TRAVERS BUSHFIRE & ECOLOGY

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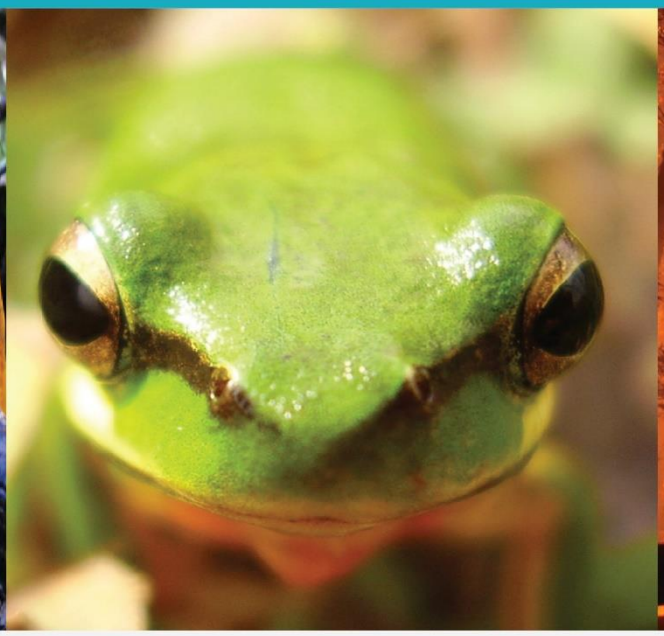


BUSHFIRE PROTECTION ASSESSMENT

Dexus Business Park

Lot 31, DP 262886

311 South Street

Marsden Park

Under Section 4.14 of the EP&A Act 1979

4 May 2022

(REF: 19DEX04.5)

BUSHFIRE PROTECTION ASSESSMENT

Dexus Business Park

Lot 311, DP 262886 South Street , Marsden Park

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File:	19DEX04.5

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Disclaimer:

This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person, including the client, then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be relied upon as meaning it reflects any advice by this firm. The report does not suggest or guarantee that a bush or grass fire will not occur and or impact the development. This report advises on policies and specifications published by the NSW Rural Fire Service e.g. Planning for Bush Fire Protection 2019.

The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

EXECUTIVE SUMMARY

This bushfire protection assessment has been undertaken for the proposed Dexus Business Park within Lot 31 DP 262886, 311 South Street, Marsden Park.

The proposed Dexus Business Park is considered a 'Class 5 - 8' structure in accordance with the National Construction Code (NCC). It is categorised by the NSW Rural Fire Service (NSW RFS) planning policy document *Planning for Bush Fire Protection* (PBP) as 'other non-residential development', and more specifically 'commercial and industrial development'.

For this type of development, the NSW RFS requires that development applications should satisfy the aims and objectives of PBP, propose an appropriate combination of bushfire protection measures and provide evidence that the intent of each measure can be satisfied.

This assessment has found that bushfire can potentially affect the proposed development from Grassy Woodland to the South west, resulting in future buildings being exposed to potential radiant heat and ember attack.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures;

- Building construction in accordance with the requirements for BAL-29
- Asset Protection Zones (APZ) for all National Construction Code (NCC) class 5-8 buildings commensurate with the above construction standards, as determined in accordance with Table A1.12.2 of *PBP 2019*,
- Provision of access in accordance with the acceptable solutions for residential infill development outlined in *PBP 2019*;
- Water, electricity and gas supply in compliance with the acceptable solutions for residential infill development outlined in *PBP 2019*.
- Preparation of a Bush Fire Emergency Management and Evacuation Plan.

GLOSSARY OF TERMS

AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
AS1596	*Australian Standard – The storage and handling of LP Gas*
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2018*
BAL	*bushfire attack level*
BCA	*Building Code of Australia*
BSA	bushfire safety authority
DA	development application
DLUP	Development Land Use Plan
EEC	Endangered ecological community
EP&A Act	*Environmental Planning & Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
FFDI	forest fire danger index
IPA	inner protection area
LEP	Local Environmental Plan
LGA	local government area
m	metres
NCC	*National Construction Code*
OPA	outer protection area
PBP 2019	*Planning for Bush Fire Protection 2019*
RF Act	*Rural Fires Act 1997*
RFS	NSW Rural Fire Service
SFR	short fire run
SFPP	special fire protection purpose
TBE	*Travers bushfire & ecology*

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1. INTRODUCTION

Travers bushfire & ecology has been engaged to undertake a bushfire protection assessment for the proposed Dexus Business Park within Lot 31 DP 262886, 311 South Street, Marsden Park. The proposed development is identified as bushfire prone on the *Blacktown City Council* bushfire prone land map (refer Figure 1-1). This triggers a formal assessment by Council in respect of the NSW Rural Fire Service (RFS) policy against the provisions of *Planning for Bush Fire Protection (PBP).*

