

Department of Planning, Industry and Environment

Moree Special Activation Precinct Environmental Package

11 February 2021

Bush Fire Report





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Executive summary

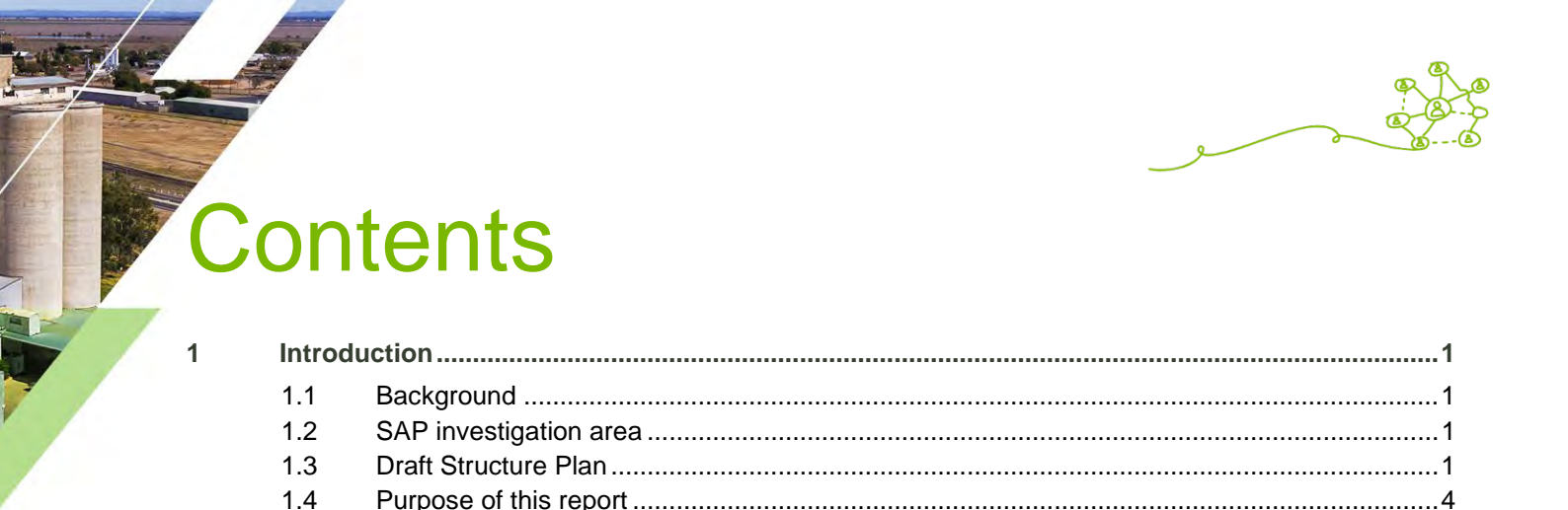
The NSW Government announced the investigation of a Special Activation Precinct at Moree on 3 December 2019. The purpose of the Special Activation Precinct is to investigate opportunities to unlock the economic potential of the region by leveraging Moree's location in the middle of one of the most productive agricultural regions in Australia, its proximity to the Inland Rail, and its strategic connections to inter- and intra-state, national and global markets.

Aurecon Australia Pty Ltd has been engaged by the NSW Department of Planning, Industry and Environment to undertake an assessment of the bushfire risks for the Moree Special Activation Precinct. The investigation area includes large areas which are mapped as Bush Fire Prone Land. As such, all new development within the Moree Special Activation Precinct must comply with the NSW Rural Fire Service's Planning for Bush Fire Protection (NSWRFS 2019). This report aims to assess the compliance of the draft Structure Plan for the Moree Special Activation Precinct against the aims and objectives of Planning for Bush Fire Protection.

Broadly, this assessment identifies a number of performance measures for new subdivisions that can be applied to the draft Structure Plan. This assessment considers the bush fire landscape, land use, access and egress, emergency services capacity and risk profile of adjoining lands. Based on these factors it is anticipated that new development within the draft Structure Plan will be able to meet the requirements of Planning for Bush Fire Protection, the Building Code of Australia, and be designed and constructed in accordance with the relevant Australian Standards to mitigate bush fire risk.

