BLACKASH
BUSHFIRE CONSULTING

Bushfire Hazard Assessment Industrial Development

Warehouse Development at 128 Andrew Road, Penrith

Prepared for
Cadence Property

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BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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Project Number	J000102
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Contents

1. Summary

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

Table 1 Summary

Can this proposal comply with AS3959, 2009 + addendum to Appendix 3 of *Planning for Bushfire Protection 2006*?	AS3959, 2009 does not apply as a DTS Provision
Does this development comply with the requirements of *Planning for Bushfire Protection 2006*?	YES
Does this development comply with the Aims and objectives of *Planning for Bushfire Protection 2006*?	YES
Is Council referral to the NSW RFS required?	NO

2. Introduction

Cadence Property has engaged Blackash Bushfire Consulting to complete a Bushfire Assessment Report for a proposed 50,000sqm Warehouse Development at 128 Andrew Road, Penrith (see Figure 1). The proposed development is shown in Figure 2.

The site is identified as 'bushfire prone land' for the purposes of Section 10.3 of the *Environmental Planning and Assessment Act 1979* (**EPA Act**) and the legislative requirements for building on bushfire prone lands are applicable. It is captured by Section 4.14 of the EPA Act.

Planning for Bush Fire Protection 2006 (**PBP 2006**) recognises non-residential development as "other development." As "other" development (Warehouse: Class 7B and Office: Class 5), the proposed warehouse development is addressed through demonstrating compliance with the aim and objectives of PBP 2006.

Under the building classification system within the National Construction Code (**NCC**), Class 5 to 8 buildings include offices, shops, factories, warehouses, public car parks and other commercial and industrial facilities. Class 10 includes non-habitable buildings and structures such as garages, carports, swimming pools and fences.

The NCC does not provide for any bushfire specific performance requirements for these particular classes of building. As such the Australian Standard for Buildings in Bushfire Prone Areas (**AS3959**) and the NASH Standard are not considered as a set of 'deemed to satisfy' provisions. However, compliance with AS3959 and NASH have been considered when meeting the aims and objectives of PBP 2006.

All development on bushfire prone land must consider and comply with PBP 2006. Industrial development has considerable flexibility and the nature of the development (i.e. concrete tilt slab construction) often results in the structures providing a higher degree of bushfire resistance than required by the RFS.

Industrial and commercial subdivisions that permit a residential house (caretaker's residence) to be constructed are considered as residential development by PBP and require a Bushfire Safety Authority. A Bushfire Safety Authority is an approval required for subdivision from the Rural Fire Service (RFS) Commissioner as identified in Section 100B of the Rural Fires Act 1997 (RF Act). Where no residential provision is intended, these requirements do not apply.

A risk-based landuse planning lens has been applied to this development which allows for the consideration of bushfire risk to be embedded within decision-making processes, allowing decisions to reflect the potential of an area to be developed and measures to be incorporated to reduce risk to a tolerable level. It balances the development expectation associated with the land with mitigating bushfire risk to an acceptable level which is provided through PBP 2006.

This assessment has been completed by Lew Short, a Level 3 certified BPAD practitioner (BPAD 16373).

A site inspection was completed on 12 October 2018.

This assessment includes an analysis of the hazard, threat and subsequent risk to the proposal and provides recommendations that satisfy the Aims and Objectives of PBP.

3. Aim and Objectives of Planning for Bushfire Protection

All development on Bush Fire Prone Land must satisfy the aim and objectives of PBP 2006.

The **aim** of PBP is to use the NSW development assessment system to provide for the protection of human life (including firefighters) and to minimise impacts on property from the threat of bush fire, while having due regard to development potential, on-site amenity and protection of the environment.

More specifically, the **objectives** are to:

> *(i) afford 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 direct flame contact and material ignition;*
> *(iv) ensure that safe operational access and egress for emergency service personnel and residents is available;*
> *(v) provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ); and*
> *(vi) ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting).*

A summary of compliance is provided in Section 7 of this report.