Figure 1-1 – Bushfire Prone Land Map
(source: Planning Portal, 2021)

1.1 Aims of the assessment

The aims of the bushfire protection assessment are to:

- review the bushfire threat to the landscape
- undertake a bushfire attack assessment in accordance with *PBP*
- propose a suitable package of bushfire protection measures commensurate with the level of risk to the development
- assess the degree to which the proposed package of bushfire protection measures meets the aim and objectives of *PBP* and any relevant performance criteria

1.2 Proposed development

The development sits within the Marsden Park Precinct, a setting of new development of both residential and commercial (refer figure 1-3). The proposed development will consist of two (2) warehouse and centre buildings with associated road network, hardstand areas and carparking. The site will also encompass two (2) bioretention basins and site landscaping. See figure 1-2 for site plan of the proposed development.

Figure 1-2 – Site Plan

(source: Watson young. Dwg. ref – 21259 – MP01 – A, dated 28/03/2022)

1.3 Information collation

Information sources reviewed for the preparation of this report include the following:

- Planning material supplied by *Watson Young. Dwg. ref ¯ 21259 – MP01 – A, dated 28/03/2022.*
- *NearMap* aerial photography
- Topographical maps DLPI of NSW 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas (2018)*
- *Planning for Bush Fire Protection 2019 (PBP)*

An inspection of the proposed development site and surrounds was undertaken by Heath Fitzsimmons on 22/04/2021 to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bushfire measures and a visual appraisal of bushfire hazard and risk were also undertaken.

1.4 Site description

The proposed Dexus Business Park is located within 311 South Street, Marsden Park and includes Lot 31 DP 262886.

The development site is located within the local government area (LGA) of Blacktown City Council. It sits east of Shanes Park and south of the new residential development of Melonba, off South Street. The development sits within the Marsden Park Precinct, a setting of new development of both residential and commercial (refer Figure 1-32). The proposed development will consist of two (2) warehouse and centre buildings with associated road network, hardstand areas and carpark. The site will also encompass two (2) bioretention basins and site landscaping.

Figure 1-3 – Aerial appraisal
(source: NearMap, 2021)