This report also includes recommendations with regard to future design of the internal road network and perimeter roads, and water supply and hydrant pressures, to enable compliance with the Planning for Bush Fire Protection guidelines.

Overall, within the boundary of the Draft Structure Plan key potential constraints and risks of bush fire are not considered to be significant as these risks can be appropriately mitigated through the design and coordination of future development. As such, at a strategic level the draft Structure Plan is well suited to accommodate future development where bush fire risks are appropriately mitigated.



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Abbreviations and glossary

Abbreviation	Definition
AP SEPP	<i>State Environmental Planning Policy (Activation Precincts) 2020</i>
APZ	Asset protection zones
BCA	Building Code of Australia
BFPL	Bush fire prone land
BFMC	Bush Fire Management Committee
DPIE	NSW Department of Planning, Industry and Environment
FRNSW	Fire and Rescue New South Wales
IBRA	Interim Biogeographic Regionalisation for Australia
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EP&A Reg	<i>Environmental Planning and Assessment Regulation 2000 (NSW)</i>
LGA	Local Government Area
NSW	New South Wales
NSWRFS	New South Wales Rural Fire Service
PBP	Planning for Bushfire Protection
PCT	Plant community type
RGDC	Regional Growth NSW Development Corporation
SAP	Special Activation Precinct



1 Introduction

1.1 Background

The New South Wales (NSW) Government has identified dedicated areas throughout regional NSW to bring together planning and investment to stimulate economic growth across a range of industries such as freight and logistics, advanced manufacturing, renewable energy, agribusiness and tourism. These dedicated areas are recognised as Special Activation Precincts (SAPs).

The NSW Government announced the investigation of a SAP at Moree on 3 December 2019. The purpose of the SAP is to investigate opportunities to unlock the economic potential of the region by leveraging Moree's location in the middle of one of the most productive agricultural regions in Australia, its proximity to the Inland Rail, and its strategic connections to inter- and intra-state, national and global markets. The SAP will guide development to support and enable future business growth and diversification in Moree.

1.2 SAP investigation area

Moree is located on the lands of the Gamilaroi (also known as Kamilaroi) people, the second largest Aboriginal nation on the eastern coast of Australia. The descendants of the Gamilaroi Nation continue to live on their land in Moree, with 21.6 percent of the Moree Plains local government area (LGA) population identifying as Aboriginal and/or Torres Strait Islander.

