeks to introduce people to bushfire prone areas.

The site has potential to be impacted by bushfires igniting from any direction and is located on bushfire prone land with significant forest vegetation onsite and nearby. Bushfire intensity after ignition is related

to the combination of fuel, slope, Fire Danger Weather and the extent of bushfire prone vegetation allowing the fire to fully develop.

- There is little likelihood of the major bushland areas adjoining and nearby being rezoned or cleared and there are large areas of heavy fuel adjacent to the site.
- Whilst slopes are modest they are also related to local riparian areas which must be retained.
- The Fire Danger Weather used to assess development in the wider Sydney area is set at the maximum of 100 measured by the Forest Fire Danger Index.
- Large extents of bushland extend for kilometres to the northwest, west, south and east allowing landscape scale fires to develop from multiple directions.

The site is highly likely to be impacted by significant bushfires into the future.

The most important objective for the strategic planning stage is to identify whether new development is appropriate subject to the identified bush fire risk on a landscape scale. An assessment of proposed land uses and potential for development to impact on existing and proposed infrastructure is a key element of the strategic planning process in bush fire prone areas. Land use planning policies can be introduced to limit the number of people exposed to unacceptable risk and the RFS will seek to test these measures critically in any Planning Proposal. There is effectively a threshold test regarding the suitability of a sites' location in the landscape that must be considered in conjunction with site specific Bushfire Protection Measures such as the provision of perimeter roads, APZ and water supplies. This threshold test is outlined as Section 4.1 of Chapter 4 – Strategic Planning in PBP.

PBP (p. 34) provides a framework for the RFS not to support a Planning Proposal where:

- *Strategic planning should provide for the exclusion of inappropriate development in bush fire prone areas as follows:*
    - *the development area is exposed to a high bush fire risk and should be avoided;*
    - *the development is likely to be difficult to evacuate during a bush fire due to its siting in the landscape, access limitations, fire history and/or size and scale;*
    - *the development will adversely effect other bush fire protection strategies or place existing development at increased risk;*
    - *the development is within an area of high bush fire risk where density of existing development may cause evacuation issues for both existing and new occupants; and*
    - *the development has environmental constraints to the area which cannot be overcome.*

When assessed against this threshold test for locational suitability this site fails to achieve the threshold, for the following reasons:

- The development area is exposed to a very high bushfire risk, particularly from the very long bushland runs to the south and east capable of sustaining a landscape scale fire.
- The development is likely to be difficult to evacuate as Arina Road and the surrounding local road network are likely to be impacted by bushfire, and have the potential to be close for extended periods of time during a bushfire due to high fuel loads in and adjacent to the road reserve.
- The development may adversely affect other bushfire protection strategies as its location would require additional resources to defend.
- The development has environmental constraints identified in the Biodiversity Study that cannot be overcome.

The site is considered unsuitable for further development unless the majority of the site is cleared to create a large area that would serve as a place of safety for occupants and reduce the need for evacuation. Even under this circumstance it would provide an additional area that would require resourcing by emergency services during a significant bushfire.

The site is unsuitable for submission as a planning proposal, with respect to bushfire management, and is unlikely to receive the necessary support from the NSW RFS Commissioner.

The criteria for strategic suitability where a proposal site is shown to have met the threshold test of being suitable is outlined within PBP and are shown at **Figure 14**.

ISSUE	DETAIL	ASSESSMENT CONSIDERATIONS

Bush fire landscape assessment	A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	› The bush fire hazard in the surrounding area, including:
		  › Vegetation
		  › Topography
		  › Weather
		› The potential fire behaviour that might be generated based on the above;
		› Any history of bush fire in the area;
		› Potential fire runs into the site and the intensity of such fire runs; and
		› The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.

Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	› The risk profile of different areas of the development layout based on the above landscape study; › The proposed land use zones and permitted uses; › The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site); and › The impact of the siting of these uses on APZ provision.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	› The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile; › The location of key access routes and direction of travel; and › The potential for development to be isolated in the event of a bush fire.
Emergency services	An assessment of the future impact of new development on emergency services.	› Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/ brigades; and › Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.
Infrastructure	An assessment of the issues associated with infrastructure and utilities.	› The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants; and › Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.	› Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans.

