

Bushfire Hazard Assessment

SSD – 10448 (MOD 3)

Aspect Industrial Estate

Erskine Park

Prepared for

Mirvac Industrial Developments Pty Ltd



Version 1.3

18 August 2022

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Site Details	Aspect Industrial Estate
Client Details:	Daniel Brook Senior Development Manager Mirvac Level 28, 200 George Street, SYDNEY, NSW 2000
BlackAsh Contact Details	
Corey Shackleton	Principal – Bushfire & Resilience
0418 412 118	corey.shackleton@blackash.com.au

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**Corey Shackleton / Principal Bushfire & Resilience**

Blackash Bushfire Consulting

B.Sc., Grad. Dip. (Design for Bushfire Prone Areas)

Fire Protection Association of Australia BPAD Level 3 – 34603

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1. Summary

Table 1 is a summary of compliance with relevant documents and approaches to limit bushfire attack and meet the requirements of the NSW planning framework for new development in Bushfire Prone Areas.

Table 1: Summary

Planning for Bushfire Protection 2019 Classification	"Other" commercial/ industrial
Location	788-882 Mamre Road, Kemps Creek
Local Government Area	Penrith City Council
Can this proposal comply with AS3959, 2018	AS3959, 2018 does not apply as a DTS Provision
Does this development comply with the requirements of <i>Planning for Bushfire Protection 2019</i>?	YES
Does this development comply with the Aims and objectives of <i>Planning for Bushfire Protection 2019</i>?	YES
Is referral to the NSW RFS required?	NO

Assessment Framework	<input checked="" type="checkbox"/> <i>Planning for Bushfire Protection 2019</i>
	<input type="checkbox"/> Meets the deemed to satisfy provisions
	<input checked="" type="checkbox"/> Alternate solution/ performance-based assessment

2. Introduction

Blackash Bushfire Consulting has been engaged by Mirvac to provide a Bushfire Hazard Assessment report to support an application for the Modification to the State Significant Development Approval for the staged development of land within the Western Sydney Employment Area (WSEA), known as the Aspect Industrial Estate (AIE).

Consent is being sought for Modification 3 (MOD 3) of the staged development of the land for warehousing and distribution uses. MOD 3 seeks to modify the approved concept masterplan and Stage 2 construction works to achieve tenant and operational requirements. It seeks consent for a range of changes to the internal layout and warehouse configuration

Industrial development such as the proposed AIE is designated as “other” development in PBP 2019. As “other” development, the proposed development has considerable flexibility and the nature of the development often results in the structures providing a higher degree of bushfire resistance that required by the NSW Rural Fire Service (NSW RFS). As “other” development, a key issue for the proposal will be meeting the aim and objectives of *Planning for Bushfire Protection*.

This report has been completed having regard to Secretary for Planning and Environment's (the Secretary) Environmental Assessment Requirements (SEARs) issued for the proposal on 30 April 2020. The SEARs specifically state (in terms of bushfire):

'If the development is on bush fire prone land, provide a bush fire assessment that details proposed bush fire protection measures and demonstrates compliance with Planning for Bush Fire Protection.'

The report also aims to ensure consistency (where appropriate) with the original Bushfire Protection Assessment prepared by Australian Bushfire Protection Planners Pty Ltd, dated 17 October 2019 and consideration to the advice provided by the NSW RFS on 8 January 2021.

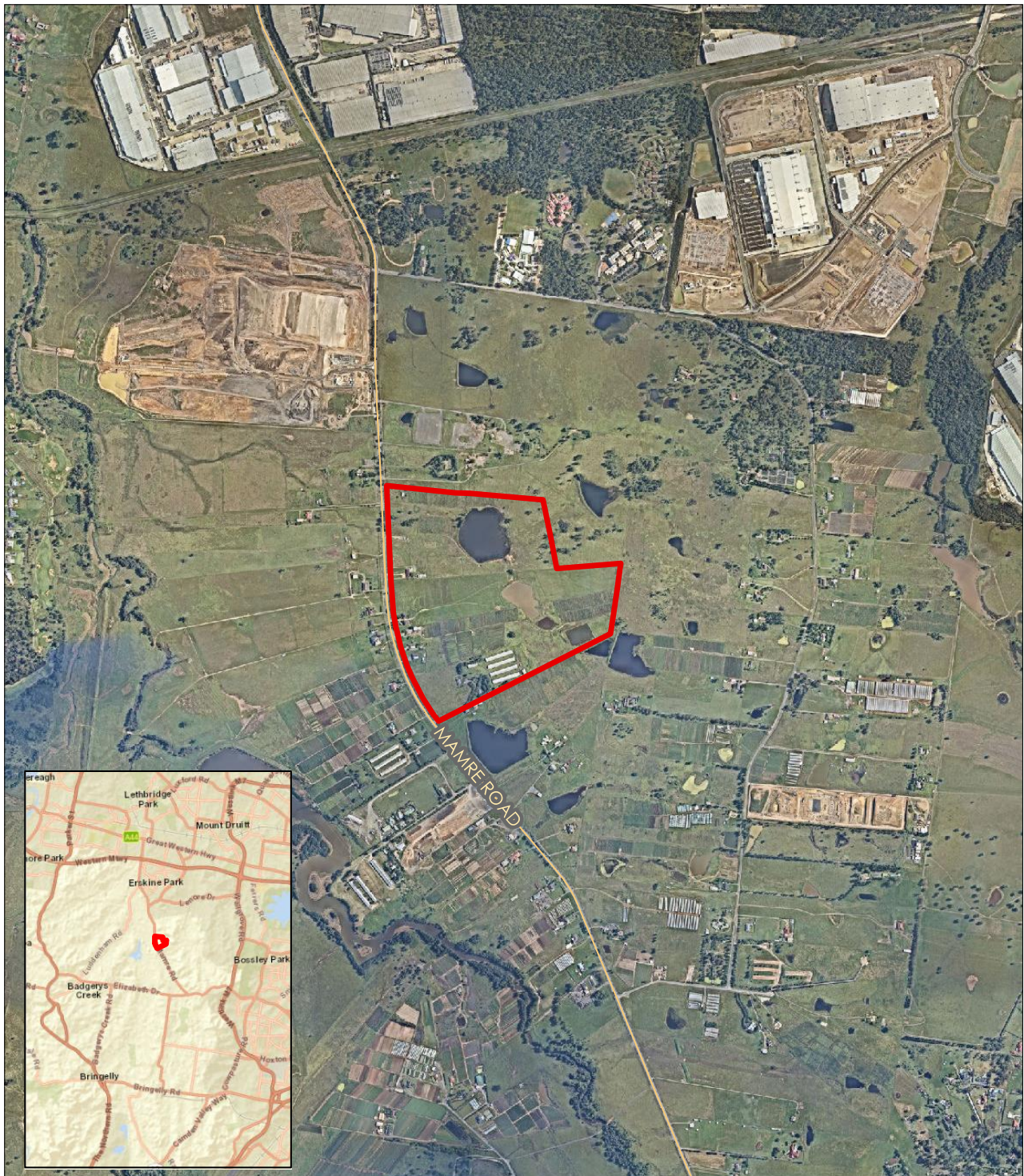
This assessment has been prepared by Corey Shackleton, Principal Bushfire & Resilience (FPAA BPAD Level 3 Certified Practitioner No. BPD-L3-34603) who is recognised by the NSW RFS as qualified in bushfire risk assessment and have been accredited by the Fire Protection Association of Australia as a suitably qualified consultant to undertake alternative solution proposals.

