

ABOUT TREES

URBAN TREE & BUSHLAND MANAGEMENT

BUSH FIRE ASSESSMENT

FOR

18 LOT SUBDIVISION

AT

LOTS 1 & 2, DP1233067

SOUTH STREET

MARSDEN PARK

FOR

FIRST STATE P/L

TABLE OF CONTENT

1.0	Introduction	Page 3
1.1	Brief	Page 4
1.2	Purpose of Report	Page 4
1.3	Scope of Report	Page 4
2.0	Methodology and Other Information	Page 5
3.0	Site Details	Page 6
4.0	Bush Fire Assessment Report	Page 11
A.	Property Details	Page 11
B.	Type of Proposal	Page 11
C.	Bushfire Attack & Level of Construction	Page 11
1.	Vegetation Type	Page 12
2.	Distances from the Proposed Development	Page 12
3.	Slope	Page 12
4.	Fire Danger Index	Page 12
5.	Level of Construction	Page 12
D.	Flame Zone	Page 13
E.	Water Supplies	Page 13
F.	Gas Supplies	Page 13
5.0	Discussion	Page 14
6.0	Conclusions & Recommendations	Page 19
7.0	References	Page 20
8.0	Photographs	Page 21
9.0	Qualifications & Experience of Author	Page 25
10.0	Site Plan	Page 26

ABOUT TREES

URBAN TREE AND BUSHLAND MANAGEMENT

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19/11/18
 Ref. 2018

1.0 INTRODUCTION:

A Development Application is to be lodged with Blacktown City Council for consent for An eighteen (18) site industrial subdivision on Lots 1 & 2, DP1233067; South Street, Marsden Park. The development includes an internal estate road and an extension of South Street (see Site Plan on Page 26)

The site as being Bush Fire Prone Land, and Council has requested that a Bush Fire Assessment be lodged with the Development Application

Commercial and industrial development on Bush Fire Prone Land is captured by S4.14 of the EP&A Act 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 Chapter 1 of Planning for Bush Fire Protection 2018.

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 of Chapter 7 of PBP (2018) should be used as a base for the development of a package of measures. Each development will be assessed on its own individual merits.

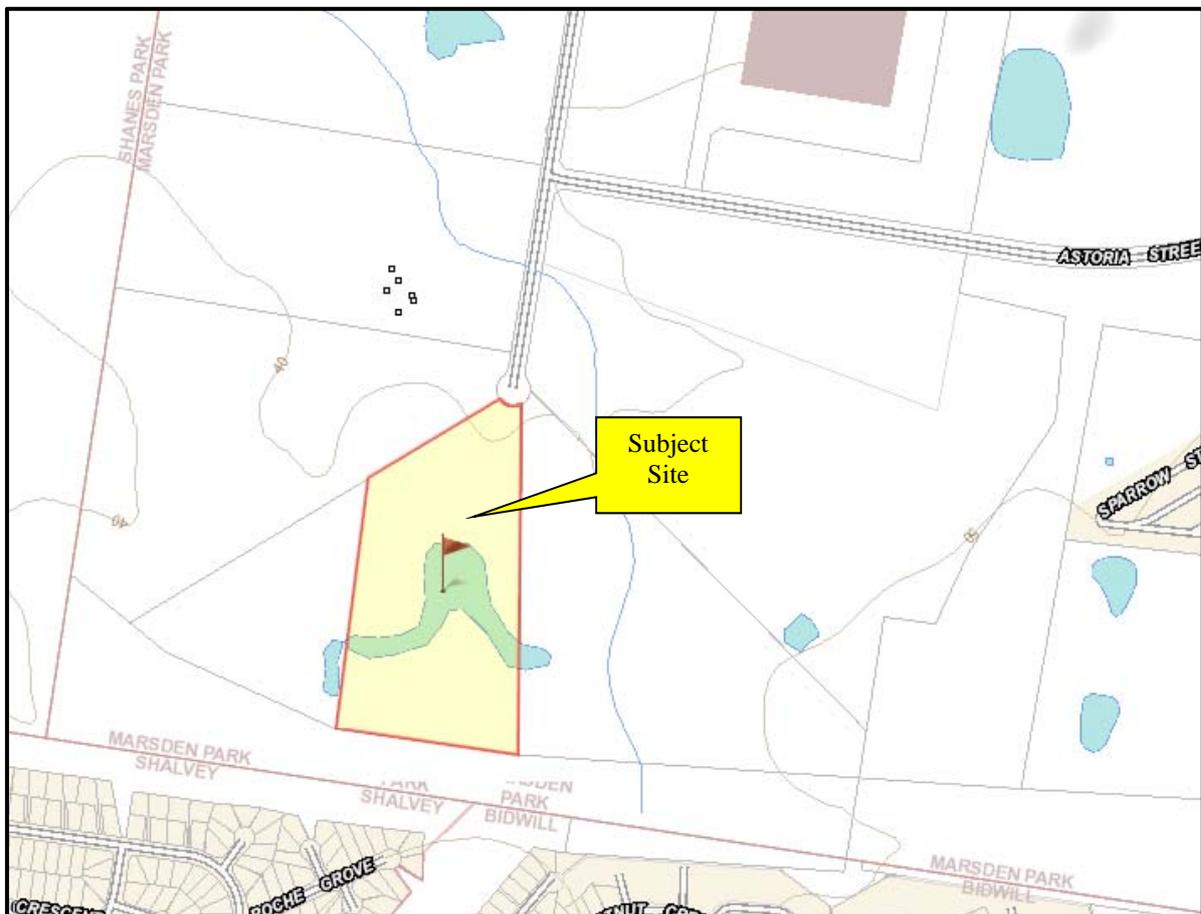


Figure 1 – showing location of subject site. (Dept Lands 2018)

1.1 Brief: This report has been commissioned by Mr. Tony Salvarinas and its purpose is to undertake Bushfire Threat Assessment in order to obtain a Bush Fire Safety Authority (BFSA) in accordance with Section 100B of the Bush Fire Act. Such developments are also integrated developments under Section 91 of the *Environmental Planning and Assessment Act 1979*.

1.2 Purpose of Report: The purpose of this report is to support the application for a SFSA by providing a Bush Fire Assessment in accordance with Section 46 of the Bush Fire Regulations and to assist Rural Fire Services in making its decision.

