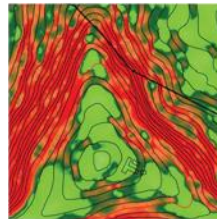


Bushfire Threat Assessment

Proposed Industrial Rezoning Development for Hydro Aluminium Lands, Kurri Kurri

February 2015



Prepared for:

Hydro Aluminium Kurri Kurri Pty Ltd

Bushfire Threat Assessment

Proposed Industrial Rezoning Development for Hydro Aluminium Lands, Kurri Kurri

Kleinfelder Job No. WBR_124055-20150719

This report was prepared for the sole use of the proponents, their agents and any regulatory agencies involved in the development application approval process. It should not be otherwise referenced without permission.

Please note:

This report is prepared in accordance with current accepted practice as described in the NSW Rural Fire Service Guide Planning for Bushfire Protection, 2006 – a Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.

This report is not an insurance policy. Owing to the unpredictable nature of bushfires and of weather conditions at the time of a bushfire, this report cannot be taken as a warranty that the recommended bushfire mitigation measures will protect the property from damage in every possible bushfire event. Ultimately, the onus is on the land owner to accept the risks associated with development on the site in light of the identified bushfire threat.

Document Control:

Revision	Description	Date	Prepared By	Reviewed By
A	Draft for client review	22/12/2014	Dan Pedersen	
B		20/02/2015	Dan Pedersen	Chelayne Evans

Kleinfelder Australia Pty Ltd

64 Medcalf Street
Warners Bay, NSW 2282
PH: 1300 881 869
FAX: 1300 881 035

ABN: 23 146 082 500

EXECUTIVE SUMMARY

Report Type:	Bushfire Threat Assessment
Site Address:	Proposed Industrial Rezoning Development for Hydro Aluminium Lands, Kurri Kurri
Client:	Hydro Aluminium Kurri Kurri Pty Ltd
Local Government Area	Cessnock City Council
Zoning under Cessnock City Council LEP Cessnock City Council	B7 Business Park and IN3 Heavy Industrial under Cessnock City Council LEP 2011

Conclusion

In general, the BCA fire safety construction provisions for 'other development' are taken as acceptable solutions and as such industrial developments do not require specified APZ setbacks and construction standards. Such developments will be assessed on the provision of the aims and objectives of PBP, and applicable performance-based controls and acceptable solutions as detailed in the PBP. These are essentially minimal defensible space (setbacks from bushfire prone vegetation), suitable access and egress, and adequate emergency water supplies.

The recommended minimum defensible space is only 10 m. This may allow some industrial buildings to be constructed within BAL-FZ (flame zone) where proposed lots directly adjoin bushfire prone vegetation. As such, all buildings within the rezoning shall be constructed from non-combustible materials including steel and/or concrete. Where these construction requirements cannot be achieved, compliance with the minimum APZ as defined in Table A2.4 of PBP (2006) shall be required; this would be assessed on a lot-by-lot basis at the development application stage (i.e. under Section 79BA of the EP&A Act 1997).

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ABBREVIATIONS AND DEFINITIONS

