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Building Construction in Bush Fire Prone Areas

Bush Fire Assessment Report

REF No. 20-12-388

Address	Lot 2 DP 787827 2115 – 2131 Castlereagh Road, Penrith NSW 2750
For	AAPT10 Pty Ltd
The site was inspected on	3rd December 2020

Craig Burley

Grad Dip Design for Bushfire Prone Areas
FPAA Certified BPAD-Level 3 Practitioner

Bushfire Risk Assessment Certificate

As required by legislation under section 4.14 of the *Environmental Planning and Assessment Act* 1979 No 203

Property Address:	Lot 2 DP 787827 2115-2131 Castlereagh Road, Penrith NSW 2750 LGA Penrith City Council
Description of Proposal	Commercial / Industrial / Warehouse development / multi storey car parking
Plan Reference: [Relied upon in report preparation]	This assessment is based on plans prepared by: SJB Architects Job No: 6348 6348 Sheets: DA-0102 Existing site plan, DA-0103 Site Plan, DA-0105 Site Staging & DA-0121 Overall Elevations and sections
Bushfire Hazard Assessment Report Ref. No.	20-12-388
Report Date:	31.01.2021
BAL Rating:	Building EW1 &EW2 BAL 12.5 Building PW2 Roof & east, west and south elevations BAL 29 Building PW2 north elevation BAL 19 The awning attached to building PW2 extends marginally closer to the southern boundary than the building walls. In accordance with section 3.2.2 of AS3959 – 2018 the awning shall be constructed to BAL 40 requirements. Car Park PC3 BAL 29
Does the proposal comply with the requirements of *Planning for Bush Fire Protection* 2019?	Yes
Does the proposal require referral to the NSW Rural Fire Service?	No
Does the proposal rely on Alternate Solutions?	No

Control Line Consulting has undertaken a bushfire risk assessment on the above mentioned proposal and property.

A detailed Bushfire Hazard Assessment Report has been prepared in accordance with the submission requirements as set out in *Appendix 2* of *Planning for Bush Fire Protection* 2019 together with recommendations as to how the relevant specifications and requirements are to be achieved.

I hereby certify, in accordance with section 4.14 of the *Environmental Planning and Assessment Act* 1979 No 203:

1. That I am a person recognised by the *NSW Rural Fire Service* as a qualified consultant in bushfire risk assessment; and

2. That subject to the recommendations contained in the attached Bushfire Hazard Assessment Report the proposed development conforms to the relevant specifications and requirements of *Planning for Bush Fire Protection* 2019

I am aware that the Bushfire Hazard Assessment Report prepared for the above mentioned site is to be submitted in support of a development application for this site and will be relied upon by Penrith City Council as the basis for ensuring that the bushfire risk management aspects of the proposed development have been addressed in accordance with *Planning for Bushfire Protection 2019*.

Yours faithfully

Craig Burley
Grad Dip Design in Bushfire Prone Areas
FPA Australia BPAD- Level 3 Certified Practitioner PA

Executive Summary

We have been engaged by AAPT 10 Pty Ltd to prepare a bush fire hazard assessment report to be a supplement for inclusion in an application for the proposed construction of a commercial, industrial and warehouse development with internal access and associated multi-level car parking upon the subject site.

The site has been identified as being bushfire prone land and therefore the legislative requirements of both *Planning for Bush Fire Protection 2019* and *AS 3959 – 2018 Construction of buildings in bushfire prone areas* are applicable for the proposed development.

The proposed development is an infill development as defined within *Planning for Bush Fire Protection 2019* and this report has been prepared in accordance with the submission requirements of section A2.2 Appendix 2 of that document.

Bushfire Attack Summary
Lot 2 DP 787827
2115 – 2131 Castlereagh Road,
Penrith NSW 2750

Vegetation Formation	Forest to the south Grassland to the East
Vegetation Slope	0 degrees or upslope through the forest / south 0 degrees and level land through the grassland / east
Building Separation Distance metres	≥ 24 metres to the forest ≥ 35 metres to the grassland
Separation Slope	0 degrees and level land to both forest and grassland hazards
Fire Danger Index	100
AS 3959 Construction Standard	Building EW1 & EW2 BAL 12.5 Building PW2 Roof & east, west and south elevations BAL 29 Building PW2 north elevation BAL 19 The awning attached to building PW2 extends marginally closer to the southern boundary than the building walls. In accordance with section 3.2.2 of AS3959 – 2018 the awning shall be constructed to BAL 40 requirements. Car Park PC3 BAL 29

The proposal and the recommendations contained within this report can provide for conformity to *Planning for Bush Fire Protection 2019* and therefore will assist in providing a reasonable level of bushfire protection and improve but not guarantee the chances of building survival, or provision for the occupants with a safe refuge during the passage of a bushfire front and or the provision of a defendable space for fire fighters.

1.0 Introduction

We have been engaged by AAPT10 Pty Ltd to prepare a bush fire hazard assessment report to be a supplement for inclusion in an application for the proposed construction of a commercial, industrial and warehouse development with internal access and associated multi-level car parking upon the subject site.

The site has been identified as being bushfire prone land and therefore the legislative requirements for bushfire protection to the proposed development are applicable.

The proposed development is an infill development as defined within *Planning for Bush Fire Protection 2019* and this report has been prepared in accordance with the requirements of *Section 4.14 of the Environmental Planning and Assessment Act 1979.*

1.1 Purpose of Report

- To determine the vegetation type, the expected fire behaviour and the threat to the proposal; and
- To assess the proposal with reference to *Planning for Bush Fire Protection 2019;* including identifying any required asset protection zones, defendable space, suitable access and service supply (water electricity and gas) with respect to bushfire protection and
- To determine the level of construction with reference to *AS 3959-2018 Construction of buildings in bushfire prone areas;* and
- To identify any other such measures as to improve the chances of building survival during a bushfire event; and
- To assist the consent authority Penrith City Council in the determination of the development application subject to this proposal.

1.2 Scope of Report

The scope of this report is limited to the Bushfire Hazard Assessment for the proposed development and only contains recommendations for the subject property. Where reference is made to adjacent or adjoining lands, this report does not purport to assess those lands; rather it may discuss bushfire progression on and through those lands with the possible bushfire impact to the subject property and the proposed development.

1.3 Regulatory Controls

The preparation of this report has given consideration to the various legislative and regulatory requirements including the *Environmental Planning and Assessment Act 1979*, the Building Code of Australia, *Planning for Bush Fire Protection 2019, AS 3959-2018 Construction of buildings in bushfire prone areas*.

Section 8.3.1 of *Planning for Bush Fire Protection 2019* (PBP) states that the Building Code of Australia (BCA) for Class 5 – 8 and 10 buildings does not provide for bushfire specific performance requirements and as such the deemed to satisfy provisions of *AS 3959-2019 Construction of buildings in bushfire prone areas* must only be considered when meeting the aims and objectives of PBP.

The general fire safety construction provisions are normally taken as acceptable solutions however construction requirements for bush fire protection will need to be considered on a case-by-case basis. The aims and objectives of PBP also apply with respect to other matters such as access, water and services, emergency planning and landscape/vegetation management.

Specifically, the objectives of PBP 2019 are to;

(i) afford the occupants of any building adequate protection from exposure to a bush fire;
(ii) provide for a defendable space to be located around buildings;
(iii) provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
(iv) ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
(v) provide for ongoing management and maintenance of BPMs; and
(vi) ensure that utility services are adequate to meet the needs of fire fighters.

Section 8.3.10 PBP states that the construction standards of AS3959 – 2018 applicable under Chapter 7 of PBP should be used as a base for the development of a package of bushfire protection measures. Each development will be assessed on its own individual merits.

The NSW RFS has been applying the provisions of AS 3959-2018 to ensure adequate bushfire protection particularly with respect of resistance to ember attack and therefore to conform with section 8.3.10 PBP this report will recommend a level of construction relative to the AS3959 - 2018 standard.