1.3 Scope of Report:

The scope of this report is limited to providing a bush fire assessment report and recommendations for the subject property in accordance with (PBP 2006). While it may discuss bush fire threats and/or progression through adjoining properties and possible impacts upon the subject property, it does not directly assess bushfire risks to the adjoining properties.

1.4 Summary of Report

- Given that the property has been identified as a Bush Fire Interface Property, any construction will need to comply with Planning for Bush Fire Protection (2006) and of the construction requirements of AS 3959 (1999). The determination of any bushfire hazard must be made on a site-specific basis that includes an assessment of the local bushland area and its potential impact to the subject property.
- The Eucalyptus forest on its western side has been identified as a bush fire risk to the proposed industrial subdivision
- An assessment of the vegetation type which poses the risk, its distance from the development and the gradient of the land has determined that following BAL construction standards will be required
 - Construction standards on the western, northern and southern sides of the proposed buildings on Lots 11 – 18 will need to comply with BAL – FZ (Flame Zone), and their eastern sides will need to comply with BAL 40.
 - The northern, eastern and western sides of the proposed buildings on Lots 19 - 20 will need to comply with BAL – FZ (Flame Zone), and their southern sides will need to comply with BAL 40.
 - The proposed buildings on Lots 3 – 10, 20 & 21 are not located within the 100m buffer of the bushfire hazard, and no BAL is required
- Consideration should be given to the provision of a non-combustible fence (i.e. ColorBond) along the northern and north-western boundaries to provide additional screening
- The design of the proposed estate road should comply with the ‘Deemed to Satisfy’ conditions required in Section 4.2.7 of PBP (2006). Fire hydrants should be regularly spaced along the proposed estate road, and comply with Australian Standard 2419. 1 – (2005)
- In accordance with the bush fire safety measures recommended in this report, and consideration of a site specific bush fire risk assessment. It is my opinion that when these are combined, they will provide a reasonable and satisfactory level of bush fire protection to the proposed development and also satisfy both the Rural Fire Services concerns and those of Blacktown Council.

If you have any questions or require further information, please don't hesitate to contact me on 0439 758 658

Yours Faithfully
L.R. Smith

2.0 METHODOLOGY:

An assessment of the subject site and study area was undertaken on the November 2018 and followed the guidelines contained in Section 4.3 of PBP (RFS 2006) and Addendum: Appendix 3 of Planning for Bushfire Protection (RFS 2010)

2.1 Curriculum Vitae of Author

The authors Curriculum Vitae is attached as Appendices 10.1 of this report which provides the qualifications, experience and additional training on which any stated opinions and conclusions are based.

2.2 Terminology

A definition of the specific terminology that is likely to be used throughout this report is provided in Appendices 10.2

2.3 Uniform Civil Procedures Rules (2005)

In order to ensure the reliability of evidence provided by experts, the Courts have provided the Uniform Civil Procedures Rules 2005 (UCPR) and Land & Environment Court Rules 2007 (LECR).

The author of this report has read and understands the Expert Witness Code of Conduct in Schedule 7 to UCPR, and agrees to be bound by it in accordance with UCPR 31.23.

An expert is permitted to provide evidence before a Court in order to assist the Court draw inferences. The primary overriding duty of an expert is to assist the Court impartially on matters relevant to the expert witness's expertise. Any opinions expressed must be based on the persons training, study or expertise.

2.4 Limitation of Liability

'Notwithstanding the precautions adopted, it should always be remembered that bush fires burn under a wide range of conditions and an element of risk, no matter how small, always remains (RFS 2001)

'Although the standard is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bush fires, that any one building will withstand bushfire attack on every occasion (AS 3959 – 1999)

Similarly, the assessment and conclusions provided by About Trees in regard to bush fire protection are also given in good faith.

The author shall not be required to provide additional information, give testimony or attend Court by reason of this report unless subsequent contractual arrangements are made, including an additional fee for such services.

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3.0 SITE DETAILS

The subject site is known as Lots 1 & 2, DP1233067; South Street, Marsden Park, and has an area of approximately 7,235ha. It is bordered on its west and northwest by Public Recreational Land, on the east by undeveloped land, on the south by an unformed road reserve and on the north by South Street.

3.1 Property Zoning

The property is zoned UNDER Blacktown Local Environment Plan 2015 as IN2 – Light Industrial (see Diagram 2)

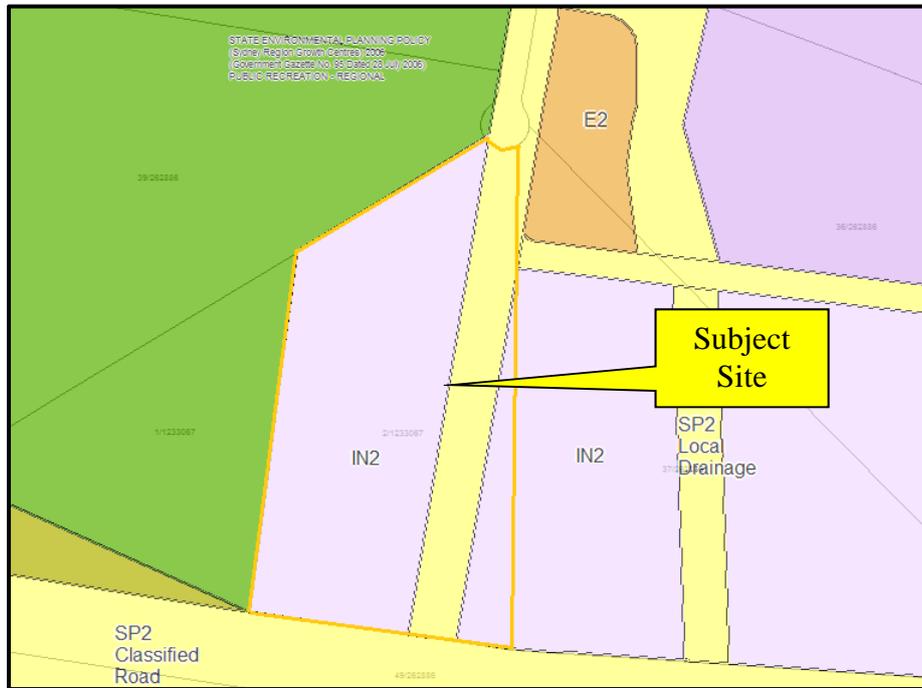


Diagram 2 – Showing property zoning (Blacktown LEP 2015)

Zone IN2 Light Industrial

3.1.1 Objectives of zone

- To provide a wide range of light industrial, warehouse and related land uses.
- To encourage employment opportunities and to support the viability of centres.
- To minimise any adverse effect of industry on other land uses.
- To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.
- To support and protect industrial land for industrial uses.
- To minimise adverse impacts on the natural environment.