APZ	Asset Protection Zone	APZ are buffer zones that help to ensure that a progressive reduction in fuel occurs between the bushfire hazard and building site. This area aims to provide a defensible space and manage heat intensities at the building surface. APZ incorporate two main areas: an Inner Protection Area (IPA) and an Outer Protection Area (OPA).
BAL	Bushfire Attack Level	There are six bush fire attack levels that are used to determine the appropriate construction to be applied to a development: ○ BAL-LOW ○ BAL-12.5 ○ BAL-19 ○ BAL-29 ○ BAL-40 ○ Flame Zone (Alternative Solution required).
BCA	Building Code of Australia (now the National Construction Code [NCC] 2013, but referred to as BCA in PBP)	Provides a uniform, national approach to building codes and building standards.
BFSA	Bush Fire Safety Authority	Issued by the NSW RFS (applies to Integrated and Special Fire Protection Purpose (SFPP) developments).
DTS	Deemed To Satisfy	
FDI	Fire Danger Index	
LEP	Local Environmental Plan	
LGA	Local Government Area	
IPA	Inner Protection Area	The IPA is an area where fuels, which could become involved in a fire, are minimised, therefore reducing the impact of direct flame contact and radiant heat. An IPA should provide a tree canopy cover less than 15% and be located greater than 2 m from any part of the roofline of a dwelling. Gardens of flammable vegetation are not to be kept under trees and should be no closer than 10 m from exposed windows or doors. Trees should have lower limbs removed up to a height of 2 m above ground level.
OPA	Outer Protection Area	The OPA is adjacent to the hazard and is managed by reducing the fuel loadings. An OPA should provide a tree canopy of less than 30% and should have the understorey managed (mowed) on an annual basis in advance of the fire season. The aim is to reduce the fires' rate of spread and the likelihood of crown fire, while the remaining canopy filters embers.
PBP	Planning for Bushfire Protection	Guidelines for construction in bushfire prone areas prepared by the NSW RFS.
RFS	NSW Rural Fire Service	

1. INTRODUCTION

Under the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002* (amends the *Environmental Planning and Assessment Act 1979*) local councils are required to ensure that all developments in bushfire prone lands conform to documented bushfire protection specifications.

The following Bushfire Threat Assessment has been prepared to assist in development planning for the planned industrial areas at the Hydro Aluminium site in Kurri Kurri, NSW (Site). The preliminary development masterplan will provide for industrial and residential land, as well as environmental offset or conservation land. This report evaluates the potential bushfire threat to the proposed industrial area only. An independent assessment has been provided specifically for the residential area.

The overall landholding of the Site is 2000 hectares and over the Cessnock City Council Local Government Areas (LGA). This assessment relates to land within the Cessnock LGA.

Bushfire Prone Land Maps identifies the landholdings as having Category 1, 2 and 3 vegetation and bushfire vegetation buffers.

The site of the proposed industrial development area will be zoned B7 Business Park and IN3 Heavy Industrial under Cessnock City Council LEP 2011.

1.1 SCOPE OF ASSESSMENT

This report evaluates the potential bushfire threat to the proposed industrial area only. The assessment for the industrial subdivision provides compliance assessment for the planning and design, and recommends measures to assist the planning in achieving such compliance. It provides the applicant, Council and the Rural Fire Service (RFS) with an independent assessment of the proposed development having regard to construction within a bushfire prone area.

Recommendations in Section 4 of this report should provide a reasonable and acceptable level of bushfire safety to the proposed development, its occupants and attending fire fighters.

1.2 PROJECT DESCRIPTION

The purpose of this assessment is to provide Hydro Aluminium and Cessnock Council an understanding of the bushfire threat within the site and potential to support an application to rezone land consistent with the zoning plan.

The assessment will indicate if the future development is capable of meeting the requirements of Planning for Bush Fire Protection 2006, AS3959 – 2009 and other relevant policies.

The adopted subdivision layout provides for employment lands (Industrial) and residential land. The Preliminary Masterplan also has environmental conservation and rural production lands.

This report refers to the Industrial or employment lands, as detailed in the site plans supplied to **Kleinfelder (Table 1)**. This report cannot be used for any other design unless authorised and amended by the author of this report.

Table 1: Plans assessed in this report.

Report Issue	Date Received	Site Plan Designer/ Reference	Comment
1	Dec 2104	November 2014 design	

1.3 SITE ASSESSMENT METHODOLOGY

The site assessment methodology utilised for determining level of bushfire attack for this development has been sourced from Section 4 and Appendix 3 of the NSW RFS Planning for Bushfire Protection (PBP, 2006).