1.4 Methodology

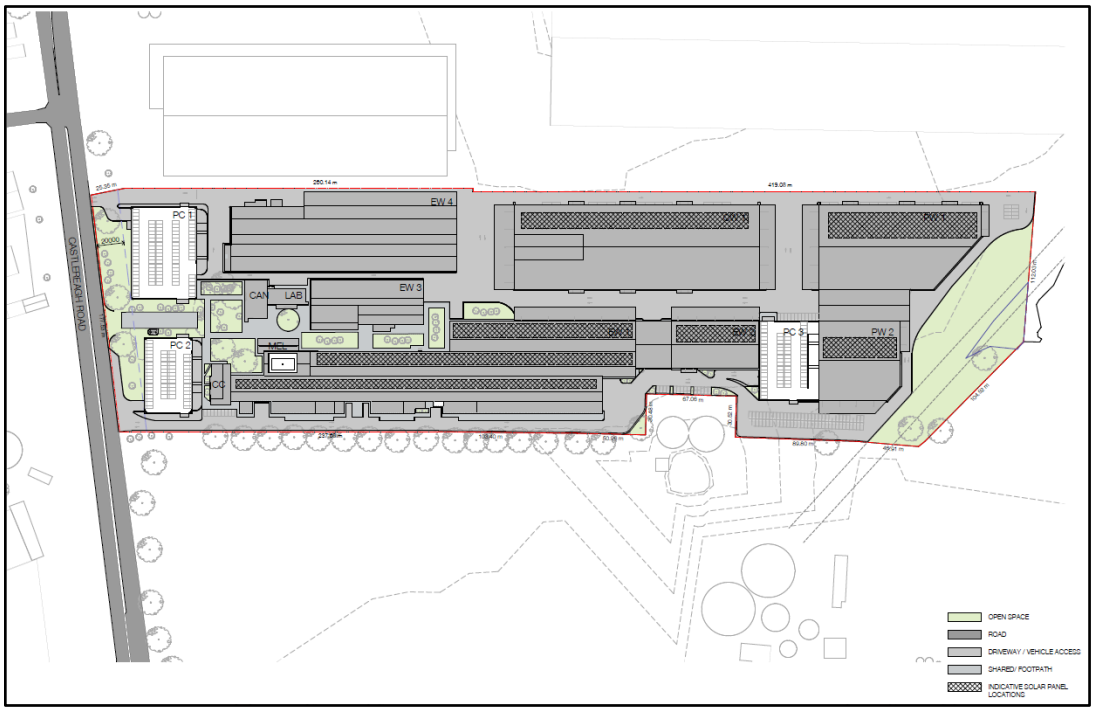
A site inspection for the purpose of assessing bushfire related matters affecting this site was conducted on the 3rd December 2020 and a review of the proposed construction plans as prepared by SJB Architects Job No: 6348 Sheets: DA-0102 Existing site plan, DA-0103 Site Plan, DA-0105 Site Staging & DA-0121 Overall Elevations and sections has taken place.

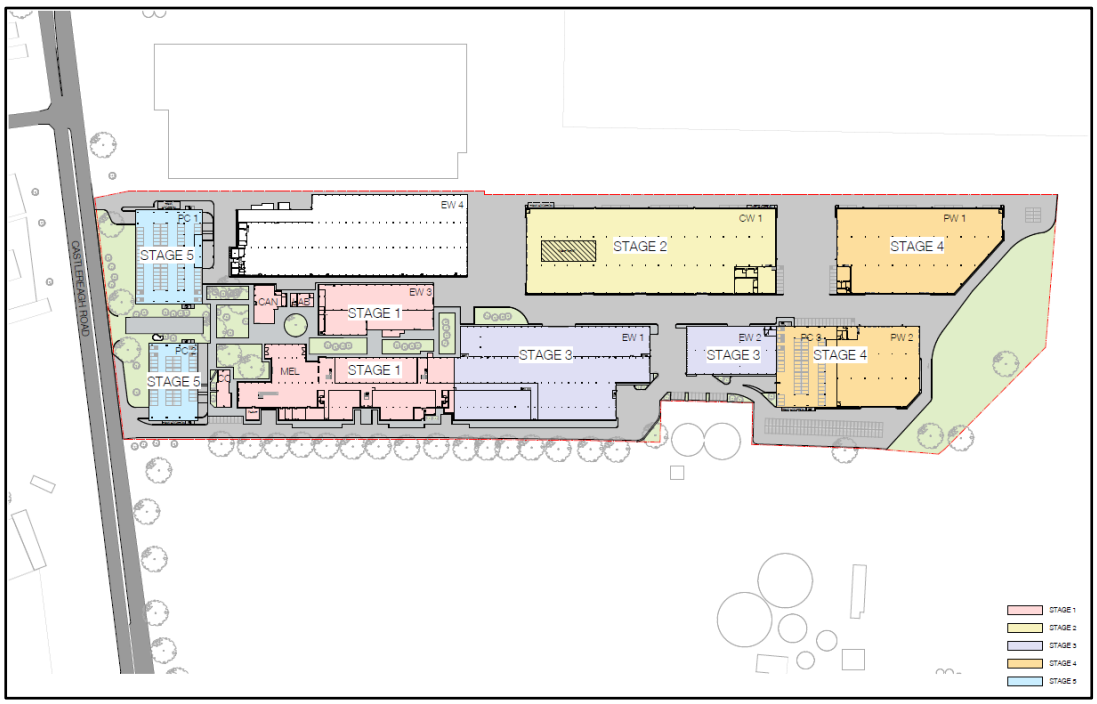
An assessment of slope was conducted out to a distance of 100 metres and assessment of vegetation was conducted out to a distance of 140 metres from the proposed development.

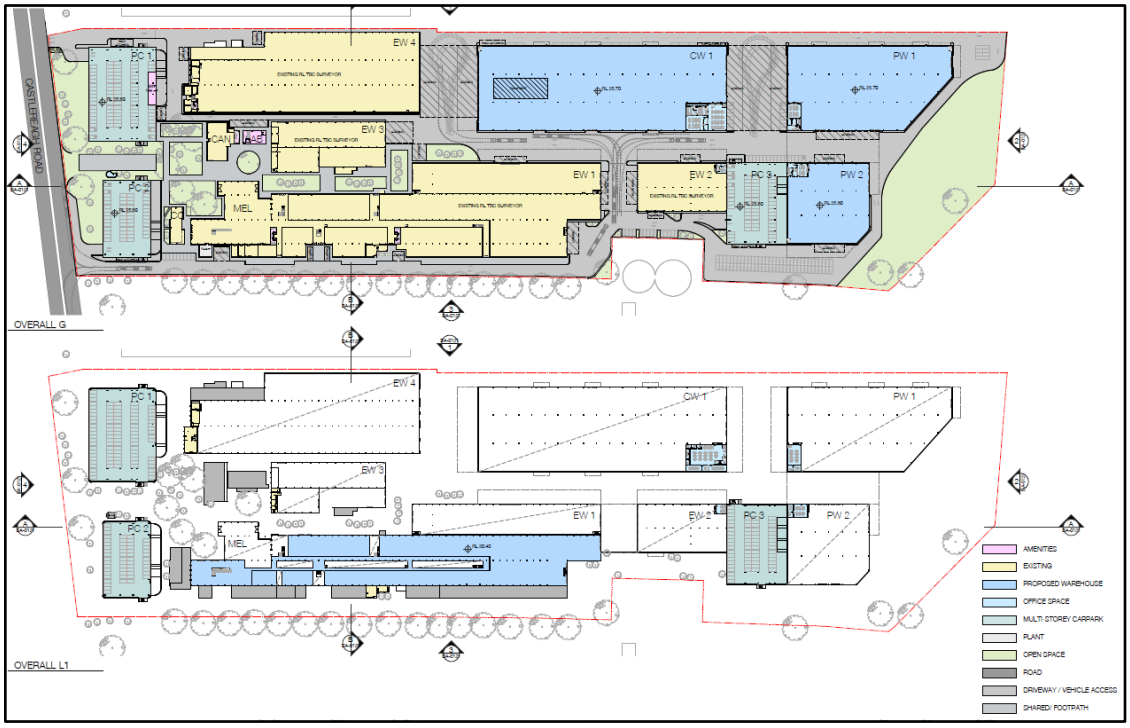
The findings were related and assessed with reference to Appendix 1 *Planning for Bush Fire Protection 2019* for the formulation of the Bushfire Hazard Assessment and Table A1.12.5 has been applied to determine construction requirements under *AS 3959-2018 Construction of buildings in bushfire prone areas*.

