Bushfire Threat Assessment

Proposed Residential Rezoning Development for Hydro Aluminium Lands, Kurri Kurri

February 2015

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Prepared for:

Hydro Aluminium Kurri Kurri Pty Ltd

Bushfire Threat Assessment

Proposed Residential Rezoning Development for Hydro Aluminium Lands, Kurri Kurri

Kleinfelder Job No. WBR_124055-20150719

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 Residential Rezoning Development for Hydro Aluminium Lands, Kurri Kurri
Client:	Hydro Aluminium Kurri Kurri Pty Ltd
Local Government Area	Maitland City Council and Cessnock City Council
Zoning under Maitland City Council and Cessnock City Council	R1 General Residential under Maitland City Council LEP 2011 and R2 Low Density Residential under Cessnock City Council LEP 2011
Conclusion	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. Provided the following recommendations are implemented in full, it is our opinion that the future residential development can comply with the requirements of PBP (2006).

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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 defendable 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 residential areas at the Hydro Aluminium site in Kurri Kurri, NSW (Site). The adopted subdivision layout will provide for residential and industrial land, as well as environmental offset or conservation land. This report evaluates the potential bushfire threat to the proposed residential area only. An independent assessment has been provided specifically for the proposed industrial area.

The overall landholding of the Site is 2000 hectares and over the Maitland City Council and Cessnock City Council Local Government Areas (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 residential development area (approximately 175ha) will be rezoned for residential land use.

1.1 SCOPE OF ASSESSMENT

This report evaluates the potential bushfire threat to the proposed residential area only. The residential master plan design incorporates 3 specific residential areas:

- Residential Northern, south from Gillieston heights;
- Residential Central, west from Cliftleigh; and
- Residential Southern (Loxford district).

The assessment for the adopted residential subdivision layout 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 future 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 SCOPE

This project involves:

Desktop:

- Review of existing planning and environmental documentation and any other relevant background information;
- Desk top analysis based on information recalled from approvals and studies including infrastructure and development, ecology, archaeology and observable community assets;
- Desk top analysis of bush fire history for the area; and
- Desk top analysis of roads and access infrastructure.

Site inspection:

- A site visit and inspection was conducted over a 1 day period to support or alter desk top studies, prior to the bushfire assessment.

A bushfire impact assessment post site inspection to clarify:

- Mapping of the broad vegetation structural types on and surrounding the subject sites;
- Description of the landform, land surface and vegetation attributes of the subject site;
- Modelling of potential bushfire behaviour;

- Assessment of the bushfire risk for significant assets;
- Identify site constraints to bushfire mitigation;
- Recommendation of techniques to control hazards and minimise risks in light of constraints;
- An assessment of recommended bushfire mitigation strategies (design fire models) toward these assets;
- Assessment of roads and access adequacy; and
- A detailed map of the residential area that will be the foundation for determining the location of assets and levels of bushfire risk.

1.3 PROJECT DESCRIPTION

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

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

The proposed rezoning provides for residential land and employment lands (Industrial), and has environmental conservation and rural production lands.

This report refers to the residential 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 2014	November 2014 design	

1.4 SITE ASSESSMENT METHODOLOGY

The site assessment methodology utilised for determining level of bushfire attack for this development has been sourced from Appendix 2 and Section 4 - Appendix 3 of the NSW RFS Planning for Bushfire Protection (PBP 2006).