Figure 14 Planning for Bushfire Protection Bushfire Strategic Study Requirements (source PBP p. 35)

11. Conclusion

The site is exposed to high bushfire risk and is likely to be difficult to evacuate during a bushfire due to location and the likely impact of bushfires on the local road network across large areas. Any bushfire impacting on the site is likely to have a major impact on the residential areas in and around Bargo and any additional development on the site is likely to add complication to managing both local and landscape scale fires.

There is a history of significant bushfires in the local area, most recently the Green Wattle Creek fire that came to approximately 5 kilometres of the site in the 19/20 fire season. There is also a significant history of fires in the National Park and catchment areas to the south and east.

As Bushfire Prone Land, the proposal is subject to the requirements of Section 9.1 of the *Environmental Planning and Assessment Act 1979* which requires Council to consult with the Commissioner of the NSW RFS and to consider any comments by the RFS Commissioner. Chapter 4 – Strategic Planning of the RFS document *Planning for Bushfire Protection 2019* specifically looks at the requirements to support the rezoning of land. For industrial development, the APZs are minimal and could result in buildings being within the Flame Zone.

When assessed against best practice bushfire risk management, the planning principles outlined in the *National Strategy for Disaster Resilience*, and against the detailed requirements of the NSW Planning system the site does not have suitable characteristics to justify further pursuing a planning proposal with respect to bushfire.

Based on an assessment of current and future bushfire impacts on this site, the site is not considered suitable for further investigation and is unlikely to be supported by the NSW Rural Fire Service Commissioner.

12. Recommendations

The following recommendation is provided:

Recommendation 1 –

The agreed revised study area is not considered suitable for a planning proposal to rezone for industrial / commercial uses and is unlikely to be supported by the NSW Rural Fire Service Commissioner.

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Appendix 1 References

Australian Building Codes Board 2014. *Performance Standard: The design and construction of private bushfire shelters*

NSW Rural Fire Service 2019. *Planning for Bushfire Protection: A guide for councils, planners, fire authorities and developers.* State of NSW.

Standards Australia. 2005. *Fire hydrant installations - System design, installation and commissioning*, AS 2419.1, Fourth edition 2005, SAI Global, Sydney

Standards Australia. 2008. *The storage and handling of LP Gas, AS/NZS 1596:2008, Fourth edition 2008*, SAI Global, Sydney.

Standards Australia. 2018. *Construction of buildings in bushfire-prone areas*, AS 3959-2018. SAI Global, Sydney.

Appendix 2 Overview of bushfire attack mechanisms

Bushfires have long remained a fundamental characteristic of the Australian bush landscape, and likewise Australians have long retained a strong affinity with bush environments. There remain a number of common factors which are associated with bushfire hazard and events and these include the incidence of fire weather, availability of fuel along with its type, structure and continuity or fragmentation, and the context of development at the bushland interface.

Bushfire attack refers to the various methods in which bushfire may impact upon life and property and principally encompass:

- Direct flame contact
- Ember attack
- Radiant heat flux
- Fire-driven wind
- Smoke

In the progression of a bushfire event, these methods interact either exclusively or in concert and are explained in the following section.

Direct flame contact

Direct flame attack refers to flame contact from the main fire front, where the flame which engulfs burning vegetation is one and the same as that which assumes contact with the building. It is the highest level of bushfire attack because of direct flame contact from the fire front in addition to heat flux and ember attack.

Ember attack

The convective forces of bushfire raise burning embers into the atmosphere on prevailing winds and deposit them to the ground ahead of the fire front. Typically, ember attack occurs approximately 30 minutes prior to the arrival of the fire front and continues during the impact of the fire front and for several hours afterwards, thus it is the longest lasting impact of bushfire attack.

Ember attack is attack by smoldering or flaming windborne debris that is capable of entering or accumulating around a building, and that may ignite the building or other combustible materials and debris.