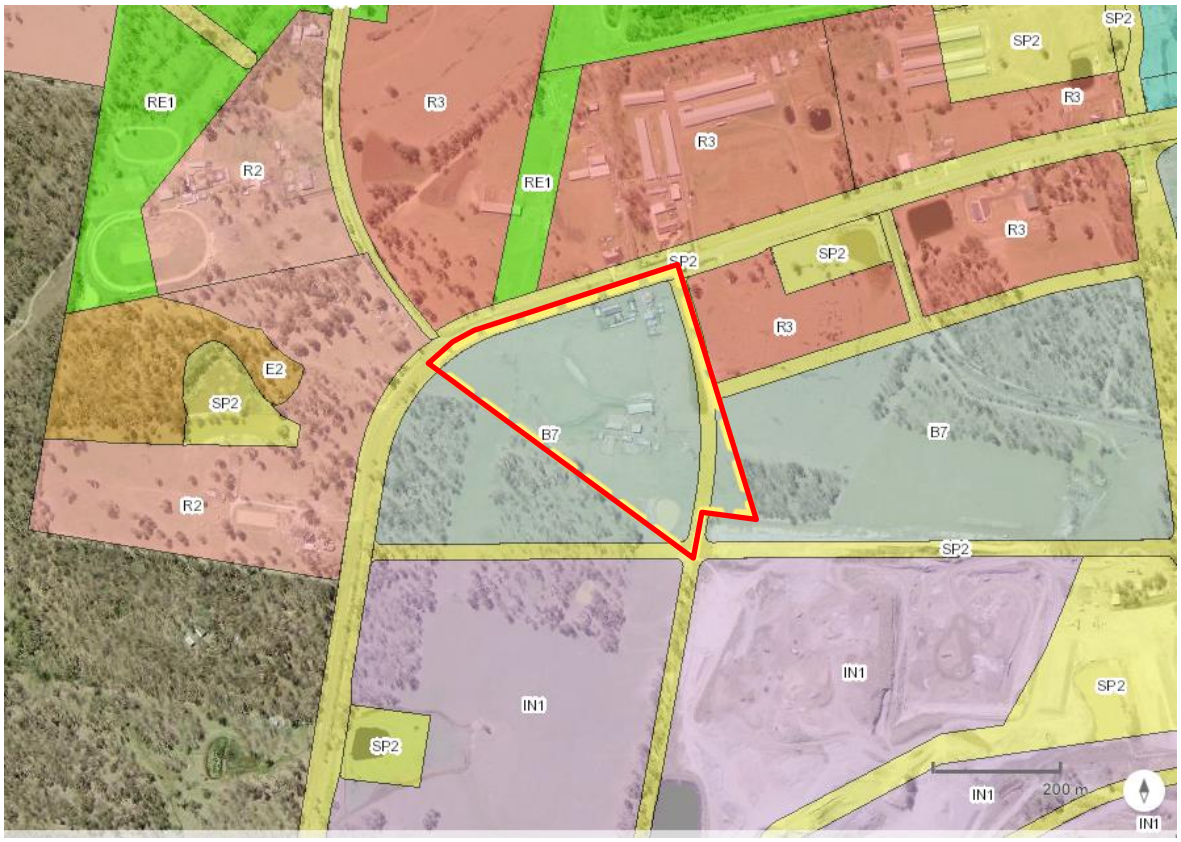


Figure 1-4 - Land Use Zoning

(source: Planning Portal, 2021)

1.5 Legislation and planning instruments

Is the site mapped as bushfire prone?	Yes
Proposed development type	Other development, buildings of Class 5-8 under the NCC, commercial and industrial development.
Is the development considered integrated for the purposes of Section 100B of the *Rural Fires Act 1997?*	No
Is the proposal located in an Urban Release Area as defined under Clause 273 of the EP&A Regulations?	No
Zoning	B7 - Business Park SP2 - Infrastructure
Significant environmental features	None
Details of any Aboriginal heritage	2 Aboriginal sites recorded near the subject location (50m buffer) (AHIMS ID 641846) – See Appendix 2
Does the proposal rely on an alternative solution?	No

1.5.1 Cultural Heritage

A search of the Aboriginal Heritage Information Management System (AHIMS) was performed on 25 November 2021. The search (Appendix 2) showed two records of an Aboriginal Site located within 50m of the subject site. It is understood an investigation has previously been undertaken by *Travers Bushfire and Ecology,* the results of which are outlined in the report '19DEX04.3 – Aboriginal AHIMS and European Heritage search for 311 South Street, Marsden Park.' Any recommendations from this report should be implemented prior to the commencement of construction or bulk earth works.

1.5.2 Significant Environmental Features

The NSW Government SEED portal (SEED) was viewed on the 25th November 2021. Layers for Koala sightings, threatened species and Endangered Ecological Communities (EEC) were applied. No threatened species were noted or Koalas spotted. Although an EEC was identified to the South West of site - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion. As this falls outside the project boundary no requirements are triggered.

1.5.3 National Construction Code (NCC) and the Australian Standard AS3959

The *NCC* is given effect through the *EP&A Act* and forms part of the regulatory environment of construction standards and building controls. The *NCC* outlines objectives, functional statements, performance requirements and deemed to satisfy provisions.

In NSW, the construction of buildings in bushfire prone areas relates to Classes 1, 2, 3, 4 and Class 9 buildings that are a special fire protection purpose (SFPP) or a Class 10a building or deck associated with the aforementioned building classes. The design and construction manual for the deemed to satisfy requirements is the Australian Standard *Construction of buildings in bushfire-prone areas 2009 (AS3959).* These classes of buildings must therefore be constructed in accordance with *AS3959.*

The *NCC* does not provide for any bushfire specific performance requirements for commercial and industrial buildings (Classes 5-8) and, as such, *AS3959* does not apply as a set of deemed to satisfy provisions. However, compliance with AS3959 and the NASH Standard must be considered when meeting the aims and objectives of PBP.

1.5.4 Planning for Bush Fire Protection 2019 (PBP)

PBP outlines the bushfire protection measures required to be assessed for new development in bushfire prone areas. For building identified of Class 5 to 8 under the NCC 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.

In accordance with section 8.3.10 of *PBP* a suitable package of bushfire protection measures should be proposed commensurate with the level of risk to the development. The provisions of Chapter 7 of *PBP* should be used as a base for the development of this package of measures.

2. BUSHFIRE THREAT ASSESSMENT

To assess the bushfire threat and to determine the required width of an Asset Protection Zone (APZ) for a development, an assessment of the potential hazardous vegetation and the effective slope within the vegetation is required. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation.

An APZ is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

2.1 Hazardous fuels

PBP guidelines require the identification of vegetation formation in accordance with David Keith (2004) if using the simplified acceptable solutions in *PBP 2019*, or alternatively the vegetation class if adopting the comprehensive vegetation fuel loads (as allowable when undertaking an assessment under Method 2 of AS3959). The hazardous vegetation is assessed for a distance of at least 140m from a proposed building envelope. The results of this assessment are detailed in the Schedule 1.