1.4.1 PBP Aims and Objectives

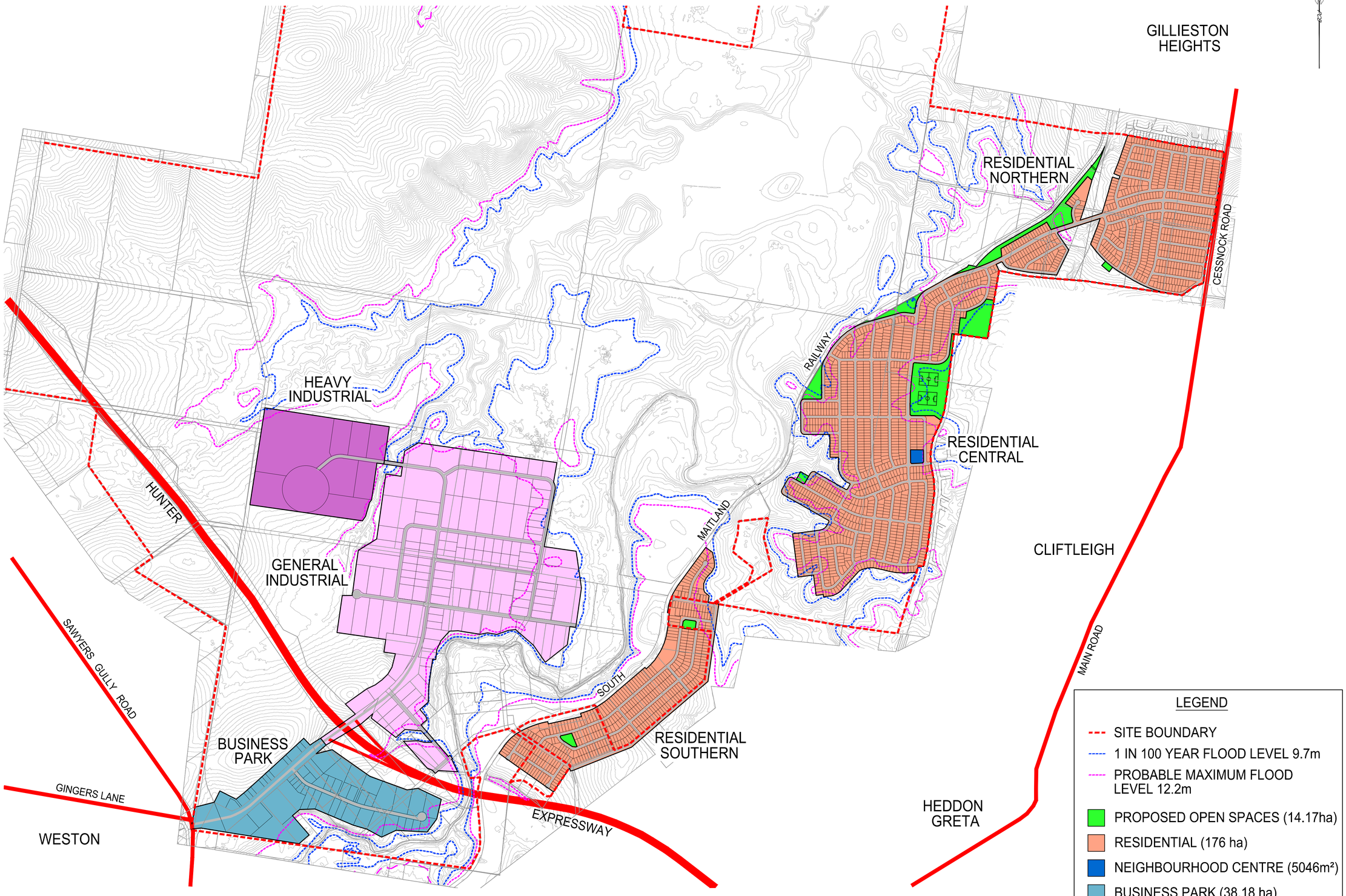
All development on bushfire prone land must satisfy the aims and objectives of PBP.

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 defendable 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).

HYDRO KURRI KURRI MASTERPLAN



LEGEND

- SITE BOUNDARY
- 1 IN 100 YEAR FLOOD LEVEL 9.7m
- PROBABLE MAXIMUM FLOOD LEVEL 12.2m
- PROPOSED OPEN SPACES (14.17ha)
- RESIDENTIAL (176 ha)
- NEIGHBOURHOOD CENTRE (5046m²)
- BUSINESS PARK (38.18 ha)
- GENERAL INDUSTRIAL (125.5 ha)
- HEAVY INDUSTRIAL (34.38 ha)

NOVEMBER 2014

1.5 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.