3. Site Context

The AIE is shown in Figure 1, located at 788-882 Mamre Road, Kemps Creek and legally described as Lots 1-5 in DP 1285305. The site has an area of approximately 55.8 hectares (ha) and a direct frontage to Mamre Road (refer to Figure 2 below). Most of the site is cleared with scattered vegetation and includes a series of farm dams.

The site is located within the suburb of Kemps Creek, which falls within the Penrith LGA. It is in the Mamre Road Precinct within the broader WSEA and is currently surrounded by rural land uses.

The site is bounded by Mamre Road to the west and agricultural uses to the north, south and east. The historic land uses on the site include rural residential, grazing, dairy farming, poultry farming and horticulture. This land is identified for future employment land, as this site and the broader Mamre Road Precinct has recently been rezoned to, primarily, IN1 General Industrial under the WSEA SEPP.



Legend

Subject Land



Date: 31/03/2022

0 250 500

Meters

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

Figure 1: Site Location

4. Legislative Framework

The proposed industrial development is designated as “other” development by the PBP 2006 and PBP 2019. The NSW RFS has reviewed PBP 2006 and now released a new document known as *Planning for Bushfire Protection 2019* (PBP 2019) and the NSW RFS has requested that all new proposals are assessed against PBP 2019.

The site is identified as ‘bushfire prone land’ (see Figure 2) for the purposes of Section 10.3 of the *Environmental Planning and Assessment Act, 1979* (EPA Act) and the legislative requirements for development on bushfire prone lands are applicable. All development on bushfire prone land must consider and comply with PBP 2019. However, industrial development has considerable flexibility and the nature of the development often results in the structures providing a higher degree of bushfire resistance than required by the NSW RFS.

As “other” development, the proposed industrial development and future development is addressed through demonstrating compliance with the aim and objectives of PBP.

Under the building classification system within the *National Construction Code* (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 bushfire specific performance requirements for these particular classes of building. As such the *Australian Standard for Construction of Buildings in Bushfire Prone Areas* (AS 3959) and the NASH Standard are not considered as a set of ‘deemed to satisfy’ provisions. However, compliance with AS 3959 and NASH should be considered when meeting the aims and objectives of PBP.

Whilst bushfire is not captured in the NCC for Class 5-8 buildings or storage of the pallets, PBP 2019 articulates the following objectives which will be applied in relation to access, water 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.

Because of their size, complexity, importance and/or potential impact, the Department of Planning, Industry and Environment (DPIE) is predominantly responsible for assessing development applications relating to State Significant Development. The Minister for Planning is the consent authority for SSD applications.

Applications designated as state significant projects are exempt from requiring a bushfire safety authority (BFSa). Given their scale however, the requirements of PBP should still be applied, and consultation with the NSW RFS has already occurred as part of the original SSD approval process.

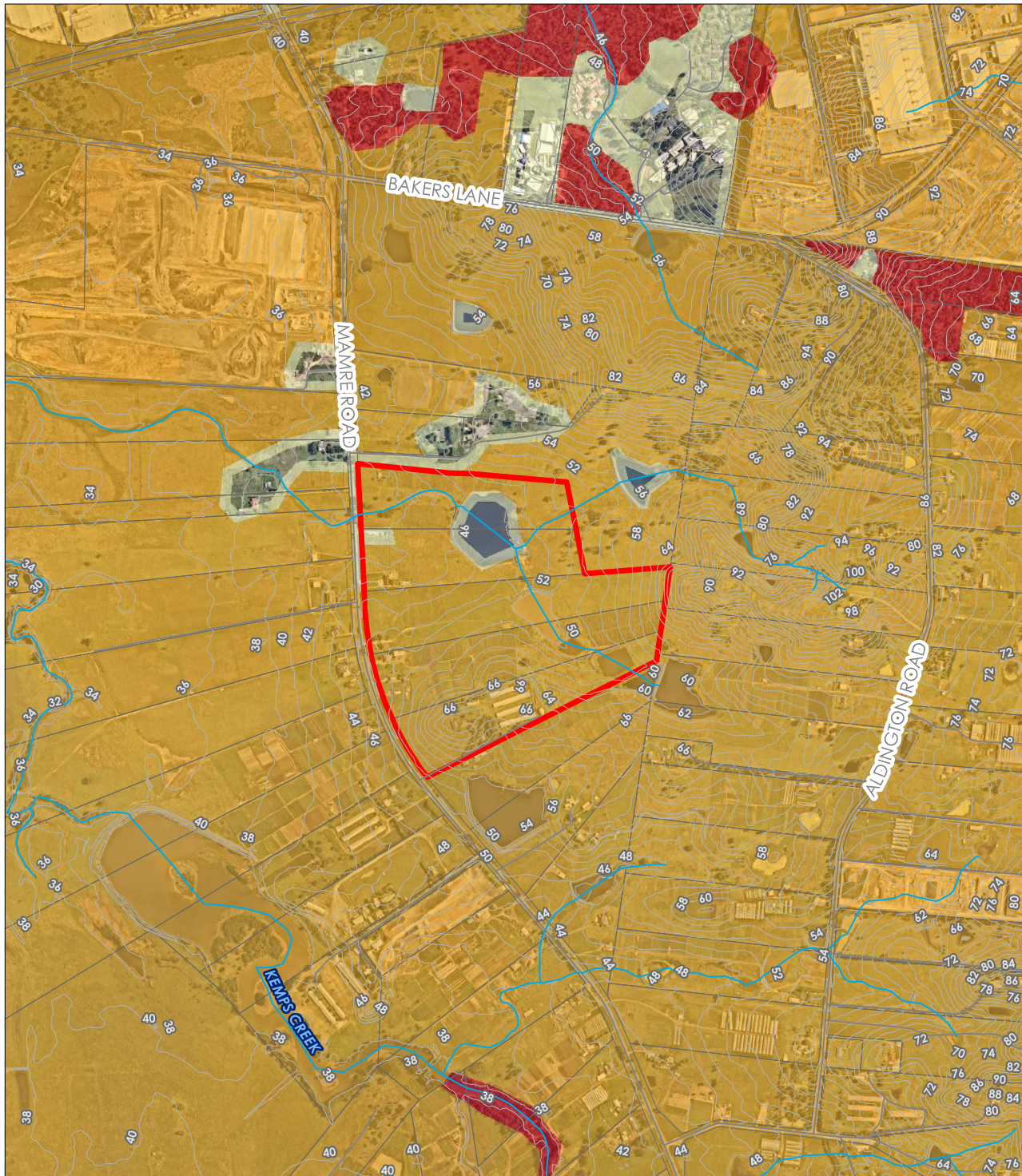
Even where comments are sought at the strategic planning stage, further development applications may need to be referred to the NSW RFS.