Mapped vegetation within 140m of the proposed building footprint includes, grassy woodland to the south/ south west which are mapped as category 1 on the bushfire prone land map and grassland to the north west, north east and east.

2.2 Effective Slope

The effective slope (post earthworks) has been assessed for up to 100m from the development site. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined. The effective slope is described within Table 2-1.

2.3 Bushfire attack assessment

The following assessment has determined the APZ and BAL levels via the following approaches;

- Table A1.12.2 & A1.12.5 of *PBP 2019*;
- Appendix B Method 2 (alternative solution) of *AS3959 Construction of buildings in bushfire prone areas* (2009).

BAL is a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. It's measured in increments of radiant heat (expressed in kilowatts/m2).

A forest fire danger index (FFDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Sydney Region. Table 2-1 provides a summary of the bushfire attack assessment and the resulting minimum APZ distance specified for residential subdivision. (required to be used as a base for commercial development in accordance with section 8.3.10 of *PBP 2019)*. Figure 2.1 displays the APZ's and their location.

Table 2-1 – Bushfire attack assessment

Aspect	Vegetation Formation	Effective Slope	Minimum APZ required	APZ provided	BAL Rating
North	Grassland	0-5° Downslope	9m	12m (South Street)	9-<12m (BAL-40) 12-<17m (BAL-29) 17-<25m (BAL-19) 25-<50m (BAL-12.5)
East	Grassland	0-5° Downslope	9m	12m (includes unnamed road)	
South-east	Grassland	Upslope	8m	10m	8-<10m (BAL-40) 10-<15m (BAL-29) 15-<22m (BAL-19) 22-<50m (BAL-12.5)
South-west	Grassland	0-5° Downslope	9m	11.12m* (refer Note 1)	9-<12m (BAL-40) 12-<17m (BAL-29) 17-<25m (BAL-19) 25-<50m (BAL-12.5)
	Woodland (grassy)	2° Downslope	12m (refer Note 1)	11.12m*	12-<16m (BAL-40) 16-<23m (BAL-29) 23-<32m (BAL-19) 32-<100m (BAL-12.5)

Note 1: Adopting a performance-based solution can result if a further reduction of the APZ. For example, the construction of a 1.8m high non-combustible fence (i.e. colourbond fence) along the south-western boundary of the site will result in a minimum APZ requirement of 11.12m along with a reduction in BAL rating to BAL 29 as depicted in the results below.

Calculated May 5, 2021, 9:11 am (RHBc v.1.4)

South-west

Radiant Heat Barrier calculator - AS3959-2018			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	1.37 km/h
Vegetation classification	Woodland	Flame length	11.12 m
Understorey fuel load	10 t/ha	Flame angle	60 °
Total fuel load	18.07 t/ha	Panel height	9.630000000000001 m
Vegetation height	n/a	Elevation of receiver	4.81 m
Effective slope	2 °	Effective barrier height	1.8 m
Site slope	0 °	Fire intensity	12,861 kW/m
Distance to vegetation	11.12 m	Transmissivity	0.87
Flame width	100 m	Viewfactor	0.499
Windspeed	n/a	Radiant heat flux	33.01 kW/m²
Heat of combustion	18,600 kJ/kg	Viewfactor of barrier	0.0674
Flame temperature	1,090 K	Adjusted viewfactor	0.4315
Actual barrier height	1.8 m	Adjusted radiant heat flux	28.55 kW/m²
		Bushfire Attack Level	BAL-29

Figure 2-1– Grassland north of subject site

Figure 2-2– Managed land (top) and grassland (bottom) east of subject site

Figure 2-3– Grassland and small patch of remnant woodland south of subject site

Figure 2-4 – Grassland and woodland south-west of subject site

3. SPECIFIC PROTECTION ISSUES

The intent of bushfire protection measures for commercial development is to minimise the risk of bush fire attack and provide protection for emergency services personnel, residents and others assisting firefighting activities.

In accordance with section 8.3.10 of *PBP* a suitable package of bushfire protection measures should be proposed commensurate with the level of risk to the development, with the provisions of Chapter 7 (Residential Infill Development) of *PBP* are used as a base for the development of this package of measures.

This section outlines the proposed package of bushfire protection measures and where possible assesses their compliance with the relevant performance criteria by comparison to the acceptable solutions for residential infill development.

Where issues listed for the specific development purpose have no specific performance criteria the proposed performance solutions are assessed by comparison to the relevant Australian Standards.

3.1 Asset protection zones (APZs)

Table 3.1 outlines the proposed performance solution and compliance with the performance criteria for APZs.