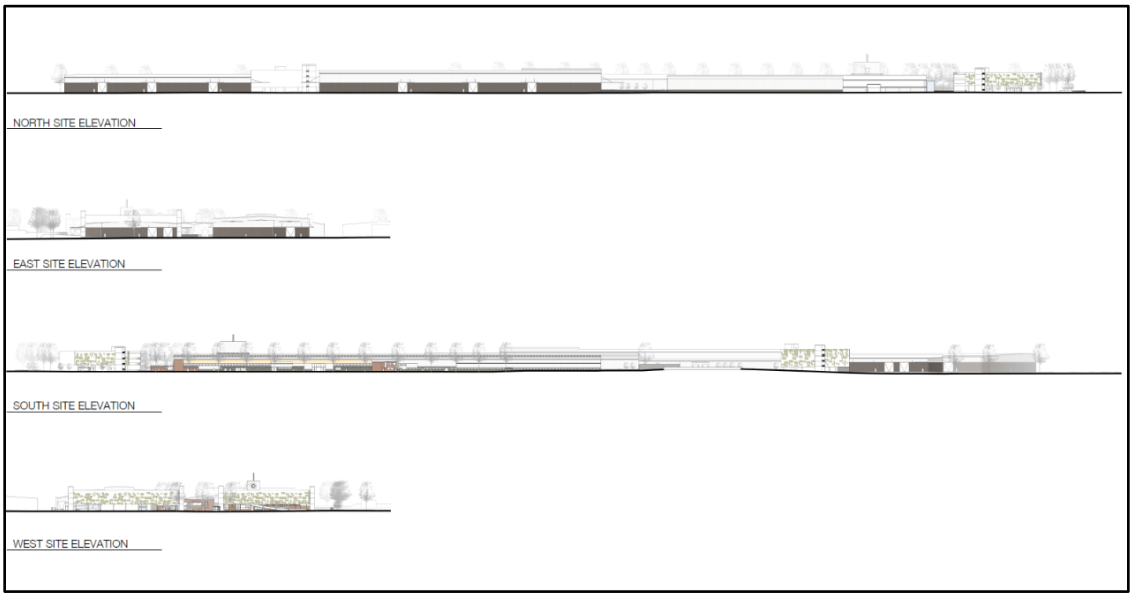
1.5 The Proposal

The proposal as indicated by consultation with SJB Architects and perusal of plans supplied shows the development to be the construction of several large commercial industrial and warehouse style buildings in several stages. Three multi-level car parks will be provided within the site and new internal access roads will provide truck and car access around the property to each car park and industrial building. Mezzanine levels are provided within each building.









2.0 Site and Adjacent Developments

The following seeks to describe the site, the adjoining lands and land uses effective upon the development proposal.

2.1 Site Description

The site is identified as	Lot 2 DP 787827 2115 – 2131 Castlereagh Road, Penrith NSW 2750 LGA Penrith City Council

The site is an industrial zoned allotment of approximately 121,000 m² in size and is located on the eastern side of Castlereagh Road at Penrith. The subject allotment contains existing buildings associated with industrial uses and the proposal is to modify parts of the existing development and extend the development over the residual vacant western and eastern portions of the site. This proposal assumes that the entirety of the subject site can and will be managed as an asset protection zone / inner protection area.

The adjoining land to the north, south and east is zoned for similar purposes. To the southeast the neighbouring property is SP2 zoned land occupied by Penrith Water Recycling Plant (Sydney Water Sewerage Treatment Plant). To the south the land is predominantly vacant managed grass's and the bushfire prone land map incorrectly identifies this area as Category 2 Vegetation. A site inspection identified an additional bushfire threat not recognised on the bushfire prone land map located to the southeast within the SP2 zoned land occupied by Penrith Water Recycling Plant.

To the north and northeast, the neighbouring site contains a large warehouse and hardstand areas and is devoid of any significant native vegetation. The bushfire prone land map also incorrectly identifies this area as Category 2 Vegetation. To the west is Castlereagh Road and beyond Castlereagh Road the properties are also occupied by various commercial / industrial complex's and these sites are also devoid of any significant native vegetation.

Provision of mains reticulated water supply, electricity, gas and phone is available to the proposal by existing infrastructure.