5. Bushfire Prone Land

Bushfire prone land maps provide a trigger for the development assessment provisions and consideration of sites that are bushfire prone.

Bushfire prone land (BFPL) is land that has been identified by council, which can support a bushfire or is subject to bushfire attack. Bushfire prone land maps are prepared by local council and certified by the Commissioner of the NSW RFS.

Figure 2 shows the Bushfire Prone Land Map for the site. The extract from the Penrith Bushfire Prone Map shows that the site and surrounds are all Category 2 Bushfire Prone Vegetation. There have been several new developments in the local area and generally the site and surrounds are rural residential, grazing, dairy farming, poultry farming and horticulture. The general area is considered a low bushfire risk.



Legend

- | | | | |
|--|--------------|----------------------------|-----------------------|
| | Contour - 2m | Bushfire Prone Land | |
| | Watercourse | | Vegetation Buffer |
| | Subject Land | | Vegetation Category 1 |
| | Cadastre | | Vegetation Category 2 |



Date: 31/03/2022

0 250 500

Meters

Coordinate System: GDA 1994 MGA Zone 56
Imagery: © Nearmap

Figure 2: Bushfire Prone Land

6. The Proposal

This proposal is to modify Development Consent SSD-10448 for the Aspect Industrial Estate at 788-882 Mamre Road, Kemps Creek (see Figure 3). The consent (SSD-10448) granted approval for:

- a concept plan for the staged development of an industrial estate with a total GFA of up to 284,917m² for industrial, warehouse and distribution centres, and café uses, and
- stage 1 development comprising site preparation works, vegetation clearing, realignment of the existing creek, construction of access road and eastern half of Mamre Road / Access Road 1 intersection works, construction fitout and operation of two warehouse buildings with ancillary offices, car parks, landscaping, signage and a café construction and operation of services and utilities, and subdivision of the site into three lots.

SSD 10488 Concept Modification

As part of the staged development of Aspect Industrial Estate, Mirvac is seeking approval for modification of the Concept Proposal and Stage 1 Development under SSD-10448 (MOD 3) and a new DA (SSD-46516461) for the Stage 2 Development of 'Warehouse 9'.

The proposed modification and SSD development application includes:

Concept Modification:

- Reconfiguration of the Estate layout south of Access Road 1 and west of Access Road 3 including:
 - Reduction in overall lot numbers across AIE from 11 to 9.
 - Relocation and shortening of Access Road 4.
 - Reconfiguration of warehouse lots 6-11 into lots 6-9.
 - New warehouse footprints including GFA of warehousing and office areas, car parking, estate landscaping.

Stage 1 Modification:

- Modification of the Stage 1 consent to provide for the following in respect of Access Road 4
 - updated road subdivision plan to provide for subdivision of Access Road 4
 - updated civil works package to facilitate construction of Access Road 4,
 - provision of landscaping works within road reserve of Access Road 4.

Stage 2 SSDA

- Construction of 'Warehouse 9' including:
 - Civil works including cut/fill and benching to set the Lot 9 pad levels.

- Construction of new 66,341sqm building for use as 'warehouse and distribution' to be built to a ridge height of 14.6m. This will comprise:
 - 64,725sqm Warehouse.
 - 140sqm Dock Office at the north elevation.
 - 126sqm Dock Office at the south elevation.
 - 1,350sqm Main Office at the eastern elevation.
 - 266 parking spaces across the lot's north and eastern frontages and hardstand areas.
 - Internal truck access roads with access from Access Road 3 to the east and egress to Access Road 4 to the north.
 - Loading dock areas at the north and south elevations.
- Fit out of the warehouse for the proposed use.
- Construction of vehicular crossovers to Access Road 4 (egress) and Access Road 3 (ingress).
- On lot landscaping.
- On lot stormwater management.
- Operation of the warehouse and distribution facility 24 hours a day, 7 days a week.

mrvac



Figure 3: Aspect Industrial Estate approved Concept Layout.

mirvac



Figure 4: Proposed MOD 3 Concept Layout.



Figure 5: Proposed staging plan.

7. Site Assessment Methodology

The Bushfire Assessment Report is based on a desktop assessment of the site utilising the following resources:

- *Planning for Bushfire Protection* (NSW RFS, 2019);
- Aerial mapping;
- Site Inspection; and
- Detailed GIS analysis.

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

7.1. Bushfire Hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as Asset Protection Zone (APZ) locations and dimensions and future building levels.

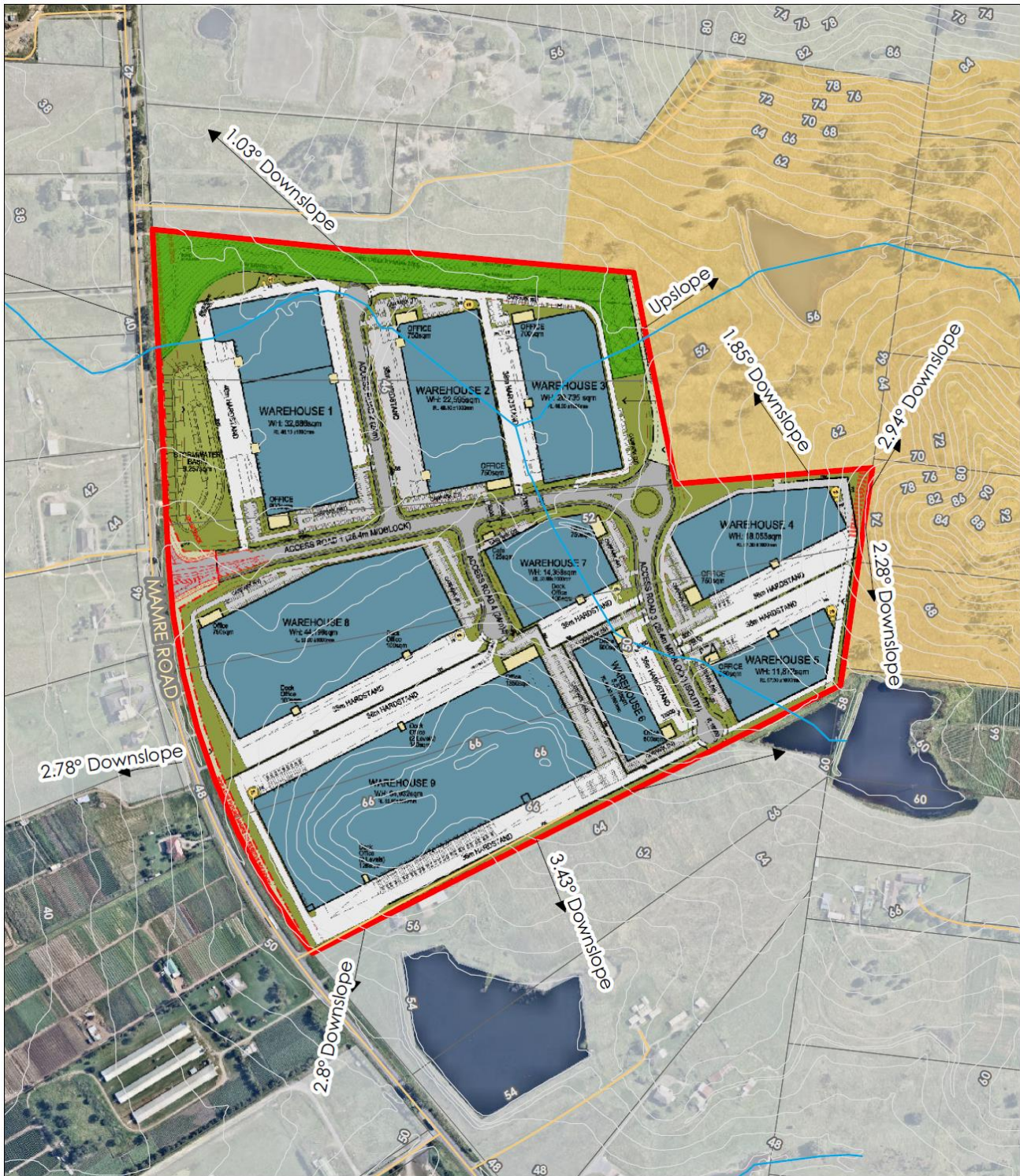
The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site and which determine the planning and building response of PBP 2019.