1.5.1 Integrated Development

The proposal to subdivide the subject site for a residential development is considered as an integrated development. Section 91 of the EP&A Act defines integrated development. Integrated developments require a formal approval from the NSW Rural Fire Service under s100B of the Rural Fires Act 1997. Section 100B of the Rural Fires Act 1997 states that the NSW Rural Fire Service can issue an approval (a Bushfire Safety Authority (BFSA)) provided the development meets certain standards. Although the land rezoning does not require the BFSA, the proponent must demonstrate that the proposal can meet the aims and objectives specified in PBP.

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

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

Maitland City Council and Cessnock City Council LGA are 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 proposed residential subdivision will have 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 when an application is made for the proposed residential 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.

3. BUSHFIRE ATTACK LEVEL ASSESSMENT

A BFSA approval requires all Lots within the residential subdivision to detail a potential suitable building envelope whereby radiant heat levels at any point will not exceed 29 kW/m^2 (BAL 29). All APZ should be within the designated Lot or apply exceptional circumstances (Section 1.3, PBP 2006).

The BAL is determined from the vegetation classification, effective slope and distance from vegetation.

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.

A description of the hazard and the maximum fuel loading (tonnes/ha) in each direction from each proposed development stage is given in **Table 2**.

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 2**). 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 on site.

For the purposes of design planning, and as slopes do not generally exceed 5 degrees, a constant 0-5 degree down slope classification will be used to model the bushfire behaviour.

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).

APZ areas must be managed in perpetuity through permanent construction, land use or ongoing maintenance and reduction of fuel loads (formal; land management plans) to minimise the risk of bushfire attack on the proposed residential development.

To achieve a radiant heat yield not exceeding 29kW/m^2, and using the fuel loads standards relevant to future development (AS3959-2009), a 32m setback or APZ will be required.

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

Each lot will have capacity to support a building envelope that can be constructed to minimum BAL29 standards. Where any lot does not provide this capability, a design amendment must be made to either the Lot layout or the provision of managed easements outside the Lot layout. These easements will require a Plan of Management (PoM) as they will be for the purpose of APZ and bushfire mitigation.

Open spaces within the residential areas will also require a PoM to ensure vegetation does not develop into bushfire prone vegetation.

3.5 WATER SUPPLY

The intent of this section is to provide adequate water services for the protection of buildings during and after the passage of a bushfire.

A reticulated water system will be constructed as part of the development to service the proposed residential and industrial subdivisions and ensure adequate water provisions for fire fighters. Hydrants would 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 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 defendable space with adequate open access. This 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 are seeking to evacuate from an area.

The proposed road design will link through the residential subdivision to both Cessnock Road (East) and McLeod Road (South). Both these existing roads have the capacity to be suitable public access roads.

Any future 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.

- Landscape scale: There are 3 separate residential areas (north, central and south). At this stage of master planning, there is not defined alternate access route (public road) for the northern and central areas. The significant increase in community population would require additional alternate access and egress opportunities from these residential areas;

- The Southern residential area does not provide a suitable through road access for Lots in the northern portion of this area, unless Bowditch Avenue is extended or the rail easement can provide access.

- 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.

- A public access road may be incorporated to provide a link between the central and southern subdivision areas, and as such, provides a through road.

- 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 faced with evacuation.