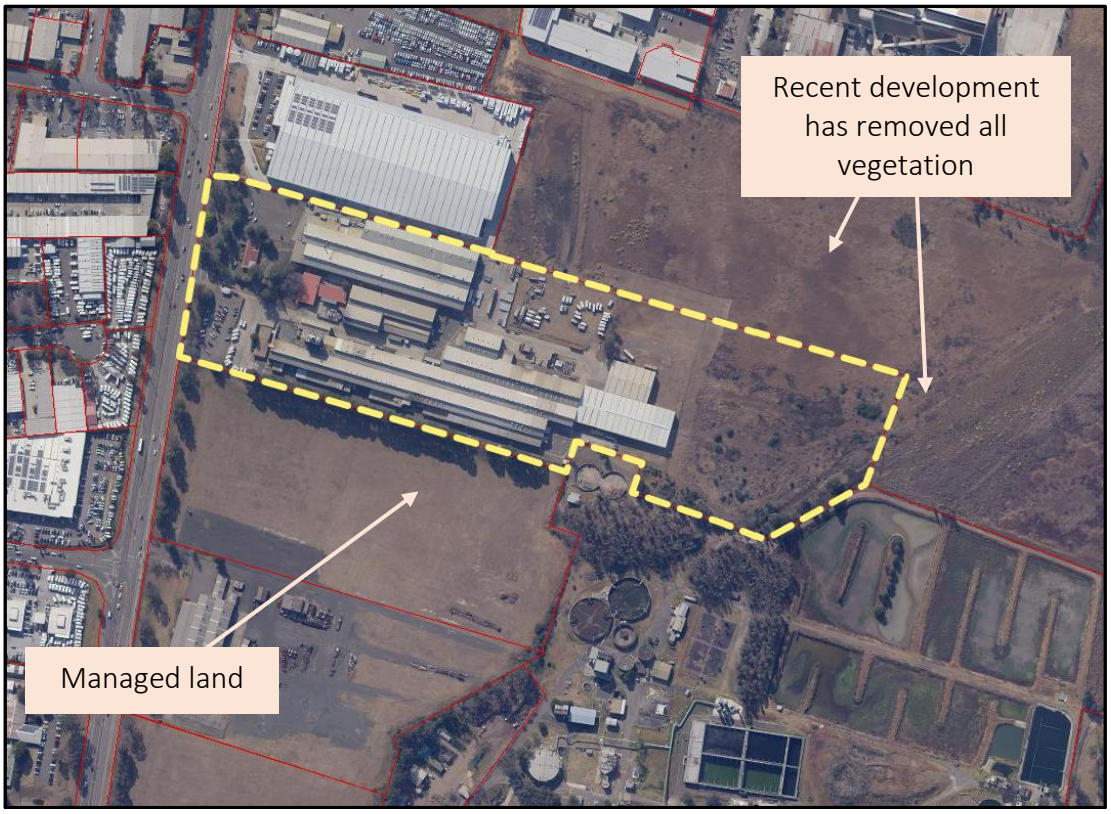


Figure 01: Aerial image extract from NSW Planning Portal

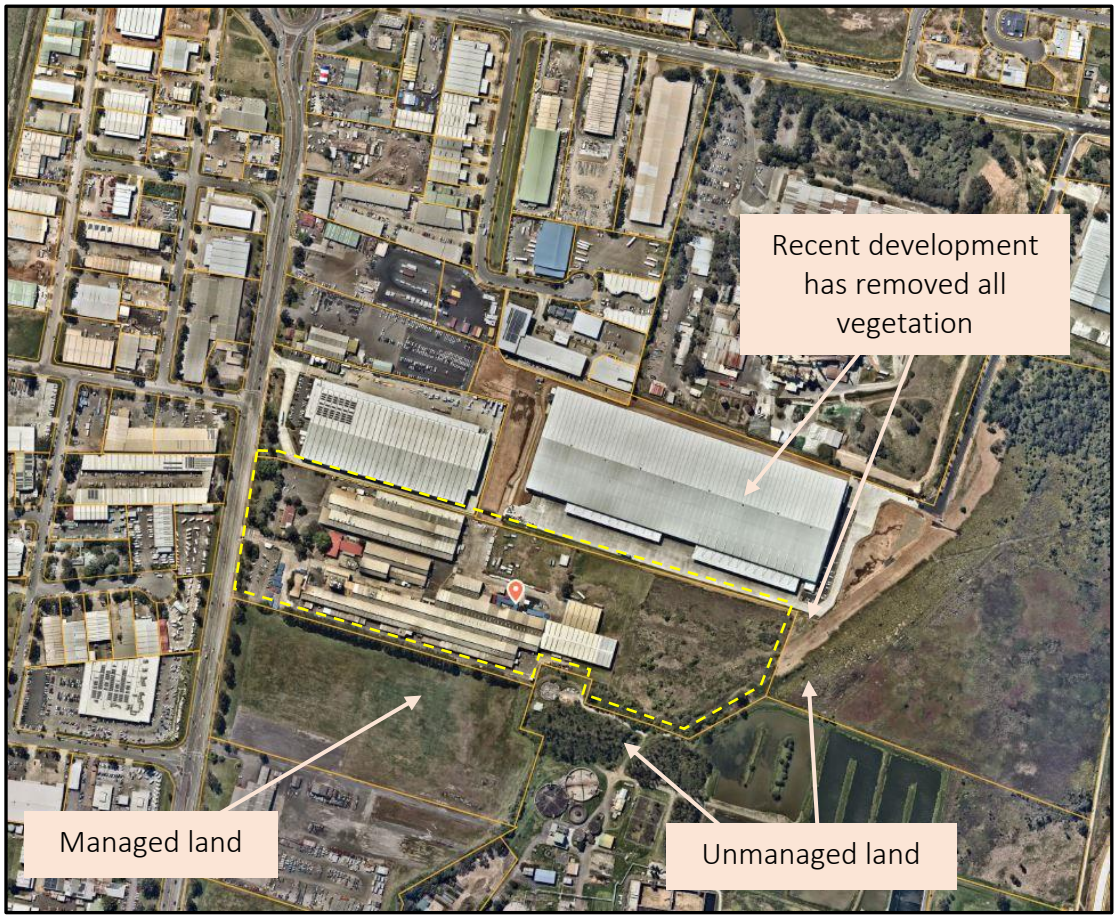


Figure 02: Aerial image extract from Nearmaps

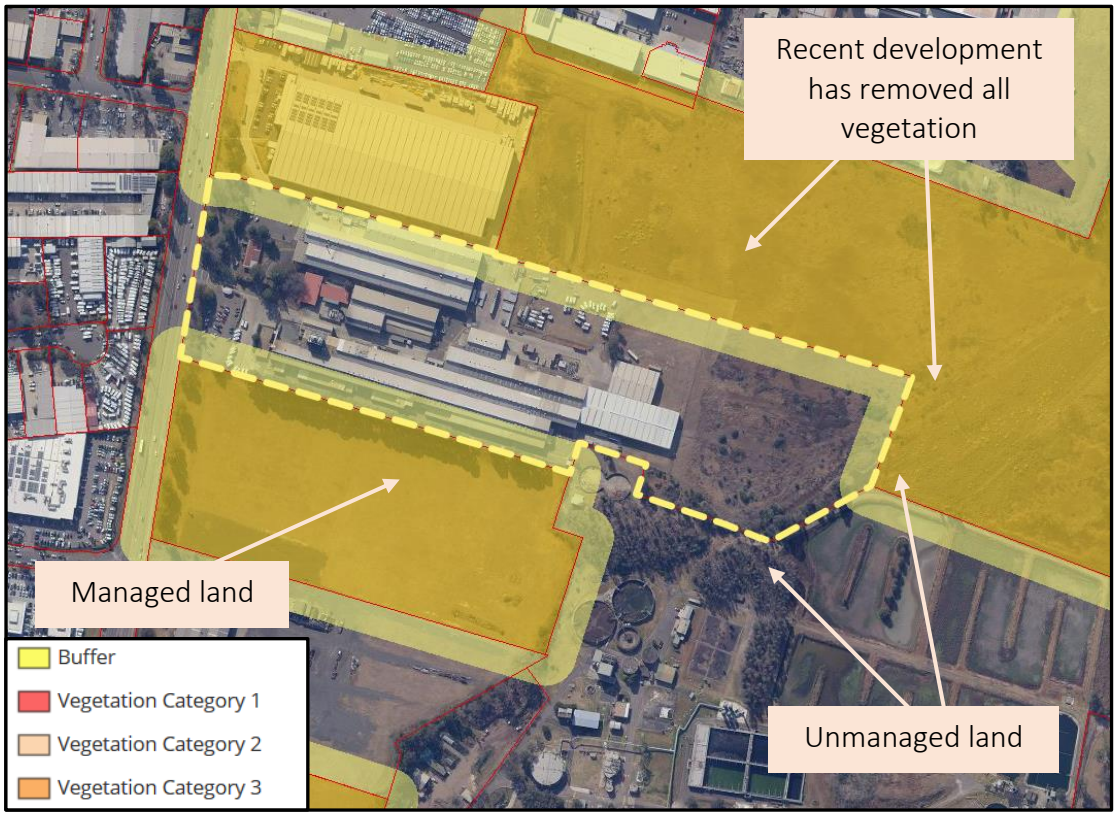


Figure 03: Extract of Council's Bushfire Prone Land Map from Dept Lands Property Information