Table 3-1 – Performance criteria for asset protection zones (PBP 2019 guidelines pg. 65)

Performance criteria	***Solution***	***Compliance***		***Comment***
		Acceptable solution	***Performance criteria***	
APZs are provided commensurate with the construction of the building; and a defendable space is provided. ***See Note 1***	An APZ is proposed for all Class 5-8 buildings and any Class 10 buildings within 6m of a Class 5-8 building, as depicted at SCHEDULE 1. APZ distances determined in accordance with Table A1.12.5 in Appendix 1 of *PBP 2019*.	▪	☑	Complies, APZ provided with use of a radiant heat barrier.
APZs are managed and maintained to prevent the spread of a fire to the building.	APZs to be managed in accordance with the requirements of Appendix 4 of *PBP*.	☑	▪	

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
The APZ is provided in perpetuity. APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	APZs are wholly within the boundaries of the development site. APZ are located on lands with a slope less than 18 degrees.	☑	▪	

3.2 Access for firefighting operations

Table 3-2 outlines the proposed performance solution and compliance with the performance criteria for access.

Table 3-2 – Performance criteria for access (PBP 2019 Guidelines pg. 66)

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	Property access roads are two-wheel drive, all weather roads.	☑	▪	Complies
The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.	☑	▪	Can be made a condition of consent.
There is appropriate access to water supply.	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005;	☑	▪	Can be made a condition of consent.

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
Firefighting vehicles can access the building/s and exit the property safely.	At least one alternative property access road is provided for buildings or groups of buildings that are located more than 200 metres from a public through road. The property will have four access points once it is developed in line with the neighbouring properties.	☑	▪	Complies
	Access roads have a minimum 4m carriageway width;	☑	▪	Complies
	Access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay;	☑	▪	Roads will have a minimum 6m trafficable width.
	A minimum vertical clearance of 4m is maintained to any overhanging obstructions, including tree branches;	☑	▪	Can be made a condition of consent.
	Internal roads are through-roads, and large hard-stand areas provide suitable turning areas exceeding the requirements of Appendix 3 of PBP 2019;	☑	▪	Complies

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
	Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	☑	☑	Complies
	The minimum distance between inner and outer curves is 6m;	☑	☑	Complies
	The crossfall is not more than 10 degrees;	☑	☑	Complies
	Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.	☑	☑	Complies

3.3 Water supplies

Table 3-3 outlines the proposed performance solution and compliance with the performance criteria for water supply.

Table 3-3 – Performance criteria for water supplies (PBP guidelines pg. 67)

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
Adequate water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available.	☑	▪	Complies

Performance criteria	*Solution*	*Compliance*		*Comment*
		Acceptable solution	*Performance criteria*	
Water supplies are located at regular intervals, and The water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2017; Hydrants are not located within any road carriageway; and Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	☑	▪	Can be made a condition of consent.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of *AS 2419.1:2017.*	☑	▪	Can be made a condition of consent.
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps. Above ground water storage tank shall be of concrete or metal	☑	▪	Can be made a condition of consent.
A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	N/A – reticulated water is provided	N/A	N/A	

3.4 Electricity services

Table 3-4 outlines the proposed performance solution and compliance with the performance criteria for electricity services.

Table 3-4 – performance criteria for electricity services (PBP guidelines pg. 68)

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	☑	▪	
	Where overhead electrical transmission lines are proposed: Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and No part of a tree is closer to a power line than the distance set out in ISSC3 Guideline for Managing Vegetation Near Power Lines.	☑	▪	Can be made a condition of consent.

3.5 Gas services

Table 3-5 outlines the proposed performance solution and compliance with the performance criteria for gas supply.

Table 3-5 – Performance criteria for gas supplies (PBP Guidelines pg. 68)

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas bottles are to be installed and maintained in accordance with *AS/NZS 1596 (2014)*, the requirements of relevant authorities and metal piping is to be used.	☑	▪	Can be made a condition of consent.
	All fixed gas cylinders are to be kept clear of flammable materials to a distance of 10m and shielded on the hazard side.	☑	▪	Can be made a condition of consent.
	Connections to and from gas cylinders are metal.	☑	▪	
	Polymer sheathed flexible gas supply lines are not used.	☑	▪	
	Above ground gas service pipes are metal, including and up to any outlets.	☑	▪	

3.6 Construction standards

The *NCC* does not provide any bushfire specific requirements for buildings of Class 5-8 and as such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions. Compliance with AS3959 and the NASH Standard must, however, be considered when meeting the aims and objectives of *PBP 2019.* Bushfire construction recommendations are dependent on the level of bushfire risk and the provision of adequate access opportunities.

The result of the bushfire attack assessment (as calculated within section 2.3 of this report) shows the proposed buildings can be expected to be exposed to potential radiant heat flux of 33kW/m^2. As a result of this the buildings should be constructed in accordance with the requirements for BAL-29, in addition to the general fire safety construction provisions of the NCC.