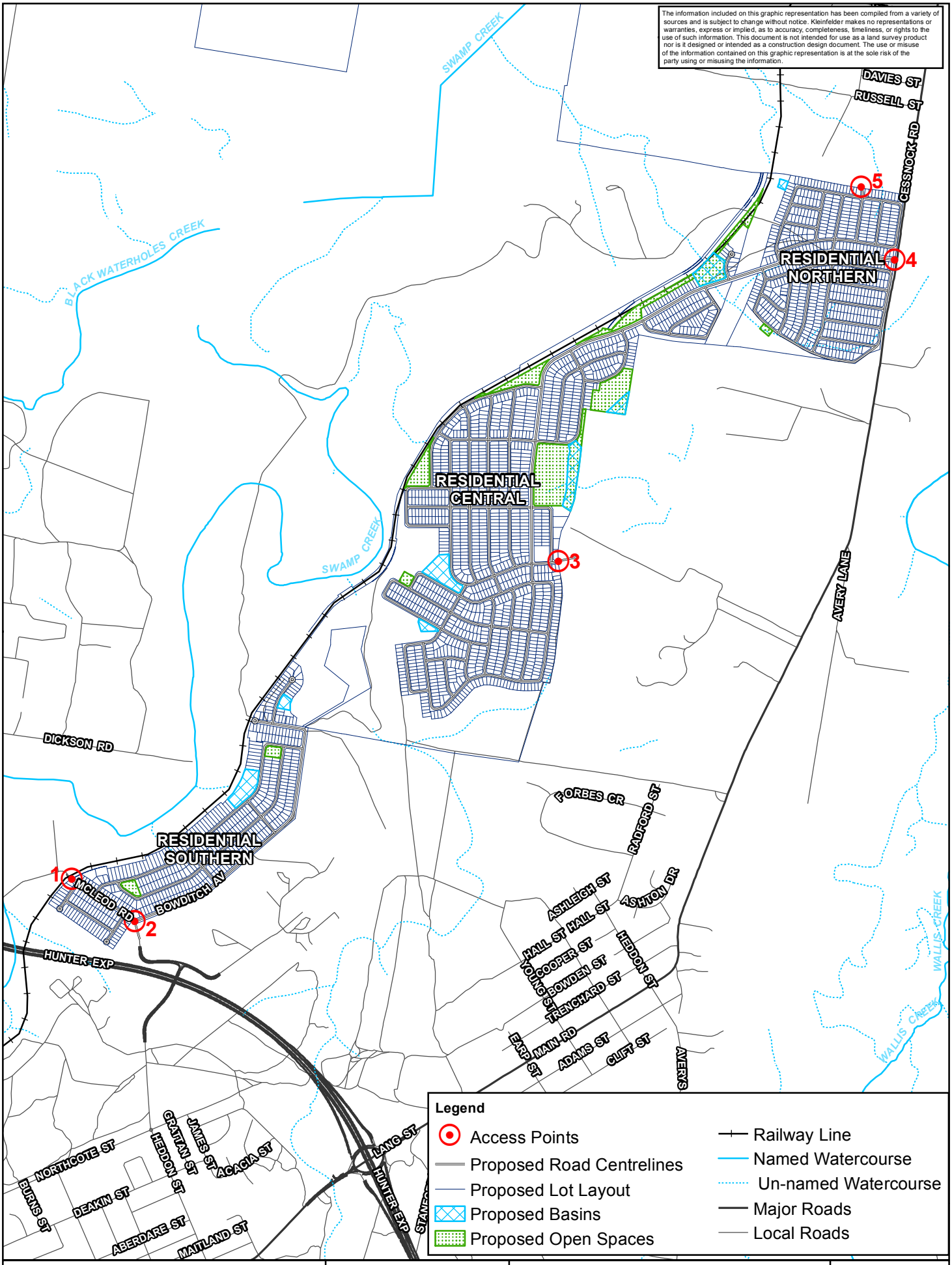
Where access to building sites will not exceed 70 metres unobstructed path between the most distant part of a proposed dwelling and the nearest part of public access road (speed limited <70kph), subsequently no specific access requirements apply in this respect.

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

The adopted 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 proposed rezoning subject site.