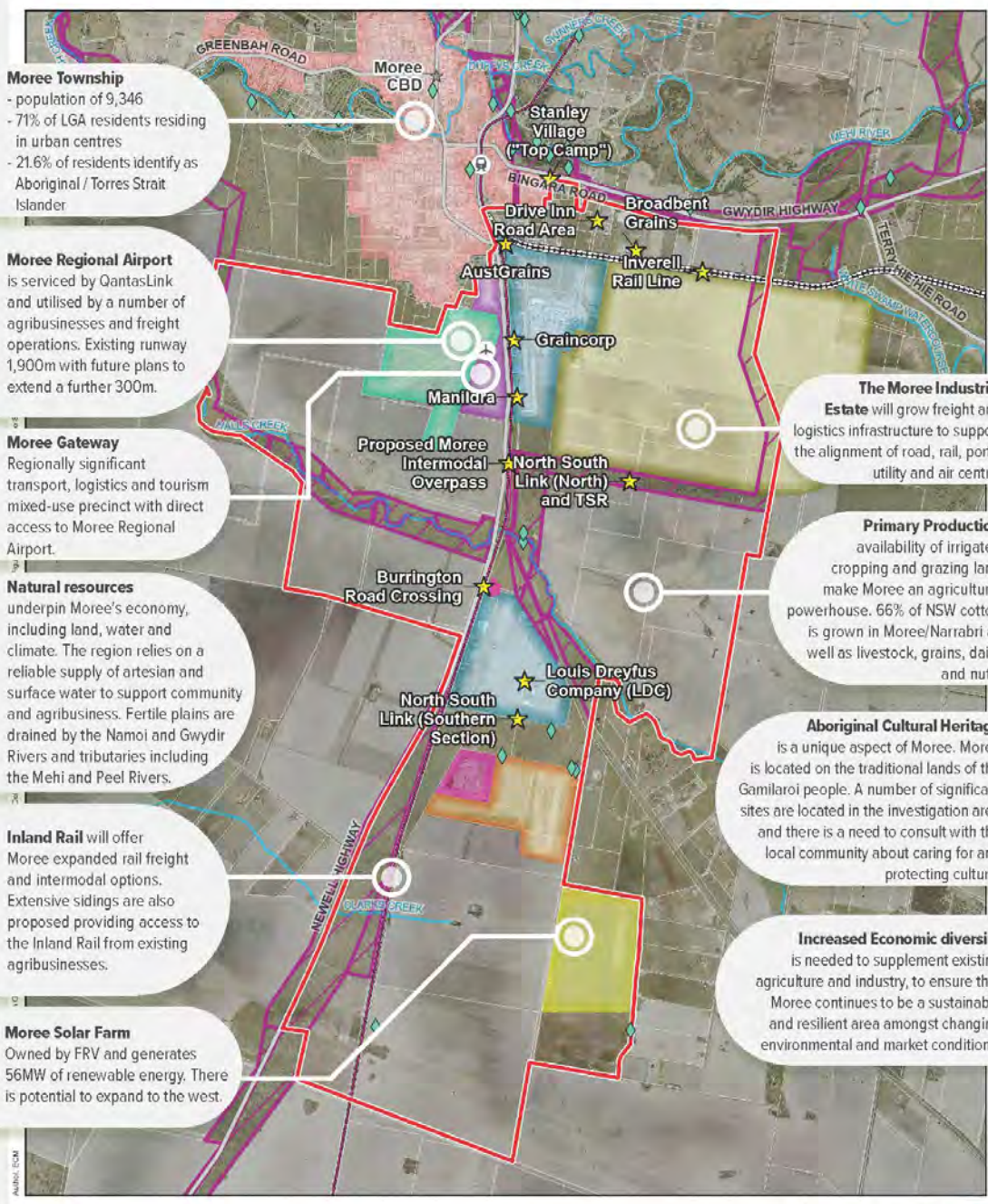
The natural assets of Moree and its surrounds make it one of the most productive agricultural regions in Australia. Natural benefits brought by fertile soils, a temperate climate, and location above significant artesian basin water have long enabled the success of large-scale broadacre cropping and pastoral production in the region. The region relies on a reliable water supply of both artesian and surface water to support community and agribusiness. Fertile plains are drained by the Namoi and Gwydir Rivers and their tributaries, including the Mehi and Peel Rivers.

The Moree SAP investigation area encompasses an area of approximately 5,800 hectares (ha) and lies just south of the Moree township and Gwydir Highway. The SAP investigation area spans both sides of the Newell Highway and the Inland Rail corridor (Narrabri to North Star section). There are a number of creek tributaries which traverse the investigation area. The primary waterway is Halls Creek, which crosses the SAP investigation area midway in an east-west direction, south of the Moree Regional Airport.

The Moree SAP investigation area and key features are shown on Figure 1.1.

1.3 Draft Structure Plan

A draft Structure Plan for the Moree SAP is shown on Figure 1.2, and is a smaller footprint of the initial Moree SAP investigation area. The proposed SAP boundary for the draft Structure Plan has been developed through an enquiry by design process identifying the possible location of certain types of industries within precincts.



Moree Township
 - population of 9,346
 - 71% of LGA residents residing in urban centres
 - 21.6% of residents identify as Aboriginal / Torres Strait Islander

Moree Regional Airport
 is serviced by QantasLink and utilised by a number of agribusinesses and freight operations. Existing runway 1,900m with future plans to extend a further 300m.

Moree Gateway
 Regionally significant transport, logistics and tourism mixed-use precinct with direct access to Moree Regional Airport.

Natural resources
 underpin Moree's economy, including land, water and climate. The region relies on a reliable supply of artesian and surface water to support community and agribusiness. Fertile plains are drained by the Namoi and Gwydir Rivers and tributaries including the Mehi and Peel Rivers.

Inland Rail will offer Moree expanded rail freight and intermodal options. Extensive sidings are also proposed providing access to the Inland Rail from existing agribusinesses.

Moree Solar Farm
 Owned by FRV and generates 56MW of renewable energy. There is potential to expand to the west.

The Moree Industrial Estate will grow freight and logistics infrastructure to support the alignment of road, rail, ports, utility and air centre.