4. Revision of Planning for Bushfire Protection 2006

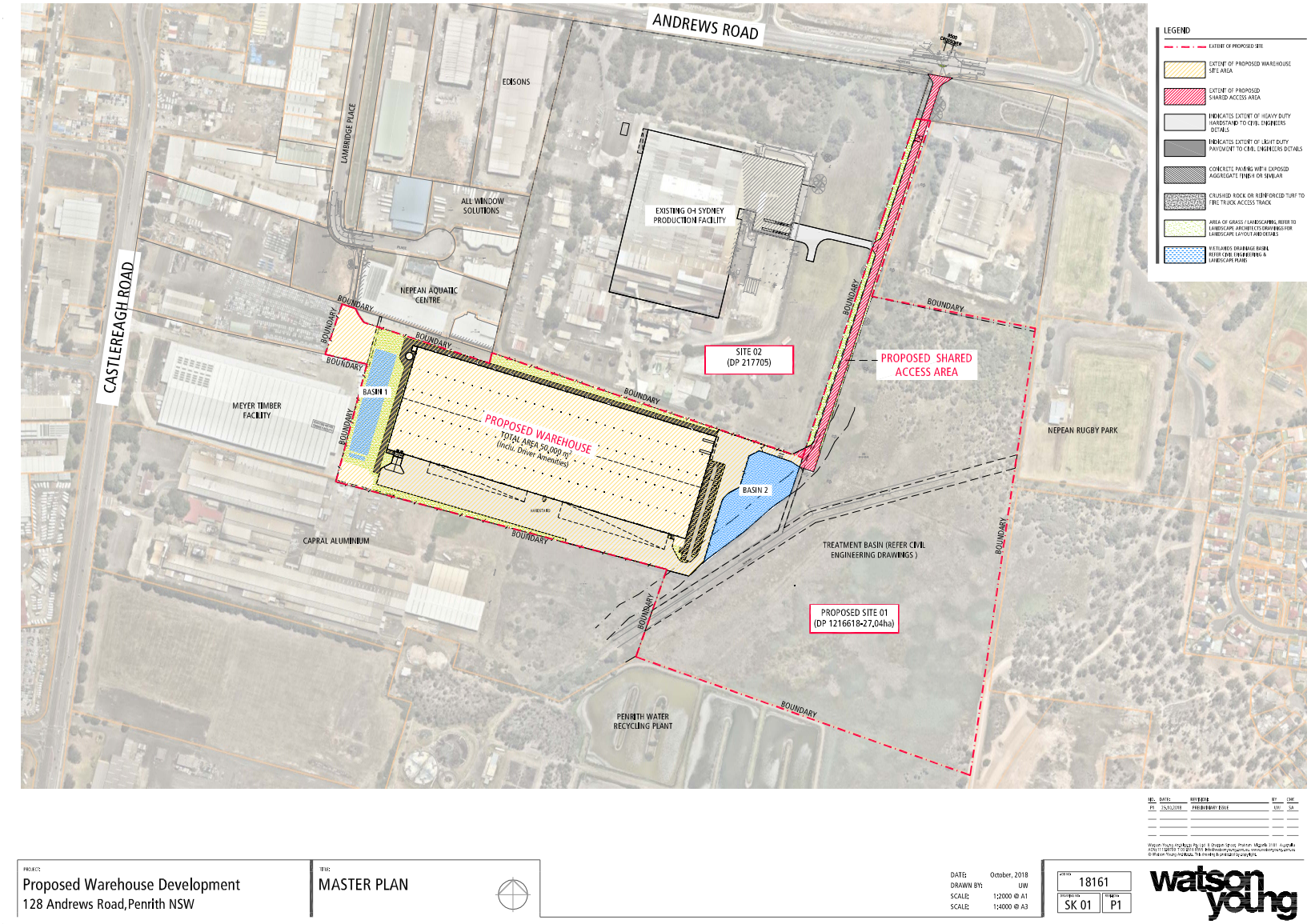
The RFS has reviewed PBP 2006. It is anticipated that PBP 2018 will become legislated by mid 2019, to coincide with the enactment of the National Construction Code 2019. Until then, PBP 2018 is in a 'pre-release' stage, also known as the transitionary period.

Until PBP 2018 becomes legislated, PBP 2006 will remain the legally referenced document and PBP 2018 can be used on a performance basis in consultation with NSW RFS only.

This application has not utilised the performance requirements of PBP 2018.

Figure 1 Site Location

Figure 2 Proposed Warehouse Plan



5. Bushfire Prone Land

Section 10.3 of the EPA Act require mapping of Bushfire Prone Land. Bushfire prone land maps provide a trigger for the development assessment provisions and consideration of sites that are bushfire prone. Bushfire prone land (BFPL) is land that has been identified by council, which can support a bushfire or is subject to bushfire attack. Bushfire prone land maps are prepared by local council and certified by the Commissioner of the NSW RFS.

Figure 3 shows the Penrith City Council Bushfire Prone Land Map for the site. It has Category 1 vegetation to the north east of the site, with the remainder of the site being Category 2 vegetation. Category 1 vegetation is also off site to the east. The Bushfire Prone Land Map is considered a fair representation of the capability of the area to carry fire.

Vegetation Category 1[1] is considered to be the highest risk for bush fire. It is represented as red on the bush fire prone land map and will be given a 100m buffer. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production. Vegetation Category 1 consists of:

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

The Category 1 vegetation within the site is forested wetland and the land to the east of the site is Cumberland Plain Woodland. See Figure 4.