Table 3-6 outlines the proposed performance solution and compliance with the performance criteria for construction standards.

Table 3-6 – Performance criteria for construction standards (PBP Guidelines pg. 68)

Performance criteria	***Solution***	***Compliance***		***Comment***
		Acceptable solution	***Performance criteria***	
The proposed building can withstand bush fire attack in the form of embers, radiant heat and flame contact.	BAL is determined in accordance with Tables A1.12.5 to A1.12.7; and construction provided in accordance with the NCC and as modified by section 7.5 of *PBP.* As depicted in SCHEDULE 1; • All aspects should be constructed in accordance with Section 7 of *AS3959* (BAL-29) as modified by section 7.5 of *PBP 2019* This is in addition to the general fire safety construction provisions and requirements of the NCC.	☑	▪	

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
Proposed fences and gates are designed to minimise the spread of bush fire.	Fencing and gates are constructed in accordance with section 7.6.	☑	▪	Complies
Proposed Class 10a buildings are designed to minimise the spread of bush fire.	Class 10a buildings are constructed in accordance with section 8.3.2.	N/A	N/A	Buildings are Class 5 and class 7b

3.7 Landscaping

Table 3-7 outlines the proposed performance solution and compliance with the performance criteria for landscaping

Table 3-7 – Performance criteria for construction standards (PBP Guidelines pg. 68)

Performance criteria	Solution	Compliance		Comment
		Acceptable solution	Performance criteria	
Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Compliance with the NSW RFS 'Asset protection zone standards' (see Appendix 4); a clear area of low-cut lawn or pavement is maintained adjacent to the building/s; fencing is constructed in accordance with section 7.6 of *PBP*; and trees and shrubs are located so that: • the branches will not overhang the roof; • the tree canopy is not continuous; and • any proposed windbreak is located on the elevation from which fires are likely to approach.	☑	▪	Can be made a condition of consent.

3.8 Issues specific to buildings of Class 5 to 8 under the NCC

Whilst bush fire is not captured in the NCC for Class 5-8 buildings, a number of objectives are applied under section 8.3.1 of *PBP* in relation to access, water supply and services, and emergency and evacuation planning. Table 3-8 outlines the proposed performance solutions and compliance with the specific objectives for buildings of Class 5-8.

Table 3-8 – Objectives and proposed solutions specific to buildings of Class 5-8 under the NCC

Objective	*Solution*	*Compliance*
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.	Access provided in accordance with section 3.2 of this report.	☑
To provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development.	A Bush Fire Emergency Management and Evacuation Plan is prepared by the operator consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*, and AS3745:2010.	Can be made a condition of development consent
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	Services provide in accordance with sections 3.3, 0 and 0 of this report.	☑
Provide for the storage of hazardous materials away from the hazard wherever possible.	No above ground storage of hazardous materials and no filling/dispensing points for underground storage to be permitted within the APZs. Storage and handling of hazardous materials in accordance with: • AS1940:2017 The storage and handling of flammable and combustible liquids • AS4897-2008 The design, installation and operation of underground petroleum storage • The recommendations of the Multi-level Risk Assessment prepared for the proposed development in accordance with SEPP 33	☑

4. CONCLUSION & RECOMMENDATIONS

4.1 Conclusion

This assessment has found that bushfire can potentially affect the proposed development from the grassy woodland to the southwest and grassland to the east and, resulting in future buildings being exposed to potential radiant heat and ember attack.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures;

- Building construction in accordance with the requirements for BAL-29
- APZs for all Class 5-8 buildings commensurate with the above construction standards, as determined in accordance with Table A1.12.2 of *PBP 2019*, or Method 2 AS3959
- Provision of access, water, electricity and gas supply in accordance with the acceptable solutions for residential infill development outlined in *PBP 2019*;
- Preparation of a Bush Fire Emergency Management and Evacuation Plan

The following recommendations are provided to ensure that the development is in accordance with, or greater than, the requirements of *PBP 2019.*

4.2 Recommendations

Recommendation 1 - The development is as generally indicated on the attached SCHEDULE 1 - Plan of .

Recommendation 2 - APZs are to be provided to the proposed development as generally depicted within SCHEDULE 1 and maintained in perpetuity in accordance with Table 3.7 of this report, Appendix 1 of this document and *Standards for Asset Protection Zones* (NSW RFS, 2005).

Recommendation 3 - Access is provided in accordance with section 3.2 of this report.

Recommendation 4 - Water, electricity and gas supply is provided in accordance with sections 3.3, 0 and 0 of this report.

Recommendation 5 - Buildings are to be constructed in accordance with the requirements of *AS3959 Construction of buildings in bushfire prone areas (2018)* and *Planning for Bush Fire Protection 2019* for BAL-29, in addition to the general fire safety construction provisions of the NCC.