In essence, building loss via ember attack relates largely to the vulnerabilities and peculiarities of each

building, its distance from hazardous vegetation and whether an occupant (or the like) is present to actively defend it. It is estimated by the CSIRO that approximately 80 to 90 per cent of buildings lost by bushfire are lost as a result of ember attack either in isolation or in combination with radiant heat impact.

Radiant heat flux

Exposure to radiant heat remains one of the leading causes of fatalities associated with bushfire events. Measured in kilowatts per square metre (kWm^2), radiant heat is the heat energy released from the fire front which radiates to the surrounding environment, deteriorating rapidly over distance.

In terms of impact on buildings, radiant heat can pre-heat materials making them more susceptible to ignition or can cause non-piloted ignition of certain materials if the energy transmitted reaches a threshold level. Radiant heat can also damage building materials such as window glazing, allowing openings into a building through which embers may enter. Radiant heat impact is an especially important factor in building-to-building ignition.

In terms of radiant heat exposure for humans, it can cause pain to unprotected skin in milder situations or life threatening and fatal injury in higher exposure thresholds. The effects of radiant heat are shown in **Table 3**.

Table 1 The effects of radiant heat (NSWRFS 2006; Drysdale, 1999; CFA, 2012)

Radiant heat flux kW/m²	Observed effect
1	Maximum for indefinite skin exposure
3	Hazardous conditions, firefighters expected to operate for a short period (10 minutes)
4.7	Extreme conditions, firefighters in protective clothing will feel pain after 60 seconds of exposure
6.4	Pain after 8 seconds of skin exposure
7	Likely to be fatal to unprotected person after exposure for several minutes
10	Critical conditions, firefighters not expected to operate in these conditions although they may be encountered. Considered to be life threatening in less than 60 seconds in protective equipment. Fabrics inside a building could ignite spontaneously with long exposure.
12.5 (BAL-12.5)	Volatiles from wood may be ignited by pilot after prolonged exposure. Standard float glass could fail during the passage of a bushfire.
16	Blistering of skin after 5 seconds
19 (BAL-19)	Screened float glass could fail during the passage of a bushfire.
29 (BAL-29)	Ignition of most timbers without piloted ignition (3 minutes of exposure) during the passage of a bushfire. Toughened glass could fail.
40+	Flame zone – exposure to direct flame contact from fire front.

Fire driven wind

The convective forces of bushfire typically result in strong to gale force fire-driven winds which in itself, can lead to building damage. The typical effects of fire driven wind include the conveyance of embers, damage from branches and debris hitting the building, as well as direct damage to vulnerable building components such as lifting roofs or roof materials and the damage / breakage of windows.

Smoke

Smoke emission remains a secondary effect of bushfire and is one which is typically not addressed by bushfire assessments. Irrespective, it is important to note the potentially severe impact of smoke emission on the human respiratory system. It can lead to difficulties in breathing, severe coughing, blurred or otherwise compromised vision, and can prove fatal. It is also important to note that toxic smoke can occur during bushfire, particularly where buildings or materials are ignited. With regard to evacuation, it can reduce visibility and create difficulties for particularly vulnerable persons.

Bushfire attack levels

The Bushfire Attack Levels (**BAL**) for the proposal site have been determined in accordance with PBP 2019 and the Australian Standards for *Construction of Buildings in Bushfire Prone Areas* (AS3959).

The BAL is a means of measuring the severity of a building's or sites potential exposure to ember attack, radiant heat and direct flame contact (see **Table 4**).

In the Building Code of Australia through AS3959, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements and to understand the radiant heat exposures for people in the open. The BAL output for the sites can be viewed with Table 3 for the effects of radiant heat. The BAL levels, the associated radiant heat flux and the predicted bushfire attack mechanisms from AS3959 are shown in **Table 4. Figure 11** shows the effects of the various forms of bushfire attack.