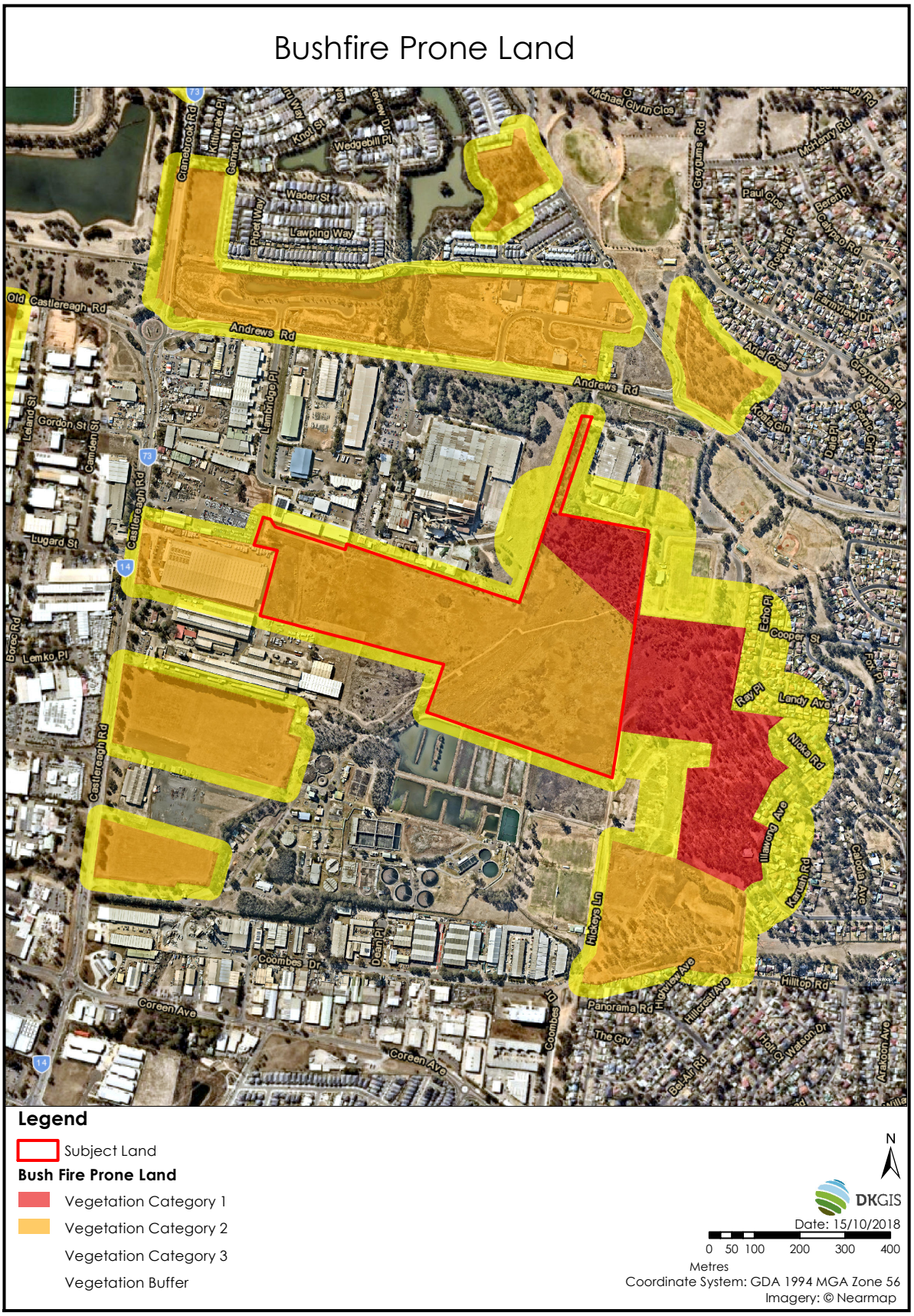
Vegetation Category 2[1] is considered to be a lower bush fire risk than Category 1 and Category 3 but higher than the excluded areas. It is represented as light orange on a bush fire prone land map and will be given a 30 metre buffer. This vegetation category has lower combustibility and/or limited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

- Rainforests.
- Lower risk vegetation parcels. These vegetation parcels represent a lower bush fire risk to
- surrounding development and consist of:
    - Remnant vegetation;
    - Land with ongoing land management practices that actively reduces bush fire risk. These areas must be subject to a plan of management or similar that demonstrates that the risk of bush fire is offset by strategies that reduce bush fire risk; AND include:
        - Discrete urban reserve/s;
        - Parcels that are isolated from larger uninterrupted tracts of vegetation and known fire
        - paths;
        - Shapes and topographies which do not permit significant upslope fire runs towards development;
        - Suitable access and adequate infrastructure to support suppression by firefighters;
        - Vegetation that represents a lower likelihood of ignitions because the vegetation is surrounded by development in such a way that an ignition in any part of the vegetation has a higher likelihood of detection.