1.3.1 PBP Aims and Objectives

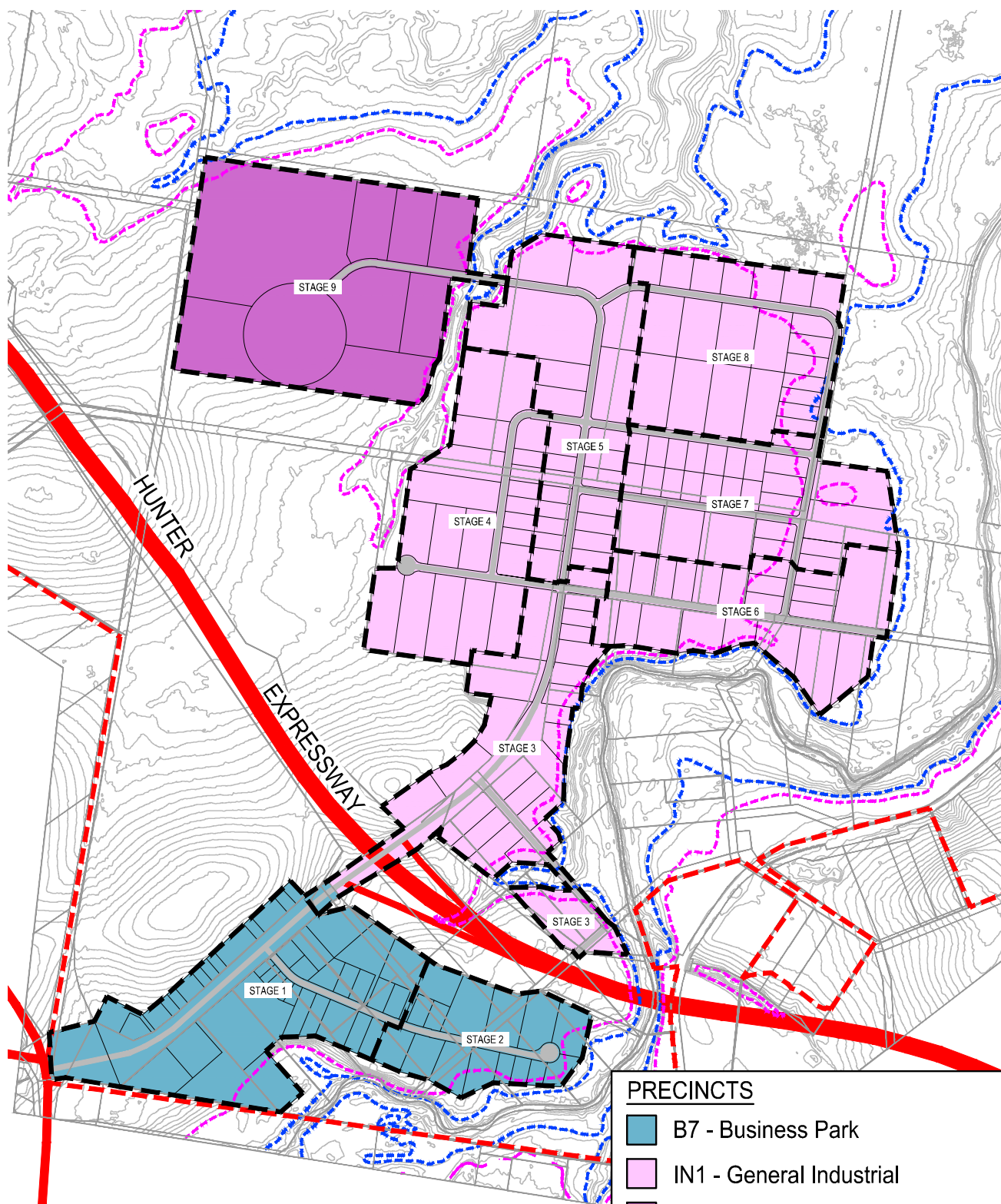
All development on bushfire prone land must satisfy the aims and objectives of PBP.