7.2. Vegetation

Predominant Vegetation is classified by structure or formation using the system adopted by Keith (2004) and by the general description using PBP 2019. Vegetation types give rise to radiant heat and fire behaviour characteristics.

The predominant vegetation is determined over a distance of at least 140 metres in all directions from the proposed site boundary or building footprint on the development site. Where a mix of vegetation types exist, the type providing the greater hazard is said to predominate.

The land around the site is identified as bushfire prone land (see Figure 2) and is made up of a mixture of grassland to the east and rural residential, grazing, dairy farming, poultry farming and horticulture to the south, west and north (see Figure 6). A narrow (30-40m wide) riparian corridor is proposed to be established along the northern boundary of the site. This will be revegetated in accordance with the Vegetation Management Plan (VMP) and consist of River-flat Eucalypt Forest, which for the purposes of David Keith, is a Coastal Floodplain Forest.



Legend

- | | | | |
|--|--------------|-----------------------------|-------------------------------------|
| | Contour - 2m | Vegetation Formation | |
| | Watercourse | | Isolated River-flat Eucalypt Forest |
| | Subject Land | | Grassland |
| | Cadastre | | Managed Land |



Date: 18/08/2022

0 100 200

Meters

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

Figure 6: Vegetation and Slope

7.3. Slopes Influencing Bushfire Behavior

The 'effective slope' influencing fire behaviour approaching the sites has been assessed in accordance with the methodology specified within PBP 2019. This is conducted by measuring the worst-case scenario slope where the vegetation occurs over a 100 metre transect measured outwards from the development boundary or the existing/ proposed buildings.

The slopes within and adjoining the site are mild and generally fall downslope from the site (Figure 6).

7.4. 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 sites have a Fire Danger Index (FDI) of 100 as per PBP 2019.

7.5. Asset Protection Zones

An Asset Protection Zone (APZ) is a buffer zone between a bushfire hazard and buildings. The APZ is managed progressively to minimise fuel loads and reduce potential radiant heat levels, flame, smoke and ember attack. The appropriate APZ distance is based on vegetation type, slope and the nature of the development.

The APZ can include roads or properties managed to be consistent with APZ standards set out in NSW RFS document *Standards for Asset Protection Zones*. The APZ provides a fuel-reduced, physical separation between buildings and bush fire hazards is a key element in the suite of bush fire measures and dictates the type of construction necessary to mitigate bushfire attack.

PBP 2019 requires APZs for commercial and industrial development to provide a defensible space and minimises material ignition.

The site will be managed and maintained to prevent the spread of a bushfire towards the building and to prevent the spread of fire onto or from the site in accordance with section 63 of the *Rural Fires Act, 1997* (RF Act). The areas around the buildings is cleared and maintained to mineral earth or non-combustible surfaces and is not a fire hazard.

The tables below (Tables 2 - 6) provide a summary of the APZ and Figure 7 depicts the APZ proposed across the site. The layout proposed through MOD 3 provides APZ consistent with the original bushfire report and advice by the NSW RFS.

Table 2: APZ Assessment – Warehouses 1 & 2.

Direction	Slope	Vegetation	Flame Zone Width	APZ Proposed
North	2° Downslope	Coastal Floodplain Forest	5 metres*	>12 metres
East	NA	No hazard	NA	NA
South	NA	No hazard	NA	NA
West	NA	No hazard	NA	NA

*Note: See detailed modelling results in Appendix 2.

Table 3: APZ Assessment – Warehouse 3.

Direction	Slope	Vegetation	Flame Zone Width	APZ Proposed
North	2° Downslope	Coastal Floodplain Forest	5 metres*	10 metres
East	2° Downslope	Coastal Floodplain Forest	5 metres*	10 metres
South	NA	No hazard	NA	NA
West	NA	No hazard	NA	NA

*Note: See detailed modelling results in Appendix 2.

Table 4: APZ Assessment – Warehouse 4.