3.1.2 Permitted without consent

Nil

3.1.3 Permitted with consent

Aquaculture; Building identification signs; Business identification signs; Depots; Food and drink premises; Funeral homes; Garden centres; Hardware and building supplies; Heliports; Industrial training facilities; Kiosks; Light industries; Neighbourhood shops; Places of public worship; Roads; Warehouse or distribution centres; Vehicle sales or hire premises; Any other development not specified in item 2 or 4

3.1.4 Prohibited

Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Boat building and repair facilities; Camping grounds; Caravan parks; Cemeteries; Commercial premises; Correctional centres; Crematoria; Eco-tourist facilities; Educational establishments; Entertainment facilities; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Health services facilities; Heavy industrial storage establishments; Helipads; Highway service centres; Home-based child care; Home businesses; Home occupations; Home occupations (sex services); Industries; Information and education facilities; Marinas; Open cut mining; Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Residential accommodation; Restricted premises; Rural industries; Signage; Tourist and visitor accommodation; Veterinary hospitals; Waste or resource management facilities; Water recreation structures; Wharf or boating facilities; Wholesale supplies

3.2 Vegetation

The type of vegetation has a direct bearing on the level of risk. The structure and formation of vegetation in the study area has been classified in accordance with Clause 2.2.3 – Vegetation Classification, AS 3959 (2009).

Figure 3 is based upon Vegetation Mapping by National Parks & Wildlife Service in 2002, and the site on the west and north has been identified as Open Forest and Woodland. Diagram 6 shows an aerial photograph of the site vegetation.

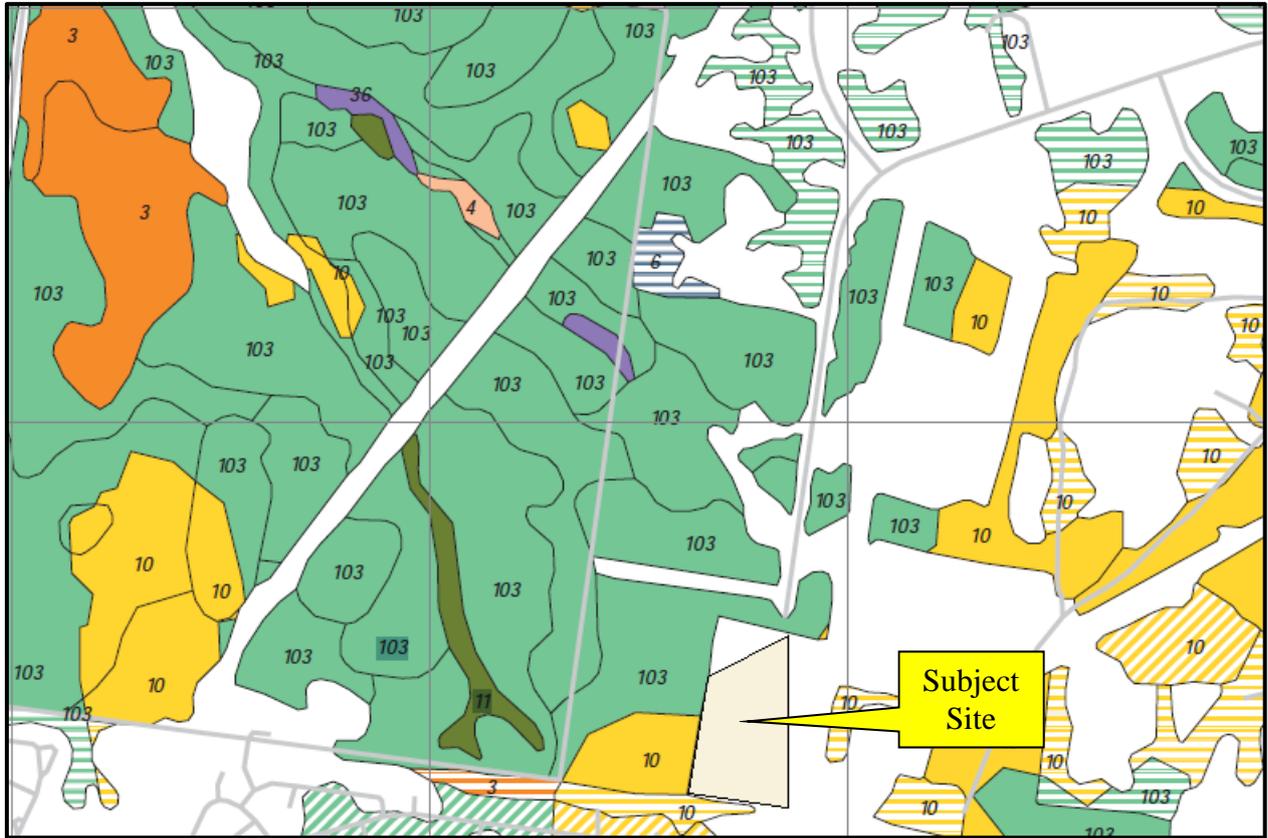


Diagram 3 – Showing mapping of Vegetation



Shale Gravel Transitional Forest



Shale Plains Woodlands

3.3 Soil Landscape

The soil landscape of the general area has been described by Bannerman & Hazelton (1990), as ‘Blacktown’ – a friable brownish black loam over a hardsetting brown clay loam. It is a residual soil derived from the underlying Wianamatta Shales and is common on the Cumberland Plain.

General fertility is low to moderate. Soil materials have low to moderate available water capacity with very low phosphorous and low to very low nitrogen levels. Where bt1 is present, it’s higher organic matter content and moderate nitrogen levels result in higher general fertility.

Top Soil; up to 30cm of top brownish black loam (bt1) overlays 10 – 20cm of hardsetting brown clay loam (bt2). The top soils are often hardsetting, containing high fine sand content and silt content. The (bt1) layer is occasionally absent on crests and midslopes.

Sub Soil; The top soils overlays up 100cm of strongly pedal, brown mottled light clay (bt3) which in turn overlies up to 100cm of light grey plastic mottled clay. These deep clay soils are moderately reactive and are usually found on the sideslopes and footslopes. Shallower soils on the crests are slightly reactive.