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

The specific aims and objectives of PBP are to:

- Afford occupants of any building adequate protection from exposure to a bushfire;
- Provide for a defensible space to be located around buildings;
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
- Ensure that safe operational access and egress for emergency service personnel and occupants is available;
- Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the Asset Protection Zone (APZ); and
- Ensure that utility services are adequate to meet the needs of fire fighters (and others assisting in bushfire fighting).

INDUSTRIAL PRECINCT STAGING PLAN



PRECINCTS

-  B7 - Business Park
-  IN1 - General Industrial
-  IN3 - Heavy Industrial

 SITE BOUNDARY

 1 IN 100 YEAR FLOOD
LEVEL 9.7m

 PROBABLE MAXIMUM FLOOD
LEVEL 12.2m

1.4 LEGISLATION

This assessment follows the prescribed methodology and assessment principles published by the PBP, for determining the construction requirements for building in designated bush fire prone areas. Industrial development is not constrained as residential and other habitable or special use developments with regards to construction requirements and minimum setbacks from vegetation. Industrial developments are assessed as Other Development in the PBP.

1.4.1 Other Development

Other development refers to applications for developments that are not residential/ rural residential subdivisions, SFPPs or residential infill (i.e. industrial infrastructure). The adopted industrial subdivision layout would be considered 'Other Development' and is to be assessed under s100B of the *Rural Fires Act* 1997. This type of development requires formal approval from the NSW Rural Fire Service under s100B of the *Rural Fires Act* 1997.

Any future subdivision must comply with the aims and objectives, and the performance criteria in Chapter 4 of the PBP through acceptable solutions which apply in relation to matters such as defensible space, access, water and services, emergency planning and landscape/vegetation management.

Section 100B of the *Rural Fires Act* 1997 states that the NSW Rural Fire Service can issue a Bush Fire Safety Authority (BFSA) provided the development meets certain standards. A BFSA authorises development to the extent that it complies with standards regarding setbacks, provision of water supply and other matters considered by the Commissioner to be necessary to protect persons, property or the environment from danger that may arise from a bushfire.

Clause 46 (1) of the RF Regulation 2002 specifies the information requirements for consideration of a BFSA under section 100B of the RF Act. A BFSA would require a bushfire assessment to be prepared in accordance with Clause 46(1).

2. SITE DESCRIPTION

2.1 LOCATION AND SURROUNDING LAND USE

The Hyrdo Aluminium lands are located approximately 1 kilometre (km) north of Kurri Kurri and 30 km west of Newcastle in the Hunter Valley, New South Wales. Hydro owns a large area of land surrounding the smelter. In addition to the former smelter and associated infrastructure, the property includes the Wangara farming property (agisted for cattle grazing), dwellings (leased by Hydro to local residents) and the Loxford Park Junior Raceway. The property also contains portions of Wentworth Swamp, Black Waterholes Creek and Swamp Creek, as well as substantial areas of woodland/forest vegetation.

2.2 FIRE WEATHER

Cessnock City Council LGA is within the Greater Hunter NSW Fire Area and has a Fire Danger Index (FDI) rating set at 100.

2.3 ENVIRONMENTAL FEATURES AND THREATENED SPECIES

A Species Impact Statement has prepared for the proposed rezoning for residential development (ELA 2014).

2.4 ABORIGINAL ARTEFACTS

An Aboriginal Cultural Heritage Assessment Report has prepared for the proposed rezoning for residential development (RPS 2014).

2.5 BUSHFIRE MANAGEMENT AND EMERGENCY RESPONSE

No bush fire management plans (BMP) or emergency response planning have been prepared for the proposed rezoning at this stage. The requirement for bush fire management

plans or emergency planning should be considered at the development application stage and prepared upon construction approval, prior to construction and operation. Such a plan should be conducted in liaison with the proponent, local NSW RFS and Hunter Bush Fire Management Committee (a committee responsible for preparing, coordinating, reviewing and monitoring the Plan of Operations and Bush Fire Risk Management Plan for their area), and surrounding landholders.