Development Stage	Vegetation Type/Hazard	Estimated max Fuel Loading t/ha	Effective Slope	Setbacks
Residential Areas	Open Forest	35	$0\text{-}5^0$ downslope	32m (APZ or managed easement)
	Grassland/wetlands	6-10t/ha	$0\text{-}5^0$ downslope	10m (APZ or managed easement)
	Maitland Railway corridor to be used as an easement	TBC	TBC	TBC



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

Access Locations

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

FIGURE:

1

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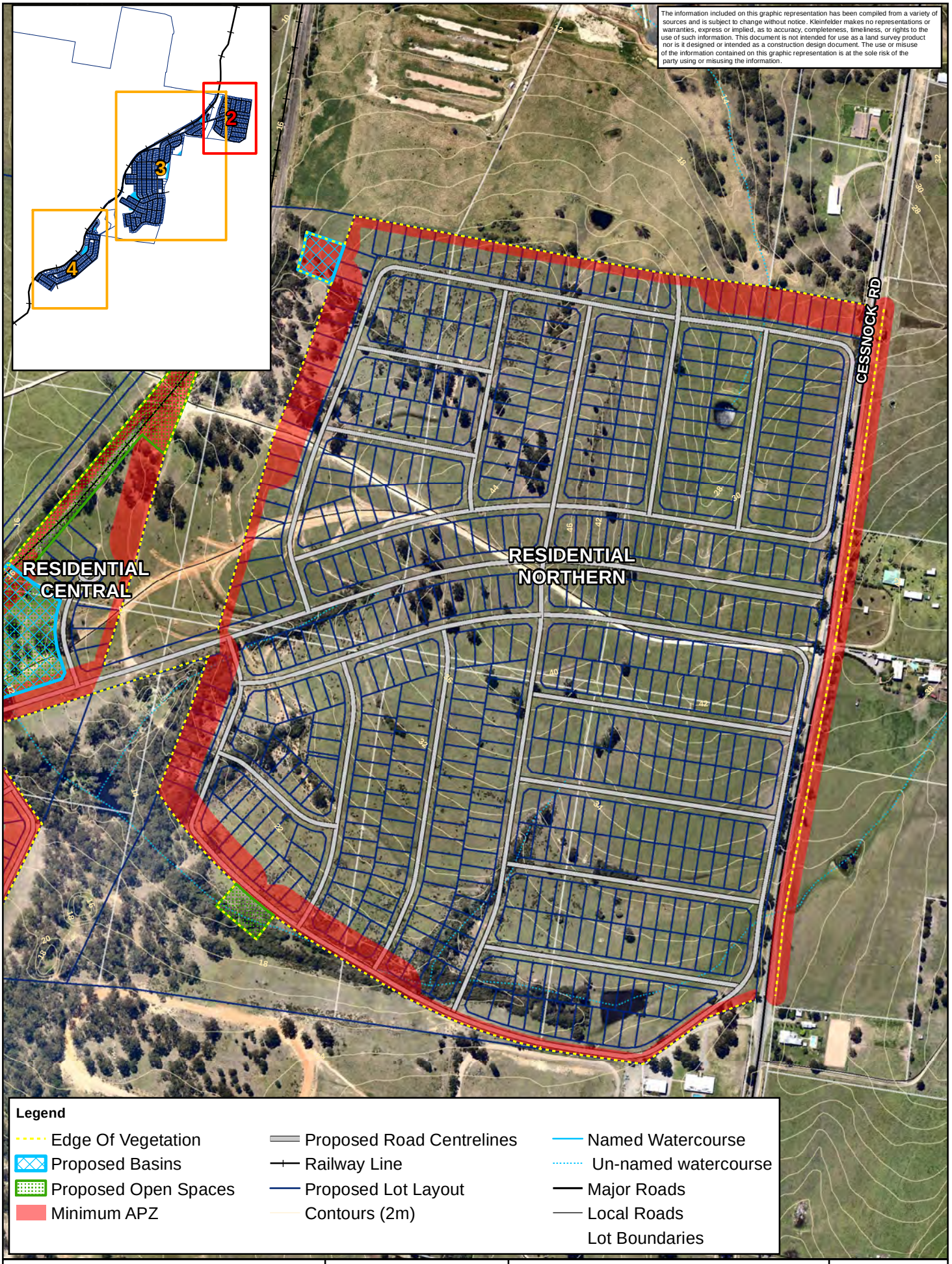