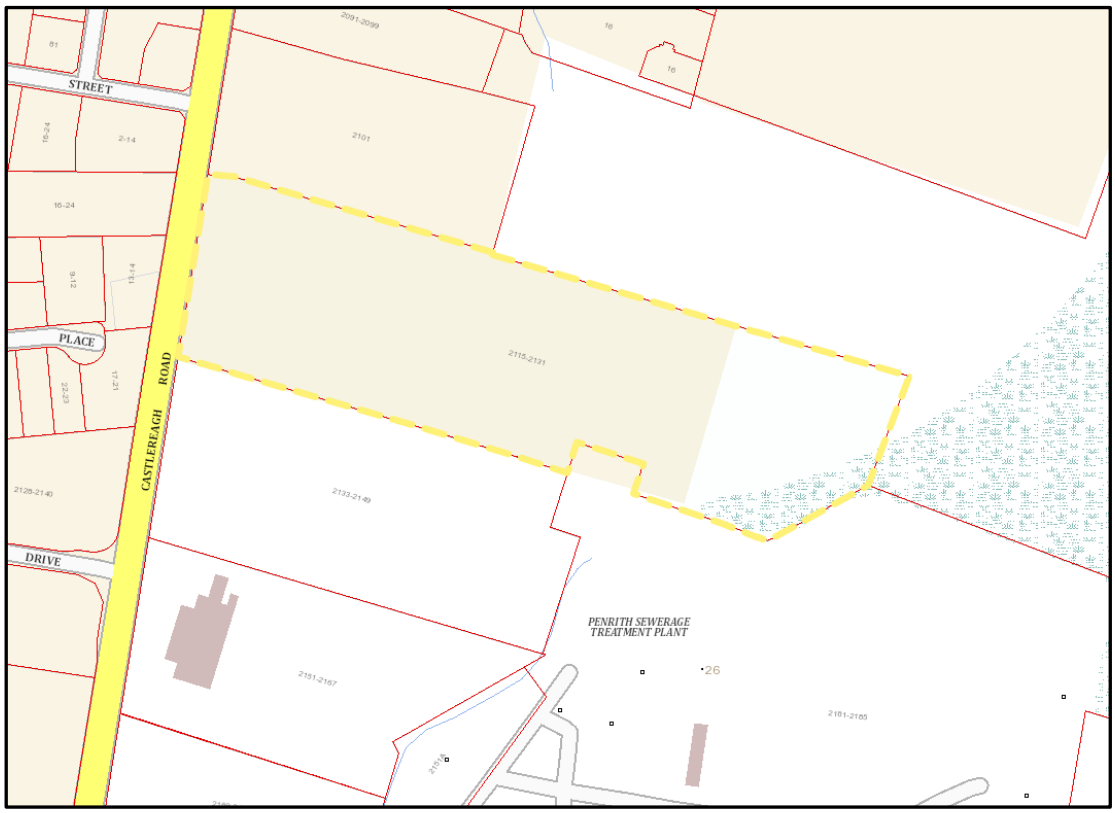


Figure 04: 10 metre topographic data from NSW Gov. SIXMaps Spatial Data

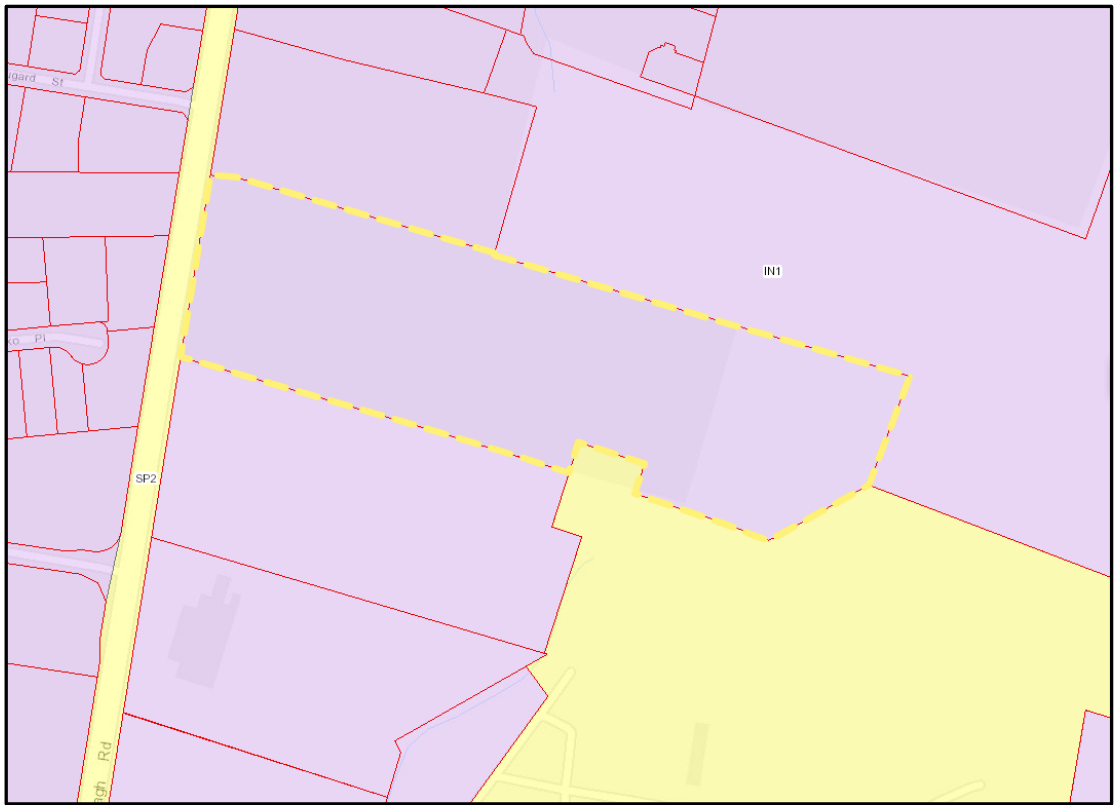


Figure 05: Extract of Council's LEP Zones Land Map from Dept Lands Property Information

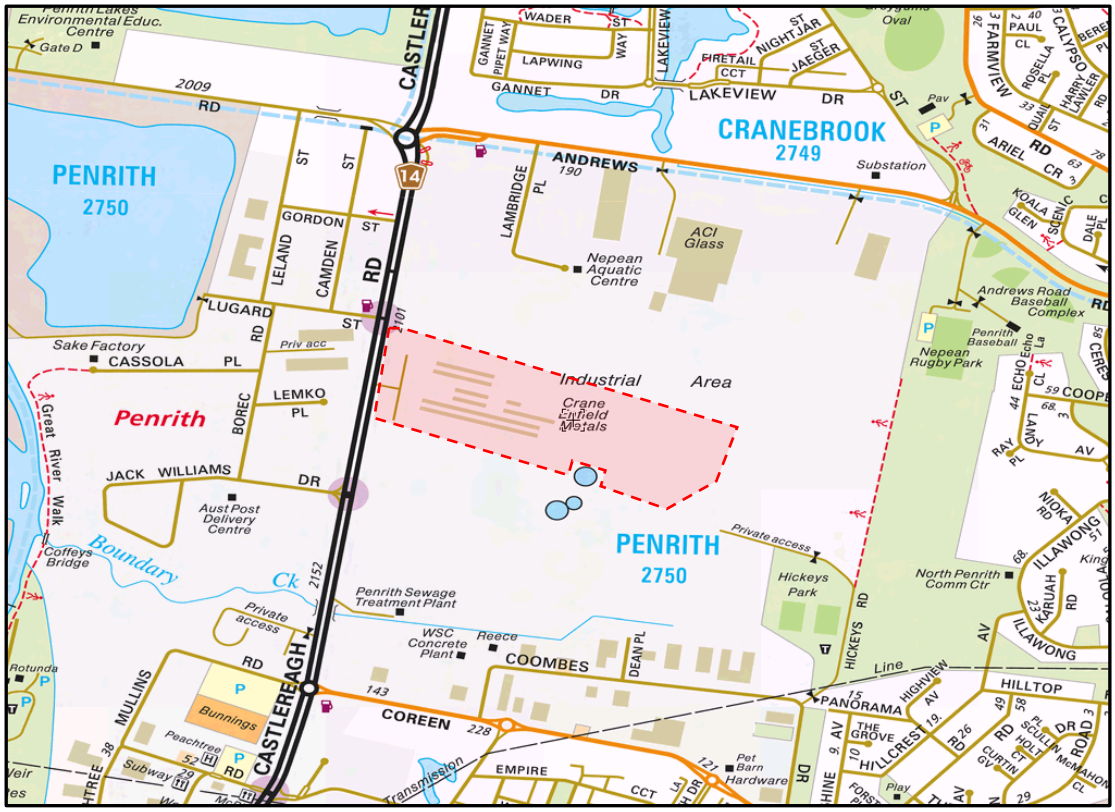


Figure 06: Extract from street-directory.com.au

3.0 Environmental Considerations

The scope of this report has not been to provide an environmental survey although this report will be a supplement to a Statement of Environmental Effects as part of the development application process.

The proposal is located on a site that has been partially cleared and past land uses have resulted in disturbance of the vegetation onsite. This proposal does not change the intended land use or increase the expected level of occupancy arising from the underlining zoning principles of the property.

The proposed scope of works does not necessitate the removal of any significant sections of native forest or woodland vegetation to satisfy the recommendations for asset protection zones.

This bushfire assessment will recommend a defendable space for fire fighters around the building envelopes including a recommendation that where not built upon all grounds within the subject site is to be maintained as an asset protection zone, inner protection area (IPA).

4.0 Bushfire Hazard Assessment

The bushfire hazard assessment was conducted for the proposed development using the procedures as outlined in *Planning for Bush Fire Protection 2019* section 8.3.10 and Appendix 1 procedure to determine the bushfire attack level (BAL) likely upon the development.

4.1 Classification of Vegetation and Separation Distance from Proposed Development

The vegetation was assessed for a distance of 140 metres from the proposed development / building footprints in each of the following directions.

To the east of the proposed development is unmanaged grasslands intermixed with weeds and other non-native varieties. The height of this vegetation was found to be 200- 400 mm with no emergent shrubs or trees. This area should be classified as being a vegetation formation of Grassland.

A site inspection also identified an additional bushfire threat not recognised on the bushfire prone land map located to the southeast within the SP2 zoned land occupied by Penrith Water Recycling Plant. This vegetation was found to be scattered emergent eucalypts above an understorey of smaller native trees and shrubs with a high degree of weed infestation. The vegetation measured greater than 1 ha and provided fire runs of greater than 50 metres and, in terms of section A1.10 & A1.11 pf PBP 2019, does not qualify for low threat exclusions or remnant classification. This area should be classified as being a vegetation formation of Forest. An internal road within the Water Recycling Plant separates this vegetation from the subject site partway along the south-eastern boundary.

4.2 Slope Assessment

The slope was assessed for a distance of 100 meters within the bushfire hazardous vegetation and reference to slope classifications has been undertaken considering the procedure specified within Appendix 1 of PBP.

The effective slope of the land, out to a distance of 100 metres from the proposed scope of works (that is, the slope of the land most likely to influence bushfire behaviour for the purposes of calculating the Category of Bushfire Attack and Asset Protection Zones), has been assessed onsite (using a clinometer) and desktop analysis as being;

- 0 degrees level land to the east of the subject site
- 0 degrees or upslope to the southeast of the subject site

The slope within the subject site and asset protection zones was generally flat level land in all areas.