The category 2 land within the site is freshwater wetland. See Figure 4.

[1] Guide for Bushfire Prone Land Mapping

Figure 3 Bushfire Prone Land Map



6. Site Assessment Methodology

The Bushfire Assessment Report is based on both a site inspection (12 October 2018) and desktop assessment of the site utilising the following resources:

- *Planning for Bushfire Protection* (NSW RFS, 2006);
- Aerial mapping;
- Detailed GIS analysis

This assessment is based on mapping of vegetation formations and slope assessment in accordance with PBP 2006.

Bushfire risk as influenced by fire history and future mitigation strategies (e.g. hazard reduction burning) has no bearing on the determination of bushfire protection strategies for future development at the sites. This is due to the fact that PBP 2006 assesses bushfire protection based purely on vegetation and slope (i.e. hazard and not risk), making the assumption that a fire may occur at a near worst-case scenario (one in fifty year event).

The methodology used in this assessment is in accordance with PBP 2006 and is outlined in the following sections.

6.1. Bushfire Hazard

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

The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site and which determine the planning and building response of PBP 2006.

6.2. Vegetation

Predominant Vegetation is classified by structure or formation using the system adopted by Keith (2004) and by the general description using PBP 2006. Vegetation types give rise to radiant heat and fire behaviour characteristics.

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

Vegetation including trees will be removed from within the building footprint and access/ parking areas of the site (see Figure 4). The existing forested wetland and freshwater wetland will be maintained to the east of the site and it is not possible to manage these areas as they are wet and subject to ecological restrictions (refer to the report by Eco Logical Australia submitted with the application for further details).

Table 2 provides vegetation types and Table 3 shows photographic evidence supporting vegetation assessment.

Table 2 Vegetation Types from the proposed warehouse

	Aspect from the proposed warehouse			
	North	East	South	West
Vegetation	NA. Managed, industrial development.	Forested wetland along the access handle. Freshwater wetland to the east of the warehouse	Managed land to the south west of the warehouse in the form of existing industrial development. Freshwater wetland to the south east	NA. Managed, industrial development.