Recommendation 6 - Fencing is to comply with Section 7.6 of PBP. All fences in bush fire prone areas should be made of either hardwood or non-combustible material. However, in circumstances where the fence is within 6m of a building or in areas of BAL 29 or greater, they should be made of non-combustible material only.

Recommendation 7 – A Bush Fire Emergency Management and Evacuation Plan is prepared by the operator consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*, and AS3745:2010.

5. REFERENCES

Australian Building Codes Board (2019) – *Building Code of Australia*, Class 1 and Class 10 Buildings Housing Provisions Volume 2.

Chan, K.W. (2001) – *The suitability of the use of various treated timbers for building constructions in bushfire prone areas*. Warrington Fire Research.

Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bush fire-prone areas.*

NSW Department of Planning (2011) *Hazardous and Offensive Development Application Guidelines - Applying SEPP 33.* State of New South Wales through the Department of Planning

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.

Rural Fire Service (2019) - *Planning for bushfire protection – a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service.

Rural Fire Service, *standards for asset protection zones.* NSW Rural Fire Service.

Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack.* RFS Development Control Service.

SCHEDULE 1. PLAN OF BUSHFIRE PROTECTION MEASURES

Legend

- Lot boundary (source: LPI)
- Contour 1m (source: LiDAR)
- 1.8m Colorbond fence
- Grassland
- Woodland
- Asset Protection Zone (APZ)

Aerial source: Nearmap

TRAVERS BUSHFIRE & ECOLOGY
A TBE ENVIRONMENTAL COMPANY

PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
311 South Street, Marsden Park 19DEX04_BF003	4/05/2022 Issue 1 KM	1:2,500 GDA 1994 MGA Zone 56

0 50 100 m

TITLE

Schedule 1 - Bushfire Protection Measures

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

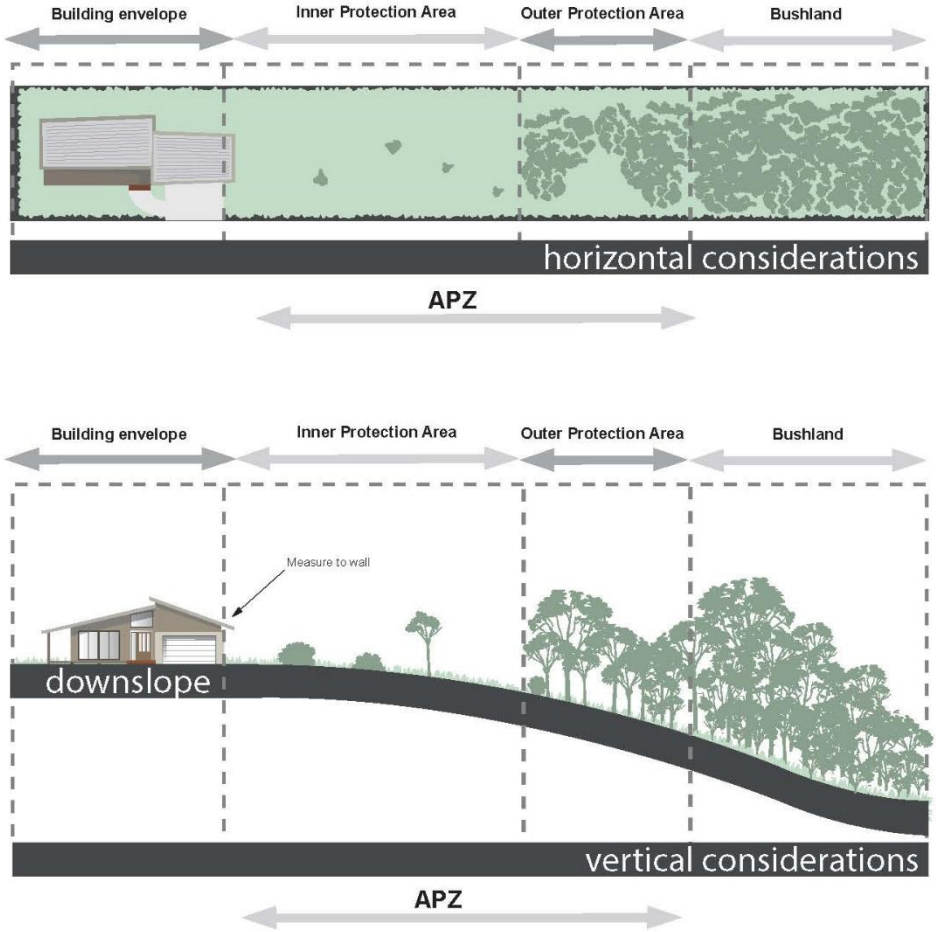
Document Path: N:\GIS STORAGE\N Drive\19DEX04_SouthStreet_MarsdenPark\MXDs\19DEX04_BF003.mxd

APPENDIX 1. MANAGEMENT OF ASSET PROTECTION ZONES

The RFS provides basic advice in respect of managing APZs through documents such as, *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 4 of *PBP*.