Primary Production
 availability of irrigated cropping and grazing land make Moree an agricultural powerhouse. 66% of NSW cotton is grown in Moree/Narrabri as well as livestock, grains, dairy and nuts.

Aboriginal Cultural Heritage
 is a unique aspect of Moree. Moree is located on the traditional lands of the Gamilaroi people. A number of significant sites are located in the investigation area and there is a need to consult with the local community about caring for and protecting culture.

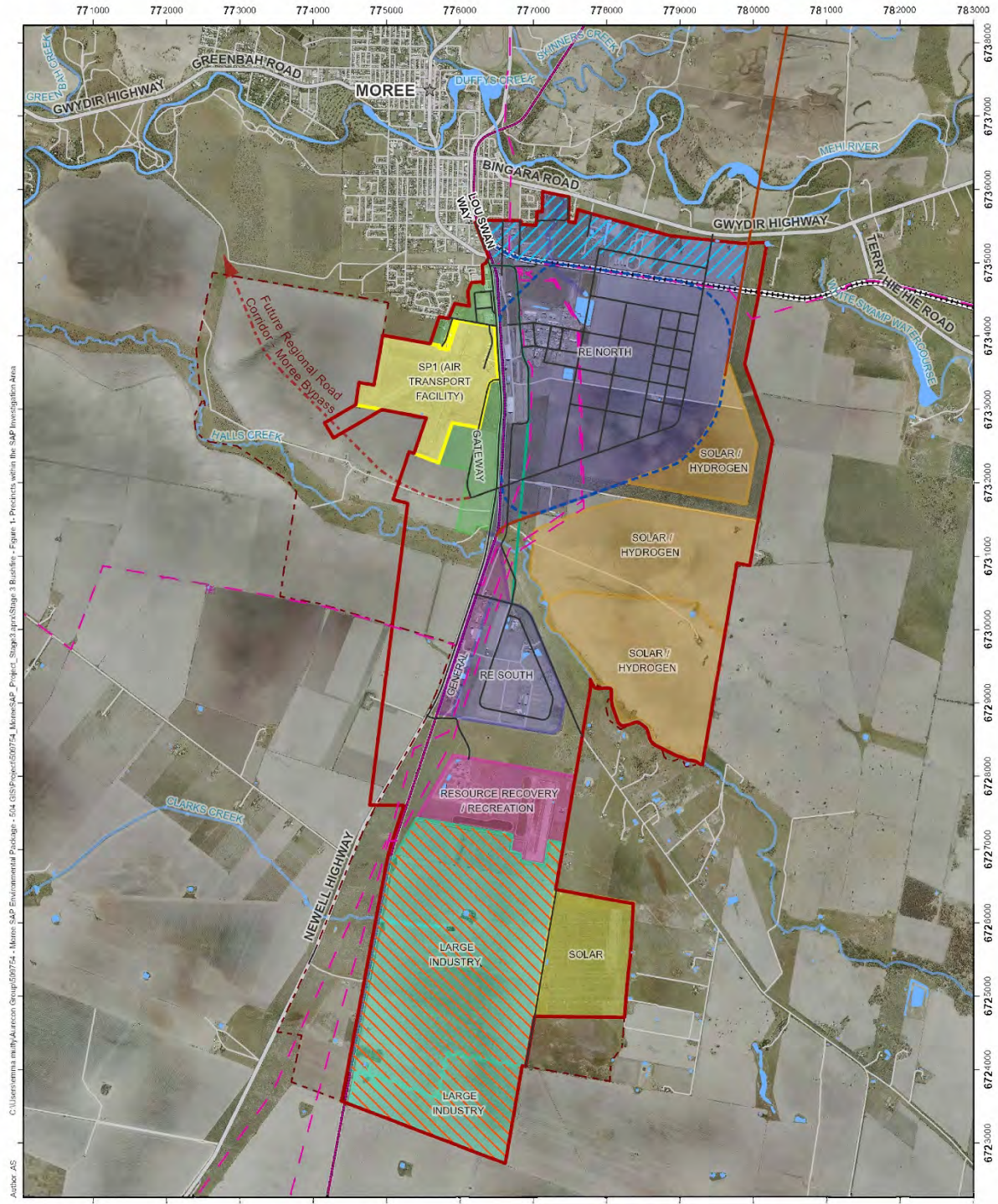
Increased Economic diversity
 is needed to supplement existing agriculture and industry, to ensure that Moree continues to be a sustainable and resilient area amongst changing environmental and market conditions.