Figure 4 Vegetation and Slope

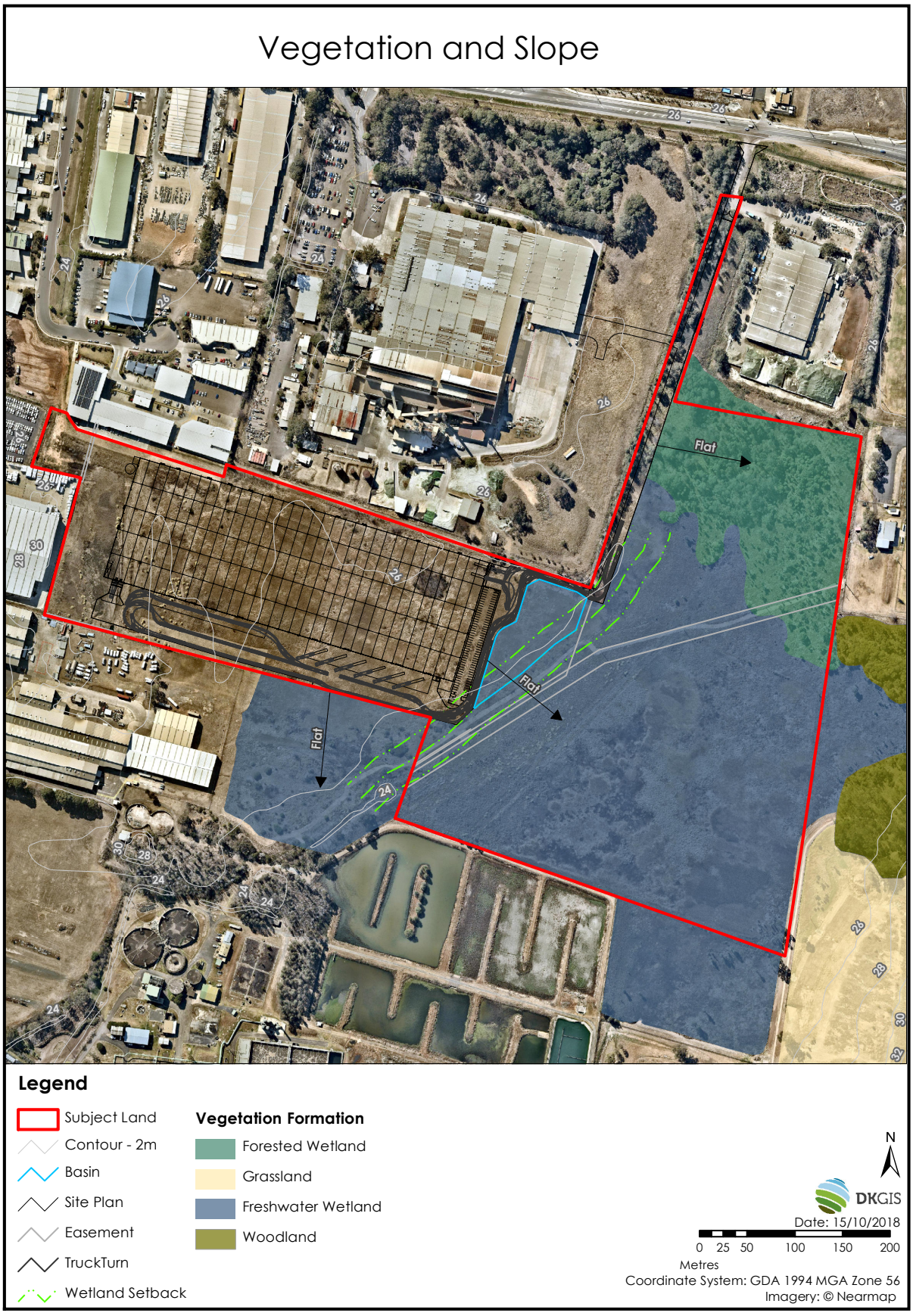


Table 3 Photographs supporting Vegetation Assessment

Photo 1
Looking from the adjoining property to the east of the site access handle from Andrew Road showing a narrow band of forested wetland Forested wetland

Photo 2
Looking from Andrew Road showing vegetation to the north of the north east of the site. Beyond the scattered trees is grassland intermixed with areas of freshwater wetland.

Photo 3
Taken east of the eastern site boundary showing tea trees associated with forested wetlands.

Photo 4
Cumberland Plain Woodland to the east of the eastern site boundary.

Photo 5
See Figure 5. This extensive area of freshwater wetland affects a significant portion of the site and cannot be developed or managed due to the extensive area of wetland.

Figure 5 Key to Photographs showing direction of image

Note: Photographs 3 and 4 are not shown on the map as they are beyond the extent shown. Photograph 3 and 4 are to the east of the image and do not affect the assessment.

6.3. Slopes Influencing Bushfire Behavior

The 'effective slope' influencing fire behaviour approaching the sites has been assessed in accordance with the methodology specified within PBP 2006. This is conducted by measuring the worst-case scenario slope where the vegetation occurs over a 100 m transect measured outwards from the development boundary or the existing/ proposed buildings.

The slope within the site and to the south of the site is flat. See Figure 4.

6.4. Fire Weather

The fire weather is dictated by PBP 2006 and assumes a credible worst-case scenario and an absence of any other mitigating factors relating to aspect or prevailing winds. The sites have a Fire Danger Index (FDI) of 100 as per PBP.

6.5. Bushfire Attack Levels

PBP 2006 Objective 3 requires that new development:

> *provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;*

Material ignition will be prevented by the use of non combustible materials in the warehouse.

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

The point of flame contact is BAL 40 in AS3959. PBP 2006 does not provide BALs that accord with the most recent version of AS3959 and ASS3959 does not provide detailed vegetation categories including forested wetland or freshwater wetland.

PBP 2006 has been used to show APZs as required to meet BAL 29 in Table A2.4 (see Figure 6). APZs can be achieved meeting the deemed to satisfy provisions of 10m for freshwater wetland and 15m for forested wetland.

As PBP 2006 does not provide for a point of flame contact or BAL 40 to be used, PBP 2018 (Figure 7) has been used as a proxy to demonstrate APZs and BAL for the proposed development. This comparison is <u>not</u> a performance based option, it has merely been used in the absence of adequate standards within PBP 2006 and lack of vegetation categories within AS3959 to demonstrate equivalence and compliance.

Figure 6 and 7 demonstrate that separation has been provided for BAL 40 to the proposed warehouse.

Figure 8 shows the Bushfire Attack Levels specifically for freshwater wetland and freshwater forest to the proposed warehouse. The proposed warehouse building is within BAL 12.5 for the eastern façade and the south eastern façade. Due to the size of the building (50,000m^2), it is proposed to only provide the required BAL to the portion of the building so affected. While AS3959 does not provide for such an approach, this is considered reasonable.