In forest vegetation an APZ may consist of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The IPA is the area immediately surrounding the building and the OPA (up to 30% of the total APZ width) is between the IPA and the hazard.

A typical APZ is graphically represented below.



APZs and progressive reduction in fuel loads
(Source: PBP, 2019)

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought regarding vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the RFS performance criteria.

The following table adapted from *PBP 2019* provides maintenance advice for vegetation within the IPA and OPA. The APZ is to be maintained in perpetuity and maintenance should be undertaken regularly, particularly in advance of the bushfire season.

	Inner Protection Area	Outer Protection Area
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 retaining smooth barked and evergreen trees.	➢ Tree canopy cover should be **less than 30%;** and ➢ Canopies should be separated by **2 to 5m**.
Shrubs	➢ Large discontinuities or gaps in the vegetation should be provided to slow down or break the progress of fire towards buildings; ➢ Shrubs should not be located under trees; ➢ Shrubs should form **less 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.	➢ Shrubs should not form a continuous canopy; and ➢ Shrubs should **form less than 20%** of ground cover.
Grass and Leaf Litter	➢ Grass should be kept mown to a height of **less than 100mm**; and ➢ Leaves and other debris should be removed	➢ Grass should be kept mown to a height of **less than 100mm**; and ➢ Leaf and other debris should be removed.

	All Management Zones
Weeds	➢ All weeds should be removed in accordance with best practice guidelines, and measures taken to prevent their further spread
Landscaping	➢ Suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways; ➢ Restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come into contact with the building; ➢ When considering landscape species consideration needs to be given to estimated size of the plant at maturity; ➢ Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies; ➢ Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown; ➢ Avoid planting of deciduous species that may increase fuel at surface / ground level (i.e. leaf litter); ➢ Avoid climbing species to walls and pergolas; ➢ Locate combustible materials such as woodchips / mulch, flammable fuel stores away from the building; ➢ Locate combustible structures such as garden sheds, pergolas and materials such timber garden furniture way from the building; and ➢ Use of low flammability vegetation species.

APPENDIX 2. AHIMS ABORIGINAL SITE SEARCH

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : 311 South Street
Client Service ID : 641846

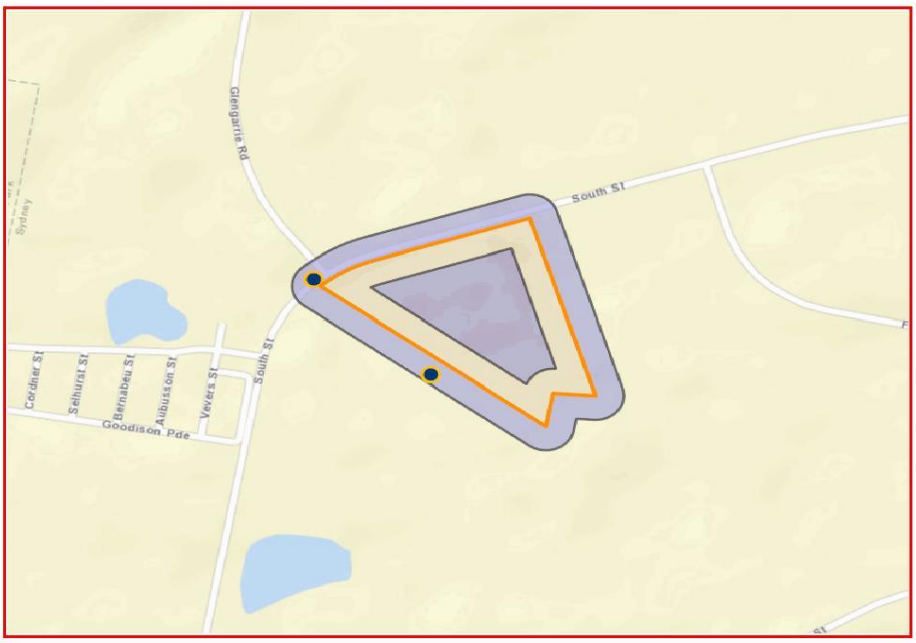
Morgan Jeffery
52 The Avenue
Kariong New South Wales 2099
Attention: Morgan Jeffery
Email: mjeffery@traversecology.com.au

Date: 25 November 2021

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 31, DP:DP262886, Section : - with a Buffer of 50 meters, conducted by Morgan Jeffery on 25 November 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *