Richmond Valley Regional Job Precinct

Bushfire Analysis Report

14 October 2024

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The business of sustainability

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Signature Page

14 October 2024

Richmond Valley Regional Job Precinct

Bushfire Analysis Report

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This report has been prepared to inform the master planning process for Richmond Valley RJP. The findings and recommendations have been developed where possible in collaboration with other disciplines. It is acknowledged that some of the recommendations in this report may not be included in the Master Plan, such as where they are out of scope for the RJP, conflict with other elements of the project or are proposed to be managed via an alternate mechanism.

EXECUTIVE SUMMARY

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by the New South Wales (NSW) Government to prepare a Bushfire Analysis Report for the proposed Richmond Valley Regional Job Precinct (RJP). The report aims to establish the relevant specifications and requirements to assist in the development of the Master Plan.

The Richmond Valley RJP will investigate the Casino area to unlock new industrial lands and create more jobs for the region in agriculture, cold storage, manufacturing and renewable energy sectors. The process recognises the current land uses in the precinct and does not indicate any changes to these existing operations. The Master Plan will assist with business diversification by identifying value-adding opportunities for existing industries and local producers. The intention of the Richmond Valley RJP is to encourage private investment and generate jobs. To attract investors, the NSW Government is seeking to create a place-based planning framework that streamlines the approval process removing statutory barriers, and enhancing investment certainty.

Parts of the precinct have been mapped as high bushfire hazard. It is therefore important that the precinct is designed to reduce the risk of bushfire to the new site users as well as the surrounding assets. Of particular note is the importance of future development to consider existing access and egress routes across the locality (including but not limited to, Reynolds Road, Summerland Way and various local roads) as well as the existing Special Fire Protection assets (retirement villages, schools, hospitals and tourist attractions) within Casino.

Complying development will not be applicable to all land use types or where a referral to the NSW RFS is required. The remaining commercial and industrial type development can be addressed within the Master Plan through the aims and objectives of Planning for Bush Fire Protection 2019. Specifically:

- Complying development is only permitted on lower risk bushfire prone land (BAL-29 or lower);
- Where hazardous industries are proposed, consultation with the NSW RFS and preparation of a performance based solution will be required. These development types will not be considered for complying development;
- Developments classified as special fire protection purpose (SFPP) would trigger referral to the NSW Rural Fire Service under s100b *Rural Fires Act 1997* and will not be considered complying development; and
- Other land uses such as places of public worship and other public assembly buildings (i.e., function centres) also require referral to the NSW RFS under s.4.14 of the *Environmental Planning and Assessment Act 1979*. Any buildings used for public assembly with a floor space area of greater than 500m² will be treated as SFPP.

At a strategic level, the Master Plan has taken into consideration the bushfire prone land mapping and new development within the precinct can be designed to meet the requirements of Planning for Bush Fire Protection 2019. This includes the provision of defendable space within the boundary of the Richmond Valley RJP. These areas of defendable space may include the perimeter road network, drainage channels and maintained public open space. All recreational space and landscaped areas should be designed and managed to meet the requirements of an Asset Protection Zone (APZ) and must be maintained in perpetuity to ensure ongoing protection from the impact of bush fires, particularly in advance of the bushfire season.

The development of the structure plan has also considered the application of suitable APZs across the precinct to result in a Bushfire Attack Level of:

- BAL 29 or lower to all the future building envelopes;
- BAL 12.5 or lower to all SFPP; and
- BAL 12.5 or lower to all potential hazardous industry.

The Richmond Valley RJP may also require the creation of APZs that need to be maintained sequentially until the final phase of development is completed to afford each stage of the development the appropriate level of bushfire protection.

Key specifications and requirements to assist in the development of the Master Plan are provided in Table E.1.

Table E.1 Proposed Performance Criteria – Bushfire

Performance Criteria No.	Performance Criteria Description
1	Asset Protection Zones are managed and maintained to prevent the spread of a fire within the precinct in accordance with the requirements of Appendix 4 of Planning for Bush Fire Protection 2019 to result in a Bushfire Attack Level of BAL 29 or lower (not BAL 40 or BAL FZ) to all future building envelopes that are being assessed as complying development. This includes staged or partial development of the Richmond Valley RJP.
2	Where referral to NSW RFS is required (SFPP, hazardous development and/or public assembly buildings), Asset Protection Zones should be managed and maintained to result in a Bushfire Attack Level of BAL 12.5 or lower (not BAL 29, BAL 40 or BAL FZ). These developments will not be assessed as complying development.
3	All landscaping is to comply with Appendix 4 of Planning for Bush Fire Protection 2019 and relevant environmental approvals required under the NSW *Biodiversity Conservation Act* 2016 and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Where environmentally sensitive vegetation such as endangered ecological communities or threatened species habitat are to be cleared, the proposals will need to be carefully considered and may no longer be consistent with complying development.
4	Landscape buffers along roadsides must also be maintained to reduce bushfire hazard. These areas are considered to be low threat vegetation provided that they are less than 20m wide. Where they are designed to be greater than 20m wide, they should have a 20m wide break every 125m so that each patch of vegetation is less 0.25ha in area. This break can include roads, carparks, road verges and other cleared areas.
5	Access roads must be designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface. The requirements for access identified in Planning for Bush Fire Protection 2019 must be met for all stages of development within the Richmond Valley RJP.
6	Adequate water supplies must be provided for firefighting purposes. Hydrants are to be installed to achieve compliance with AS 2419.1 – 2021 Fire Hydrant Installations - System Design, Installation and Commissioning (AS 2419) and must be located less than 70m from each building envelope.
7	The location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings. Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used.
8	The location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings and must comply with requirements of Planning for Bush Fire Protection 2019.

Acronyms and Abbreviations

Name	Description
APZ	Asset Protection Zones. A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required APZ varies with slope, vegetation and FFDI.
Asset	Anything valued by the community which includes houses, crops, heritage buildings and places, infrastructure, the environment, businesses, and national parks, that may be at risk from bushfire.
AS 3959-2018	*Australian Standard 3959 - 2018 Construction of Buildings in Bushfire-prone Areas*
BAL	Bushfire Attack Level
BC Act	NSW *Biodiversity Conservation Act 2016*
BFMC	Bushfire Management Committee
BFRMP	Bush Fire Risk Management Plan
BOM	Bureau of Meteorology
Bushfire Hazard	Any vegetation that has the potential to threaten lives, property or the environment.
Bushfire Risk	The chance of a bushfire igniting, spreading and causing damage to the community or the assets they value
Defendable space	An area adjoining a building that is managed to reduce combustible elements free from constructed impediments. It is a safe working environment in which efforts can be undertaken to defend the structure, before and after the passage of a bushfire.
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Australia Pty Ltd
GIS	Geographic Information System
Grasslands	Grassed areas capable of sustaining a fire. Grass, whether exotic or native, which is regularly maintained at or below 10cm in height (including maintained lawns, golf courses, maintained public reserves, parklands, nature strips and commercial nurseries) is regarded as managed land.
Ha	Hectare
IFEG	International Fire Engineering Guidelines
IPA	inner protection area
km/h	Kilometres per hour
kW/m^2	Kilowatts per metre squared
LGA	Local Government Area
Major Bush Fire	A bushfire which requires the attendance of multiple brigades, or causes damage to property or injury to one or more persons
MNES	Matter of National Environmental Significance
NSW	New South Wales
NPWS	National Parks and Wildlife Service
NSW RFS	NSW Rural Fire Service
PBP	Planning for Bush Fire Protection 2019
RF Act	NSW *Rural Fires Act 1997*
RFS	Rural Fire Service
RJP	Regional Job Precinct

Name	Description
RJP Investigation Area	This is the focus of investigation for the Richmond Valley RJP and is approximately 655 hectares in size.
SFAZ	Strategic Fire Advantage Zone
SFP	Special Fire Protection. Developments where the vulnerable nature of the occupants means that a lower radiant heat threshold needs to be accommodated for in order to allow for the evacuation of occupants and emergency services.
SFPP	"special fire protection purpose" means the purpose of the following: (a) a school, (b) a child care centre, (c) a hospital (including a hospital for the mentally ill or mentally disordered), (d) a hotel, motel or other tourist accommodation, (e) a building wholly or principally used as a home or other establishment for mentally incapacitated persons, (f) seniors housing within the meaning of State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 , (g) a group home within the meaning of State Environmental Planning Policy No 9--Group Homes , (h) a retirement village, (i) any other purpose prescribed by the regulations.
TOBAN	Total Fire Ban
VM	Verification Method

Note:

Despite the mitigation measures and treatments that are put in place, it is noted that some bushfire risk will always remain and that some of the infrastructure may be subject to direct flame contact. The absence of any identified hazard or asset within the Richmond Valley RJP Investigation Area should not be interpreted as a guarantee that such hazards or impacts do not exist. It is noted that a Bushfire Emergency Management Plan may be required to support future development of the precinct in conjunction with relevant stakeholders, including local fire services, NSW RFS, NSW Fire and Rescue, and adjoining property owners and employees.

Disclaimer:

Any representation, statement of opinion, or advice expressed or implied in the bushfire assessment will be made in good faith on the basis that ERM employees and / or agents are not liable (whether by reason of negligence, lack of care or any other reason) to any person, company or their agents for any damage or loss whatsoever which has occurred or may occur in relation to that person taking (or not taking) action in respect of any representation, statement or advice provided within the bushfire assessment.

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Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by the New South Wales (NSW) Government to prepare a Bushfire Analysis Report for the proposed Richmond Valley Regional Job Precinct. The report aims to establish the relevant specifications and requirements to assist in the development of the Master Plan.

1.1 Project Description

The NSW Government's Regional Job Precincts (RJP) will provide planning support to drive growth, investment and development opportunities within regional NSW. Four locations have been chosen for the first round of this initiative: Albury, Richmond Valley, South Jerrabomberra and Namoi.

The Richmond Valley RJP will investigate the Casino area to unlock new industrial lands and create more jobs for the region in agriculture, cold storage, manufacturing and renewable energy sectors. The precinct will assist with business diversification by identifying value-adding opportunities for existing industries and local producers. The intention of the Richmond Valley RJP is to encourage private investment and generate jobs. To attract investors, the NSW Government is seeking to create a place-based planning framework that streamlines the approval process removing statutory barriers, and enhancing investment certainty.

By reducing delays and simplifying planning processes, the precinct will attract investment and diversify business opportunities, creating jobs for the young and a skilled and growing local workforce in Casino.

1.2 Richmond Valley Investigation Area

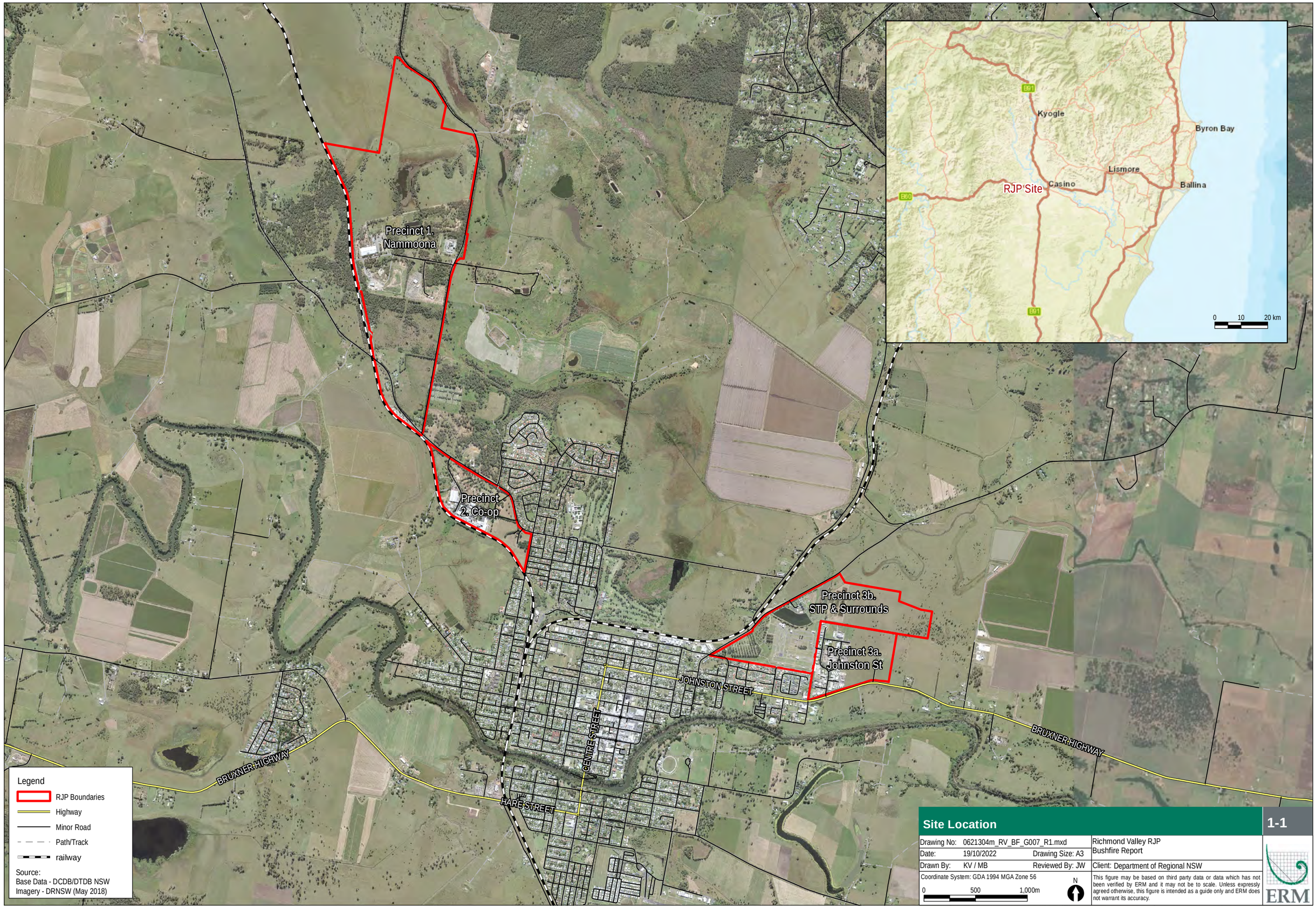
The Richmond Valley RJP is centred on Casino, approximately 717km north of Sydney and 228km south of Brisbane. The precinct is located at the intersection of the Bruxner Highway and Summerland Way. These major roads serve as the east-west link between the Northern Rivers coast to the Northern Tablelands (via Bruxner Highway) and a north-south link between Grafton and the Queensland border (via Summerland Way). It is also connected to key coastal centres and markets by the North Coast railway line.

The Richmond Valley RJP will aim to activate several locations within a specialised industry cluster in Casino. It includes land that is already developed or approved for development, including:

- Area 1: Nammoona Industrial Area;
- Area 2: Casino Food Co-op Complex (formerly Northern Co-op Meat Company); and
- Area 3: Richmond Valley Sewage Treatment Plant and surrounds; and
- Area 3b: Johnston Street Industrial Area.

The Nammoona Industrial Area sits to the north west of the township and is accessed via Reynolds Road. Existing industrial activities are currently focused within the central portion of the area including Council-owned assets (Northern Rivers Livestock Exchange and Richmond Valley Waste Management Centre) as well as several privately operated industries. This area also has direct heavy rail frontage to the North Coast Railway line.

The Casino Food Co-op (formerly the Northern Co-op Meat Company) Complex is the largest employment centre in Casino. Several different activities are undertaken within the complex, with cattle yards and cold storage facilities supporting an abattoir and tannery.


Precinct 1.
Nammoona
Precinct
2. Co-op
Precinct 3b.
STP & Surrounds
Precinct 3a.
Johnston St
JOHNSTON STREET
CENTRE STREET
HARE STREET
BRUXNER HIGHWAY
BRUXNER HIGHWAY
B01
Kyogle
Byron Bay
Lismore
Casino
Ballina
RJP Site
B01
B01
0 10 20 km
Legend
RJP Boundaries
Highway
Minor Road
Path/Track
railway
Source:
Base Data - DCDB/DTDB NSW
Imagery - DRNSW (May 2018)
Site Location
1-1
Drawing No: 0621304m_RV_BF_G007_R1.mxd
Date: 19/10/2022
Drawing Size: A3
Drawn By: KV / MB
Reviewed By: JW
Coordinate System: GDA 1994 MGA Zone 56
0 500 1,000m
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Richmond Valley RJP
Bushfire Report
Client: Department of Regional NSW
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM

The Richmond Valley Sewage Treatment Plant (STP) and surrounds has been identified within the Richmond Valley RJP as they may assist with managing land use conflict as part of the master planning process for the Richmond Valley RJP. Uses within this area will also need to be managed to maintain amenity within the Rail Trail, and as the entry point to the town. Future projects in this area may include innovation associated with the STP, which could benefit businesses within the broader precinct.

The Johnston St Industrial Area is a mixed-use and mixed-user site offering a variety of industrial lot sizes and currently accommodates over 40 businesses. A focus for the Richmond Valley RJP project will be the retention of these industries, including considerations for their ability to expand/diversify within the Richmond Valley RJP.

1.3 Strategic Bushfire Planning

Bushfire presents a threat to human life and assets and can adversely impact ecological values. In planning for the use of land in the rural or urban context, it is important to consider the potential threat from bushfire. Bushfire risk is a major constraint to future development, and with the impacts of climate change already being observed, the need to address these issues as early as possible within the planning process is critical.

In accordance with the Section 4 of NSW RFS Planning for Bush Fire Protection 2019, in bushfire prone areas strategic planning should provide for the exclusion of inappropriate development. Development should be avoided as follows:

- Where a development area is exposed to a high bushfire risk;
- Where a development is likely to be difficult to evacuate during a bushfire due to its siting in the landscape, access limitations, fire history and/or size and scale;
- Where the development will adversely affect other bushfire protection strategies or place existing development at increased risk;
- Where density of existing development may cause evacuation issues for both existing and new occupants; and
- Where the development has environmental constraints to the area which cannot be overcome.

This report provides an overview of the bushfire landscape, and also broadly identifies how the preferred scenario for the proposed Master Plan can be designed to satisfy the aims and objectives of Planning for Bush Fire Protection 2019. It does not provide any advice or recommendations for alternative solutions and does not provide any site or industry specific advice in terms of bushfire hazard or risk mitigation. This will need to be addressed separately as part of any future development applications.

It is also important to note that despite the mitigation measures and treatments that are put in place, some bushfire risk will always remain and that some of the infrastructure may be subject to direct flame contact. It is noted that a Bushfire Emergency Management Plan may be required to support future development of the precinct in conjunction with relevant stakeholders, including local fire services, NSW RFS, NSW Fire and Rescue, and adjoining property owners and employees.

2. LEGISLATIVE AND POLICY CONTEXT

Table 2.1 summarises the relevant legislation and policies applicable to this assessment. In summary, the NSW land-use planning framework provides two main phases: strategic planning (the development of the Master Plan) and development assessment (future development within the precinct). Planning for Bush Fire Protection 2019 provides the foundation for bushfire protection during both phases of development.

Table 2.1 Key Legislation and Policies

Key Legislation/Guideline	Description
NSW *Rural Fires Act 1997*	The main objectives of the *Rural Fires Act 1997* (RF Act) are to: ■ prevent, mitigate and suppress bush and other fires in NSW; ■ co-ordinate bushfire fighting and bushfire prevention throughout the State; ■ protect people from injury or death and property from damage as a result of bushfires; ■ protect infrastructure and assets from damage as a result of bushfires; and ■ protect the environment. With specific reference to the Richmond Valley RJP, the subdivision of bushfire prone land that could lawfully be used for residential or rural residential purposes (unlikely within the precinct), or development of bushfire prone land for a Special Fire Protection Purpose (SFPP) would trigger referral to the NSW Rural Fire Service under s100b RF Act. These developments would not be considered under complying development. It is also noted that under Section 63 of the RF Act, owners and occupiers of land have a duty to take practicable steps to prevent the occurrence of bushfires on, and to minimise the danger of the spread of bushfires on, or from, that land.
Planning for Bush Fire Protection 2019	*Planning for Bush Fire Protection 2019* (NSW Rural Fire Service, 2019) is a planning document to link responsible planning and development control with the protection of life, property and the environment. Planning for Bush Fire Protection 2019 was legislatively adopted in the *Environmental Planning & Assessment Regulations 2000* on 1 March 2020. It is the culmination of significant investment in scientific research and policy development to provide appropriate bushfire protection whilst still having due consideration for development potential and economic sustainability. During precinct selection and development of the Master Plan, consideration has been given to the overall aims and objectives of Planning for Bush Fire Protection 2019 and the expectation will be that the future development will be able to comply with Planning for Bush Fire Protection 2019 at the DA stage.
Australian Standard 3959 - 2018 Construction of Buildings in Bushfire-prone Areas (AS 3959-2018)	For the purposes of this baseline assessment, the Richmond Valley RJP is considered 'other development' under *AS 3959-2018*, as it is unlikely to include residential subdivision, residential infill, or SFPP and the National Construction Code 2019 does not provide for any bushfire specific performance requirements. This may vary as the planning and detailed design process progresses. In a designated bushfire prone area, a Class 2 building, a Class 3 building, a Class 4 part of a building or a Class 9 building that is a special fire protection purpose or a Class 10a building or deck associated with such a building or part, must comply with *AS 3959-2018* as a set of 'deemed to satisfy'

Key Legislation/Guideline	Description
	provisions. These deemed-to-satisfy provisions have not been considered as part of this baseline assessment. General fire safety provisions and the methodology for determining the bushfire attack level (refer to Section 2 of the *AS 3959-2018*) are taken as acceptable solutions. The aims and objectives of Planning for Bush Fire Protection 2019 apply in relation to other matters such as access, water and services, emergency planning and landscaping/vegetation management. The baseline assessment considers the aims and objectives of Planning for Bush Fire Protection 2019.
Biodiversity Conservation Act 2016	Projects determined by a statutory authority of the NSW State Government are required to be assessed in accordance with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Biodiversity Conservation Act 2016* (BC Act). The BC Act requires the consideration of threatened species and their habitats in the developmental planning process and a responsibility of the proponent to determine potential impacts on listed species and Endangered Ecological Communities. Schedule 3 of the BC Act lists Key Threatening Processes for species, populations and ecological communities within NSW. 'Clearing of native vegetation', 'high frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition', and 'removal of dead wood and dead trees', are listed by the BC Act as Key Threatening Processes and need to be carefully considered and managed when implementing fire management activities.
Commonwealth Environment Protection and Biodiversity Act 1999	The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary piece of Federal legislation relating to the environment. Under the EPBC Act any action that has, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES) requires approval from the Commonwealth Minister for the Environment. An action is defined as a project, development, undertaking, activity (or series of activities), or alteration to any of these.

3. THE BUSHFIRE ENVIRONMENT (LANDSCAPE ASSESSMENT)

In accordance with Planning for Bush Fire Protection 2019, this landscape assessment considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape. It includes consideration of vegetation, topography, weather, history of bushfire in the area; and the difficulty in accessing and suppressing a fire.

3.1 Bushfire Prone Land Mapping

Bushfire prone land is land that has been identified by local 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. A review of the Casino Bushfire Prone Land mapping as shown in Figure 3-1 identifies that Area 3 is not currently mapped as bushfire prone land, although it is recognised that category 3 vegetation (including but not limited to grasslands and freshwater wetlands) will likely be added to the bushfire prone land mapping at some stage to align with the requirements of the NSW RFS Guide for Bush Fire Prone Land Mapping (NSW RFS 2015). This will increase the area of bushfire prone land and would likely extend into all areas of the precinct including Area 3. The entire Richmond Valley RJP is therefore considered to be bushfire prone land for the purposes of this assessment.

This map is the trigger for the consideration of bushfire protection measures for all development, including the Richmond Valley RJP.

3.2 Vegetation Hazard

Vegetation growth can be encouraged by periods of wet weather, increasing the amount of fuel available (grass, leaf litter, twigs, bark). When the weather is hot, the humidity is low, and there has been little recent rain, this vegetation dries out and becomes more flammable. A fire is more likely to start, and continue to burn, in hot, dry and windy weather.

For the purposes of this assessment, the regional vegetation mapping as reported in the biodiversity analysis report (ERM 2022) has been simplified in Table 3.1 in line with the vegetation formations as per Keith (2004). The vegetation types have been classified into fuel groups using the following parameters:

- Frequency that the vegetation provides ‘available fire fuel’;
- Structure of the vegetation and the ability of ground level fuels to carry fire into higher vegetation levels e.g., from understorey into crown fire;
- Arrangement of the fuel within the vegetation type, e.g., fine fuels that are elevated, such as in heath, contribute more to fire intensity than a similar quantity of leaf litter fuel; and
- Amount of fuel that accumulates after a long period without fire.

Table 3.1 Broad Vegetation Groups

Vegetation Community (Biodiversity Assessment ERM 2022)	Vegetation Formation (Keith 2004)	Vegetation Category (NSW RFS 2015)
Northern Hinterland Hills Bloodwood-Red Gum Grassy Forest	Dry Sclerophyll Forest (grassy formation)	Vegetation Category 1
Northern Floodplain Paperbark Fern Swamp	Forested Wetland	Vegetation Category 1
Far North Floodplain Paperbark-Swamp Oak Forest	Forested Wetland	Vegetation Category 1
Far North Floodplain Fern-Forb Wetland	Freshwater Wetland	Vegetation Category 3
Far North Lowland Basalt Grassy Forest	Grassy Woodland	Vegetation Category 1
Modified native/exotic planted vegetation	Grassy Woodland	Vegetation Category 2
Non-native/mixed Grassland	Grassland	Vegetation Category 3

- *Vegetation Category 1 is considered to be the highest risk for bushfire.*
- *Vegetation Category 2 is considered to be a lower bushfire risk than Category 1 and Category 3 but higher than the excluded areas.*
- *Vegetation Category 3 is considered to be medium bushfire risk vegetation. It is higher in bushfire risk than category 2 (and the excluded areas) but lower than Category 1.*

While not identified as a bushfire prone vegetation community in Figure 3-1, grassfires should not be underestimated and can start and spread quickly. For this reason we have considered these as a bushfire hazard as identified in Figure 3-2 and Figure 3-7. They can travel up to 25km per hour and pulse even faster over short distances. As described by Sullivan *et al*. (2012), grass is a fine, high surface area to volume ratio fuel with high thermal conductivity, low density and vertical orientation, which rapidly ignites (and rapidly burns out). Grassfires are also generally more open to wind than forest fuels (Cheney and Sullivan 2008) making them unpredictable. Grassfires tend to be less intense and produce fewer embers than bushfires, but still generate enormous amounts of radiant heat. Grassfires can also start earlier in the day than bushfires, because grass dries out more quickly when temperatures are high and humidity is low. It should be assumed that, under the most extreme weather, a fire would spread even in heavily grazed grass and embers may breach any Asset Protection Zone (APZ).