Figure 6 PBP 2006 APZ based on 29kWm2

Figure 7 APZ PBP 2018 showing BAL 40 separation distances

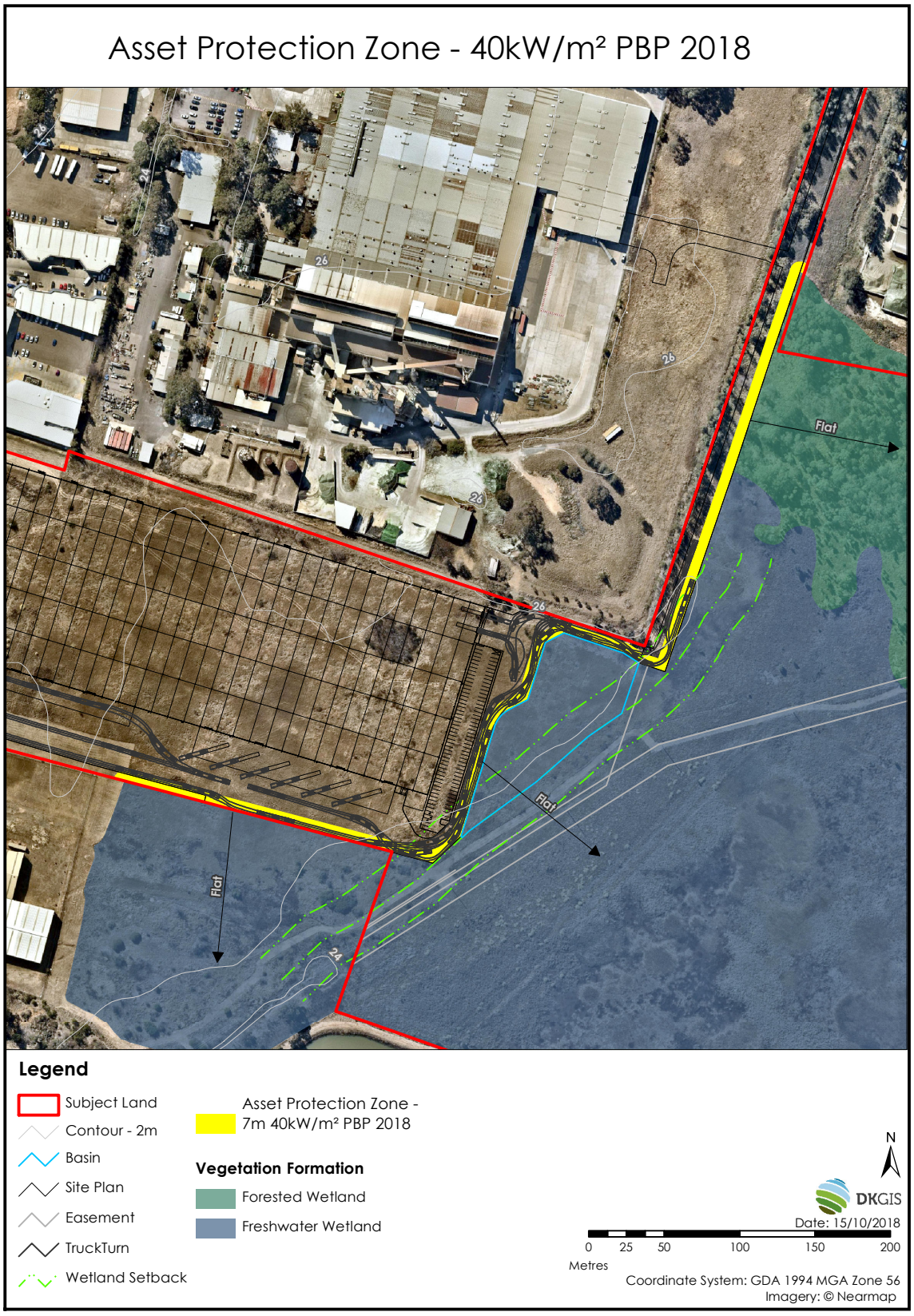
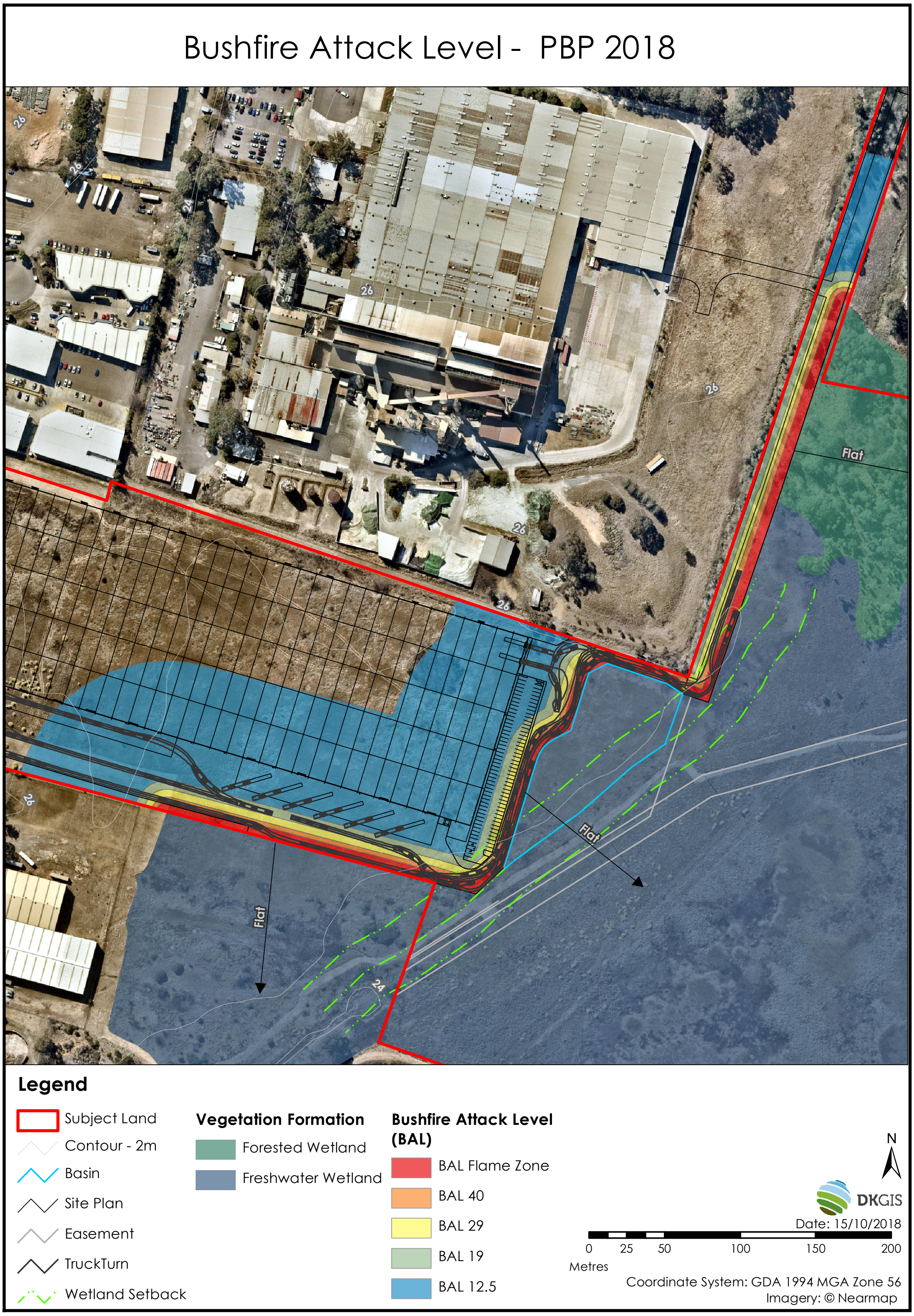