Legend

- Edge Of Vegetation
- Proposed Basins
- Proposed Open Spaces
- Minimum APZ
- Proposed Road Centrelines
- Railway Line
- Proposed Lot Layout
- Contours (2m)
- Named Watercourse
- Un-named watercourse
- Major Roads
- Local Roads
- Lot Boundaries

Metres
0 25 50 100 150 200

N

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

Site Layout
Northern Residential

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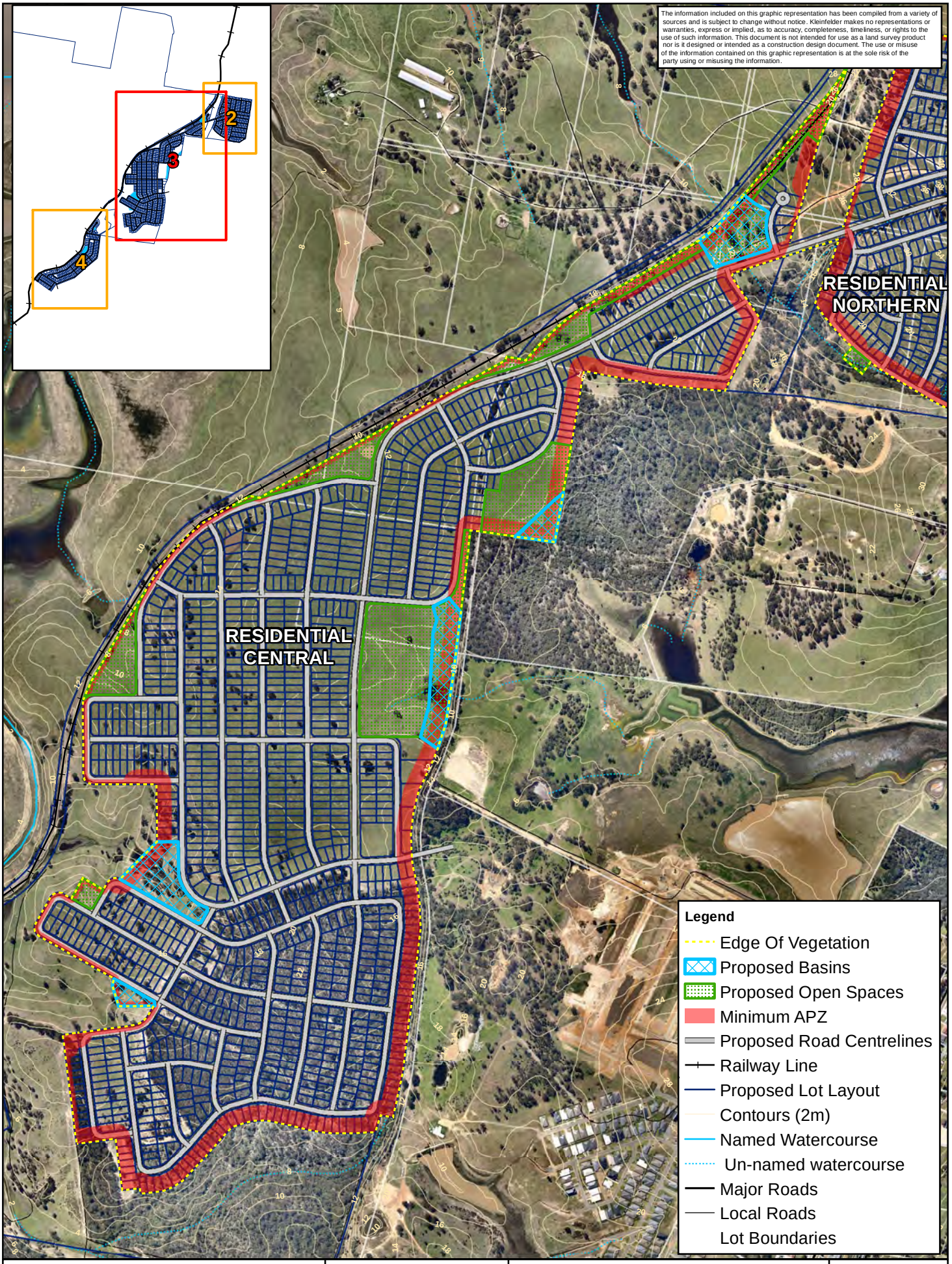
Hydro Aluminium Lands, Kurri Kurri