The adopted subdivision layout indicates suitable access and water supplies for fire fighting and emergency response. The access roads will provide a width suitable for passing and operating, and suitable turning capabilities will be constructed within each proposed lot.

A BMP should be prepared for the proposed subdivision. This plan will involve landscape management, including identifying the setback monitoring and maintenance requirements. The BMP can be integrated within a landscape management plan. The management of potential bush fire fuels surrounding and within the managed lands through hazard reduction is considered the most suitable method of bush fire risk management.

An Emergency Response Plan should be prepared by all lot owners to consider the response to bush fire. Such a plan should be prepared in compliance with AS3745-2002 'Emergency control organisation and procedures for building, structures and workplaces'.

3. BUSHFIRE ATTACK LEVEL ASSESSMENT

The bush fire attack level (BAL) is determined using the vegetation type, distance from vegetation class and effective slope (described in Section 3.1-3.3). Given there are no specific locations for building envelopes at this stage, the BAL for each stage/lot cannot be specified. However, Sections 3.3 and 3.4 detail the minimum setbacks required and building construction standards to be applied for future development.

3.1 BUSHFIRE HAZARD (VEGETATION)

Vegetation within and surrounding the subject site, out to a distance of 140 m, has been classified using formations and sub-formations identified in Keith (2004). The vegetation classifications and extent are derived from the ELA (2014) vegetation assessment.

For the purposes of design planning the vegetation has been determined to be either Forest, or grassland/wetland areas.

3.2 SLOPE ASSESSMENT

The effective slopes are slopes that affect the behaviour of a bushfire. Slopes impact the rate of fire spread, flame lengths and fire intensity. The effective slopes are measured under the vegetation hazard that will impact the development site (**Table 3**). Where no hazard is within 140 m from the development site, no slope assessment is required. Average slope was measured using 2 metre contour data obtained from the Department of Land and Property Information and verified by a laser hypsometer on site.

For the purposes of design planning, and as no slopes exceed 5 degrees, a constant 0-5 degree slope classification will be used to assess the bushfire model.

3.3 ASSET PROTECTION ZONES

Asset Protection Zones (APZ) are buffer zones that help to ensure that a progressive reduction in fuel occurs between the bushfire hazard and building site. This area aims to provide a defendable space and manage heat intensities around the proposed development. The size of each component of the APZ is measured horizontally in metres and is typically

dependent on the vegetation classification, effective slope and FDI rating (PBP 2006). However, buildings of Classes 5-8 and 10 of the BCA do not require a specified APZ setback which is associated with residential developments. However, the PBP does require the provision of a defendable space for emergency services operations, and it is generally accepted that a minimum 10m setback would provide for this requirement.

Therefore, a minimum standard 10m setback is recommended as a defendable space between the bushfire hazard and the assets. This setback can be established for some areas of a future subdivision through proposed roads and other easements, and proposed clearing.

Defendable space areas must be managed to Inner Protection Area (IPA) standards (see Abbreviations and Definitions section) in perpetuity through ongoing maintenance and reduction of fuel loads to minimise the risk of bushfire attack on the proposed development.

Table 2 details the predominant vegetation hazard, the estimated maximum fuel loading, effective slope, and the existing and/or required setbacks for each stage of the proposed development.

3.4 CONSTRUCTION STANDARDS

Australian Standard AS 3959-2009 Construction of Buildings in Bushfire-Prone Areas (AS 3959) sets out requirements for the construction of various elements of a building in order to reduce the likelihood of ignition of the building when subject to bushfire attack. The level of building construction is defined as BAL and is equivalent to the BAL rating derived from the above assessment.