Legend

★ Sites	Moree Inverell Railway	Moree Gateway
☆ Town	Inland Rail Corridor	Industrial Area
Ⓜ Railway Station	SAP Investigation Area	Moree Industrial Estate
✈ Airport	Lot	Moree Airports
🌿 Aboriginal Heritage Sites	Residential Dwellings	Moree Solar Farm
🌊 Watercourse	Travelling Stock Reserves	Moree Water Park
— Roads	Moree Township	Evergreen Precinct

AS1 scale 1:70,000
 0 1 2 Kilometers
 Date: 31/07/2020 Version: 2 Job No: 509754
 Coordinate System: GDA 1984 MGA Zone 55

Moree SAP Environmental Package
 Figure 1.1: Investigation area of the Moree SAP



★ Town — Roads --- SAP Road network ⋯ Inland Rail Corridor ⋯ Moree Inverell Railway — Watercourse ⋯ North-East Intermodal Loop

--- Future Moree Bypass — Rail Bypass — North-South Connector ⋯ Existing transmission line ⋯ SAP investigation area — Proposed SAP Boundary

Regional enterprise
— Regional Enterprise - Gateway — Regional Enterprise - General — Regional Enterprise - Large Industry — Regional Enterprise - Resource Recovery / Recreation — Regional Enterprise - Solar — Regional Enterprise - Solar / Hydrogen

— Moree Airport --- Regional enterprise - potentially hazardous industry --- Regional enterprise - low impact

Sources: ESRI, Aurecon Group, DPiE, Open Street Map



All scale: 1:70,000
 0 1 2 Kilometers

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 Coordinate System: GDA 1994 MGA Zone 55

Moree SAP Environmental Package (Stage 3)

Figure 1.2: Draft Structure Plan



1.4 Purpose of this report

Future development within the Moree SAP will require careful consideration ensuring the right balance can be achieved between community need, environmental values, cultural heritage, economic development and technical considerations.

Aurecon has been commissioned by the NSW Department of Planning, Industry and Environment (DPIE) to prepare a suite of environmental technical studies to support the Moree SAP Master Plan, including:

- Biodiversity
- Bush fire
- Aboriginal and non-Aboriginal cultural heritage
- Soils, geology and contamination
- Hydrogeology
- Air, odour and noise

Our environmental technical studies provide a comprehensive appreciation of environmental constraints and opportunities within and surrounding the SAP investigation area. The preferred Structure Plan, land yields and notional allocation to land uses have been used to inform an assessment of the potential impacts of the Moree SAP and preparation of the environmental technical studies to support the Moree SAP Master Plan.

This report provides an overview of the baseline analysis completed during Stage 1 (bush fire landscape assessment), and also provides a bushfire assessment which identifies how the preferred scenario for the proposed masterplan satisfies the aims and objectives of *Planning for Bush Fire Protection (PBP)* (NSWRFS 2019). The application of PBP will require satisfactory demonstration of the following protection measures:

- Asset protection zones
- Construction requirements
- Access
- Water supply and services
- Plans and emergency procedures.



2 Overview of regulatory framework and relevant guidelines

2.1 Rural Fires Act - 1997

The Rural Fires Act 1997 (RF Act) defines the function of NSW Rural Fire Service, as well as making provisions for the prevention, mitigation and suppression of rural fires. Key requirements of the RF Act applicable to this report include:

- The need for a bush fire safety authority to be issued by the RFS under section 100B of the RF Act for any development applications for subdivision (therefore considered integrated development)
- All landowners to exercise a duty of care to prevent bush fire from spreading on or from their land under Section 63 of the RF Act. This relates to the appropriate provision and maintenance of Asset Protection Zones (APZ), landscaping and any retained vegetation when developing land.

2.2 Planning for Bush Fire Protection - 2019

PBP (NSWRFS 2019) is applicable to those lands determined as being within a 'bush fire prone area' in accordance with a local Bush fire Prone Land Map as provided by the Rural Fire Service and Councils. The most appropriate method of determining site bushfire hazard under the terms of PBP is to consider the site in a singular form. Bush fire prone areas are defined as those areas containing or within:

- 100 m of Category 1 Vegetation; or
- 30 m of Category 2 or 3 Vegetation.