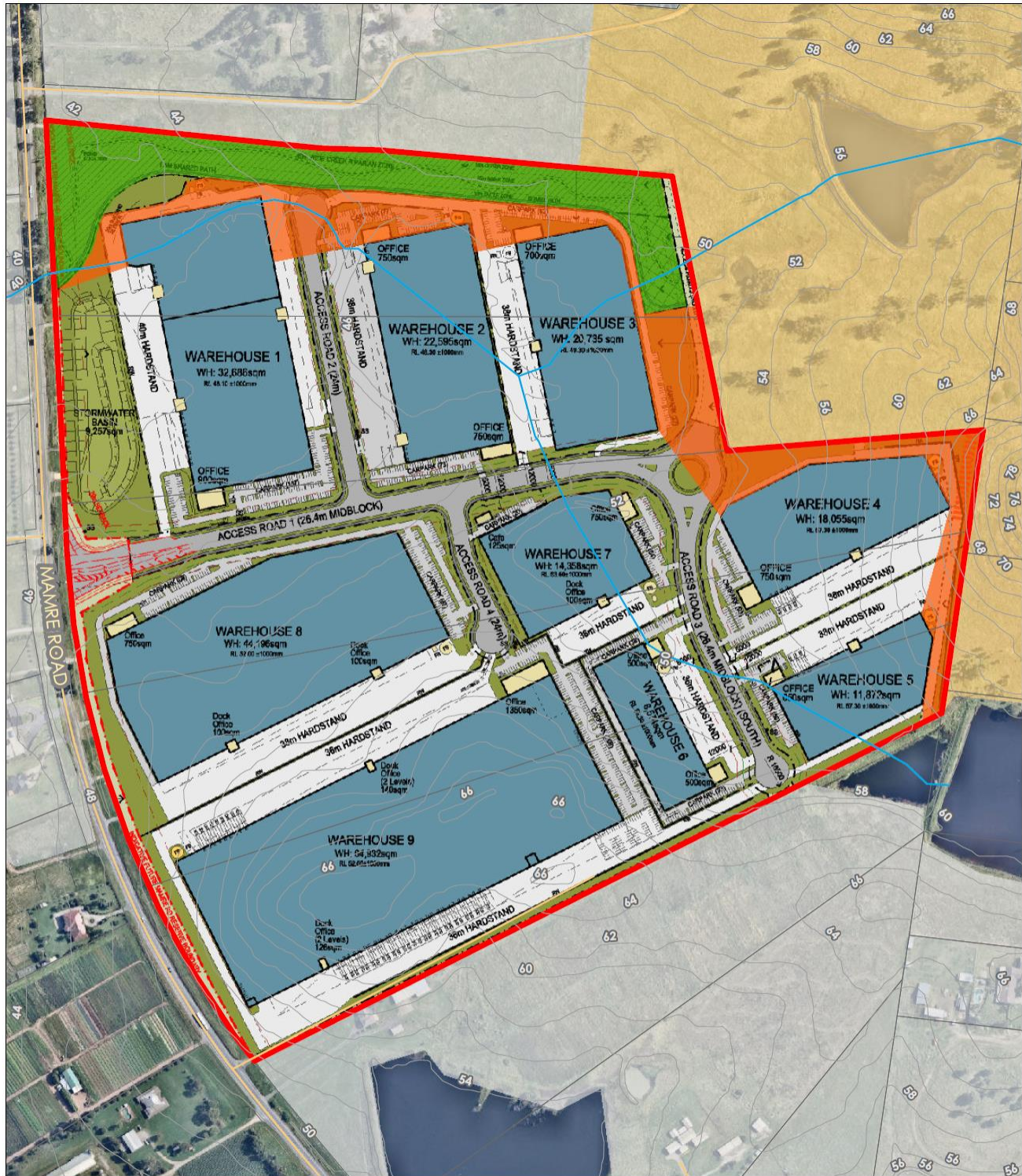
Direction	Slope	Vegetation	Flame Zone Width	APZ Proposed
North	0-5° Downslope	Grassland	9 metres	>10 metres
East	0-5° Downslope	Grassland	9 metres	>10 metres
South	NA	No hazard	NA	NA
West	NA	No hazard	NA	NA

Table 5: APZ Assessment – Warehouse 5.

Direction	Slope	Vegetation	Flame Zone Width	APZ Proposed
North	NA	No hazard	NA	NA
East	0-5° Downslope	Grassland	9 metres	>10 metres
South	NA	No hazard	NA	NA
West	NA	No hazard	NA	NA

Table 6: APZ Assessment – Warehouses 6-9.

Direction	Slope	Vegetation	Flame Zone Width	APZ Proposed
North	NA	No hazard	NA	NA
East	NA	No hazard	NA	NA
South	NA	No hazard	NA	NA
West	NA	No hazard	NA	NA



Legend

- Contour - 2m
- Watercourse
- Subject Land
- Cadastre

Vegetation Formation

- Isolated River-flat Eucalypt Forest
- Grassland
- Managed Land

- Asset Protection Zone



Date: 18/08/2022

0 100 200

Meters

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

Figure 7: Asset Protection Zones

7.6. Bushfire Attack Levels

The Bushfire Attack Level (BAL) is a means of measuring the severity of a buildings or sites potential exposure to ember attack, radiant heat and direct flame contact. In the Building Code of Australia, the BAL is used as the basis for establishing the requirements for residential construction to improve protection of building elements.

The Bushfire Attack Levels to the site has been completed from a combination of the PBP 2019 Table A1.12.5 (Table 7) and site-specific radiant heat modelling. The BAL for the site is shown in Figure 7.

As "Other" development, the development must comply with objective 3 of PBP 2019 which requires that the development:

3. Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent the likely fire spread to buildings.

Asset Protection Zones (see section 7.5) will be provided around the development that will include perimeter roads and hardstand areas. The buildings will be constructed to meet the relevant requirements of AS3959-2018 as identified in PBP 2019 and through the radiant heat modelling consistent with the methodology in PBP 2019.

Table 7: Bushfire Attack Levels (source PBP 2019 Table A1.12.5).

KEITH VEGETATION FORMATION		BUSH FIRE ATTACK LEVEL (BAL)				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) asset to predominant vegetation class				
ALL UPSLOPE AND FLAT LAND	Rainforest	< 8	8 -< 11	11 -< 16	16 -< 23	23 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 18	18 -< 24	24 -< 33	33 -< 45	45 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 7	7 -< 10	10 -< 14	14 -< 21	21 -< 100
	Tall Heath	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Short Heath	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 6	6 -< 9	9 -< 14	14 -< 100
	Freshwater Wetlands	< 4	4 -< 5	5 -< 7	7 -< 11	11 -< 100
	Grassland	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 50
> 0 > 5 DEGREES - DOWNSLOPE	Rainforest	< 11	11 -< 14	14 -< 21	21 -< 29	29 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 22	22 -< 29	29 -< 40	40 -< 54	54 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 100
	Tall Heath	< 13	13 -< 18	18 -< 26	26 -< 36	36 -< 100
	Short Heath	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Freshwater Wetlands	< 4	4 -< 6	6 -< 8	8 -< 12	12 -< 100
	Grassland	< 9	9 -< 12	12 -< 17	17 -< 25	25 -< 50

The tables below (Tables 8 - 12) provide a summary of the Bushfire Attack Levels while Figure 7 depicts the BAL requirements across the site.

Table 8: Bushfire Attack Levels – Warehouses 1 & 2.

Direction	Slope	Vegetation	APZ Proposed	Bushfire Attack Level
North	2° Downslope	Coastal Floodplain Forest	>12 metres	See Figure 8*
East	NA	No hazard	NA	See Figure 8*
South	NA	No hazard	NA	See Figure 8*
West	NA	No hazard	NA	See Figure 8*

*Note: The extent of the BAL for the building is depicted in detail in Figure 8.

Table 9: Bushfire Attack Levels – Warehouse 3.

Direction	Slope	Vegetation	APZ Proposed	Bushfire Attack Level
North	2° Downslope	Coastal Floodplain Forest	10 metres	See Figure 8*
East	2° Downslope	Coastal Floodplain Forest	10 metres	See Figure 8*
South	NA	No hazard	NA	See Figure 8*
West	NA	No hazard	NA	See Figure 8*

Note: The extent of the BAL for the building is depicted in detail in Figure 8.

Table 10: Bushfire Attack Levels – Warehouse 4.

Direction	Slope	Vegetation	APZ Proposed	Bushfire Attack Level
North	0-5° Downslope	Grassland	>10 metres	See Figure 8*
East	0-5° Downslope	Grassland	>10 metres	See Figure 8*
South	NA	No hazard	NA	See Figure 8*
West	NA	No hazard	NA	See Figure 8*

Note: The extent of the BAL for the building is depicted in detail in Figure 8.

Table 11: Bushfire Attack Levels – Warehouse 5.

Direction	Slope	Vegetation	APZ Proposed	Bushfire Attack Level
North	NA	No hazard	NA	See Figure 8*
East	0-5° Downslope	Grassland	>10 metres	See Figure 8*
South	NA	No hazard	NA	See Figure 8*
West	NA	No hazard	NA	See Figure 8*

Note: The extent of the BAL for the building is depicted in detail in Figure 8.

Table 12: Bushfire Attack Levels – Warehouses 6-9.

Direction	Slope	Vegetation	APZ Proposed	Bushfire Attack Level
North	NA	No hazard	NA	No Requirements
East	NA	No hazard	NA	No Requirements
South	NA	No hazard	NA	No Requirements
West	NA	No hazard	NA	No Requirements

7.6.1. Radiant Heat Modelling

Detailed radiant heat modelling has been undertaken for the northern elevation of warehouse buildings 1 and 3 due to unique short fire run characteristics. Table 13 below is a summary of the key inputs, while the detailed outputs can be found in Appendix 2.

The riparian corridor is generally 40 metres wide and contains a variety of revegetation, pathways and ponds. However, for the purposes of the SFR modelling, a 50 metre fire run and an assumption that the area is completely revegetated as Coastal Floodplain Forest has been used to create a level of conservatism in the design.

Table 13: Radiant heat modelling inputs.

Direction	Slope	Vegetation	Short Fire Run	Comments
North	2°	Coastal Floodplain Forest	50 metres	See Appendix 2 for modelling results

7.6.2. Application of AS3959 (2018)

Construction must comply with the corresponding Bushfire Attack Level (BAL) as shown in Figure 8.

The application of each BAL is as defined on Figure 8 and not broadly applied across the entire elevation/building. The construction must comply with corresponding sections of the Australian Standard AS3959-2018 Construction of buildings in bush fire-prone areas or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas – 2014* as appropriate, and Section 7.5 of *Planning for Bush Fire Protection 2019*.

The construction for the remainder of the proposed buildings not denoted with a BAL in Figure 8 is greater than 100 metres from any bushfire hazard. Consistent with AS3959 and PBP 2019, construction greater than 100 metres from a bushfire hazard is classified as BAL-Low. AS3959 describes BAL-Low as:

'There is insufficient risk to warrant specific construction requirements'.

Therefore, the construction for the remainder of the proposed building not denoted with a BAL in Figure 8, is appropriately BAL-Low.

The construction of the buildings in this manner complies with *Planning for Bush Fire Protection 2019* and the *National Construction Code (NCC)*.

While in AS3959 certain elements of BAL-12.5 may be required to be constructed entirely of non-combustible materials, PBP 2019 does not have any requirements for buildings in BAL-12.5 to be constructed entirely with non-combustible materials, nor does AS3959 and/or the NASH Standard. In this regard, additional construction requirements, beyond AS3959 are unnecessary.

8. Water Supply and Utilities

PBP 2019 (p. 47) requires that adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

Suitable water supply arrangements will be provided for firefighting that meet the NSW RFS requirements. A reticulated water supply for potable water supply and fire hydrants will be extended into the site. The fire-fighting water supply to the new buildings shall comply with the Building Code of Australia [BCA] and A.S. 2419.1 – 2005.

9. Access

PBP 2019 requires that the design of access roads enables safe access and egress for people attempting to leave the area while emergency service personnel are arriving to undertake firefighting operations.

Figure 4 shows the proposed MOD 3 Masterplan including the proposed access within the site.

The AIE has been designed to integrate with the regional road network planned for the Mamre Road Precinct. Access to the site will be directly off Mamre Road, which four internal estate roads providing circulation throughout the development. The concept plan identifies future connection points north and south of the precinct, which facilitates broader road connections across the Mamre Road Precinct.

The proposed internal access roads will be constructed to provide heavy rigid and articulated vehicle access to each of the proposed buildings. This internal road network provides suitable access for fire-fighting appliances like NSW RFS Category 1 Tankers and Fire & Rescue NSW Composite and Aerial Appliances.

Given the comprehensive nature of the road design, access complies with the requirements of PBP 2019.