In general, the BCA fire safety construction provisions for 'other development' are taken as acceptable solutions and as such industrial developments do not require specified APZ setbacks and construction standards which are associated with residential developments. However, as the recommended minimum defendable space is only 10 m, this may allow some buildings to be constructed within BAL-FZ (flame zone) where proposed lots directly adjoin bushfire prone vegetation. As such, all buildings within the future subdivision shall be constructed from non-combustible materials including steel and/or concrete. Where these construction requirements cannot be achieved, compliance with the minimum APZ as defined in Table A2.4 of PBP (2006) shall be required; this would be assessed on a lot-by-lot basis (i.e. under Section 79BA of the EP&A Act 1997).

3.5 WATER SUPPLY

A reticulated water system will be constructed as part of the development to service the proposed industrial subdivision and ensure adequate water provisions for fire fighters. Hydrants should be installed along the proposed roads within the subdivision with spacing, sizing and pressures in accordance with the requirements of Australian Standard AS 2419.1 (2005) *Fire hydrant installations - System design, installation and commissioning*.

Where hydrants are unable to comply with AS 2419.1 (2005) within the industrial subdivision, it is recommended that each lot which is not adequately serviced have a minimum 20,000 L static water supply (SWS) dedicated for firefighting purposes. Tanks should be constructed from concrete or metal and is to be located within the defensible space with adequate open access. The water supply shall also have suitable connections for fire-fighting purposes (i.e. metal 65mm Storz outlet with a gate or ball valve).

3.6 ACCESS AND EGRESS

3.6.1 Public Roads

The NSW RFS intent of measures for public roads is to provide safe operational access to structures and water supply for emergency services, while residents (or industrial park occupants) are seeking to evacuate from an area.

The proposed road design will link from the Hunter Expressway north through the general and heavy industrial subdivision and south through the Business Park, linking with Government Road, Weston.

The existing public roads have the capacity to be suitable public access roads.

Any future industrial subdivision public access roads should apply the performance criteria as detailed in Chapter 4 of PBP 2006.

A review of the adopted subdivision layout has identified areas which do not meet the acceptable solutions for public roads, and a recommendation has been made for each area.

- Any dead ends (if unavoidable) will not extend for further than 200m from a public through road, and will incorporate a minimum 12m outer radius turning circle.

- Landscape scale: There are 3 separate industrial areas (heavy, general, business park). At this stage of master planning, there are 4 (four) public roads considered as dead ends (**Figure 1**) exceeding 200m in length, and with no defined alternate access route. An alternate access route can be provided as an emergency fire trail (fire trail construction standards). The significant increase in a potential working population would require additional alternate access and egress opportunities from these industrial areas;
- The southern Business Park extends greater than 500m from Hart Road. An alternate egress would be required.
- The central General Industrial area has two locations where a dead end exceeds 200m (Dickson Road east and west). Alternate access could link through existing fire trail network to the west, and potentially link with the Heavy Industrial alternate access recommendation. The eastern road can link around the proposed development as a perimeter road.
- The northern Heavy Industrial area can provide alternate access through existing fire trail network to the west, and potentially link with the General Industrial alternate access recommendation.
- All perimeter roads will need to be 8m minimum (kerb to kerb), and linked to the internal road system at intervals no greater than 500m.

3.6.2 Property Access

The intent of this section is to provide for safe access to and from the public road system for fire fighters providing property protection during a bushfire and for occupants of the industrial area faced with evacuation.

Where property access to industrial sites will not exceed 70 metres unobstructed path between the most distant part of a proposed dwelling and the nearest part of public access road (speed limited <70kph), no specific access requirements apply in this respect.