2.3 Australian Standard 3959 –2018 'Construction of buildings in bushfire-prone areas'

Australian Standard 3959 –2018 *Construction of buildings in bushfire-prone areas* (AS3959:2018) provides for six (6) levels of building construction these being BAL -Low, BAL -12.5, BAL -19, BAL -29, BAL -40 and BAL -FZ. The Australian Standard 3959 specifies construction standards for buildings as determined by the Bushfire Attack Levels.

2.4 Building Code of Australia

Building Code of Australia or National Construction Code 2019 – reference provisions for bush fire protection if they occur on bush fire prone land and stipulates the role of AS3959-2018 as an acceptable construction manual.



3 Baseline analysis and key considerations

3.1 Bush fire landscape assessment

3.1.1 Overview

A bush fire landscape assessment considers the likelihood of a bush fire (which includes grass, shrub, heath and other fires), the potential severity and intensity, and the potential impact on life and property in the context of the broader surrounding landscape. The assessment takes into consideration factors across the landscape, including:

- Vegetation types in the surrounding landscape, incorporating the context of land use and how this can impact fuel load and potential movement of fire
- Topography to identify areas where slope may impact fire movement
- Local climate to identify periods where fire risk may be increased (ie drought)

An assessment of bush fire behaviour, historical fire events and potential suppression difficulties will be evaluated to identify local constraints in relation to bush fire management, evacuation and the likelihood of isolation, and identify opportunities to mitigate risk in the development of SAP investigation area.

3.1.2 Vegetation

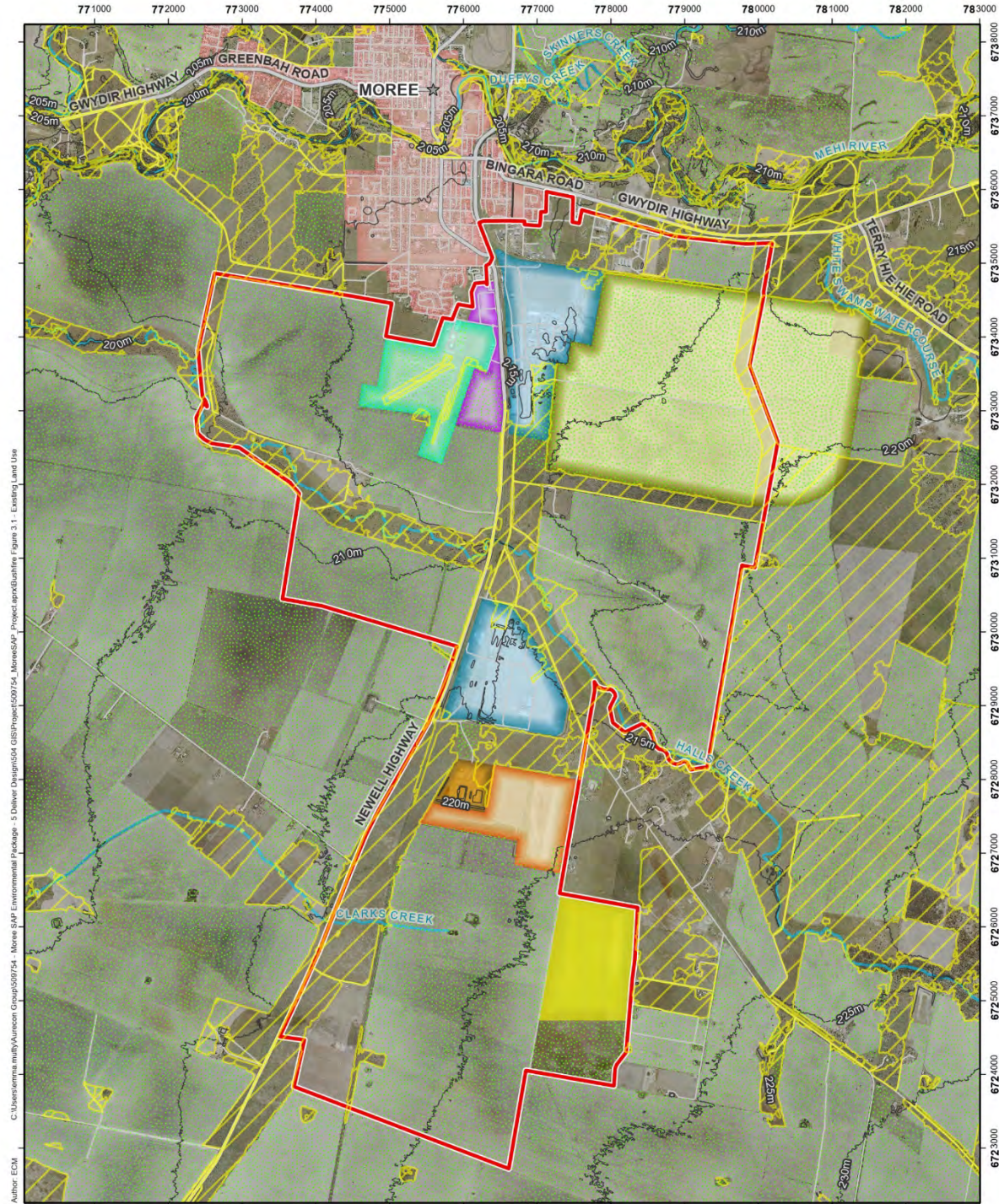
The SAP investigation area consists predominantly of land that has undergone historical clearing for the purpose of:

- Dry land cropping
- Urban and intensive uses
- Intensive animal and plant production
- Grazing, modified pasture
- Manufacturing and industrial uses

Due to the high productivity of the black soils present, agricultural activities such as cropping, grazing and intensive farming occupy the majority of the SAP investigation area, followed by manufacturing and industrial uses (located in the industrial estates and airport precinct) (refer Figure 3.1). A range of mitigation measures are applied on agricultural properties such as slashed breaks, to minimise the potential for a fire to start and spread and impact life, property, crops or livestock, creating commercial and livelihood impacts. Managed pasture and crops grow relatively quickly in the black soils present creating grass fuels more quickly than in other parts of the landscape. Grass fuels and crops will support fires when enough fuel is present and cured. Grazing and harvesting crops and grasses, coupled with slashed breaks, harvesting controls and prompt fire response assists in mitigating potential impacts.

Remnant and regenerated habitat within the SAP investigation area consists of woodland areas which are largely restricted to Halls Creek running east to west through the middle of the SAP investigation area and to the south of the Airport (refer Figure 3.1). Areas mapped as native grassland occur within the Newell Highway corridor along the south-western boundary and in the centre of the SAP investigation area, adjoining Halls Creek and at the north-west and north-eastern boundaries.

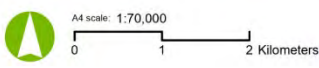
Vegetation within the SAP investigation area according to the relevant plant community types (PCT), vegetation formations and vegetation classes are shown in Table 3.1. These vegetation communities consist of species which are fire maintained, requiring fire for their reproduction and persistence. Planned burning provides a natural means to reduce fuels in these areas should it be required.