Reactive soils can cause surface movement as they shrink or swell in response to changes of their soil moisture content. This can cause extensive damage to pathways, paving, underground services and buildings with inappropriately designed footings.

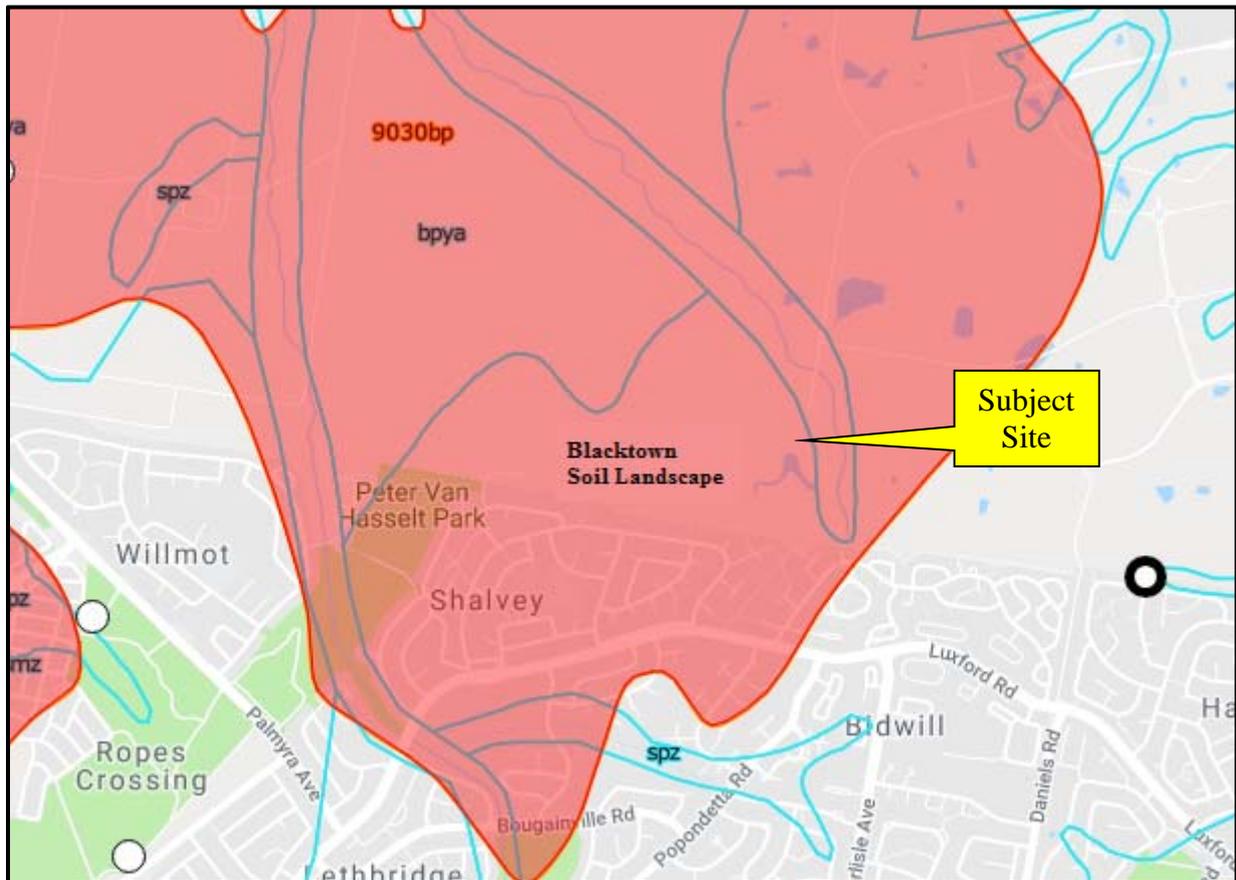


Diagram 4 – showing Soil Landscapes in the local area

3.4 Topography:

The slope of land influences the speed that a fire will travel. Fire will travel faster and with greater intensity uphill because vegetation in front of the fire is preheated and will more readily ignite. With every 10° increase in slope, the intensity and spread of the fire doubles. Conversely, the intensity and spread of fires decrease when they burn down slope.

The property fall by less than 10m m over a distance of 416m towards the north and drains into a tributary of South Creek. This represents an average gradient of 1: 47, or a slope of 0 – 5°

The vegetation on the western side of the site poses the highest risk to the proposed subdivision. The site falls towards the west with a gradient of 1: 77, or a slope 0 – 5°.