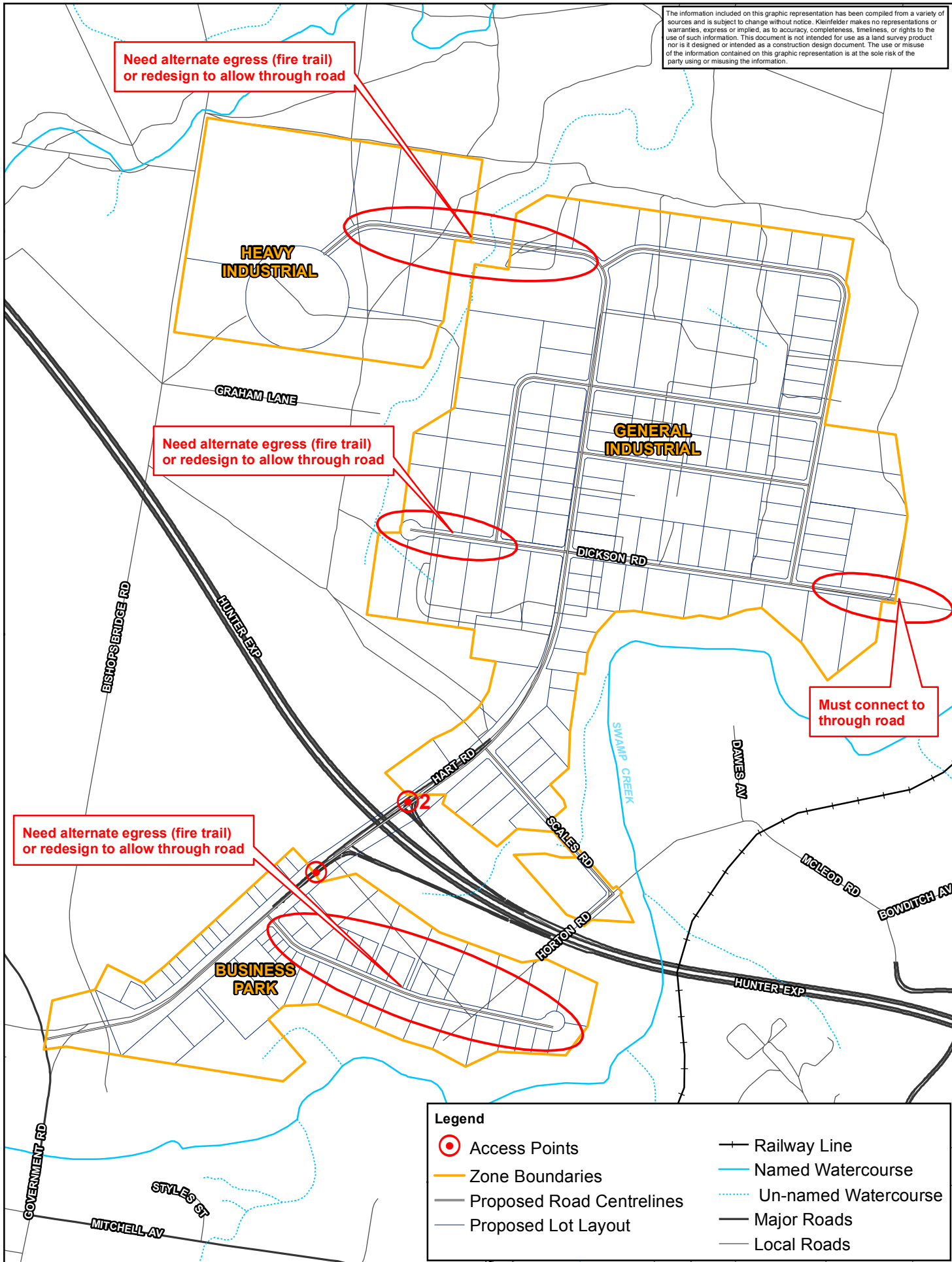
Where property access does not meet this scenario, Chapter 4.1.3 of PBP 2006 applies.

The adopted industrial subdivision access design would allow for all proposed lots to meet the acceptable solutions for property access detailed in PBP 2006.

Table 2: Summary of bushfire attack level assessment for the subject site.

Development Stage	Vegetation Type/Hazard	Estimated max Fuel Loading t/ha	Effective Slope	Setbacks
Industrial Areas	Open Forest	35	0-5 ⁰ downslope	Minimum 10m – BAL FZ
	Grassland/wetlands	6-10t/ha	0-5 ⁰ downslope	10m (APZ or managed easement)

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DATA SOURCE:
LPI - 2009
ESS Australia - 2014
Nearmap - 2014

Site Layout

Hydro Aluminium Kurri Kurri Pty Ltd
Bushfire Threat Assessment
Proposed Residential Subdivision Development for
Hydro Aluminium Lands, Kurri Kurri

FIGURE:
1

4. RECOMMENDATIONS AND CONCLUSIONS

The bushfire threat for the proposed rezoning has been assessed and subject to mitigation measures it is considered that the rezoning of the land is supported

The following measures are recommended to be incorporated into any future industrial subdivision design to mitigate the risk of bushfire on the future or subsequent industrial development.

Provided the following recommendations are implemented in full, it is our opinion that the future industrial development can comply with the requirements of PBP (2006).

4.1 APZ SETBACKS

- A minimum 10m setback is required as a defensible space between the bushfire hazard and the assets.
- These minimum 10m setbacks must be managed to IPA standards (see Abbreviations and Definitions section) in perpetuity through ongoing maintenance and reduction of fuel loads to minimise the risk of bushfire attack on the proposed development.

4.2 BUILDING AND CONSTRUCTION STANDARDS

- In general, the BCA fire safety construction provisions for 'other development' are taken as acceptable solutions and as such industrial developments do not require specified APZ setbacks and construction standards which are associated with residential developments. However, as the recommended minimum defensible space is only 10 m, this may allow some buildings to be constructed within BAL-FZ (flame zone) where proposed lots directly adjoin bushfire prone vegetation. As such, all buildings within the proposed subdivision shall be constructed from non-combustible materials including steel and/or concrete. Where these construction requirements cannot be achieved, compliance with the minimum APZ as defined in Table A2.4 of PBP (2006) shall be required; this would be assessed on a lot-by-lot basis (i.e. under Section 79BA of the EP&A Act 1997).

4.3 ACCESS ARRANGEMENTS

- Landscape scale: There are 3 separate industrial areas (heavy, general, business park). At this stage of master planning, there are 4 (four) public roads considered as dead ends (Figure 1) exceeding 200m in length, and with no defined alternate access route. An alternate access route can be provided as an emergency fire trail (fire trail construction standards). The significant increase in a potential working population would require additional alternate access and egress opportunities from these industrial areas;
- The southern Business Park extends greater than 500m from Hart Road. An alternate egress would be required.
- The central General Industrial area has two locations where a dead end exceeds 200m (Dickson Road east and west). Alternate access could link through existing fire trail network to the west, and potentially link with the Heavy Industrial alternate access recommendation. The eastern road can link around the proposed development as a perimeter road.
- The northern Heavy Industrial area can provide alternate access through existing fire trail network to the west, and potentially link with the General Industrial alternate access recommendation.
- All perimeter roads will need to be 8m minimum (kerb to kerb), and linked to the internal road system at intervals no greater than 500m.

4.4 SERVICES

- All other services must meet the performance requirements of PBP 2006 (Chapter 4.1).

4.5 EMERGENCY PLANNING

- A Bushfire Management Plan should be prepared for future subdivisions. This plan will involve landscape management, including identifying the setback monitoring and maintenance requirements. The BMP can be integrated within a landscape management plan. The management of potential bush fire fuels surrounding and within the managed lands is considered the most suitable method of bush fire risk management.

- An Emergency Response Plan should be prepared by all lot owners to consider the response to bush fire. Such a plan should be prepared in compliance with AS3745-2002 'Emergency control organisation and procedures for building, structures and workplaces'.

5. REFERENCES

Australian Standard 3959–2009: *Construction of Buildings in Bushfire-Prone Areas*.

Keith, D. (2004). *Ocean Shores to Desert Dunes: The native vegetation of New South Wales and the ACT*. NSW Department of Environment and Conservation.

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Standards Australia Handbook HB 36–1993 *Building in Bushfire Prone Areas*.