FIGURE:
2

L:\GIS FOLDER\00 CLIENT FILES\124055_HydroAluminium_KurriKurri\20150719_BushfireImpactAssessment\Mapping\20150719_Fig2_BushfireThreat_Northern.mxd



Legend

- Edge Of Vegetation
- Proposed Basins
- Proposed Open Spaces
- Minimum APZ
- Proposed Road Centrelines
- Railway Line
- Proposed Lot Layout
- Contours (2m)
- Named Watercourse
- Un-named watercourse
- Major Roads
- Local Roads
- Lot Boundaries

Metres
0 50 100 200 300 400 500

N

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

Site Layout
Central Residential

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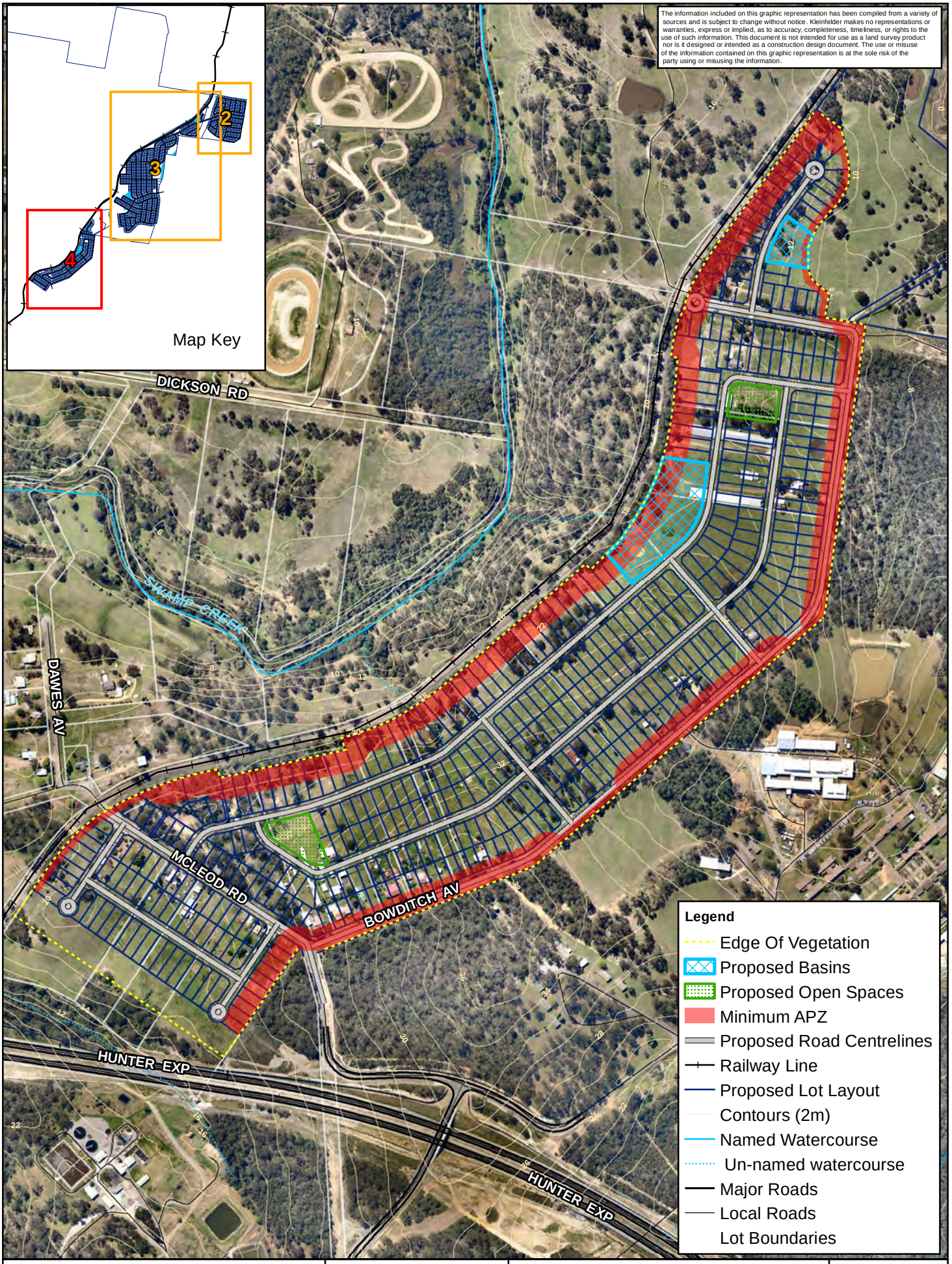
Proposed Residential Subdivision Development for
Hydro Aluminium Lands, Kurri Kurri