There are also patches of woodland and forest vegetation within the Richmond Valley RJP Investigation Area that will influence fire behaviour. They tend to have continuous fuels that are available to burn during average seasons. They are highly combustible and the regional climatic conditions (see Section 3.6 - low rainfall, low humidity. high temperatures and high winds) may support crown fires. These areas should be avoided where possible and will be subject to asset protection zones.

Legend

RJP Boundaries

National Parks Estate and Conservation Areas

Bush Fire Prone Land

Vegetation Buffer

Vegetation Category 1

Vegetation Category 2

Source:
Base Data - DCDB/DTDB NSW
Imagery - DRNSW (May 2018)

Bushfire Prone Land Mapping

3-1

Drawing No:	0621304m_RV_BF_G001_R2.mxd		Richmond Valley **RJP** Bushfire Report
Date:	19/10/2022	Drawing Size: A3	
Drawn By:	KV / MB	Reviewed By: JW	Client: Department of Regional NSW

Coordinate System: GDA 1994 MGA Zone 56

0 500 1,000m

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Legend

- RJP Boundaries
- Highway
- Minor Road
- Path/Track
- railway
- Dry Sclerophyll Forest (grassy formation)
- Forested Wetland
- Freshwater Wetland
- Grassy Woodland
- Mixed Grassland

Notes:
This is very broad vegetation mapping only based on a combination of desktop assessment and field survey undertaken to support the Richmond Valley RJP Biodiversity Assessment Report (ERM 2022). Detailed site investigation and bushfire risk assessment will be required to support future development applications.

Source:
Base Data - DCDB/DTDB NSW
Imagery - DRNSW (May 2018)

JOHNSTON STREET
BRUXNER HIGHWAY
CENTRE STREET
HARE STREET
BRUXNER HIGHWAY

Broad Vegetation Communities within the Richmond Valley RJP

F3.2

Drawing No:	0621304s_RV_BF3_G010_R2.mxd		Richmond Valley RJP **Bushfire** Report
Date:	20/10/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: AH	Client: Department of Regional NSW

Coordinate System: GDA 1994 MGA Zone 56

0 500 1,000m

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3.3 Topography

Steeper slopes significantly increase the rate of spread of fires, and the relationship of the steepness of slope, and whether a fire moves upslope or downslope, is vital to understanding bushfire behaviour potential. For every 10-degree slope, the fire will double its speed. Slope and wind are often the major factors determining the direction of fire spread.

The township of Casino is situated in the alluvial flatlands of the Richmond River. As identified within Figure 3-3 the topography is generally flat to undulating affording long vistas over expansive grazing land towards the distant Richmond Ranges and Tweed Range.

Research by Sharples (2011) has shown that dynamic fire behaviour can occur on steep slopes of over 24-26 degrees. Areas downwind of these slopes can be exposed to a much greater risk of damage than normal, due to the occurrence of dynamic fire propagation and the development of catastrophic 'firestorms'. In the case of eruptive fire behaviour, the spread will be dominated by convective heat transfer (by strong air movement) rather than radiant heat transfer alone. In addition, eruptive fires may produce a larger area of active flame than the standard fire front, which makes containment of a bushfire more difficult. This is not a key risk within the Richmond Valley RJP with only small localised steep slopes associated with the creeklines.

3.4 Fire History within the Project Area

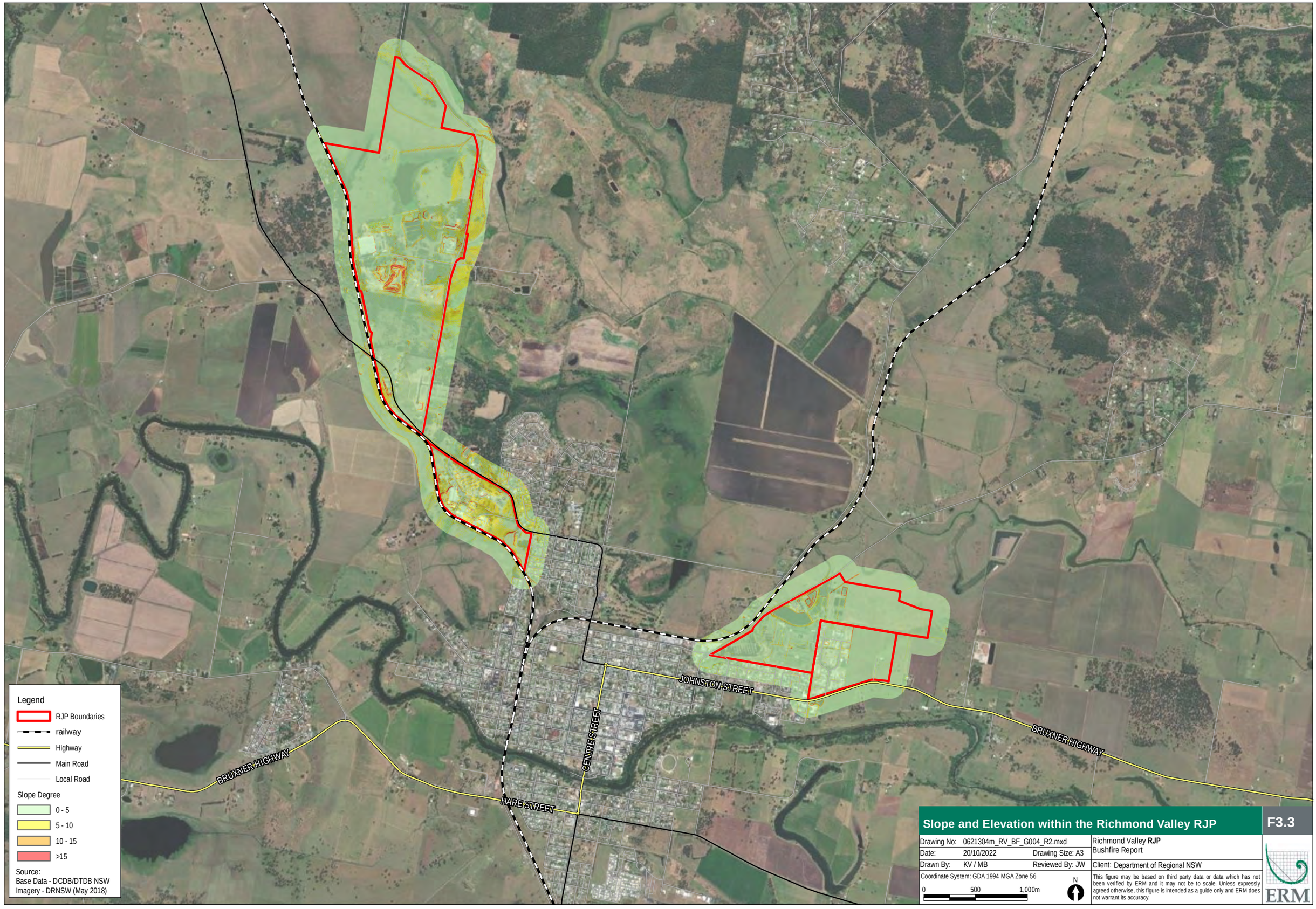
As reported in the Northern Rivers Bush Fire Risk Management Plan (2021), the region has on average 120 bush fires per year, of which 7 on average can be considered to be major fires. During the devastating 2019/20 Spring and Summer seasons, two major bushfires had significant impacts on the Richmond Valley LGA - the Busbys Flat Road Fire (commenced on 8 October 2019) and the Myall Creek Road Fire (commenced on 8 November 2019) which together devastated 1,427 km^2 of land (about 46.8% of the LGA) causing extensive damage. These fires did not directly impact the precinct or the township of Casino itself although indirect impacts of these major fire events included disruption to freight and transport, impacts to regional economy as well as impacts to tourism, social wellbeing, agriculture and forestry. The recovery process is likely to be measured in years rather than months or weeks.

As indicated in Figure 3-4, there have been no reported bushfires impacting the Richmond Valley RJP (based on publically accessible mapping).

3.5 Fire Ignition

Based on a review of the publically available information, bushfires occur in most years in this district, and natural ignitions such as lightning strikes are likely and historically common across the region. As reported by Northern Rivers BFMC (2021) the main sources of ignition in the Northern Rivers BFMC area are:

- Pre-bush fire danger period burns;
- Illegal burning-off;
- Arson;
- Escapes from legal burning-off; and
- Lightning.



Slope and Elevation within the Richmond Valley RJP

F3.3

Drawing No:	0621304m_RV_BF_G004_R2.mxd		Richmond Valley **RJP** Bushfire Report
Date:	20/10/2022	Drawing Size: A3	
Drawn By:	KV / MB	Reviewed By: JW	Client: Department of Regional NSW

Coordinate System: GDA 1994 MGA Zone 56

0 500 1,000m

N

ERM

BRUXNER HIGHWAY
HARE STREET
CENTRE STREET
JOHNSTON STREET
BRUXNER HIGHWAY

Legend
- RJP Boundaries
- railway
- Highway
- Main Road
- Local Road
- 1976-77 Wildfire
- 1981-82 Wildfire
- 1986-87 Wildfire
- 1991-92 Wildfire
- 2002-03 Wildfire
- 2006-07 Wildfire
- 2007-08 Wildfire
- 2008-09 Wildfire
- 2017-18 Wildfire

Source:
Base Data - DCDB/DTDB NSW
Imagery - DRNSW (May 2018)

Bushfire History Map

3-4

Drawing No:	0621304m_RV_BF_G006_R2.mxd		Richmond Valley **RJP** Bushfire Report
Date:	19/10/2022	Drawing Size: A3	
Drawn By:	KV / MB	Reviewed By: JW	Client: Department of Regional NSW

Coordinate System: GDA 1994 MGA Zone 56

0 1,000 2,000m

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3.6 Climate and Fire Weather

Weather conditions influence the size, intensity, speed, and predictability of bushfires and how dangerous they can be to the community. While bushfires can happen at any time of the year in Australia, the time of peak bushfire activity varies across the country with the changes in the seasonal weather patterns. In NSW and southern Queensland this generally occurs in spring to mid-summer.

Source: Bureau of Meteorology – Bushfire Weather (2021)
http://www.bom.gov.au/weather-services/fire-weather-centre/bushfire-weather/index.shtml

Figure 3-5 Fire Danger Seasons

As described by the Bureau of Meteorology (BOM) (2021), the greatest danger occurs following a dry winter and spring (as seen during the bushfires in 2019). The worst conditions occur when deep low-pressure systems near Tasmania bring strong, hot and dry, westerly winds to the coastal districts. The end of the fire season is determined by the onset of moister conditions, sometimes the result of a tropical cyclone developing near the Queensland coast.

As reported by the Northern Rivers Bushfire Management Committee (BFMC) (BFMC, 2021), the typical / average climate in the Northern Rivers BFMC area is warm subtropical with a well-defined summer / autumn rainfall peak (January to March) and a dry winter and spring. The rainfall can be unreliable during the late winter / spring period, particularly on the lower altitude landforms.

The bushfire season generally coincides with strong south-west to north-west winds, which tend to prevail during late winter / spring (August / September) and often result in extreme fire danger days, particularly where the drought indices are low. The majority of serious bush fires occur from this period until the onset of summer rains, which normally start from December and continue through to autumn. Longer fire seasons are experienced when summer rainfall is lower than normal, with the bushfire season extending through summer to early autumn.

Strong gusty winds help fan the flames and cause a fire to spread faster across the landscape. Strong winds can carry hot embers long distances - these can start spot fires many kilometres ahead of the main fire front. Smoke attributed to bushfire can also have a major impact on various assets and the environment. Wind direction, fuel moisture content, and ignition source should be considered and managed to reduce the likelihood of smoke issues.

The Northern Rivers BFMC area commences its Bush Fire Danger Period on the 1st of September each year in recognition of a typical early onset of bushfire dangers across the region. This is one month earlier than the statutory period. In a typical year, the Bush Fire Danger Period generally ends in February due to typically high rainfall that occurs in the late summer months. This is assessed by the BFMC each year varied as required.

3.7 Climate Change and Bushfires

Eastern Australia is documented to be one of the most bushfire-prone areas in the world. As reported by the Bureau of Meteorology (BOM 2021), human induced climate change is influencing the frequency and severity of dangerous bushfire conditions in Australia and other regions of the world, influencing temperature, environmental moisture, weather patterns, and fuel conditions. Observed changes in southern and eastern Australia include more extreme conditions during summer, as well as an earlier start to the bushfire season with dangerous weather conditions occurring significantly earlier in spring than they used to.

This is also supported by the Adapt NSW New England North West Climate Change Snapshot which reports that in the near future (by 2030), projected changes to the Forest Fire Danger Index (FFDI) will occur, increasing fire weather in summer, spring and winter and also increasing the number of fire weather days in summer and spring. As reported in the Richmond Valley Council LSPS 2020:

- Severe fire weather is projected to have an increase (+0.1 days) across the North Coast region by 2030, and an increase (+0.3 days) by 2070 during the peak prescribed burning seasons (Spring +0.2 days) and peak fire risk season (Summer +0.1 days).
- By 2030 the North Coast is projected to experience an average of 3 more days above 35oC per year and continue to rise to 9 days per year by 2070 (Summer +5.7 days and Spring +3.0 days).

While climate change might not ignite the fire, it is giving fires the chance to turn into catastrophic fires by creating warmer temperatures, increasing the amount of fuel (dried vegetation) available, and reducing water availability due to higher evaporation. In relation to fire ignition, there is some indication that human induced climate change could also influence the risk of ignitions from dry-lightning (i.e., lightning that occurs without significant rainfall).

Bushfire weather conditions in future years are projected to increase in severity for many regions including Casino. This will result in:

- An earlier start to the bushfire season;
- Reduced opportunities for fuel reduction burning;
- Management of fire risk to property, people and biodiversity will become increasingly challenging; and
- An increase in the number of extreme fire danger days.

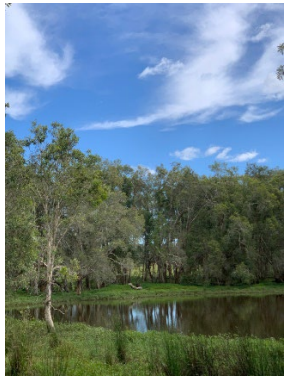
3.8 Key Assets and Land Use within and Surrounding the Investigation Area

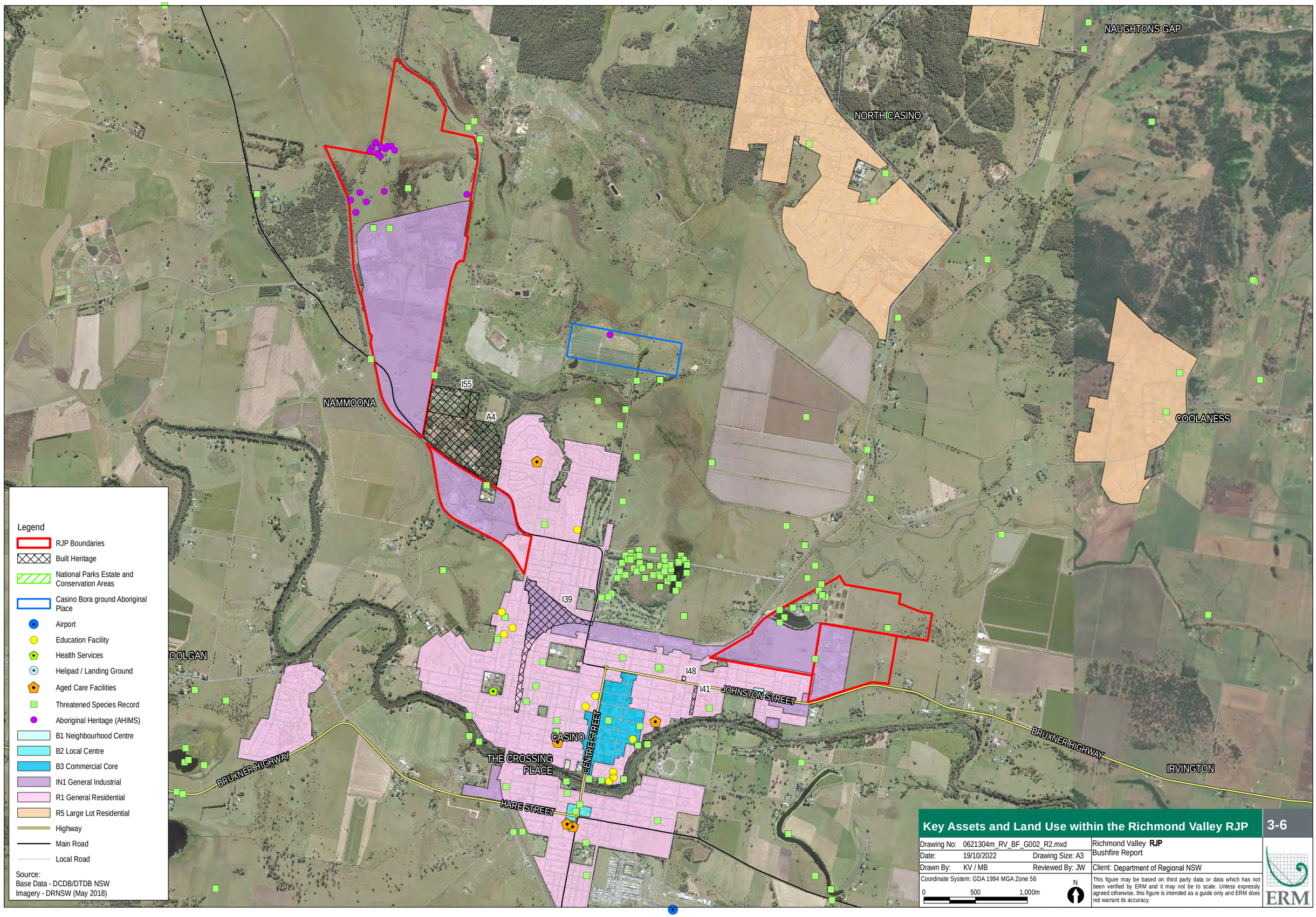
Key assets and land use within and surrounding the Richmond Valley RJP have been very broadly classified in Table 3.1. A separate asset register has also been included in Appendix B, based on the Northern Rivers BFMC Bush Fire Risk Management Plan (2021).

Table 3.2 Identification of Assets within the Richmond Valley RJP

Asset		Description of asset	Vulnerable to bushfire impacts?	Within the Richmond Valley RJP?
National Parks Estate and Conservation Areas		The Jabiru Genebeeinga Wetlands are a natural habitat area that provides a sanctuary for native birds and other wildlife. Situated adjacent to the Casino Golf Club alongside Queensland Road, they were developed in 1988 as a bicentennial project with an aim to support and preserve habitat primarily for native bird species, as well as offer a viewing platform and an amphitheatre.	✓	✗
Residential areas and Special Fire Protection (SFP) assets.		The precinct is located to the north and east of the residential township of Casino and is surrounded by residential areas and associated infrastructure including aged care facilities, shopping centres, tourist accommodation, children's playgrounds, sporting grounds, schools, health services. Rural residential areas are also scattered within the surrounding landscape.	✓	Area 1 - Nammoona Precinct Area 2 - Co-op Precinct Area 3a - Johnston St Area 3b - STP and surrounds

Asset		Description of asset	Vulnerable to bushfire impacts?	Within the Richmond Valley RJP?
Rail		The North Coast Railway Line is the primary rail route in the Mid North Coast and Northern Rivers regions of New South Wales, Australia, and forms a major part of the Sydney–Brisbane rail corridor.	✓	Area 1 - Nammoona Precinct Area 2 - Co-op Precinct
Commercial and Industrial Infrastructure		A wide variety of commercial and industrial development have been identified within the precinct. This includes a number of existing assets that are vulnerable to bushfire, including (but not limited to) food processing facilities, meat co-op, livestock exchange, waste management centre, general industry and powerlines. An industrial subdivision at Reynolds Road, in the southern portion of the Nammoona Precinct has also recently been approved as Stage 1, 2 and 3.	✓	Area 1 - Nammoona Precinct Area 2 - Co-op Precinct Area 3a - Johnston St Area 3b - STP and surrounds

Asset		Description of asset	Vulnerable to bushfire impacts?	Within the Richmond Valley RJP?
Threatened species	 	A large number of threatened fauna have been recorded across the investigation area and the remnant vegetation contributes to important local habitat corridors. These include a combination of: ■ Richmond River and associated riparian zone (south of the study area). ■ Barlings Creek (south of the study area). ■ Endangered Ecological Communities (EEC) in the northern portion of the Nammoona Industrial Precinct. ■ Remnant vegetation north of the Northern Coop Meat Company sector.	✓	Area 1 - Nammoona Precinct Area 2 - Co-op Precinct Area 3a - Johnston St Area 3b - STP and surrounds
Cultural heritage		The RJP investigation area and the local Casino region contains a number of Aboriginal and historic heritage sites that will need to be considered during the Master Plan process. Indigenous land use and burning practices were recognised in the recent 2020 National Bushfire and Climate Summit and are being addressed within the Royal Commission into National Natural Disaster Arrangements. The Master Plan may also present an opportunity to explore additional options and integrate Indigenous land use and fire management practices.	✓	Area 1 - Nammoona Precinct Area 2 - Co-op Precinct Area 3a - Johnston St Area 3b - STP and surrounds



Key Assets and Land Use within the Richmond Valley RJP

3-6

Drawing No:	0621304m_RV_BF_G002_R2.mxd		Richmond Valley **RJP** Bushfire Report
Date:	19/10/2022	Drawing Size: A3	
Drawn By:	KV / MB	Reviewed By: JW	Client: Department of Regional NSW

Coordinate System: GDA 1994 MGA Zone 56

0 500 1,000m

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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

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3.9 Suppression and Fire Response Difficulties

This assessment has identified that some areas of the precinct are located within bushfire prone land. It is also important to note that much of the broader urban area is currently managed to reduce the risk of bushfires impacting life and property.

Although main roads are often treated as fire advantages, firefighting access and evacuation potential must be considered and an assessment of traffic volumes and evacuation routes will be required. The potential for these evacuation routes to be non-trafficable during a bushfire event will be factored into the Traffic and Transport Assessment (separate package). It will also be important to consider any increase traffic volume on the main evacuation pathways (including but not limited to, Reynolds Road Summerland Way and various local roads).

The Master Plan will need consider appropriate site access points and design of access roads to enable safe access and egress for residents/site users attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations.

Fragmentation of the landscape due to existing disturbance and infrastructure provide fire suppression control options within the Richmond Valley RJP. While not mapped at this scale, asset protection zones have been established around existing individual assets within the precinct. They are also a requirement for all residential, special fire protection development and most other assets that require protection from bushfires.

New fire ignitions are likely to be detected relatively quickly due to the generally flat topography of the project area reducing visual barriers to observers and the presence of a major roads.

3.10 Summary

Bushfire hazard classes were identified across the landscape by applying relative weightings to the varying fuel groups and combining them with available slope classes (i.e., <2°, 2-5°, 5-10°, >10°) within a Geographic Information System (GIS) model. The vegetation fuel load and slope data sets were loaded into a Weighted Overlay Model, to combine the data and highlight areas of overall higher hazard considering both fuel load and slope. Slope was calculated in degrees and bushfire hazard rating based on steepness and movement speeds of potential bushfire up or down these slopes. The model assumed in this case that both slope and fuel load were equally important or weighted the same in the analysis process.

The result is an overlay that identifies broad bushfire hazard classes for the Richmond Valley RJP (refer to Figure 3-7). This analysis does not indicate how often an area will receive potentially damaging fires or the actual intensity of a fire. It does however, provide a useful comparative ranking, identifying sites of higher and lower potential fire behaviour compared to others in an area.

Based on the information provided in the fire weather and fire hazard analysis above, likely fire behaviour can be predicted. The evaluation of existing bushfire behaviour shows that the greatest hazard is a combination of undesirable fire weather (i.e., strong south-west to north-west winds during summer) and the potential for a fire to spread towards key infrastructure and assets in the surrounding area. A fire under the influence of wind may travel fast in an easterly or south-easterly direction, reaching assets before fire fighters can attend the scene as was observed across Australia during the recent 2019/2020 fire season.

Legend

- RJP Boundaries
- Highway
- Minor Road
- Path/Track

Bushfire Hazard Class

- Extreme
- High
- Moderate
- Low

Source:
Base Data - DCDB/DTDB NSW
Imagery - DRNSW (May 2018)

Indicative Bushfire Risk Mapping

F3.7

Drawing No:	0621304s_RV_BF3_G011_R1.mxd		Richmond Valley RJP Biodiversity Report
Date:	20/10/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: AH	Client: Department of Regional NSW

Coordinate System: GDA 1994 MGA Zone 56

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4. LAND USE ANALYSIS

As outlined within Planning for Bush Fire Protection 2019, land use planning can be an effective tool in minimising or avoiding the impact of natural hazards such as bushfire. From a risk management perspective, the safest approach is always to avoid high risk areas. In a bushfire context, strategic planning must ensure that future land uses are in appropriate locations to minimise the risk to life and property from bushfire attack. Services and infrastructure that facilitate effective suppression of bush fires also need to be provided for at the earliest stages of planning.

The design of precinct includes the retention of the wetland in the north which presents a clear, well defined interface between the hazard and potential development within the RJP. This interface will be the focus of the bushfire mitigation measures and required setbacks (asset protections zones) although it is noted that some bushfire risk will always remain.

It is also noted that at the strategic land use planning stage the range of possible tenants, activities and associated hazards are unknown. Hence, it is not possible to undertake a detailed land use assessment and the following information provided is general in nature.

4.1 Complying Development

The intention of the Richmond Valley RJP is to unlock investment and growth opportunities, deliver stability and create jobs for communities across Richmond Valley. To make it easier for businesses to set-up or expand within the precinct it is intended to maximise the type and number of developments which can occur through complying development pathways. Considerations for assessing applications located on bushfire prone land are outlined in Part 5A, Division 4, Clause 5A.29 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008, as follows:

5A.29 Development standards for bush fire prone land

(1) This clause applies—

(a) to all development specified in clause 5A.2(1) for this code that is to be carried out on a lot that is wholly or partly bush fire prone land, and

(b) in addition to all other development standards specified for this code.

Note - See clause 1.19A for additional provisions relating to bush fire prone land.

(2) The development may be carried out on the lot only if—

(a) the development conforms to the specifications and requirements of Planning for Bush Fire Protection that are relevant to the development, and

(b) (Repealed)

(c) the lot has direct access to a public road or a road vested in or maintained by the council, and

(d) a reticulated water supply is connected to the lot, and

(e) a fire hydrant is located less than 70m from the location on the lot of the proposed development, and

(f) mains electricity is connected to the lot, and

(g) reticulated or bottled gas on the lot is installed and maintained in accordance with AS/NZS 1596:2014, The storage and handling of LP Gas and the requirements of relevant authorities (such as the requirement that metal piping be used), and

(h) any gas cylinders on the lot that are within 10m of a dwelling—

(i) have their release valves directed away from the dwelling, and

(ii) are enclosed on the hazard side of the installation, and

(iii) have metal connections to and from the cylinders, and

(i) there are no polymer sheathed flexible gas supply lines to gas meters adjacent to any dwelling on the lot or an adjoining lot.

Note - The requirements relating to the construction of buildings in bush fire prone areas set out in the Building Code of Australia also apply.

At this Master Plan phase, one of the important items is the ability for future complying development to provide suitable APZs to result in a Bushfire Attack Level of BAL 29 or lower (not BAL 40 or BAL FZ) to the future building envelopes in accordance with the requirements of Planning for Bush Fire Protection 2019. The identification, application and management of asset protection zones is further considered in Section 5.2.

4.2 Special Fire Protection Purpose Development

SFPP uses would attract larger minimum required APZs and more onerous Bushfire Protection Measures. Examples of SFPP developments relevant to the Richmond Valley RJP may include education facilities (eg TAFE) or other industrial or agricultural training hubs. Subject to a detailed hazard and land use conflict assessment these may be located within the 'opportunity' sites identified in Area 2 although it is noted that other sensitive land uses such as schools or child care centres are unlikely to be suitable based on the risk profile presented in the Food Co-Op precinct (refer to Sherpa Consulting, 2022).

Information and education facilities are defined in the Standard Instrument (Local Environmental Plans) Order 2006 as a building or place used for providing information or education to visitors, and the exhibition or display of items, and includes an art gallery, museum, library, visitor information centre and the like. For the purposes of this assessment and in accordance with Section 8.3.11 of Planning for Bush Fire Protection 2019, any buildings used for public assembly with a floor space area of greater than 500m² will also be treated as SFPP.

Other land uses such as places of public worship and other public assembly buildings (i.e., function centres) are not defined as SFPP under section 100B of the Rural Fires Act but do require referral to the NSW RFS under s.4.14 of the EP&A Act. For the purposes of this assessment and as outlined above, any buildings used for public assembly with a floor space area of greater than 500m² will also be treated as SFPP.

Commercial and industrial development is also captured by EP&A Act s.4.14 only where a manager's residence is included. Where no residential component is included, commercial and industrial development would be addressed through the aims and objectives of Planning for Bush Fire Protection 2019.

A SFPP development is one which is occupied by people who are considered to be at-risk members of the community. In a bushfire event, these occupants may be more susceptible to the impacts of bushfire. Evacuating at-risk members of the community is more challenging because they may be physically or psychologically less able to relocate themselves or are unfamiliar with their surroundings.

Due to the potential vulnerable nature of the occupants, there is more reliance on the provision of a wider APZ and emergency management. The specific objectives for SFPP developments are to:

- Minimise levels of radiant heat, localised smoke and ember attack through increased APZ, building design and siting;
- Provide an appropriate operational environment for emergency service personnel during firefighting and emergency management; ensure the capacity of existing infrastructure (such as roads and utilities) can accommodate the increase in demand during emergencies as a result of the development; and
- Ensure emergency evacuation procedures and management which provides for the special characteristics and needs of occupants.

The identification, application and management of increased APZs is further considered in Section 5.2. It is also noted that the location of sensitive land uses will be defined by a number of additional restrictions such as access capabilities, air quality, noise impacts and consideration of other planned facilities (co-location).

It is also important to note that development of bushfire prone land for a Special Fire Protection Purpose (SFPP) triggers referral to the NSW Rural Fire Service under s100b Rural Fires Act 1997 and cannot be considered 'complying development' under any environmental planning instrument.

4.3 Hazardous Industry

Some developments are considered by their very nature to be hazardous, as much for their ability to start bushfires as their susceptibility to bushfire impacts. Where hazardous industries are proposed with the precinct, consultation with the NSW RFS and preparation of a performance based solution will be required. These development types will also not be considered for complying development.

Hazardous industries include but are not limited to:

- power generating works;
- sawmills;
- junk yards;
- liquid fuel depots;
- hazardous industries/storage;
- chemical industries/storage;
- service stations;
- ammunition storage/manufacture; and
- fireworks manufacture/storage.

Hazardous and offensive industries are types of industries and storage establishments that cannot comply with the conditions of their EPA licence, and present a risk to life, property and the environment. Hazardous developments are unlikely to be suitable within the Richmond Valley RJP due to land use conflicts.

Potentially hazardous development such as service stations that can comply with their license and conditions of consent may be permitted within the precinct. Environmental Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33) will continue to apply. Consultation with the NSW RFS and preparation of a performance based solution will be required. Potentially hazardous developments, including those handling toxic material(s), are likely to be acceptable in Area 1 Nammoona Precinct and Area 3 STP and surrounds.

These development types will not be considered for complying development within the Richmond Valley RJP.

4.4 Commercial / Industrial Development

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. The NCC does not provide for any bushfire specific performance requirements for these particular classes of buildings and as such Australian Standard 3959 'Construction of buildings in bushfire-prone areas' does not apply as a set of 'deemed to satisfy' provisions.

In this case (and as outlined within Section 8.3.1 of Planning for Bush Fire Protection 2019), the following objectives will be applied in relation to access, water and services, and emergency and evacuation planning:

- to provide safe access to/from the public road system for firefighters providing property protection during a bushfire and for occupant egress for evacuation;
- to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development;

- to provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building; and
- provide for the storage of hazardous materials away from the hazard wherever possible.

Construction requirements for bushfire protection will need to be considered on a case-by-case basis. Where a manager's residence is included in the proposal for a commercial and industrial development it is captured by s4.14 of the EP&A Act (refer to Section 4.2).

Where no residential component is included, commercial and industrial development is addressed through the objectives of Planning for Bush Fire Protection 2019, being:

i. afford buildings and their occupants 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, minimises material ignition;
iv. ensure that appropriate operational access and egress for emergency service personnel and residents is available;
v. provide for ongoing management and maintenance of BPMs; and
vi. ensure that utility services are adequate to meet the needs of firefighters.

The scale of the development and numbers of people likely to be occupying the building will directly influence the bushfire protection measures. While there are no minimum required APZs applicable to commercial / industrial development, to satisfy the aim and objectives of Planning for Bush Fire Protection 2019, the buildings must be located outside Flame Zone.

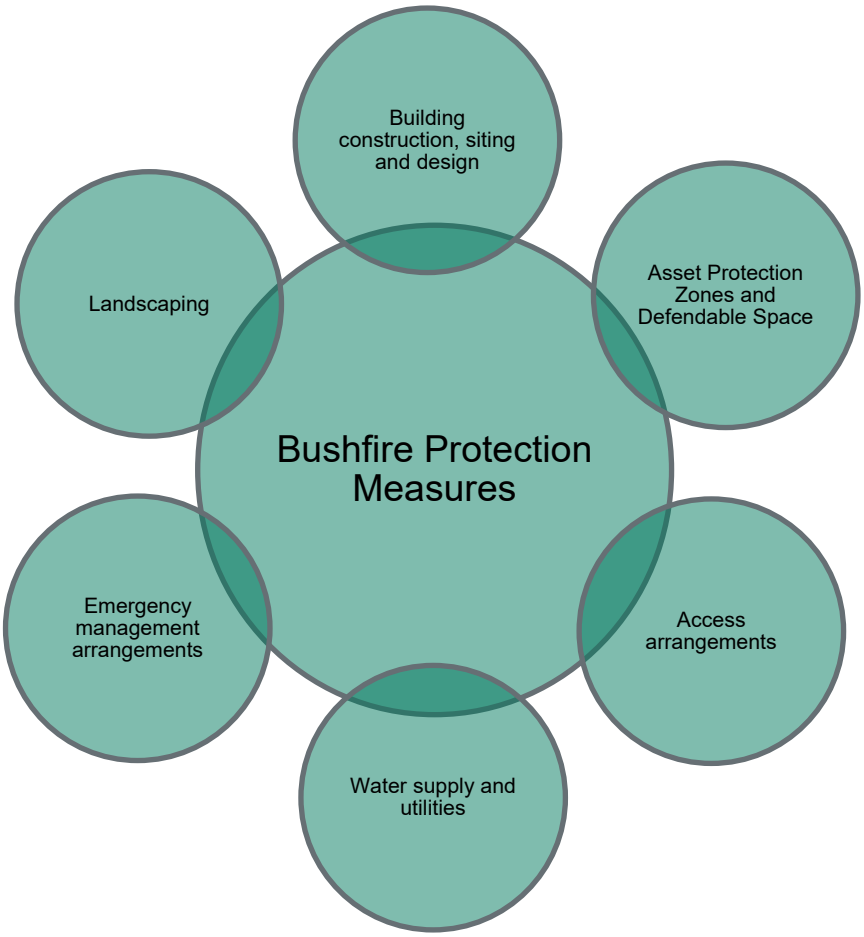
To satisfy the requirements of complying development, commercial and industrial development should have a Bushfire Attack Level of BAL 29 or lower (refer to Section 5.2).

5. OTHER CONSIDERATIONS

It is neither possible nor desirable to eliminate bushfires in NSW – they are inevitable across all fire-prone vegetation types. When high fuel loads, ignition sources and adverse weather inevitably coincide, wildfires will result. Modern fire management requires the assessment, measurement and mitigation of risks – to social, economic and environmental values. As reported by OEH (2012), this creates an imperative to work closely with adjoining land managers, community groups and fire authorities to continually improve our understanding of bushfires, and to work together in managing the risks associated with living in a fire-prone environment.

As outlined within Planning for Bush Fire Protection 2019, land use planning can be an effective tool in minimising or avoiding the impact of natural hazards such as bushfire. From a risk management perspective, the safest approach is always to avoid high risk areas. In a bushfire context, strategic planning must ensure that future land uses are in appropriate locations to minimise the risk to life and property from bushfire attack. Services and infrastructure that facilitate effective suppression of bush fires also need to be provided for at the earliest stages of planning.

The capacity of the current road network to deal with increased traffic volumes associated with the development of the Richmond Valley RJP including evacuating residents and workers is being addressed separately.



5.1 Firefighter and Public Safety

The firefighters likely to respond to a bushfire in this area would be volunteers from the NSW RFS and/or individual property owners. Based on the locality of the site, NSW RFS may also work closely with the Fire and Rescue NSW in the event of any major fires in this area.

These agencies and groups work together through local bushfire management committees across NSW. Set up under the NSW RF Act, these committees coordinate fire management planning, prevention and suppression in local areas.

NSW Police, NSW Ambulance and the NSW State Emergency Services will also assist in active support roles in bushfire and emergency incidents.

Emergency service capacity may need to expand to meet suppression requirements based on the type, nature and size of development within the Richmond Valley RJP over the coming years. Once the scale and type of development is known, a decision to scale up emergency resources in the region may be required.

5.2 Asset Protection Zones and Defendable Space

An APZ is a buffer zone between a bushfire hazard and buildings, and is managed to minimise fuel loads and reduce potential radiant heat levels, flame, localised smoke and ember attack. The appropriate APZ distance is based on vegetation type, slope and the nature of the development (refer to Appendix A).

The APZ can include roads, fences, boardwalks, signage, seating or other passive recreational activities managed to be consistent with the NSW RFS document Standards for Asset Protection Zones. A fuel-reduced, physical separation between buildings and bushfire hazards is a key element in the suite of bushfire measures and has a major influence on the type of construction necessary to mitigate bushfire attack.

Irrespective of the bushfire prone land mapping, it is important to ensure that a defendable space is provided for the size and scale of the development. Proposed measures must operate in combination to minimise the impact of bushfire and ensure that access and services are adequate. At this stage of the Master Plan process, it is important to highlight the need to provide suitable APZs across the precinct to result in a Bushfire Attack Level of:

- BAL 29 or lower to all the future building envelopes;
- BAL 12.5 or lower to all SFPP; and
- BAL 12.5 or lower to all hazardous industry.

As indicated within Figure 5.1, the width of the APZ will differ based on the location of the hazard (slope and vegetation type) relevant to the development footprint. As an indication, the following separation distances in Table 5.1 will apply to all areas located 0-5 degrees downslope (the hazard is downslope or lower than the development footprint).

Additional information is provided in Appendix A.

Legend

- RJP Boundaries
- Highway
- Minor Road
- Path/Track
- railway
- 20m wide APZ
- 30m wide APZ
- 40m wide APZ

Mater Plan

- C2 Environmental Conservation Zone
- C3 Environmental Management Zone
- E3 Productivity Support
- E4 General Industrial
- E5 Heavy Industrial
- RU1 Prmary Production
- Opportunity site
- Park
- Road
- Urban Growth Boundary Reduction Area

Notes:
Indicative Asset Protection Zones only based on achieving a BAL 29 or lower.
The precinct may require the creation of additional APZs that need to be maintained sequentially until the final phase of development is completed to afford each stage of the development the appropriate level of bush fire protection.
No additional APZ have been applied within the approved Reynolds Road Subdivision which already includes a 20m wide asset protection zone.

Source:
Base Data - DCDB/DTDB NSW
Imagery - DRNSW (May 2018)

JOHNSTON STREET
BRUXNER HIGHWAY
CENTRE STREET
HARE STREET

Indicative Asset Protection Zones for the Structure Plan

F5.1

Drawing No:	0621304s_RV_BF3_G012_R1.mxd		Richmond Valley RJP Bushfire Report
Date:	21/10/2022	Drawing Size: A4	
Drawn By:	KV	Reviewed By: AH	Client: Department of Regional NSW

Coordinate System: GDA 1994 MGA Zone 56

0 500 1,000 m

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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

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Table 5.1 Indicative separation distances

KEITH VEGETATION FORMATION		BUSH FIRE ATTACK LEVEL (BAL)*				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) from the asset to the predominant vegetation				
> 0 > 5 degrees	Dry Sclerophyll Forest (grassy formation)	< 19	19 -< 25	25 -< 35	35 -< 47	47 -< 100
	Forested Wetland	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
	Freshwater Wetland	< 4	4 -< 6	6 -< 8	8 -< 12	12 -< 100
	Grassy Woodland	< 10	10 -< 13	13 -< 19	19 -< 28	28 -< 100
	Grassland	< 8	8 -< 11	11 -< 16	16 -< 23	23 -< 50
		Not complying development	Not complying development	BAL 29 or lower to all the future building envelopes		Potentially Hazardous Industry and SFPP

**Based on 0-5 degrees downslope. Refer to Table A1.12.6 Planning for Bushfire Protection 2019*

5.3 APZs on Environmentally Protected Lands

Bushfire protection measures such as APZs may not necessarily be compatible with environmental protection and conservation objectives. It must not be assumed that an APZs can extend into an adjoining vegetated area or riparian corridor. Where environmentally sensitive vegetation such as endangered ecological communities or threatened species habitat are to be cleared for the purposes of an APZ, the proposals will need to be carefully considered and may no longer be consistent with complying development.

This is applicable to the C2 and C3 Environmental Zone in the North Namooona precinct and can be addressed through the provision of the DCP planning framework.

5.4 Landscaped Areas and Recreational Spaces

All landscaping is to comply with Appendix 4 of Planning for Bush Fire Protection 2019 and relevant environmental approvals required under the NSW BC Act 2016 and/or EPBC Act 1999. All landscaped areas should be designed and managed to meet the requirements of an APZ. These areas should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires, particularly in advance of the bushfire season. As a minimum:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5 m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

Grass

- grass should be kept mown to a height of less than 100 mm; and
- leaf and other debris should be removed.

Provided that these areas are designed (and maintained) to comply with Appendix 4 of Planning for Bush Fire Protection 2019, no additional asset protection zones need to be applied to these areas.

5.5 Landscape Buffers

The Master Plan aims to establish site planning controls (via the DCP planning framework) to promote the retention and enhancement of 10m wide landscape buffers along roadsides and RJP boundaries. 20m wide buffers will be provided north of the approved Stage 3 subdivision.

In accordance with Planning for Bush Fire Protection 2019 and AS3959, the proposed landscape buffers are considered to be low threat vegetation and are not required to be considered for the purposes of Planning for Bush Fire Protection provided that they are designed and maintained as follows:

- Strips of vegetation less than 20 metres in width (regardless of length) and not within 20m of other areas of vegetation being Category 1, 2 or 3 vegetation; and/or
- Multiple areas of vegetation less than 0.25 hectares in area and not within 20m of other areas of vegetation being classified vegetation.

To meet this requirement, all landscape buffers must be less than 20m wide. Where they are designed to be greater than 20m wide, they should have a 20m wide break every 125m so that each patch of vegetation is less 0.25ha in area. This break can include roads, carparks, road verges and other cleared areas.

5.6 Staged Development

As outlined within Planning for Bush Fire Protection 2019 and relevant to the Richmond Valley RJP, often a time lag can occur between one or more stages of development which can result in persons and property being unprotected in the event of a bushfire. The precinct may require the creation of APZs that need to be maintained sequentially until the final phase of development is completed to afford each stage of the development the appropriate level of bushfire protection.

Indicative Asset Protection Zones have been identified within Figure 5.1.

No additional APZ have been applied within the approved Reynolds Road Subdivision which already includes a 20m wide asset protection zone. An APZ will be required to this vegetation until such time as it cleared.

5.7 Building Construction, Siting and Design

Construction measures should not be applied as a stand-alone mitigation solution, but will form part of a suite of bushfire management measures. Building design needs to ensure adequate protection of vulnerable building elements. Construction standards are outlined in AS 3959 and the NCC to provide various levels of protection for different building elements.

The NCC does not provide any bushfire specific performance requirements for Class 5 to 8 buildings including offices, shops, factories, warehouses, public car parks and other commercial and industrial facilities.

5.8 Access

Design of the internal road network must enable safe access and egress for occupants attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations. In a bushfire prone area, the purpose of the road system is to:

- provide firefighters with access to structures, allowing more efficient use of firefighting resources;
- provide evacuation routes for firefighters and the public; and
- provide access to areas of bushfire hazard for firefighting and hazard mitigation purposes.

The capacity of the current road network to deal with increased traffic volumes associated with the development of the Richmond Valley RJP including evacuating residents and workers is being addressed separately.

A perimeter road should be provided where possible to separate retained bushland from the development precincts, allowing more efficient use of firefighting resources. A perimeter road usually runs parallel to the bush land interface and provides space to conduct active firefighting operations and hazard reduction activities. Where this is not provided, the application of defendable space within each of the lots should be considered. The precinct should be designed to ensure that no lots directly adjoin the retained environmental protection areas.

Roads must provide sufficient width and other dimensions to ensure safe unobstructed access and allow firefighting crews to operate equipment around the vehicle. Road width is defined as the trafficable width from kerb to kerb or the inside edge of the table drain.

Dead-end roads should be avoided. However, where they are present, they must incorporate a sufficient turn-around area to minimise the need for vehicles to make multipoint turns.

Appendix C provides a summary of the design principles that will need to be considered the internal road network. Table 5.2identifies the Acceptable Solutions under the Planning for Bush Fire Protection 2019.

Table 5.2 Acceptable Solutions for Access Roads (General)

Performance criteria	Acceptable solutions*
Firefighting vehicles are provided with safe, all-weather access to structures.	■ property access roads are two-wheel drive, all-weather roads; ■ traffic management devices are constructed to not prohibit access by emergency services vehicles; ■ 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; ■ all roads are through roads; ■ dead end roads are not recommended, but if unavoidable, are not more than 200m in length, incorporate a minimum 12m outer radius turning circle, and are clearly sign posted as a dead end; ■ where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; ■ where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and ■ one way only public access roads are no less than 3.5m wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.
The capacity of access roads is adequate for firefighting vehicles.	■ the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/ causeways are to clearly indicate load rating.
There is appropriate access to water supply.	■ hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; ■ hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005; and ■ there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.
Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	■ are two-way sealed roads; ■ minimum 8m carriageway width kerb to kerb; ■ parking is provided outside of the carriageway width; ■ hydrants are located clear of parking areas; ■ are through roads, and these are linked to the internal road system at an interval of no greater than 500m; ■ curves of roads have a minimum inner radius of 6m; ■ the maximum grade road is 15 degrees and average grade of not more than 10 degrees; ■ the road crossfall does not exceed 3 degrees; and ■ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

**Planning for Bush Fire Protection (NSW Rural Fire Service, 2019)*

5.9 Water Supply

An adequate supply of water is essential for firefighting purposes and suitable water supply arrangements must be provided for firefighting that meet the NSW RFS requirements. It is essential to ensure that any water sources are maintained at the appropriate capacity.

Where a non-reticulated water supply is provided or the reticulated water supply is deemed inadequate, an additional on site dedicated supply of water for firefighting will be required.

Any future development must comply with the water supply requirements detailed in Planning for Bush Fire Protection 2019. These requirements can be achieved in two ways, being:

- reticulated water is to be provided to the development, where available; and
- a static water supply is provided where no reticulated water is available.

Given the scale of the proposal it would be considered likely that any future development will be serviced by a hydrant system.

- The fire hydrant spacing, design and sizing must comply with the Australian Standard AS 2419.1:2005;
- hydrants are not located within any road carriageway;
- reticulated water supply uses a ring main system for areas with perimeter roads;
- fire hydrant flows and pressures comply with AS 2419.1:2005; and
- all above-ground water service pipes external to the building are metal, including and up to any taps.

5.10 Electricity and Gas

Planning for Bush Fire Protection also addresses the installation of services (i.e., electricity and gas) within bushfire prone areas. The following are the requirements for the relevant services:

- where practicable, electrical transmission lines are underground;
- where overhead, electrical transmission lines are proposed as follows:
  - lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas;
  - 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;
- 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;
- 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.

5.11 Emergency management

It is noted that a Bushfire Emergency Management Plan may be required to support future development of the precinct in conjunction with relevant stakeholders, including local fire services, NSW RFS, NSW Fire and Rescue, and adjoining property owners and employees. At this strategic land use planning stage, no detailed recommendations have been provided for the content or structure of any Bushfire Emergency Management Plan and this discussion is provided for information only.

Despite the mitigation measures and treatments that are put in place, some bushfire risk will always remain and some of the infrastructure may be subject to direct flame contact. It is noted that the Royal Commission Inquiry into the 2009 Victorian 'Black Saturday' Bush Fires delivered a number of recommendations that reiterated the importance of educating the community on the most appropriate actions to take prior to and during a bushfire. Recommendations 1-5 of the final report, which relate to bushfire safety policy, provided the direction for the creation of the new Community Protection Plan (CPP) framework.

The development and implementation of a CPP is an asset specific treatment for a very high to extreme risk human settlement asset identified in a Bush Fire Risk Management Plan (BFRMP). Casino and North Casino residential areas are currently identified as a medium to high bushfire risk (Northern Rivers BFMC 2021) and do not require the preparation of a CPP. These documents can also be prepared by the NSW Rural Fire Service (RFS) in consultation with stakeholders independent of the BFRMP and may provide some direction for emergency management planning within the precinct.

CPP consist of maps with supporting documentation are made publicly available at https://www.rfs.nsw.gov.au/resources/publications/community-protection-plans.

- Bushfire Survival Map - includes information on the potential bushfire threat, the safety of access / egress provisions, early relocation options and contingency shelter options. This map provides information that can be used by members of the community when developing their personal Bushfire Survival Plan or Emergency Management and Evacuation Plan.
- Bushfire Preparation Map - provides information for land managers, fire agencies and community members on details of the existing and proposed bushfire risk treatment works for the community. The map will also provide information that will prompt home owners / occupiers to take action to reduce their bushfire risk.

6. CONCLUSION

This Bushfire Assessment has been prepared for the New South Wales (NSW) Government to prepare a Bushfire Analysis Report to support the development of the Master Plan for the Richmond Valley RJP. This assessment considers the bushfire landscape, land use, access and egress and emergency services capacity. Based on these factors it is anticipated that new development within the precinct can be designed to meet the requirements of Planning for Bush Fire Protection 2019.

Complying development will not be applicable to all land use types or where a referral to the NSW RFS is required. The remaining commercial and industrial type development can addressed within the Master Plan through the aims and objectives of Planning for Bush Fire Protection 2019. Specifically:

- Complying development is only permitted on lower risk bushfire prone land (BAL-29 or lower);
- Where hazardous industries are proposed, consultation with the NSW RFS and preparation of a performance based solution will be required. These development types will not be considered for complying development;
- Developments classified as special fire protection purpose (SFPP) would trigger referral to the NSW Rural Fire Service under s100b *Rural Fires Act 1997* and will not be considered complying development; and
- Other land uses such as places of public worship and other public assembly buildings (i.e., function centres) also require referral to the NSW RFS under s.4.14 of the EP&A Act. Any buildings used for public assembly with a floor space area of greater than 500m² will be treated as SFPP.

Development of the Richmond Valley RJP should ensure complementary bushfire management and mitigation strategies. Of particularly note is the importance to consider existing access and egress routes across the locality and ensure complementary management strategies with key consideration of the Northern Rivers Livestock Exchange, Richmond Valley Waste Management Centre, Casino Food Co-op, Richmond Valley Sewage Treatment Plant, Johnston St Industrial Area as well as the nearby identified Special Fire Protection assets (retirement villages, schools, hospitals and tourist attractions).

It will also be important to consider any increase traffic volume on the main evacuation pathways including but not limited to, Reynolds Road, Summerland Way and various local roads. The Master Plan will need consider appropriate site access points and design of access roads to enable safe access and egress for residents/site users attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations.

The development of the structure plan has also considered the application of suitable APZs across the precinct to result in a Bushfire Attack Level of:

- BAL 29 or lower to all the future building envelopes;
- BAL 12.5 or lower to all SFPP; and
- BAL 12.5 or lower to all potential hazardous industry.

The Richmond Valley RJP may also require the creation of APZs that need to be maintained sequentially until the final phase of development is completed to afford each stage of the development the appropriate level of bushfire protection. APZs should be applied to meet the objectives of Planning for Bushfire Protection 2019 and will consider the possibility of direct flame contact in accordance with AS3959:2018. Decisions on where and how APZs should be maintained will be based on a site specific risk assessment. Other factors such as loss of visual amenity, potential erosion, loss of biodiversity and cultural heritage values and the indirect implications for the long-term management of the precinct will also be considered.

Key specifications and requirements to assist in the development of the Master Plan are provided in Table 6.1.

Table 6.1 Proposed Performance Criteria – Bushfire

Performance Criteria No.	Performance Criteria Description
1	Asset Protection Zones are managed and maintained to prevent the spread of a fire within the precinct in accordance with the requirements of Appendix 4 of Planning for Bush Fire Protection 2019 to result in a Bushfire Attack Level of BAL 29 or lower (not BAL 40 or BAL FZ) to all future building envelopes that are being assessed as complying development. This includes staged or partial development of the Richmond Valley RJP.
2	Where referral to NSW RFS is required (SFPP, hazardous development and/or public assembly buildings), Asset Protection Zones should be managed and maintained to result in a Bushfire Attack Level of BAL 12.5 or lower (not BAL 29, BAL 40 or BAL FZ). These developments will not be assessed as complying development.
3	All landscaping is to comply with Appendix 4 of Planning for Bush Fire Protection 2019 and relevant environmental approvals required under the NSW *Biodiversity Conservation Act* 2016 and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Where environmentally sensitive vegetation such as endangered ecological communities or threatened species habitat are to be cleared, the proposals will need to be carefully considered and may no longer be consistent with complying development.
4	Landscape buffers along roadsides must also be maintained to reduce bushfire hazard. These areas are considered to be low threat vegetation provided that they are less than 20m wide. Where they are designed to be greater than 20m wide, they should have a 20m wide break every 125m so that each patch of vegetation is less 0.25ha in area. This break can include roads, carparks, road verges and other cleared areas.
5	Access roads must be designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface. The requirements for access identified in Planning for Bush Fire Protection 2019 must be met for all stages of development within the Richmond Valley RJP.
6	Adequate water supplies must be provided for firefighting purposes. Hydrants are to be installed to achieve compliance with AS 2419.1 – 2021 Fire Hydrant Installations - System Design, Installation and Commissioning (AS 2419) and must be located less than 70m from each building envelope.
7	The location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings. Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used.
8	The location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings and must comply with requirements of Planning for Bush Fire Protection 2019.

Despite the mitigation measures and treatments that are put in place, it is noted that some bushfire risk will always remain and that some of the infrastructure may be subject to direct flame contact. The absence of any identified hazard or asset within the Richmond Valley RJP should not be interpreted as a guarantee that such hazards or impacts do not exist. It will be important that a Bushfire Emergency Management Plan is prepared as part of the future Master Plan in conjunction with relevant stakeholders, including local fire services, NSW RFS, NSW Fire and Rescue, and adjoining property owners and employees. This may be facilitated by the Northern Rives BFMCC as part of a Community Protection Plan or similar risk management process.

Any representation, statement of opinion, or advice expressed or implied in the bushfire assessment will be made in good faith on the basis that ERM employees and / or agents are not liable (whether by reason of negligence, lack of care or any other reason) to any person, company or their agents for any damage or loss whatsoever which has occurred or may occur in relation to that person taking (or not taking) action in respect of any representation, statement or advice provided within the bushfire assessment.

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APPENDIX A TABLES FOR DETERMINING MINIMUM DISTANCES FOR APZ, PLANNING FOR BUSHFIRE PROTECTION 2019

Minimum distances for APZs – SFPP developments (≤10kW/m², 1200K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	38	47	57	69	81
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	67	79	93	100	100
Grassy and Semi-Arid Woodland	42	50	60	72	85
Forested Wetland (excluding Coastal Swamp Forest)	34	42	51	62	73
Tall Heath	50	56	61	67	72
Short Heath	33	37	41	45	49
Arid-Shrublands (acacia and chenopod)	24	27	30	34	37
Freshwater Wetlands	19	22	25	28	30
Grassland	36	40	45	50	55

**Based Table A1.12.1 Planning for Bushfire Protection 2019*

Minimum distances for APZs – FFDI 80 areas (≤29kW/m2, 1090K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	9	12	15	20	25
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	20	25	31	39	48
Grassy and Semi-Arid Woodland	11	13	17	21	27
Forested Wetland (excluding Coastal Swamp Forest)	8	10	13	17	22
Tall Heath	16	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Freshwater Wetlands	5	6	6	7	8
Grassland	10	11	12	14	16

**Based Table A1.12.3 Planning for Bushfire Protection 2019*

Determination of BAL, FFDI 80 – residential development

	KEITH VEGETATION FORMATION	BUSH FIRE ATTACK LEVEL (BAL)*				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) from the asset to the predominant vegetation formation				
ALL UPSLOPE AND FLAT LAND	Rainforest	< 7	7-<9	9-<14	14 -< 20	20 -< 100
	Forest (wet and dry sclerophyll) including CoastalSwamp Forest, Pine Plantations and Sub-Alpine Woodland	< 15	15 -< 20	20 -< 29	29 -< 40	40 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 8	8-<11	11 -< 16	16 -< 22	22 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 6	6-<8	8-<12	12 -< 18	18 -< 100
	Tall Heath	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Short Heath	< 7	7-<9	9-<14	14 -< 20	20 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5-<6	6-<9	9-<14	14 -< 100
	Freshwater Wetlands	< 4	4-<5	5	-< 7	7-<11
	Grassland	< 7	7-<10	10 -< 14	14 -< 20	20 -< 50
> 0 > 5 DEGREES – DOWNSLOPE	Rainforest	< 9	9-<12	12 -< 17	17 -< 25	25 -< 100
	Forest (wet and dry sclerophyll) including CoastalSwamp Forest, Pine Plantations and Sub-Alpine Woodland	< 19	19 -< 25	25 -< 35	35 -< 47	47 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 10	10 -< 13	13 -< 19	19 -< 28	28 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 8	8-<10	10 -< 15	15 -< 22	22 -< 100
	Tall Heath	< 13	13 -< 18	18 -< 26	26 -< 36	36 -< 100
	Short Heath	< 8	8-<10	10 -< 15	15 -< 22	22 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5-<7	7-<11	11 -< 16	16 -< 100
	Freshwater Wetlands	< 4	4-<6	6-<8	8-<12	12 -< 100
	Grassland	< 8	8-<11	11 -< 16	16 -< 23	23 -< 50
> 5 > 10 DEGREES – DOWNSLOPE	Rainforest	< 11	11 -< 15	15 -< 22	22 -< 32	32 -< 100
	Forest (wet and dry sclerophyll) including CoastalSwamp Forest, Pine Plantations and Sub-Alpine Woodland	< 24	24 -< 31	31 -< 43	43 -< 57	57 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 12	12 -< 17	17 -< 24	24 -< 34	34 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 10	10 -< 13	13 -< 20	20 -< 28	28 -< 100
	Tall Heath	< 15	15 -< 20	20 -< 29	29 -< 40	40 -< 100
	Short Heath	< 9	9-<12	12 -< 18	18 -< 25	25 -< 100
	Arid-Shrublands (acacia and chenopod)	< 6	6-<8	8-<12	12 -< 18	18 -< 100
	Freshwater Wetlands	< 5	5-<6	6-<10	10 -< 14	14 -< 100
	Grassland	< 9	9-<12	12 -< 18	18 -< 26	26 -< 50

**Based Table A1.12.6 Planning for Bushfire Protection 2019*

KEITH VEGETATION FORMATION		BUSH FIRE ATTACK LEVEL (BAL)*				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) from the asset to the predominant vegetation formation				
>10 > 15 DEGREES – DOWNSLOPE	Rainforest	< 14	14 -< 20	20 -< 29	29 -< 40	40 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 30	30 -< 39	39 -< 52	52 -< 68	68 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 16	16 -< 21	21 -< 31	31 -< 42	42 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 12	12 -< 17	17 -< 25	25 -< 35	35 -< 100
	Tall Heath	< 17	17 -< 22	22 -< 32	32 -< 44	44 -< 100
	Short Heath	< 10	10 -< 13	13 -< 20	20 -< 29	29 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7-<9	9-<14	14 -< 20	20 -< 100
	Freshwater Wetlands	< 5	5-<7	7-<11	11 -< 16	16 -< 100
	Grassland	< 10	10 -< 14	14 -< 21	21 -< 30	30 -< 50
>15 > 20 DEGREES – DOWNSLOPE	Rainforest	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 38	38 -< 48	48 -< 63	63 -< 81	81 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 20	20 -< 27	27 -< 38	38 -< 52	52 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 16	16 -< 22	22 -< 32	32 -< 43	43 -< 100
	Tall Heath	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Short Heath	< 11	11 -< 15	15 -< 23	23 -< 32	32 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7-<10	10 -< 16	16 -< 23	23 -< 100
	Freshwater Wetlands	< 6	6-<8	8-<13	13 -< 18	18 -< 100
	Grassland	< 12	12 -< 16	16 -< 24	24 -< 34	34 -< 50

**Based Table A1.12.6 Planning for Bushfire Protection 2019*

APPENDIX B KEY ASSETS WITHIN THE INVESTIGATION AREA (NORTHERN RIVERS BFMC 2021)

Table B.1 Assets within the Richmond Valley RJP
(extract from Northern Rivers Bush Fire Risk Management Plan (Northern Rivers BFMC 2011)

Asset Name	Asset Location	Asset Type	Subtype	Risk Level	Priority	Treatment/ Action Description	Responsible Agencies	Support Agencies
Christian Community School	North Casino	Human	Residential	Low	-	-		
North Coast Railway – Whiporie to Casino	Whiporie to Casino	Economic	Infrastructure	Extreme	1A	Maintain Vegetation in Rail Corridor	RailCorp;ARTC	
North Coast Railway – Casino to Border	Casino to Border	Economic	Infrastructure	Extreme	1A	Maintain Vegetation in Rail Corridor	RailCorp;ARTC	
North Casino Rural Residential Area	North Casino	Human	Residential	High	3A	Undertake Community Engagement Maintain Roadside Vegetation Promote & Implement Static Water Supply Program	RFS, LGA	
Casino Meatworks	Casino	Economic	Commercial	Medium	4			
Casino Industrial Area – Reynolds Road	Casino	Economic	Commercial	Medium	4	-		
North Coast Railway Casino-Lismore	Casino	Economic	Infrastructure	Medium	4	-		
Casino Industrial Area – East	Casino	Economic	Commercial	Low	-	-		
NW Casino	Casino	Human	Residential	Low	-	-		
Casino	Casino	Human	Residential	Medium	4	-		

Northern Rivers BFMC Bush Fire Risk Management Plan 2021

Kyogle - Map Display Area

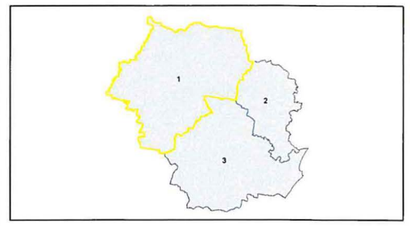
Map 1 of 3

This Bush Fire Risk Management Plan (BFRMP) has been prepared by the Northern Rivers Bush Fire Management Committee (BFMC) pursuant to section 52 of the *Rural Fires Act 1997*.

The aim of this BFRMP is to reduce the adverse impact of bush fires on life, property and the environment.

The objectives of this BFRMP are to:
- reduce the number of human-induced bush fire ignitions that cause damage to life, property or the environment;
- manage fuel to reduce the spread and intensity of bush fires while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment.

This map forms part of the BFRMP for the Northern Rivers BFMC, covering the local government area(s) of Kyogle, Lismore and Richmond Valley. It should be viewed in conjunction with the accompanying BFRMP document which provides further details on the BFMC area, the assets assessed and the risk assessment process used.



Review
Under the *Rural Fires Act 1997* this plan must be reviewed and updated within each successive five year period following the constitution of the BFMC. The Northern Rivers BFMC will also review this plan as necessary. This may be triggered by a range of circumstances, including but not limited to:
- changes to the BFMC area, organisational reponsibilities or legislation;
- changes to the bush fire risk in the area; or
- following a major fire event.

Assets
This BFRMP identifies the assets that are considered by the Northern Rivers BFMC and community to be at risk from bush fires, assesses the bush fire risk to each asset and assigns treatments designed to mitigate the risk. Assets in the BFMC area identified as requiring treatments are listed in the assets table. Other assets within the BFMC area that were assessed as not requiring treatments within the life of this plan are listed in the appendix to the BFRMP document. The Map Ref number "NA" denotes non-spatial assets.

Treatments
Specific treatments assigned to assets in the Northern Rivers area are listed in the treatments table and linked to the assets which they are designed to protect. Standard BFMC wide treatments (i.e. not linked to a specific asset) which occur on an ongoing basis within the BFMC area are:
- reviewing the bush fire prone land map;
- ensuring developments in the bush fire prone land comply with Planning for Bush Fire Protection;
- using the Local Environment Plan/s (LEPs) to control development in areas with a bush fire risk;
- varying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods
- prosecution of arsonists/offenders
- investigation of bush fire cause;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a S52 Operations Coordination Plan;
- fire management plans or plans of management; and
- bush fire hazard complaints.

Note on LMZ: All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMZ for this risk management plan. For areas identified by an LMZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression Objective(s)	Zone characteristics
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document *Standards for Asset Protection Zones*.
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development. To aid containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of: Parallel Attack suppression strategies within the zone, and/or Indirect Attack (back burning) in high to very high fire weather conditions within the zone, To reduce the likelihood of: Crown fire development within the zone, and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependant upon: - Topography - Aspect - Spotting propensity - Location of adjacent firebreaks - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in areas where APZs or SFAZs are not appropriate.	As per the land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning	As appropriate to achieve land management e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependant on size of fire sensitive area requiring protection.

Assets
- Human - Residential
- Human - Other
- Special Fire Protection
- Economic - Agricultural
- Economic - Commercial
- Economic - Infrastructure
- Economic - Tourism and Recreational
- Economic - Mines
- Commercial Forests
- Drinking Water Catchments
- Environmental - Locally Important
- Environmental - Significant Species
- Environmental - Endangered Species
- Cultural - Aboriginal Heritage
- Cultural - Other
- Cultural - Non Indigenous

Bush Fire Management Zones
- Fire Exclusion Zone (FEZ)
- Land Management Zone (LMZ)
- Asset Protection Zone (APZ)
- Strategic Fire Advantage Zone (SFAZ)

Base Data Layers
- Major Roads Sealed
- Major Roads Unsealed
- Secondary Road Sealed
- Secondary Road Unsealed
- Local Road Sealed
- Local Road Unsealed
- Local Road Unspecified
- 4WD Track Unspecified
- Path
- Heavy Rail
- Light Rail
- Heavy Rail Siding
- Drainage Perennial
- Drainage Non Perennial
- Hydro Line Perennial
- Hydro Line Non Perennial
- Contour (100m)
- Contour (10m)
- Map Display Area
- Local Government Area
- Crown Land
- State Forests
- National Park

*Note – Some base data layers may not be displayed on map

N

0 2.5 5 7.5 10 km @ A0

Disclaimer
The Northern Rivers BFMC makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances.

The Northern Rivers BFMC can not guarantee and assumes no legal liability or responsibility for the accuracy.

Authorized by ..... of Northern Rivers BFMC.
Date created: Tuesday, 7 September 2021

BFRR version 2.1.28.0 +S

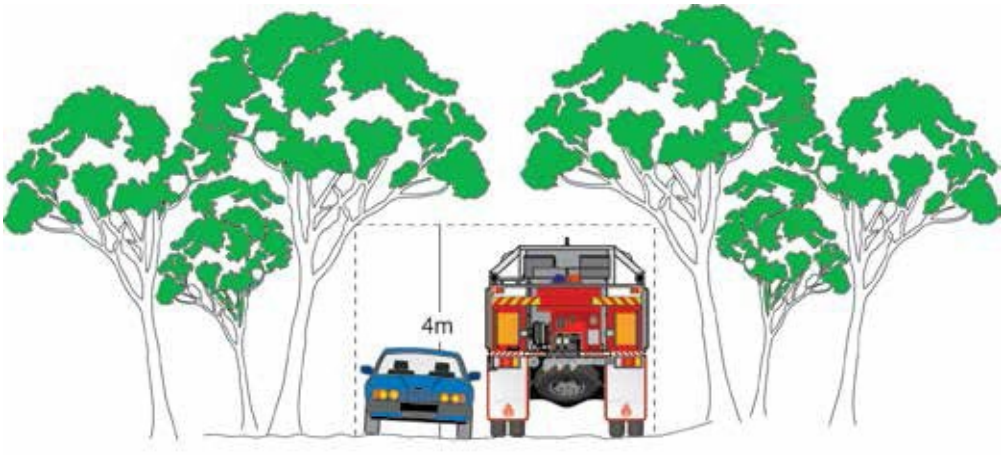
APPENDIX C DESIGN PRINCIPLES FOR EMERGENCY SERVICE VEHICLE ACCESS, PLANNING FOR BUSHFIRE PROTECTION 2019

ACCESS

This appendix provides design principles for emergency service vehicle access and is an extract from Appendix 4, Planning for Bushfire Protection 2019

Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.



Vehicle turning requirements

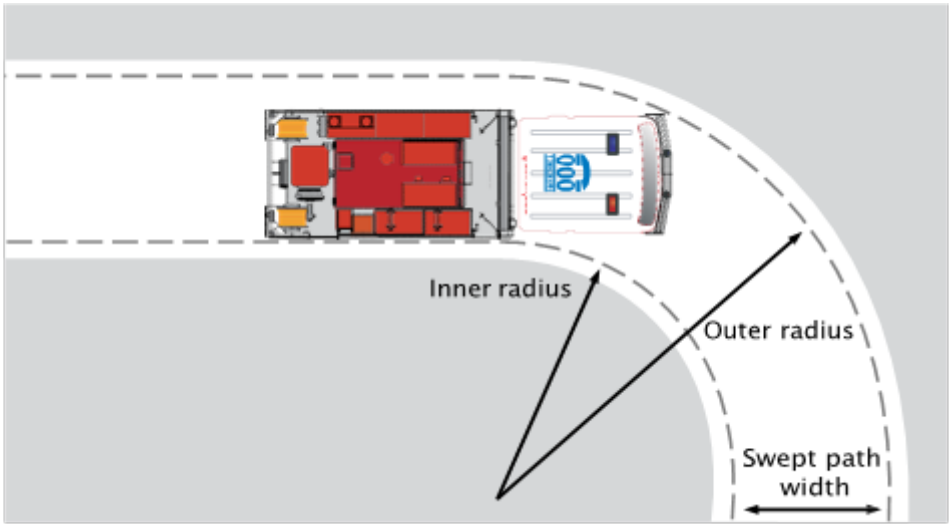
Curved carriageways should be constructed using the minimum swept path as outlined in the Table below:

Minimum curve radius 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

Swept path width for turning vehicles.

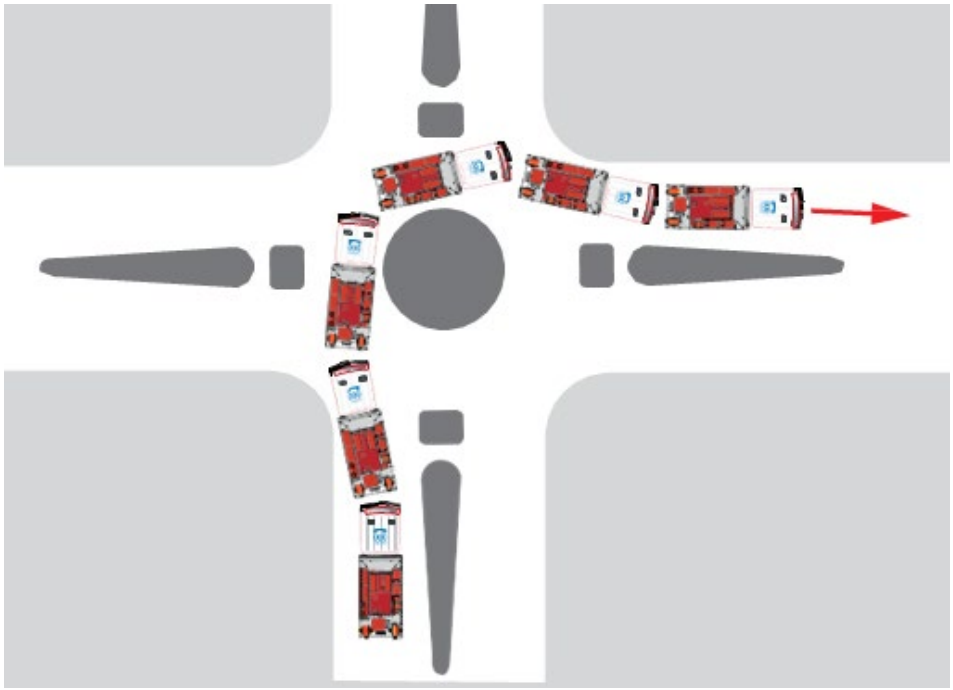
The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.



Roundabout swept path.

Example of a swept path as applied to a roundabout.

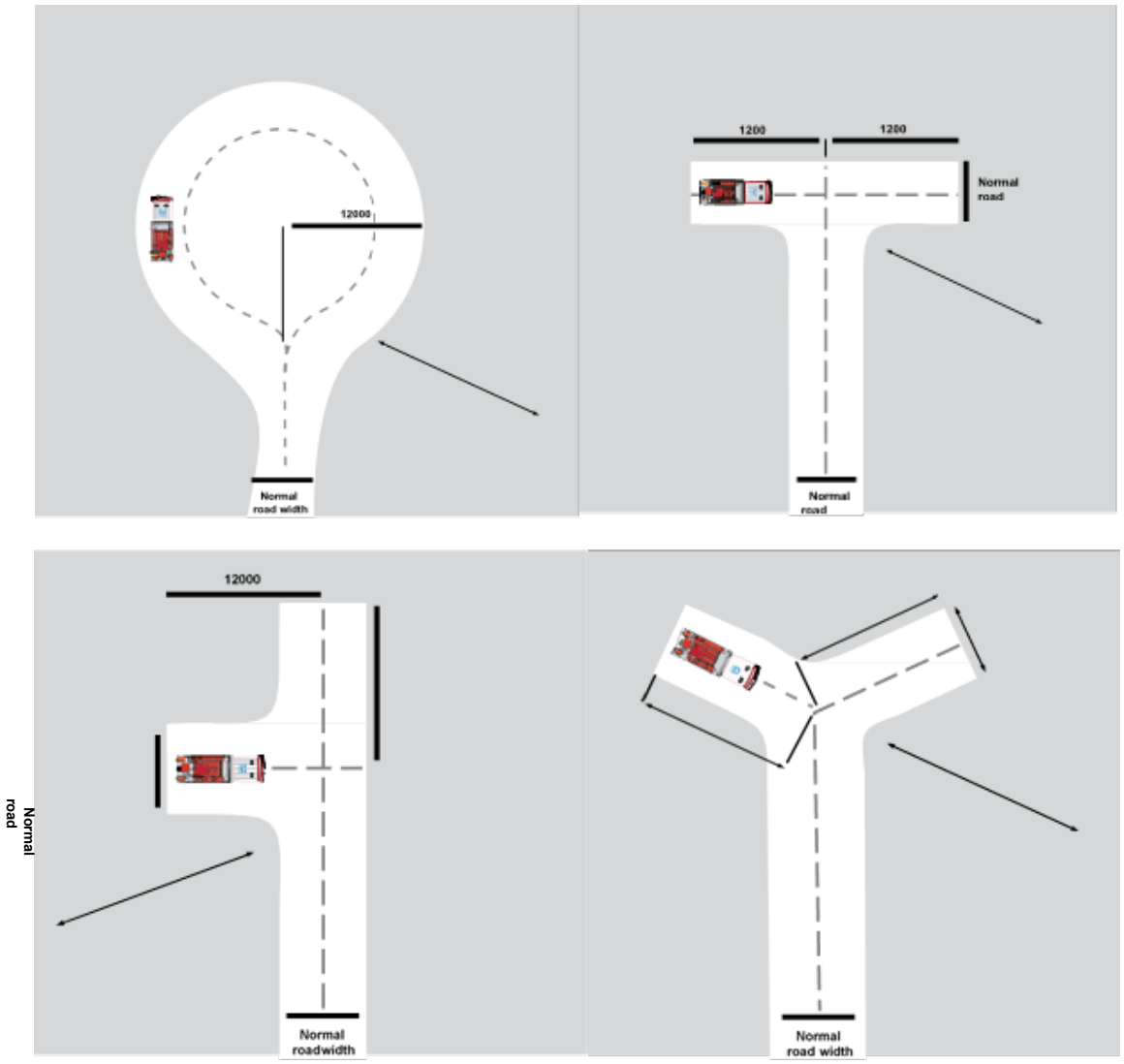
The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections.



Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. “No parking” signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2 of Planning for Bushfire Protection 2019. Where multipoint turning is proposed the NSW RFS will consider the following options:



Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bushfire threat where possible.

Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

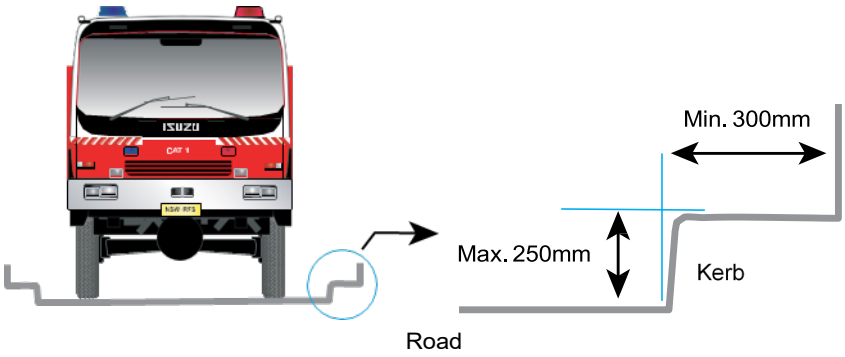
Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.

Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

Kerb dimensions

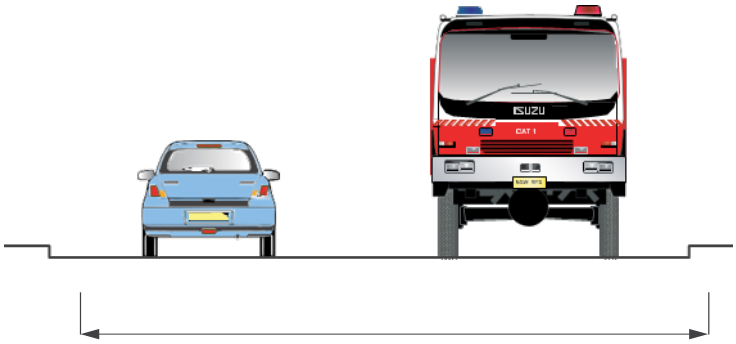
All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.



ROAD TYPES

Perimeter Roads

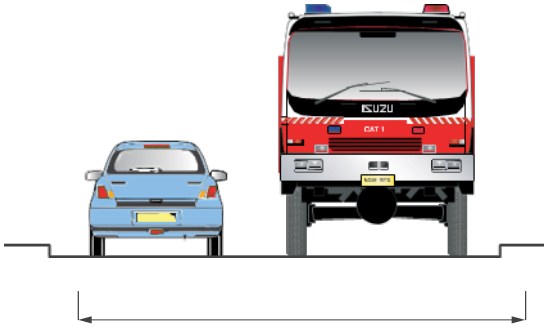
Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.



Perimeter roads = 8m to kerb

Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.



Non-perimeter roads = 5.5m to kerb

Property access

Property access roads are to be a minimum of 4m wide.

Property access road
4m wide carriage way

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