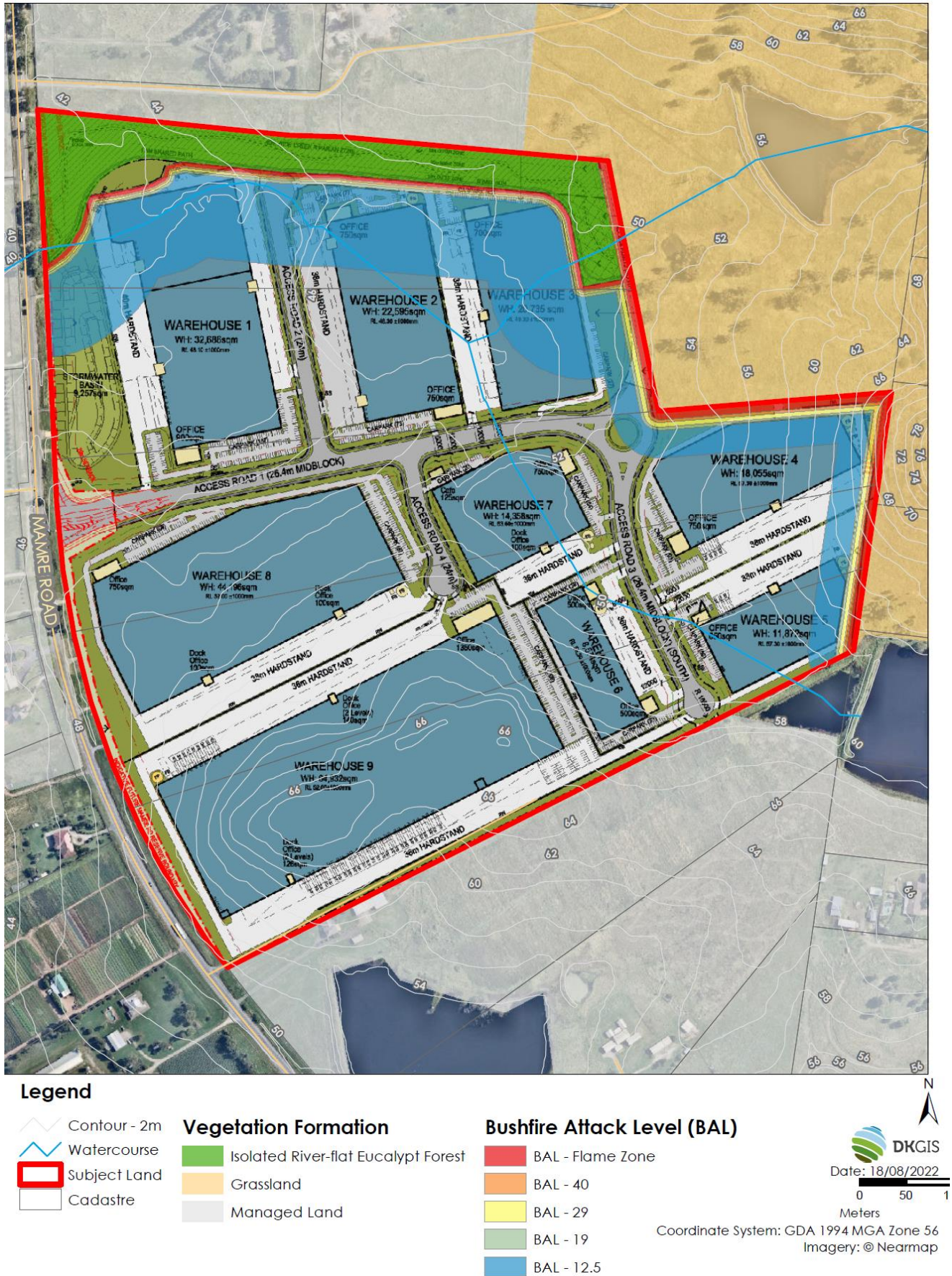


Figure 8: Bushfire Attack Levels

10. Landscaping

Given the low bushfire risk associated with the site and the inherent building resilience (non-combustible, internal sprinklers, etc), the proposed landscaping as shown in the *Aspect Industrial Estate, Mamre Rd, Kemps Creek Landscape Masterplan MOD2*, prepared by Site Image, dated June 2022, is consistent with the intent of PBP 2019.

11. Assessment Against the Aim and Objective of PBP

All development in Bushfire Prone Areas needs to comply with the aim and objectives of PBP. Table 14 shows the compliance with PBP.

Table 14: Compliance with Aim & Objectives of PBP 2019.

Aim	Meets Criteria	Comment
The aim of PBP is to use the NSW development assessment system to provide for the protection of human life (including fire fighters) and to minimise impacts on property from the threat of bushfire, while having due regard to development potential, onsite amenity and the protection of the environment.	Yes	Landscaping, defensible space, access and egress, emergency risk management and construction standards are in accordance with the requirements of PBP and the aims of PBP have been achieved.
Objectives	Meets Criteria	Comment
Afford occupants of any building adequate protection from exposure to a bushfire.	Yes	The development provides opportunity for all occupants to be shielded from any external bushfire. Construction material will comply with the relevant AS3959 requirements.
Provide for a defensible space to be located around buildings.	Yes	Defensible space is provided on all sides of the proposed buildings.
Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent the likely fire spread to buildings.	Yes	The structures are separated from the remnant vegetation areas and provide APZs and commensurate construction in accordance with AS3959.
Ensure that safe operational access and egress for emergency service personnel and occupants is available.	Yes	The site has direct access to public roads, and access and egress for emergency vehicles and evacuation is adequate. A perimeter road is provided around the buildings. The development provides for the movement of heavy articulated trucks about the site.
Provide for ongoing management and maintenance of bushfire protection measures.	Yes	The site will be managed by Mirvac including all APZ and landscaping in accordance with PBP.
Ensure that utility services are adequate to meet the needs of firefighters.	Yes	Utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).

The suite of bushfire protection measures provided for the proposed development satisfies the objectives for buildings of Class 5-8 under the NCC as identified in section 8.3.1 and 8.3.10 of PBP 2019.

12. Recommendations

The following recommendations are made to ensure the Aspect Industrial Estate is provided with adequate bushfire protection in accordance with PBP:

Recommendation 1: At the commencement of building works and in perpetuity, an Asset Protection Zone shall be established and maintained as per Figure 7. The APZ shall be established and maintained as an inner protection area as outlined within *Planning for Bushfire Protection 2019* and the NSW RFS document '*Standards for Asset Protection Zones*'.

Recommendation 2: Fire hydrants are provided in accordance with Building Code of Australia E1.3, AS2419.1:2005.

Recommendation 3: Buildings are constructed in accordance *Australian Standard AS 3959-2009 Construction of buildings in bushfire-prone areas (AS 3959-2018)* to the extent identified in Figure 8.

Recommendation 4: Landscaping to the site is required to comply with the *Aspect Industrial Estate, Mamre Rd, Kemps Creek Landscape Masterplan MOD2*, prepared by Site Image, dated June 2022.

13. Conclusion

Blackash Bushfire Consulting have completed a Bushfire Hazard Assessment Report for the industrial development known as the Aspect Industrial Estate. The Application is for the modification (MOD 3) of the previously approved SSD-10448 and will be submitted to the Department of Planning, Industry and Environment for determination.

The MOD 3 proposal seeks to modify the existing approval for the staged development of the AIE facilitated via a staged SSDA process. The Department of Planning and Environment Secretary's Environmental Assessment Requirements have been assessed and the proposed modification complies with the requirements of PBP 2019 and is considered generally consistent with the previous bushfire report, prepared by Australian Bushfire Protection Planners Pty Ltd, dated 17 October 2019.

The proposed development is industrial development and considered as "other" development in Planning for Bushfire Protection 2019 and complies with the aim and objectives of that document. This report demonstrates that the proposed development satisfies the requirements of Section 8.3.1 and 8.3.10 of *Planning for Bush Fire Protection 2019*.

This Report is a Bush Fire Hazard Assessment that provides the required information to assist the DPIE and demonstrates compliance with the relevant requirements of *Planning for Bushfire Protection 2019*.



Corey Shackleton | Principal Bushfire & Resilience
Blackash Bushfire Consulting
B.Sc., Grad. Dip. (Design for Bushfire Prone Areas)
Fire Protection Association of Australia BPAD Level 3 - 34603



Appendix 1 References

Australian Building Codes Board Building Code of Australia Volumes 1&2

Councils of Standards Australia AS3959 (2018) – Australian Standard Construction of buildings in bushfire-prone areas

Keith, David (2004) – Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT. The Department of Environment and Climate Change

NSW Rural Fire Service (2015) Guide for Bushfire Prone Land Mapping

NSW Rural Fire Service (NSW RFS). 2006. Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners. Australian Government Publishing Service, Canberra

NSW Rural Fire Service (NSW RFS). 2019. Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.

NSW Government (1979) Environmental Planning and Assessment Act 1979. NSW Government Printer.