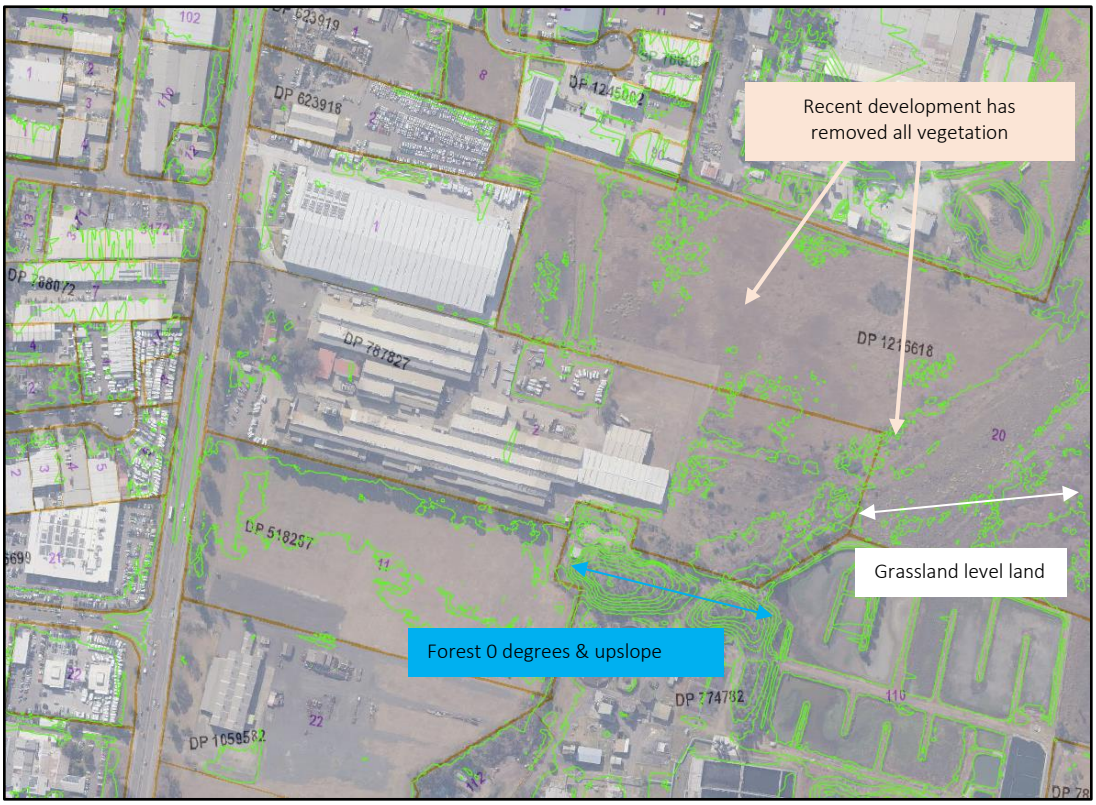


Figure 7: 1 m contour data / Geoscience Australia Elevation Foundation Spatial Data

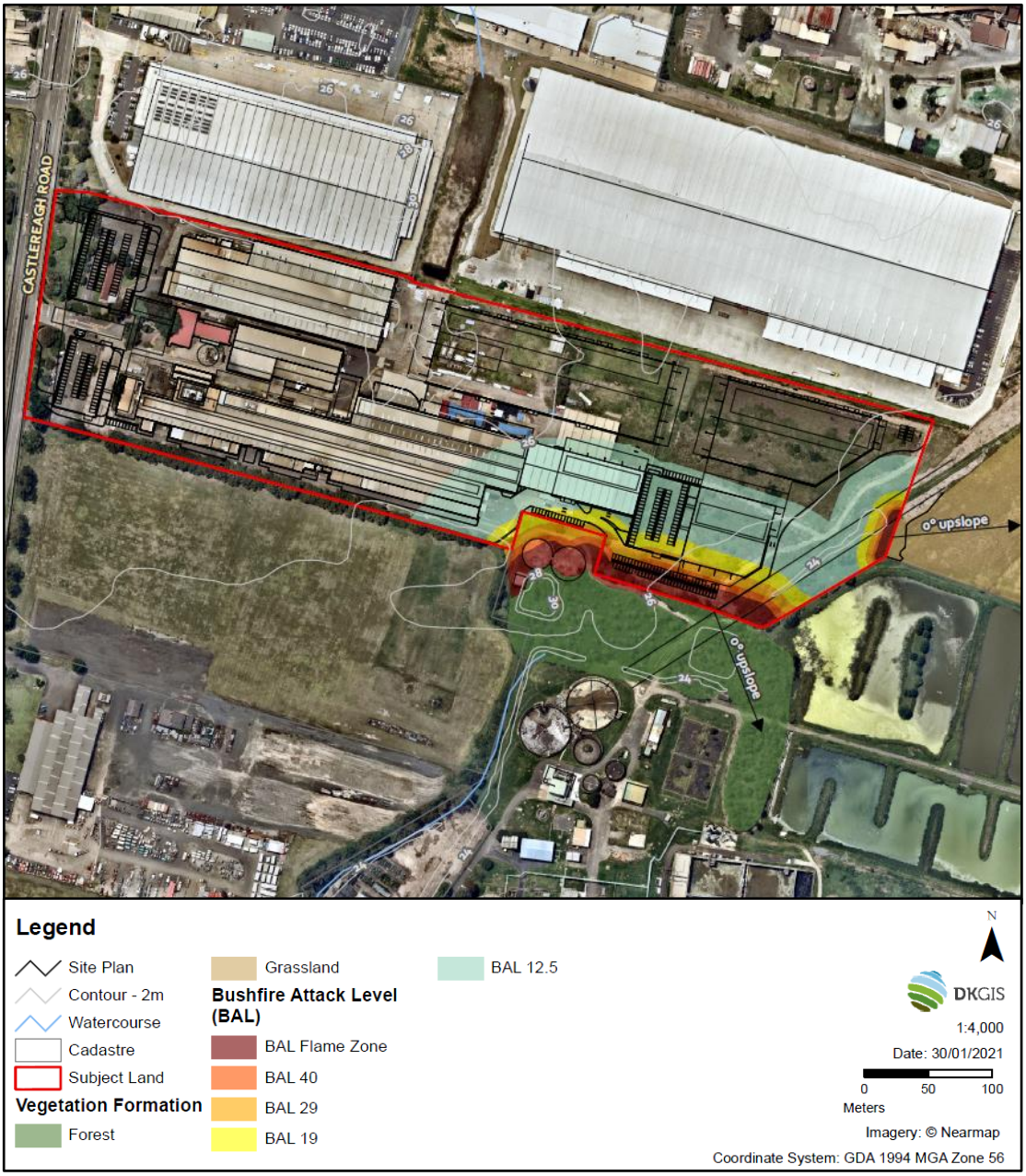
4.3 Category of Bushfire Attack

The bushfire attack level (BAL) for the proposed development was determined by using the information gathered with respect to the classification of the vegetation, the effective slope and provision of asset protection zones specified in this report with reference given to the Appendix 1 Table A1.12.5 of *Planning for Bush Fire Protection 2019.*

Bushfire Attack Summary

Vegetation Formation	Forest to the south Grassland to the East
Vegetation Slope	0 degrees or upslope through the forest to the south 0 degrees and level land through the grassland to the east
Building Separation Distance metres	≥ 24 metres to the forest ≥ 35 metres to the grassland
Separation Slope	0 degrees and level land to both forest and grassland hazards
Fire Danger Index	100

AS 3959 Construction Standard	Building EW2 BAL 12.5 Building PW2 Roof & east, west and south elevations BAL 29 Building PW2 north elevation BAL 19 The awning attached to building PW2 extends marginally closer to the southern boundary than the building walls. In accordance with section 3.2.2 of AS3959 – 2018 the awning shall be constructed to BAL 40 requirements. Car Park PC3 BAL 29



5.0 Assessment of the extent to which the development conforms or deviates from *Planning for Bush Fire Protection 2019*

The proposed development will conform to the requirements of *Planning for Bush Fire Protection 2019* when considered in conjunction of both the proposal supplied for this assessment and the recommendations arising from this bushfire hazard assessment report.

5.1 Asset Protection Zones

The provision of asset protection zones for the proposed building footprints to satisfy the aims and objectives of *Planning for Bush Fire Protection* 2019 and section 8.3.10 and Chapter 7 of that document are provided for onsite.

The proposed development can provide an asset protection zone of ≥24 metres to the southeast and ≥ 35 metres to the eastern boundary. The asset protection zones are such that the proposed buildings falls within the BAL 29 or less area. When determining the asset protection zone and BAL applicable from the southeast aspect the internal road within the Water Recycling Plant partway along the south-eastern boundary is included as land equivalent to an asset protection zone.

This report will recommend a defendable space for fire fighters around the building envelope including a recommendation that, where not built upon, all grounds within the subject site is to be maintained as an asset protection zone, inner protection area (IPA).

The following is a summary of the requirements for an asset protection zone inner protection area as described within the documents *Planning for Bush Fire Protection* 2019 and NSW RFS *Standards for Asset Protection Zones*.

Inner Protection Areas (IPAs)

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

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens. When establishing and maintaining an IPA the following requirements apply:

Trees

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

Shrubs

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

Grass

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

5.2 Position and Design of Proposed Development

The design and siting of the proposed building must take into consideration the actual bushfire risk and this report contains recommendations to assist in mitigating the mechanisms of bushfire attack.

5.3 Construction Level

The Building Code of Australia contains both the performance requirements and the 'deemed to satisfy' provisions relating to construction of class 1, 2 & 3 buildings that are proposed for *construction in bushfire prone areas.* To satisfy the performance provision P2.3.4 of the Building Code of Australia Vol. 2, a Class 1a building that is constructed in a designated bushfire prone area must be designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes.

Australian Standard 3959-2018 Construction of buildings in bushfire prone areas is referenced by the BCA as the deemed to satisfy construction standard for residential dwellings in designated bushfire prone areas with the exception that in NSW the requirements shall be varied to comply with the section 7.5.2 of *Planning for Bushfire Protection 2019.*

However, the Building Code of Australia (BCA) for commercial buildings does not provide for bushfire specific performance requirements and as such the deemed to satisfy provisions of *AS 3959-2018 Construction of buildings in bushfire prone areas* is not strictly applicable.

Section 8.3.1 of *Planning for Bush Fire Protection 2019* (PBP) states that the Building Code of Australia (BCA) for Class 5 – 8 and 10 buildings does not provide for bushfire specific performance requirements and as such the deemed to satisfy provisions of *AS 3959-2019 Construction of buildings in bushfire prone areas* must only be considered when meeting the aims and objectives of PBP.

The general fire safety construction provisions are normally taken as acceptable solutions however construction requirements for bush fire protection will need to be considered on a case-by-case basis. The aims and objectives of PBP also apply with respect to other matters such as access, water and services, emergency planning and landscape/vegetation management.

Specifically, the objectives of PBP are to;

(vii) afford the occupants of any building adequate protection from exposure to a bush fire;
(viii) provide for a defendable space to be located around buildings;
(ix) provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
(x) ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
(xi) provide for ongoing management and maintenance of BPMs; and
(xii) ensure that utility services are adequate to meet the needs of fire fighters.

Section 8.3.10 PBP states that the construction standards of AS3959 – 2018 applicable under Chapter 7 of that document should be used as a base for the development of a package of bushfire protection measures. Each development will be assessed on its own individual merits.

The NSW RFS has been applying the provisions of AS 3959-2018 to ensure adequate bushfire protection particularly with respect of resistance to ember attack and therefore to conform with section 8.3.10 PBP this report will recommend a level of construction relative to the AS3959 - 2018 standard.

To ensure that adequate bushfire protection is incorporated into the construction techniques to resist the mechanisms of bushfire attack this report recommends that the construction subject to this development application is as follows:

Any new external works on existing buildings EW1 & EW2 shall be constructed to a minimum standard of section 3 Construction General and section 5 BAL 12.5 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 12.5 construction.

Proposed building PW2 roof and southern, western and eastern facades shall be constructed to a minimum standard of section 3 Construction General and section 7 BAL 29 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 29 construction.

Proposed building PW2 northern facade shall be constructed to a minimum standard of section 3 Construction General and section 6 BAL 19 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 19 construction

Proposed carpark PC3 shall be constructed to a minimum standard of section 3 Construction General and section 7 BAL 29 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 29 construction.

The additional construction requirements detailed within section 7.5.2 of PBP 2019 are also applicable to all new works.

The construction plans included within this assessment do not reflect the detail for the requirements of AS 3959-2018 this will be undertaken by others.

5.4 Access / Egress

It should be considered by the occupants that during a major bushfire event the following may occur;

- That there may not be adequate fire authority resources to protect this development or others in the general area.

Whilst all fire authorities will endeavour to assist all occupants and protect all buildings during major bushfire events this is not always possible and cannot be guaranteed.

5.4.1 To the Proposed Development

The access to the subject site is from Castlereagh Road which is a sealed two way / four lane road in a well maintained condition and, under normal circumstances, should provide adequate access and egress for both occupants and emergency service vehicles.

Castlereagh Road is a through road and connects to main road infrastructure to the north and a main arterial road (Great Western Highway) to the south. These routes are not impinged by any bushfire hazardous vegetation and should be adequate to afford the building occupants the ability to evacuate the area to a location not being directly implicated by the mechanisms of bushfire attack.

5.4.2 Within the Site

The site plan for the proposal shows that vehicle access will be provided to all areas of the site via existing and proposed new internal road infrastructure. Traffic enters and exits to and from Castlereagh Road at a single point on the western boundary.

The intent of measures required by PBP is to *provide safe access to / from the public road system for firefighters providing property protection during a bush fire and for occupants faced with evacuation*. The performance requirement is that *access to properties is provided in recognition of the risk to fire fighters and / or evacuating occupants*.

The most distant external point of the building footprints will be greater than 70 metres from a public road supporting a hydrant network and therefore the Property Access requirements detailed in PBP should be provided.

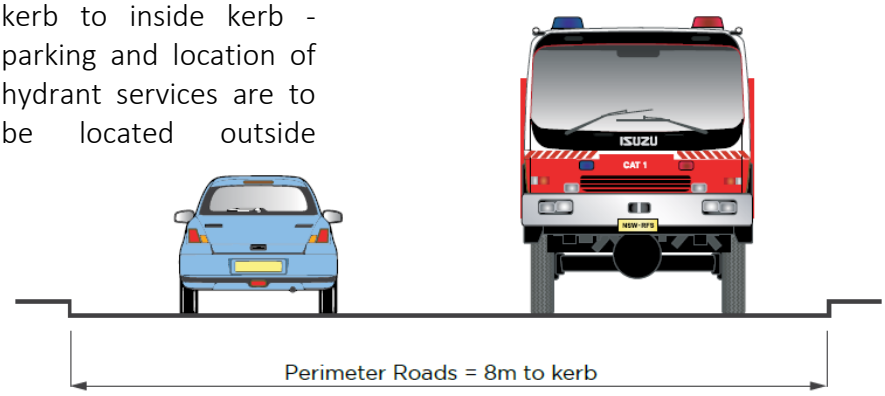
The applicable Rural Fire Service requirements of PBP for the development are;

- property access roads are two-wheel drive, all-weather roads; and
- traffic management devices are constructed to not prohibit access by emergency services vehicles; and
- maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; and
- all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; and

Perimeter roads **applicable adjacent to the southeast forest and east grassland areas**:

- perimeter roads are two-way sealed roads; and
- 8m carriageway width kerb to kerb; and
- parking is provided outside of the carriageway width; and
- hydrants are located clear of parking areas; and
- there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and
- curves of roads have a minimum inner radius of 6m; and
- the maximum grade road is 15° and average grade is 10°; and
- the road crossfall does not exceed 3°; and
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided

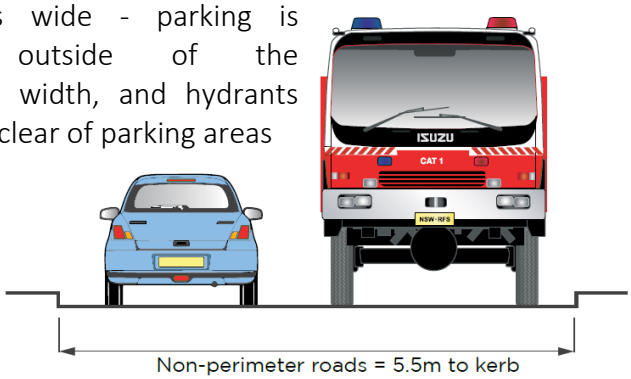
Perimeter road widths:
8 metres wide - inside kerb to inside kerb - parking and location of hydrant services are to be located outside



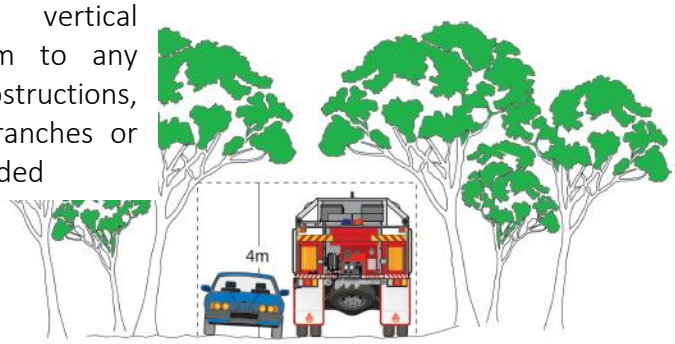
Non-perimeter roads **applicable to all other new internal roads:**

- minimum 5.5m width kerb to kerb; and
- parking is provided outside of the carriageway width; and
- hydrants are located clear of parking areas; and
- roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and
- curves of roads have a minimum inner radius of 6m; and
- the road crossfall does not exceed 3°; and
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

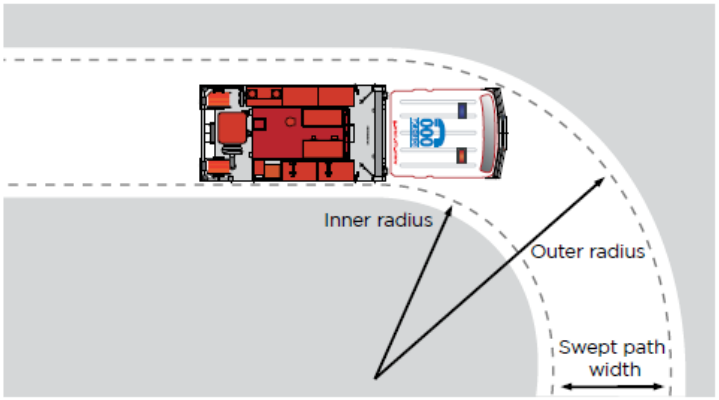
Non perimeter road widths:
5.5 metres wide - parking is provided outside of the carriageway width, and hydrants are located clear of parking areas