Figure 8 Bushfire Attack Levels on the proposed warehouse



7. Assessment Against the Aim and Objective of PBP

All development in Bushfire Prone Areas needs to comply with the aim and objectives of PBP. Table 2 shows the compliance with PBP.

Table 4 Compliance with Aim & Objectives of PBP

Aim	Meets Criteria	Comment
The aim of PBP is to use the NSW development assessment system to provide for the protection of human life (including fire fighters) and to minimise impacts on property from the threat of bushfire, while having due regard to development potential, onsite amenity and the protection of the environment.	Yes	Landscaping, defendable space, access and egress, emergency risk management and construction standards are in accordance with the requirements of PBP and the aims of PBP have been achieved.
Objectives	**Meets Criteria**	**Comment**
Afford occupants of any building adequate protection from exposure to a bushfire.	Yes	The warehouse development provides opportunity for all occupants to be shielded from any external bushfire. The external cladding will be: • Precast concrete dado panels of at least 2,400mm high with Colorbond metal wall cladding above precast concrete panels. Insulation: The concrete panels will be 150mm thick. The solid 150mm thick panel achieves a 180 minute FRP. The proposed construction materials are above the fire resistance levels of AS3959. Ember protection will be provided in accordance with AS3959 to prevent ember penetration into the structures on the eastern façade and the south eastern portion of the warehouse as per Figure 8.
Provide for defendable space to be located around buildings.	Yes	Defendable space is provided on all sides of the proposed development.
Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent direct flame contact and material ignition.	Yes	The precast concrete dado panels to 2,400mm with Colorbond metal wall cladding above precast concrete panels eliminates combustible elements. The construction requirement for the warehouse exceeds the minimum requirement for AS3959.
Ensure that safe operational access and egress for emergency service personnel and occupants is available.	Yes	The site has direct access to public roads, and access and egress for emergency vehicles and evacuation is adequate. The warehouse development provides for the **movement of heavy articulated trucks** about the site with passing areas provided for fire trucks if needed. Heavy articulated trucks provides access provisions, including turning areas within the site in excess of PBP 2006. The