FIGURE:

3

L:\GIS FOLDER\00 CLIENT FILES\124055_HydroAluminium_KurriKurri\20150719_BushfireImpactAssessment\Mapping\20150719_Fig3_BushfireThreat_Central.mxd



Metres
0 25 50 100 150 200 250

N

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Nearmap - 2014

Site Layout
Southern Residential

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Hydro Aluminium Lands, Kurri Kurri

FIGURE:

4

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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 subdivision design to mitigate the risk of bushfire on the future or subsequent residential development.

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

4.1 APZ SETBACKS

- A minimum 10m setback is required from grasslands and wetland areas.
- A minimum 32m setback is required from forested areas.
- Exceptional circumstances for APZ will include easements such as roads, powerlines or any easement specific for bushfire mitigation; potentially South Maitland Rail Corridor.
- These minimum 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.
- Open spaces within the residential areas will also require a PoM to ensure vegetation does not develop into a bushfire prone vegetation.

4.2 BUILDING AND CONSTRUCTION STANDARDS

Each lot will have capacity to support a building envelope that can be constructed to minimum BAL29 standards. Where any lot does not provide this capability, a design amendment must be made to either the Lot layout or the provision of managed easements outside the Lot layout. These easements will require a Plan of Management (PoM) as they will be for the purpose of APZ and bushfire mitigation.

4.3 ACCESS ARRANGEMENTS

- Alternative for access/egress need to be defined for Southern and Central areas.

4.4 SERVICES

A reticulated water system will be constructed as part of the development to service the proposed residential and industrial subdivisions and ensure adequate water provisions for fire fighters. Hydrants would 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 a future 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 defendable space with adequate open access. This water supply shall also have suitable connections for fire-fighting purposes (i.e. metal 65mm Storz outlet with a gate or ball valve).

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

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.

NSW Rural Fire Service (2006). *Planning for Bushfire Protection guidelines*. Prepared in cooperation with Planning NSW.

NSW Rural Fire Service (2010). *Addendum: Appendix 3 of the NSW RFS Planning for Bushfire Protection.*

APPENDIX 1: PROPOSED PLANS