Table 2: Bushfire Attack Levels (source AS3959 p. 34)

Bushfire Attack Level	Radiant Heat Flux exposure	Description of predicted bushfire attack and levels of exposure
BAL - Low	NA	There is insufficient risk to warrant specific construction requirements
BAL – 12.5	<12.5kWm^2	Ember attack
BAL – 19	>12.5kWm^2 - <19kWm^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux
BAL – 29	>19kWm^2 - <29kWm^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux
BAL – 40	>29kWm^2 - <40kWm^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux with the increased likelihood of exposure to flames
BAL – Flame Zone	>40kWm^2	Direct exposure to flames from the fire front in addition to radiant heat flux and ember attack

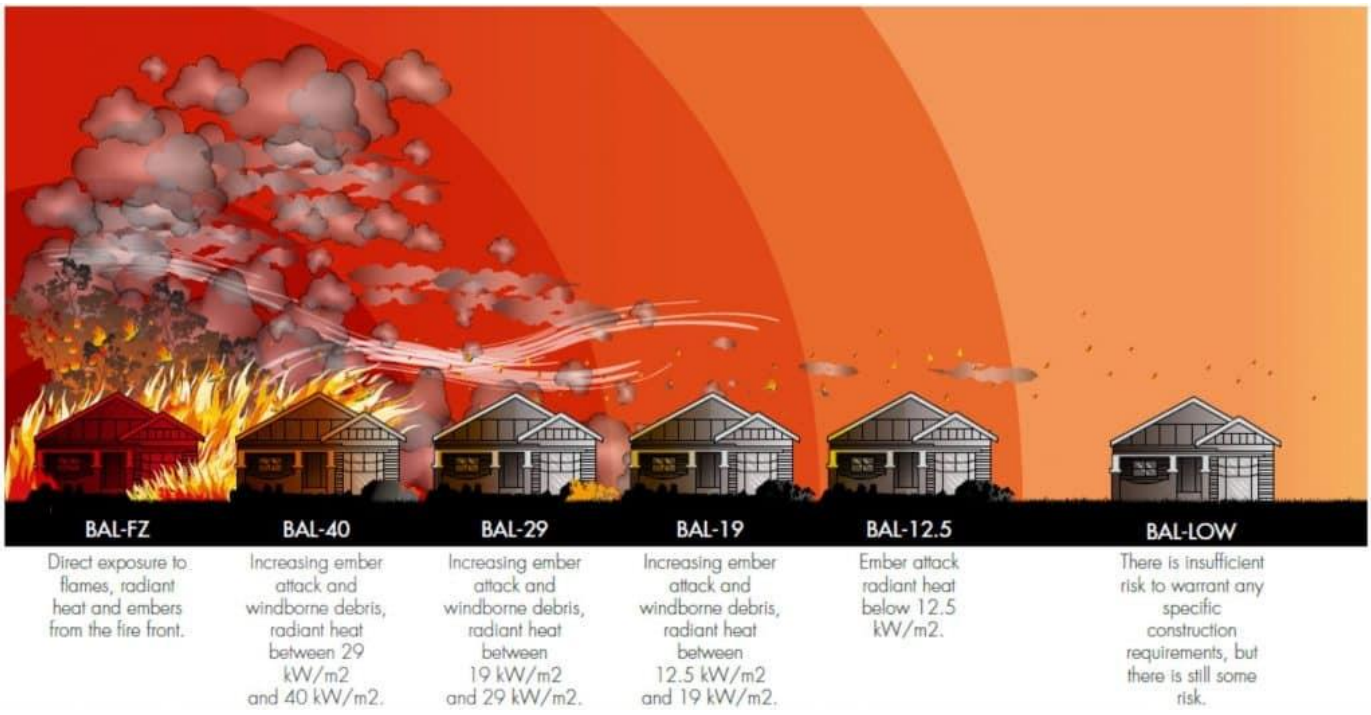

Figure 15: Forms of Bushfire Attack (source cfa.vic.gov.au)

Appendix 3 Asset Protection Zone Requirements

Source PBP 2019. P. 107

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

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

Grass

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

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.