		main access handle is 9.5 metres wide that is in excess of the requirements of PBP 2006 (see Appendix 3 for details).
Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads, in the asset protection zone.	Yes	The areas shown (shaded yellow) as APZ on Figure 7 will be managed as an APZ in accordance with Appendix 2.
Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).	Yes	Reticulated water is to be provided to the development fire hydrant spacing, design and sizing comply with the Australian Standard AS2419.1:2005, and hydrants are not located within any road carriageway, Utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).

8. Recommendations

The following recommendations are made for a proposed 50,000sqm Warehouse Development at 128 Andrew Road, Penrith:

1. **Construction Standard:** The proposed warehouse development shall be constructed in accordance with the Bushfire Attack Level 12.5 within *Australian Standard for the Construction of Buildings in Bushfire Prone Areas* (AS3959) for the eastern façade and south eastern portion of the warehouse that is identified as being BAL 12.5 as per Figure 8.
2. **No bushfire construction** is proposed for the northern and western façade or for the south western portion of the façade that is not identified as BAL 12.5 as per Figure 8.
3. **Asset Protection Zones:** At the commencement of building works and in perpetuity, an Asset Protection Zone of 7m shall be established and maintained from the edge of the wetland area toward the warehouse and along the access handle as depicted in the areas shaded yellow in Figure 7. The APZ shall be maintained in accordance with *NSW Rural Fire Service Standards for Asset Protection Zones.*
4. **Access:** 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;
    a. The access handle will be managed as an asset protection zone
    b. The access road will be 9.5m wide
5. **Water for fire fighting**: hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression, and hydrants are provided in accordance with AS 2419.1:2005
    a. a connection for firefighting purposes is located within the IPA or non hazard side and away from the structure; a 65mm Storz outlet with a ball valve is fitted to the outlet
    b. fire hose reels are constructed in accordance with AS/NZS 1221:1997 Fire hose reels, and installed in accordance with AS 2441:2005 Installation of fire hose reels
6. **Electricity:** where practicable, electrical transmission lines are underground,
7. **Gas**: reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used, and all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side, and connections to and from gas cylinders are metal, and if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion,

9. Conclusion

This report consists of a bushfire risk assessment for the proposed 50,000sqm Warehouse Development at 128 Andrew Road, Penrith NSW.

The proposed development is designated as "other" development in *Planning for Bushfire Protection 2006* and only should comply with the aim and objectives of that document. Section 7 of this document demonstrates compliance.

The site could be impacted by embers from adjoining lands to the south and east ember protection (BAL 12.5) has been proposed to the east and south east of the facility. As such, it is recommended that the proposed development will be constructed to the minimum standards required in accordance with the guidelines of *Planning for Bushfire Protection 2006*. Due to the size of the warehouse (approximately 50,000m^2), it has been proposed to reduce the construction level in accordance with AS3959 so that ember protection is only provided for the portions of the building that are within 100m from potential hazard vegetation.

This report has considered all elements of bushfire attack and provided the proposed development is constructed in accordance with the recommendations included in section 8 of this report, it is my considered opinion that the development satisfies the Aims and Objectives of Planning for Bushfire Protection 2006.

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Appendix 1 References

Australian Building Codes Board *Building Code of Australia Volumes 1&2*
Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bushfire-prone areas*

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

NSW Rural Fire Service (2015) *Guide for Bushfire Prone Land Mapping Version 5b*

NSW Rural Fire Service *Standards for Asset Protection Zones*.

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

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

Appendix 2 APZ Maintenance

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Potential bushfire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

An APZ is located between an asset and a bushfire hazard and within the subject site.

The APZs and future landscaping of the subject land will achieve the following principles:

- Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis.
- A minimal ground fuel is to be maintained to include less than 4 tonnes per hectare of fine fuel (fine fuel means ANY dead or living vegetation of <6 mm in diameter e.g. twigs less than a pencil in thickness. 4 t/ha is equivalent to a 1 cm thick layer of leaf litter).
- Grass needs to be kept short and, where possible, green
- Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.
- Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.
- The presence of a few shrubs or trees in the APZ is acceptable provided that they:
    - are well spread out and do not form a continuous canopy;
    - are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and
    - are located far enough away from future buildings so that they will not ignite the buildings by direct flame contact or radiant heat emission.
- Any landscaping or plantings should preferably be local endemic mesic species or other low flammability species.

Appendix 3 Site Plan and Shared Access Road