Appendix 2: Radiant Heat Modelling Outputs (BAL Mapping)

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics: Aspect Industrial Estate

Common and bushfire behaviour contributor inputs:

Predominant vegetation: Coastal Floodplain Forests - 8.2 & 15.1 - Low - 0m - < 0.9m

Surface & Elevated Fuel Load: 8.2 tph Overall fuel load: 15.1 tph

Average Canopy Height: 20 Metres Fire weather district: 100 FDI

Average elevated fuel height: 0.9 Metres Flame temperature: 1090 Kelvin

Distance to vegetation: 5 Metres Target elevation of receiver: 3 Metres

Effective slope: 2 Degrees Ambient temperature: 308 Kelvin

Site slope: 0 Degrees SFR fire run length: 50 Metres

IF nominal head width: Metres

Outputs - Fully Developed Fire (FDF)

Wind Speed: 45 kph

Default elevation of receiver: 4.577 Metres

FDF Flame Angle: 35 Degrees

FDF Flame Length: 9.15 Metres

FDF Intensity: 8813 kW/m

FDF FROS: 1.1296 kph

FDF Flame transmissivity: 0.8993 kW/m

FDF View Factor: 0.8986

Outputs - Developing Fire Run (DFR)

Wind speed: 30 kph

Default elevation of receiver: 2.767 Metres

SFR Flame Angle: 61 Degrees

SFR Flame Height: 5.533 Metres

SFR Intensity: 4786 kW/m

SFR FROS: 1.1296 kph

SFR Flame transmissivity: 0.8889 kW/m

SFR View Factor: 0.5270

Calculated SFR Head Width: 18.302 Metres

SFR fire run length: 50 Metres

Approx. SFR travel time: 20:15 min/sec

SFR Radiant Heat: 35.62 kW/m²

☐ Input cells ☐ Locked output cells

Glossary of abbreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m² = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV = Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Warehouse 1 & 3 (North) – BAL-40

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics: Aspect Industrial Estate

Common and bushfire behaviour contributor inputs:

Predominant vegetation: Coastal Floodplain Forests - 8.2 & 15.1 - Low - 0m - < 0.9m

Surface & Elevated Fuel Load: 8.2 tph Overall fuel load: 15.1 tph

Average Canopy Height: 20 Metres Fire weather district: 100 FDI

Average elevated fuel height: 0.9 Metres Flame temperature: 1090 Kelvin

Distance to vegetation: 7 Metres Target elevation of receiver: 3 Metres

Effective slope: 2 Degrees Ambient temperature: 308 Kelvin

Site slope: 0 Degrees SFR fire run length: 50 Metres

IF nominal head width: Metres

Outputs - Fully Developed Fire (FDF)

Wind Speed: 45 kph

Default elevation of receiver: 4.577 Metres

FDF Flame Angle: 46 Degrees

FDF Flame Length: 9.15 Metres

FDF Intensity: 8813 kW/m

FDF FROS: 1.1296 kph

FDF Flame transmissivity: 0.8882 kW/m

FDF View Factor: 0.6508

Outputs - Developing Fire Run (DFR)

Wind speed: 30 kph

Default elevation of receiver: 2.767 Metres

SFR Flame Angle: 65 Degrees

SFR Flame Height: 5.533 Metres

SFR Intensity: 4786 kW/m

SFR FROS: 1.1296 kph

SFR Flame transmissivity: 0.8800 kW/m

SFR View Factor: 0.3615

Calculated SFR Head Width: 18.302 Metres

SFR fire run length: 50 Metres

Approx. SFR travel time: 20:15 min/sec

SFR Radiant Heat: 24.19 kW/m²

☐ Input cells ☐ Locked output cells

Glossary of abbreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m² = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV = Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Warehouse 1 & 3 (North) – BAL-29

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics: Aspect Industrial Estate

Common and bushfire behaviour contributor inputs:

Predominant vegetation: Coastal Floodplain Forests - 8.2 & 15.1 - Low - 0m - < 0.9m

Surface & Elevated Fuel Load: 8.2 tph Overall fuel load: 15.1 tph

Average Canopy Height: 20 Metres Fire weather district: 100 FDI

Average elevated fuel height: 0.9 Metres Flame temperature: 1090 Kelvin

Distance to vegetation: 9 Metres Target elevation of receiver: 3 Metres

Effective slope: 2 Degrees Ambient temperature: 308 Kelvin

Site slope: 0 Degrees SFR fire run length: 50 Metres

IF nominal head width: Metres

Outputs - Fully Developed Fire (FDF)

Wind Speed: 45 kph

Default elevation of receiver: 4.577 Metres

FDF Flame Angle: 56 Degrees

FDF Flame Length: 9.15 Metres

FDF Intensity: 8813 kW/m

FDF FROS: 1.1296 kph

FDF Flame transmissivity: 0.8775 kW/m

FDF View Factor: 0.5008

Outputs - Developing Fire Run (DFR)

Wind speed: 30 kph

Default elevation of receiver: 2.767 Metres

SFR Flame Angle: 68 Degrees

SFR Flame Height: 5.533 Metres

SFR Intensity: 4786 kW/m

SFR FROS: 1.1296 kph

SFR Flame transmissivity: 0.8716 kW/m

SFR View Factor: 0.2410

Calculated SFR Head Width: 18.302 Metres

SFR fire run length: 50 Metres

Approx. SFR travel time: 20:15 min/sec

SFR Radiant Heat: 17.30 kW/m²

☐ Input cells ☐ Locked output cells

Glossary of abbreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m² = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV = Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Warehouse 1 & 3 (North) – BAL-19

Forest/Woodland - FDF & SFR Calculation page:

Fire run specifics: Aspect Industrial Estate

Common and bushfire behaviour contributor inputs:

Predominant vegetation: Coastal Floodplain Forests - 8.2 & 15.1 - Low - 0m - < 0.9m

Surface & Elevated Fuel Load: 8.2 tph Overall fuel load: 15.1 tph

Average Canopy Height: 20 Metres Fire weather district: 100 FDI

Average elevated fuel height: 0.9 Metres Flame temperature: 1090 Kelvin

Distance to vegetation: 12 Metres Target elevation of receiver: 3 Metres

Effective slope: 2 Degrees Ambient temperature: 308 Kelvin

Site slope: 0 Degrees SFR fire run length: 50 Metres

IF nominal head width: Metres

Outputs - Fully Developed Fire (FDF)

Wind Speed: 45 kph

Default elevation of receiver: 4.577 Metres

FDF Flame Angle: 65 Degrees

FDF Flame Length: 9.15 Metres

FDF Intensity: 8813 kW/m

FDF FROS: 1.1296 kph

FDF Flame transmissivity: 0.8637 kW/m

FDF View Factor: 0.3743

Outputs - Developing Fire Run (DFR)

Wind speed: 30 kph

Default elevation of receiver: 2.767 Metres

SFR Flame Angle: 71 Degrees

SFR Flame Height: 5.533 Metres

SFR Intensity: 4786 kW/m

SFR FROS: 1.1296 kph

SFR Flame transmissivity: 0.8600 kW/m

SFR View Factor: 0.1713

Calculated SFR Head Width: 18.302 Metres

SFR fire run length: 50 Metres

Approx. SFR travel time: 20:15 min/sec

SFR Radiant Heat: 11.20 kW/m²

☐ Input cells ☐ Locked output cells

Glossary of abbreviations/terms:

tph = tonnes per hectare
kW/m = Kilowatts per metre
kW/m² = Kilowatts per metre squared
HFD = Horizontal Flame Depth
LRV = Low Risk Vegetation

m/h = metres per hour
FROS = Forward rate of Spread
kph = kilometres an hour
FF = Flank Fire
SFR = Short Fire Run

K = Kelvin
min = minutes
sec = seconds
min/sec = minutes and seconds

Warehouse 1 & 3 (North) – BAL-12.5