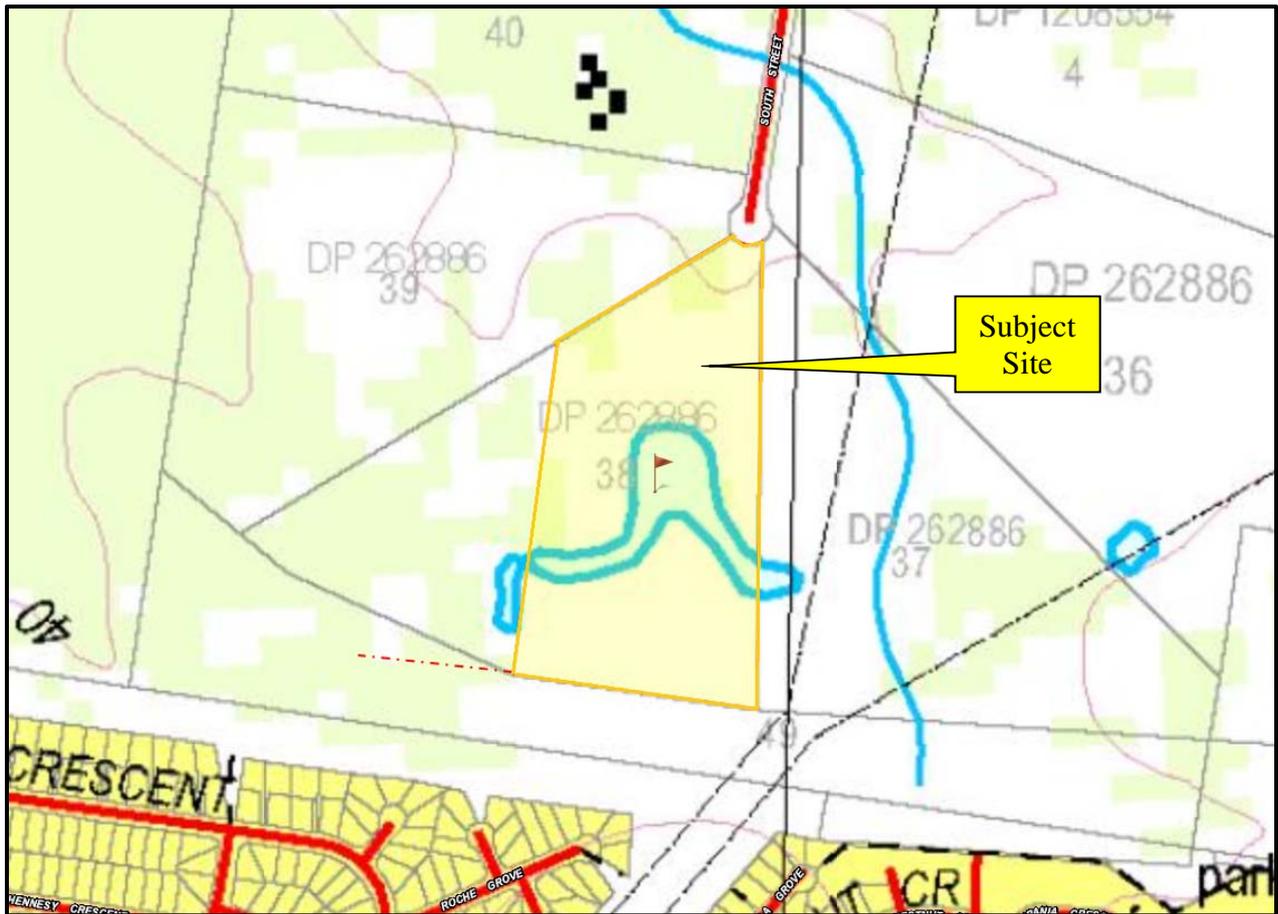


Diagram 5 – Showing Topographic details of subject site (Dept Lands 2018)

3.5 Asset Protection Zone (APZ)

An APZ is a buffer zone between a bush fire hazard and buildings, which is managed progressively to minimise fuel loads and reduce potential radiant heat levels, flame, ember and smoke attack. For SFP radiant heat levels of $>10\text{kW/m}^2$ must not be experienced by emergency service workers

The intent of an APZ is to provide sufficient space for fire fighters and other emergency services personnel, ensuring radiant heat levels permit operations under critical conditions of radiant heat, smoke and embers, while supporting or evacuating occupants.

An appropriate APZ is based on vegetation type, slope and levels of construction. Existing roads, other buildings or managed properties can be considered as part of the APZ. For forest and woodland vegetation, the APZ consists of two areas:

- **Inner Protection Area**, closest to buildings, incorporating the defensible space and for managing heat intensities at the building surface; and
- **Outer Protection Area**, for reducing the potential length of flames by slowing the rate of spread, filtering embers and suppressing the crown fire.



Diagram 6 – showing vegetation within 140m of the western boundary

4.0 BUSH FIRE ASSESSMENT

PART A: PROPERTY DETAILS

The subject site is known as Lots 1 & 2, DP1233067; South Street, Marden Park (see Diagram 1) and has been identified as being a Bush Fire Interface Property (see Diagram 7)

The main bushfire risk to the site is the Woodland vegetation unit on its western and northern sides. The western and northern aspects of the site are within a 100m Bush Fire Buffer Zone 1

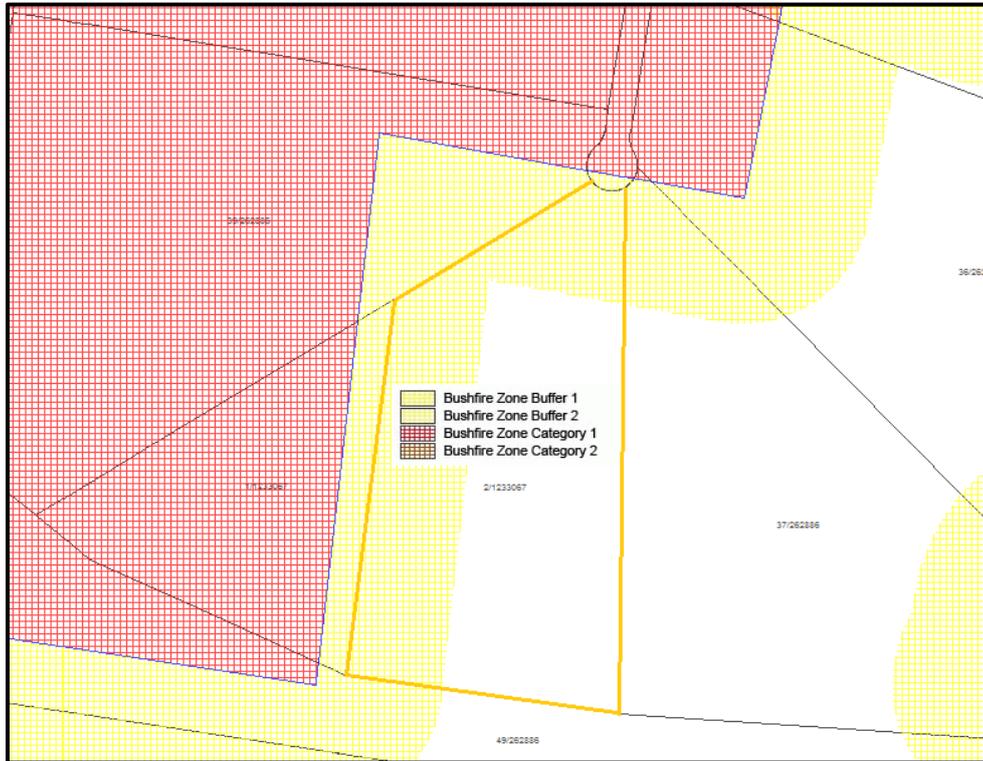


Diagram 7 - Showing Bush Fire mapping of subject site

PART B: TYPE OF PROPOSAL

The proposed development is for an industrial subdivision and is classified as a Class 8 building under the Building Code of Australia.

PART C: BUSH FIRE ATTACK AND LEVEL OF CONSTRUCTION

	North	West	South	East
Vegetation Structure within 140m	Open Forest	Open Forest	N/A	N/A
Setbacks of Vegetation	15m	15m	N/A	N/A
Effective Slope	0 - 5° downslope	0 - 5° downslope	0 - 5° upslope	0 - 5° upslope
Fire Danger Index	100	100	100	N/A
Bushfire Attack Level	F/Z	F/Z	F/Z	N/A

Table 1: Showing BAL ratings on Each Aspect of the Proposed Subdivision

Step 1: Assess the vegetation about the proposed building in all directions

The vegetation that poses the risk to the development is an Open Forest with crowns that touch or overlap. Sunlight penetrates through the canopy and allows the growth of a grassy understorey (see Plates 1 & 8).

The Bush Fire Mapping in Diagram 7 does not classify the vegetation on the south and east as being a risk, as it will be cleared for future development

Given the significant risk associated with developments in the flame zone and the complexity of the protection measures required, there are no 'deemed to satisfy' solutions for buildings in the flame zone. To support this, the BCA has established a NSW variation that excludes AS3959 Section 9 Construction for BAL-FZ (RFS 2010)

Step 2: Determine the distance from the building line to the vegetation in each direction.

North – 15m of APZ are provided between the northern sides of the buildings on Lots 19 & 20 and the north-western boundary

West – 15m of APZ are provided on the western side of the buildings on Lots 11 – 18 and the western boundary, and 25m is provided between the western side of the building on Lot 19 and the western boundary

South – 1m of Managed Lands is provided between the southern side of the building on Lot 11 and the southern boundary

East – 90m of Managed Lands are provided between the eastern sides of the building on Lots 11 - 18 and the eastern boundary

Step 3: Determine the effective slope in degrees that will influence bushfire behaviour in each direction over 100m

North – 0 - 5° downslope over 100m from northern boundary

West – 0 - 5° downslope over 100m from the western boundary

East – 0 - 5° upslope for 100m from the eastern boundary

South – 0 - 5° upslope over 100m from the southern boundary

Step 4: Determine the Fire Danger Index (FDI) that applies to the Local Government Area
FDI: 100**Step 5: Construction Levels**

According to Table A1.11.3 in PBP 2018, buildings will require a setback of 22m from an Open Forest with a downslope of 0 – 5° in order to comply with BAL F/Z.

As such, construction standards on the western, northern and southern sides of the proposed buildings on Lots 11 – 18 will need to comply with BAL – FZ (Flame Zone), and their eastern sides will need to comply with BAL 40.

The northern, eastern and western sides of the proposed buildings on Lots 19 - 20 will need to comply with BAL – FZ (Flame Zone), and their southern sides will need to comply with BAL 40.

The proposed buildings on Lots 3 – 10 are not located within the 100m buffer of the bushfire hazard, and no BAL is required

PART D: FLAME ZONE

According to Table A1.11.3 in PBP 2018, a building with a downslope of 0 – 5° and a setback of 15m from a unit Forest vegetation unit would require BAL – F/Z construction in order to comply with ‘Planning for Bushfire Protection 2018’.

As a 15m APZ is proposed between the western sides of the buildings on Lots 11 – 18, and on the north-western side of the buildings on Lots 19 & 20, these aspects will be located in the flame zone.

PART E: WATER SUPPLIES

The proposed subdivision will be connected to the water mains.

Fire hydrants:

- Fire hydrants should be regularly spaced along the proposed estate road, and comply with Australian Standard 2419. 1 – (2005)

PART F: ELECTRICITY & GAS SUPPLIES

Electricity services should be located to limit the possibility of ignition of surrounding bush land or the fabric of buildings. Where practicable electrical transmission lines are underground, and where overhead, electrical transmission lines are proposed as follows:

- 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 accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines

The location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings

- Reticulated or bottled gas is to installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used;
- All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
- 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

5.0 DISCUSSION

Applications for developments that are not residential/rural residential subdivisions, SFPPs or residential infill should:

- note the range of available bush fire protection measures
- satisfy the aim and objectives of PBP (see Section 4.1)
- consider any matters listed for the specific purpose below; and
- propose an appropriate combination of bush fire protection measures, with evidence that the intent of each measure (with reference to the relevant Tables in sections 4.1.3 and 4.2.7) is satisfied

5.1 Aims and Objectives of PBP

All development on BFPL must satisfy the aim and objectives of 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:

1. afford buildings and their occupants protection from exposure to a bush fire
2. provide for a defensible space to be located around buildings
3. provide appropriate separation between a hazard and buildings which, in combination with other measures,
4. minimises material ignition ensure that appropriate operational access and egress for emergency service personnel and residents is available
5. provide for ongoing management and maintenance of BPMs,
6. ensure that utility services are adequate to meet the needs of firefighters.

In circumstances where the aim and aims and objectives of PBP are not met, then the construction requirements for bush fire protection will need to be considered on a case-by-case basis (PBP 2006, Page 46).

5.2 Bush fire protection measures

BPMs are measures which are required to improve property protection and community resilience to bush fire attack.

Bush fire protection can be achieved through a combination of strategies which:

1. control the types of development permissible in bush fire prone areas
2. minimise the impact of radiant heat and direct flame contact by separating development from bush fire hazards
3. minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers
4. enable appropriate access and egress for the public and firefighters
5. provide adequate water supplies for bush fire suppression operations focus on property preparedness, including emergency planning and property maintenance requirements facilitate the maintenance of APZs, fire trails,
6. access for firefighting and on-site equipment for fire suppression.

Adequate BPMs are provided by the proper design of:

1. APZs construction standards and design access
2. water and utilities
3. landscaping
4. emergency management

5.3 Performance Criteria and Acceptable Solutions

The Performance Criteria and Acceptable Solutions relevant to a new dwelling in an isolated rural area in accordance with AS 3959 (2009), BPB (2006) & Section A37 – Addendum Appendix 3 of Planning for Bushfire Protection (2010) is summarised in Table 1 and discussed in more details in Sections 5.3.1 – 4.6. Non-compliant issues are highlighted in red.

Performance criteria	Acceptable Solutions
The intent may be achieved where:	
<p>In relation to Asset Protection Zones: A defendable space is provided on site.</p> <p>An APZ is provided and maintained for the life of the development.</p>	A 15m wide APZ can be provided in accordance with PBP (2018)
<p>In relation to siting and design: Buildings sited and designed to minimise the risk of bushfire attack.</p>	Buildings are designed and sited in accordance with the siting and design principles in AS 3959 (2009), Section 4 of BPB (2006) & Section A37 – Addendum Appendix 3 of Planning for Bushfire Protection (2010)
<p>In relation to construction standards: It is demonstrated that the proposed building can withstand bush fire attack in the form of wind, smoke, embers, radiant heat and flame contact.</p>	<p>No ‘Deemed to Satisfy’ construction standards within Flame Zone are provided under AS3959 (2009) and BPB (2006).</p> <p>As such, the Development Application will need to be referred to the RFS</p>
<p>In relation to access requirements: Safe, operational access is provided (and maintained) for emergency personnel in suppressing a bush fire while residents are seeking to relocate, in advance of a bush fire, (satisfying the intent and performance criteria for access roads in Sections 4.1.3 and 4.2.7 of PBP (2006)</p>	<p>Public road access will be provided to the proposed subdivision, and shall comply with Section 4.1.3 of PBP (2006)</p> <p>The proposed estate road internal access and the provision of a turning circle shall comply with Section 4.2.7 PBP (2006)</p>
<p>In relation to water and utility services: Adequate water and electricity services are provided for firefighting operations.</p> <p>Gas and electricity services are located so as not to contribute to the risk of fire to a building</p>	<p>Mains water will be provided to the proposed subdivision</p> <p>Fire hydrants should be regularly spaced along the proposed estate road, and comply with Australian Standard 2419. 1 – (2005)</p> <p>Water and utility services layout are to comply with Section 4.1.3 of PBP (2006) for services - water, electricity and gas</p>
<p>In relation to landscaping: It is designed and managed to minimise flame contact, and radiant heat to buildings, and the potential for wind driven embers to cause ignitions.</p>	Compliance with Appendices 5 of PBP (2006)

Table 1: Performance Criteria and Acceptable Solutions for

5.3.1 Asset protection Zones – *The intent of an APZ is to minimise the risk of bush fire attack and provide protection for emergency services personnel, residents and others assisting firefighting activities.*

An APZ is a buffer zone between a bush fire hazard and buildings, which is managed progressively to minimise fuel loads and reduce potential radiant heat levels, flame, ember and smoke attack. The appropriate APZ is based on vegetation type, slope and levels of construction (and for SFPPs the nature of development). For ‘other development’, existing roads, other buildings or managed properties can be considered as part of the APZ

- **Response** – The proposed building has a 15m wide APZ that is provided by a sealed carpark along the northern and western boundaries and the proposed building. As this is less than 24m, the building will be located in the Flame Zone

5.3.2 Design and Construction – *The intent of measures is that buildings are designed and constructed to withstand the potential impacts of bush fire attack.*

For development on bush fire prone land preliminary consideration of construction levels is necessary at DA stage.

The performance of a building should be enhanced through the following siting and design principles:

- avoid building on ridge tops and saddles;
- building on level ground wherever possible;
- where buildings must be constructed on sloping land, they are built on cut-in benches rather than elevated or above fill;
- avoid raised floors, utilise concrete slabs (raft construction);
- locating the habitable buildings near the property entrance for easier access/egress;
- the use of non-combustible fencing (or other class 10a buildings) which is located within close proximity to the main building;
- reducing the bulk of a building (height and width) facing a bush fire hazard;
- simplifying the design of buildings to reduce the numbers of re-entrant corners;
- providing more simplified rooflines;

- **Response** – The proposed building is located within 15m from an Open Forest on a downslope of 0 – 5°. As it is located within the Flame Zone, construction will need to meet BAL – FZ.

5.3.3 Access Standards – *For new subdivisions and large scale SFPPs, design of public and property access roads should enable safe access, egress and defensible space for emergency services. Fire trails enable access for management of APZs. These principles also apply for ‘other developments’ but greater emphasis on landscaping, construction and other Bushfire Protection Measures may be necessary.*

5.3.4 Public Roads – *The intent of measures of the public road system is to provide safe operational access to structures and water supply for emergency services while residents are seeking to evacuate from an area*

The purpose of the public road system is proposed to be upgraded

- Provide firefighters with easier access to structures, allowing more efficient use of firefighting resources
 - Provide a safe retreat for firefighters and
 - Provide a clear control line from which to conduct hazard reduction or back burning operations.
- **Response** – The D/A proposes to extend South Street to comply with the ‘Deemed to Satisfy’ conditions required for Public Roads in Section 4.1 (2006). In addition, there is a future proposal to upgrade South Street to dual carriageways.

5.3.5 Property Access – *The intent of measures for property access is to provide safe access to/from the public road system for firefighters providing property protection during a bushfire and for occupants faced with evacuation.*

Short access roads are preferable to long ones for the safety of evacuating residents and emergency service personnel, and therefore, it is preferable to site dwellings as close as possible to public through roads.

Where access is greater than 200m from a main road or refuge suitable for occupants and firefighters, a second access arrangement in a different direction is required from the main access.

Unrestricted pedestrian access should be provided and maintained around the property for firefighting activities

- **Response** – An extension of South Street is proposed as part of the subdivision. This will comply with Section 4.1.3 of PBP (2006)
- The Propose Estate Road is still in a design form. However, it will be possible to comply with the ‘Deemed to Satisfy’ conditions required in Section 4.2.7 of PBP (2006).
- The furthest point of the proposed estate is approximately 350m from the public road, the proposed development will provide shielding from the bush fire hazards on the north and west.

5.3.6 Water & Utilities – *During major bushfire events, the preparedness of the dwelling and its occupants may be seriously jeopardised with the loss of water and electrical services. Adequate supply of water is essential for firefighting purposes when considering all forms of development.*

5.3.6.1 Water Supply – *Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire.*

The determination of a guaranteed water supply is one that can only be made by the water supply authority where mains water supply is available.

In rural areas and areas not serviced by reticulated water supplies, the provision of a dedicated static water supply is essential. The amount of water is determined on the basis of lot sizes and density of development

Where reticulated supply is inadequate, water can be supplemented with the provision of a dedicated static water supply in the form of tank storage. Where supplementary supplies of water are required, swimming pools, creeks and dams should not be used as a substitute for a dedicated static supply. These sources of water are not considered reliable during drought conditions.

- **Response** – Mains water supply with the provision of fire hydrants is proposed for the subdivision.
- Fire hydrants should be regularly spaced along the proposed estate road, and comply with Australian Standard 2419. 1 – (2005)
- These should be supplemented by additional static water supplies, pumps and hoses as part of individual development applications of each lot

5.3.6.2 Utility Services – *Intent of measures: gas and electrical infrastructure should be located so as not to contribute to the risk of fire or impede the firefighting effort.*

Location of electricity and gas services limits the possibility of ignition of surrounding bushland or the fabric of the building

Regular inspection of lines is undertaken to ensure they are not fouled by branches

- **Response** – Mains electricity will be provided to the subdivision, with access from South Street.

Reticulated or bottled gas is proposed is to be installed and maintained in accordance with AS/NZS 1596 (2008), the storage and handling of LP Gas, and the requirements of the local authorities. Metal piping is to be used.

5.6 Landscaping – *The principles of landscaping for bush fire protection aim to maintain a garden that does not contribute to the spread of bush fires by*

- Preventing flame impingement on the dwelling;
- Providing a defensible space for property protection;
- Reducing fire spread;
- Deflecting and filter embers;
- Providing shelter from radiant heat; and
- Reducing wind speed.

In terms of priorities of addressing bush fire attack, priority should be given to preventing flame impingement by not allowing fine debris to accumulate close to the building. Secondly, removal of understorey fuels aids in the reduction of flame heights and likely canopy fire, thereby reducing overall radiant heat. Removal of loose bark and fine fuels reduces both heat output and ember generation, while the retention of taller trees with canopies will also assist in filtering out embers.

- **Response** – The landscaping principles and ongoing maintenance of the APZ is to comply with Appendix 5 of PBP (2006)

6.0 CONCLUSION & RECOMMENDATIONS

- Given that the property has been identified as a Bush Fire Interface Property, any construction will need to comply with Planning for Bush Fire Protection (2006) and of the construction requirements of AS 3959 (1999). The determination of any bushfire hazard must be made on a site-specific basis that includes an assessment of the local bushland area and its potential impact to the subject property.
- The Eucalyptus forest on its western side has been identified as a bush fire risk to the proposed industrial subdivision
- An assessment of the vegetation type which poses the risk, its distance from the development and the gradient of the land has determined that following BAL construction standards will be required
- An assessment of the vegetation type which poses the risk, its distance from the development and the gradient of the land has determined that following BAL construction standards will be required
 - Construction standards on the western, northern and southern sides of the proposed buildings on Lots 11 – 18 will need to comply with BAL – FZ (Flame Zone), and their eastern sides will need to comply with BAL 40.
 - The northern, eastern and western sides of the proposed buildings on Lots 19 - 20 will need to comply with BAL – FZ (Flame Zone), and their southern sides will need to comply with BAL 40.
 - The proposed buildings on Lots 3 – 10 are not located within the 100m buffer of the bushfire hazard, and no BAL is required
- Consideration should be given to the provision of a non-combustible fence (i.e. ColorBond) along the northern and western boundaries to provide additional screening
- The design of the proposed estate road should comply with the ‘Deemed to Satisfy’ conditions required in Section 4.2.7 of PBP (2006). Fire hydrants should be regularly spaced along the proposed estate road, and comply with Australian Standard 2419. 1 – (2005)
- In accordance with the bush fire safety measures recommended in this report, and consideration of a site specific bush fire risk assessment. It is my opinion that when these are combined, they will provide a reasonable and satisfactory level of bush fire protection to the proposed development and also satisfy both the Rural Fire Services concerns and those of Blacktown Council.

If you have any questions or require further information, please don't hesitate to contact me on 0439 758 658

Yours Faithfully
L.R. Smith

7.0 REFERENCES

- AS 3959 (2009) Construction of buildings in bushfire prone areas' Standards Australia
- Bannerman S. & Hazelton, P. (1989) 'Soil Landscapes of the Penrith 1:100,000 Sheet' Soil Conservation Services NSW
- Department of Lands (2018) Six Viewer
- RFS (2006) 'Planning for Bushfire Protection', NSW Rural Fire Services

8.0 PHOTOGRAPHS



Plate 1 – showing vegetation on northern side site



Plate 2 – Open Forest with a cleared understory on adjoining property along the northern boundary



Plate 3 – showing vegetation on eastern side of the site



Plate 4 – Open Forest with a regenerating shrubby understory on adjoining property along the eastern boundary



Plate 5 – showing vegetation on southern side of the site



Plate 6 – Open Forest with a regenerating shrubby understory on adjoining property along the southern boundary



Plate 7 – showing vegetation on eastern side of the site



Plate 8 – showing vegetation on eastern side of the site

9.0 QUALIFICATIONS & EXPERIENCE OF AUTHOR

QUALIFICATIONS

- Graduate Certificate in Bushfire Design, University of Western Sydney (2012 – Completed)
- Diploma in Conservation & Land Management (AQF 5), Hortus Australia (2005)
- Advanced Diploma of Horticulture (Arboriculture – AQF 6), Hortus Australia (2002).
- Small Business Enterprise Certificate, Blue Mountains TAFE (1996).
- Certificate in Tree Care, Lynnfield West (1995).
- Tree Surgery Certificate, Ryde School of Horticulture (1990).
- Certificate in Horticulture, Wollongong TAFE (1987).

WORK HISTORY

- 1998 – Present Self-employed as an Arboricultural Consultant.
- 2000 – 2002. Tree Management Officer, Blue Mountains City Council.
- 1984 – 1998. Self-employed as a Practicing Arborist.
- 1977 – 1978. Tree pruning and removal, SEC Victoria.
- 1975 – 1976. Tree maintenance, Queensland Forestry Commission.

FURTHER TRAINING

- Attendance of the following seminars or conferences;
 1. ISA Tree Risk Assessment Qualification (TRAQ) Melbourne (2013)
 2. EIANZ Environmental Expert Professional Development Course (Sydney 2013)
 3. HEDRA Workshop (Sydney 2012)
 4. ISA National Conference Newcastle (2009)
 5. Tree Roots in the Built Environment, J. Urban (2008)
 6. *Phytophthora cinnamomi* – Workshop (2008)
 7. Trees on Construction Sites Workshop by J. Barrell (2006)
 8. ISA National Conference, Parramatta (2004)
 9. 5 Day Scientific Workshop on Tree Pathology and Wood Decay by F. Schwarze (2004)
 10. Safe Trees Seminar by Ed Hayes (2002)
 11. ISA National Conference, Melbourne (2002)
 12. Advanced Lecture on Visual Tree Assessment by Dr Claus Mattheck (2001)
 13. Trees for Urban Landscapes (2000)
 14. Assessing Hazardous Trees & their Safe Useful Life Expectancy (1997)

PROFESSIONAL ASSOCIATIONS

- International Society of Arboriculture (#152238)
- Fire Protection Association Australia (#26890)

10.0 PROPOSED SITE PLAN