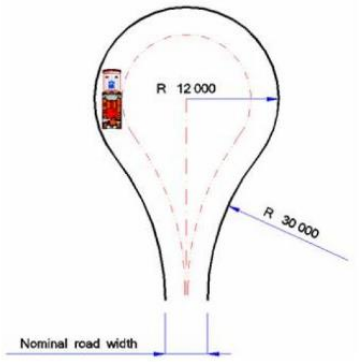
A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches or buildings, is provided



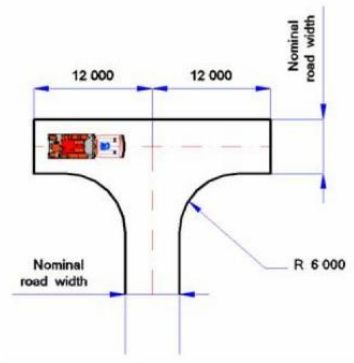
Swept path width for turning vehicles



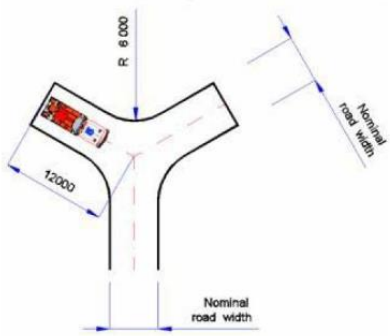
Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
> 100	2.5



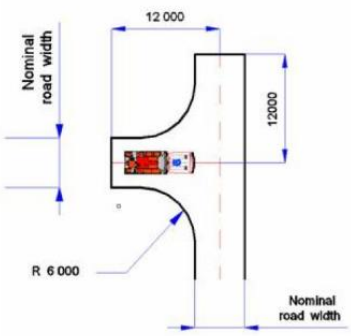
Type A



Type B



Type C



Type D

5.5 Utility Supplies

5.5.1 Water

Castlereagh Road is serviced by a mains reticulated water system and a site inspection confirms that hydrants are located in Castlereagh Road and the subject site itself.

It is envisaged that as a part of the overall approvals and consent for this development water supplies will be supplied in accordance with Part E of the Building Code of Australia (BCA).

Where necessary this will include the installation of hydrants complying with the requirements of AS2419:2017. This will ensure that adequate services of water for the protection of future buildings during and after the passage of bush fire are supplied.

5.5.2 Electricity

The site inspection noted that within this locality the supply of electricity is by above ground cabling. The new connection of electricity to the proposed development is to comply with Table 7.4a of *Planning for Bush Fire Protection 2019*, in particular;

- 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.*

5.5.3 Gas

An online check indicates gas supply is available in this area. The installation of any new reticulated, tank or bottled gas supply to service the development of the site is required to comply with Table7.4a of *Planning for Bush Fire Protection 2019*. In particular the location and design of gas services shall be such that it will not lead to ignition of surrounding bushland or the fabric of buildings.

- bottled gas is 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; and
- above-ground gas service pipes are metal, including and up to any outlets.

5.6 Landscaping

It is probable that landscaping and garden establishment may occur on the site. However, no future planting of trees or shrubs, or combustible landscaping features should be undertaken or constructed in a manner which allows for a potential compromise to the integrity of the asset protection zone.

All landscaping should be in accordance with the NSW RFS document *Standards for asset protection zones*.

- When creating and maintaining a garden that is part of an APZ you should:

  a) Ensure that vegetation does not provide a continuous path to the buildings;
  b) Remove all noxious and environmental weeds;
  c) Plant or clear vegetation into clumps rather than continuous rows;

d) Prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
e) Rake and clear fuel from areas under fences, fence posts and gates and trees;
f) Provide suitable impervious areas immediately surrounding buildings such as courtyards, paths and driveways.
g) Provide grassed areas/mowed lawns/ or ground cover plantings in close proximity to buildings.
h) Locate vegetation far enough away from the buildings so that plants will not ignite the buildings by direct flame contact or radiant heat emission;
i) Plant and maintain short green grass around the buildings as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the buildings;
j) Ensure that shrubs and other plants do not directly abut the buildings. Where this does occur, gardens should contain low-flammability plants
k) Not use organic mulch in garden beds adjacent buildings and non-flammable material should be used instead, e.g. Scoria, pebbles, recycled crushed bricks.
l) Not erect brush type fencing and planting "pencil pine" type trees next to buildings, as these are highly flammable. Compliance with the NSW RFS Fast Fact 2/06 Dividing Fences is best practice in bushfire prone areas.

5.7 Emergency Procedures

Preparation of procedures and actions by individuals and occupants of lands within bushfire prone areas has clearly been shown to increase chances of personal safety and building survival should a bushfire event occur.

Bushfire evacuation procedures should be included within any developed emergency management plan for the site or, if no such plan exists, a bushfire evacuation plan should be prepared in accordance with the current NSW RFS guidelines.

6.0 Bushfire Hazard Assessment Recommendations

1. That where not built upon, all grounds within the subject site are to be maintained as an asset protection zone, inner protection area in accordance with Appendix 4 of *Planning for Bush Fire Protection 2019* for the lifetime of the development.

2. That landscaping features, planting of shrubs, trees or other vegetation shall occur in such a manner as not to compromise the integrity of the asset protection zone and comply with the NSW RFS document *Standards for asset protection zones.*

3. That the any new external works on existing buildings EW1 & EW2 shall be constructed to a minimum standard of section 3 Construction General and section 5 BAL 12.5 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 12.5 construction.

4. That proposed building PW2 roof and southern, western and eastern facades shall be constructed to a minimum standard of section 3 Construction General and section 7 BAL 29 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 29 construction.

5. That building PW2 northern facade northern facade shall be constructed to a minimum standard of section 3 Construction General and section 6 BAL 19 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 19 construction

6. That proposed carpark PC3 shall be constructed to a minimum standard of section 3 Construction General and section 7 BAL 29 of *AS 3959 – 2018 Construction of buildings in bushfire prone areas* or NASH Standard (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas 2014* as appropriate for BAL 29 construction.

7. That the additional construction requirements detailed within section 7.5.2 of PBP 2019 are also applied to all new works.

8. That where applicable services and equipment (fire protection measures) are to be provided to and within the proposed buildings in accordance with Part E of the Building Code of Australia.

9. That the supply of water, electricity and gas to the subject buildings is to comply with Table 7.4a of *Planning for Bush Fire Protection 2019*.

10. That all new internal access is to comply with is to comply with Table 5.3b of *Planning for Bush Fire Protection 2019*. Perimeter road requirements are applicable adjacent to the southeast forest and east grassland areas and non-perimeter road requirements are applicable to all other new internal roads:

7.0 Conclusion

This assessment has been undertaken with respect to applying bushfire requirements for the proposed construction of a commercial, industrial and warehouse development with internal access and associated multi-level car parking upon the subject site.

The objectives and performance requirements for the proposed development as required by the document *Planning for Bush Fire Protection 2019* will be achieved by the incorporation of the recommendations and findings contained within this report as consent conditions within the approval conditions for the subject development.

The proposal, when combined with these recommendations, has included a package of bushfire protection measures which will assist in providing a reasonable level of bushfire protection and improve but not guarantee the chances of building survival, or provision for the occupants with a safe refuge during the passage of a bushfire front and or the provision of a defendable space for fire fighters.

Site inspection and report preparation by

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FPA Australia Certified BPAD-A Practitioner

Caveat

Quote from *Planning for Bush Fire Protection 2019*, '*Due to a range of limitations, the measures contained in this document do not guarantee that loss of life, injury and/or property damage will not occur during a bush fire event.'*

Quote from Standards Australia, '*It should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions.'*

References

Planning for Bush Fire Protection 2019 Planning NSW in conjunction with NSW Rural Fire Service

National Construction Code Volume 2 2019 Australian Building Codes Board

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Landscape and building Design for Bushfire Areas Ramsay C. & Rudolph L. CSIRO 2003

Quantifying bushfire penetration into urban areas in Australia Keping Chan & McAneny J. Geophysical Research Letters, Volume 31, L12212, doi:10.1029/2004GL020244,2004

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Standards for Asset Protection Zones NSW Rural Fire Service 2005

Ocean Shores to Dessert Dunes Keith D. Department of Environment and Conservation Sydney 2004

List of attachments

Attachments 01 Site Bushfire Attack Level Overlay