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 Author: ECM

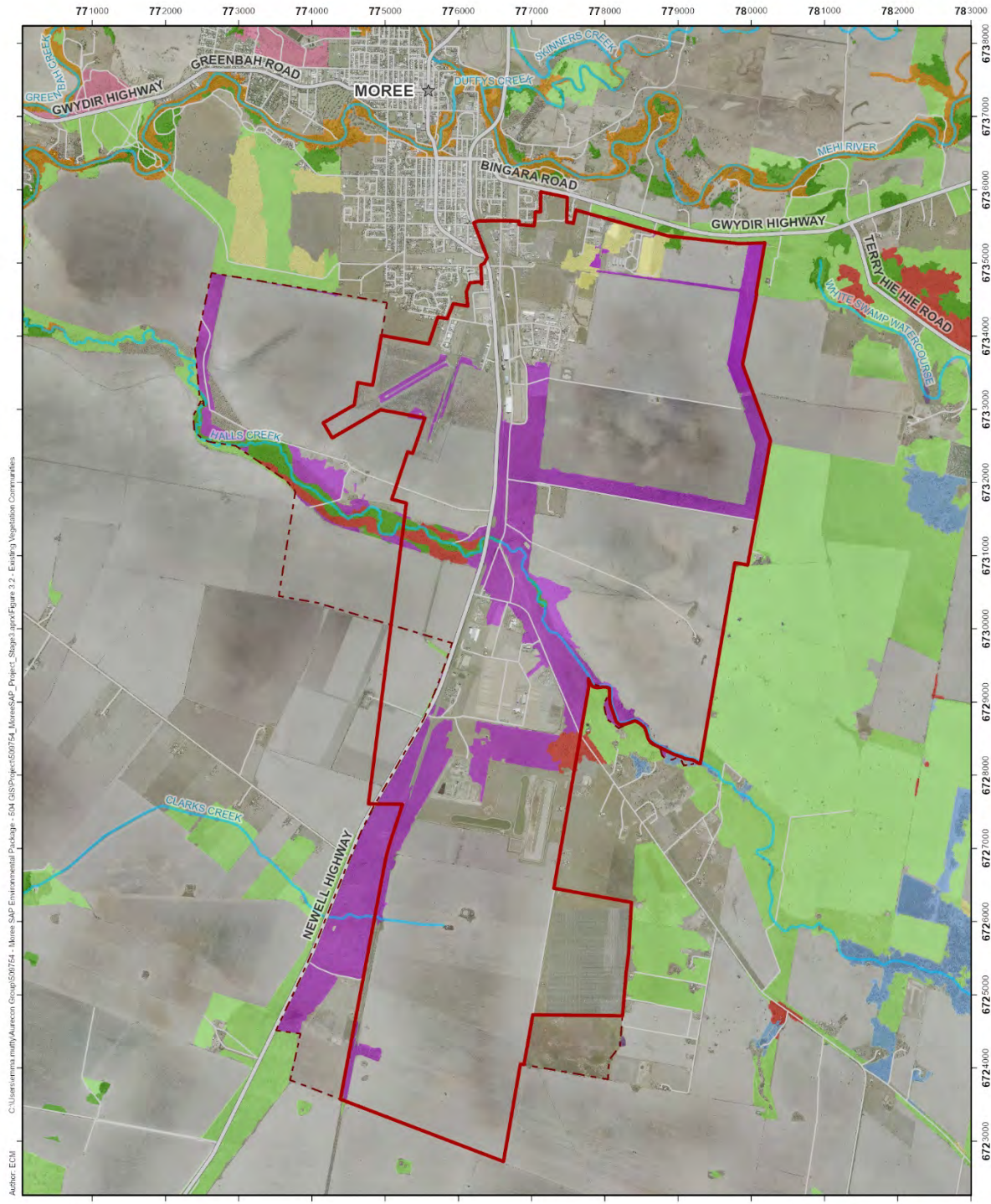
- Legend**
- Town
 - Native Vegetation
 - Intermodal Park
 - Major Roads
 - Cropping Land
 - Moree Airports
 - Contour (5m)
 - Moree Township
 - Moree Solar Farm
 - Watercourse
 - Gateway Site
 - Moree Water Park
 - SAP Investigation Area
 - Industrial Area
 - Waste Management Facility

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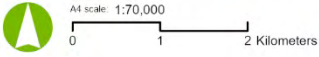
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Moree SAP Environmental Package
Figure 3.1: Moree SAP Investigation Area Land Use



C:\Users\emma.muthy\Aurecon Group\509754 - Moree SAP Environmental Package - E04 GIS\Project\509754_MoreeSAP_Project_Stage3.aprx\Figure 3.2 - Existing Vegetation Communities
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Legend		
<ul style="list-style-type: none"> ★ Town Major Roads Roads Watercourse SAP investigation area Proposed SAP Boundary 	Field Verified PCT's <ul style="list-style-type: none"> PCT1: Candidate Native Grasslands PCT27: Weeping Myall open woodland PCT36: River Red Gum PCT39: Coolibah - River Coobah - Lignum Woodland Wetland PCT40: Coolibah open woodland wetland 	
	<ul style="list-style-type: none"> PCT55: Belah woodland PCT56: Poplar Box - Belah woodland PCT87: Poplar Box - Coolibah floodplain woodland PCT204: Water Couch marsh grassland wetland PCT52: Queensland Bluegrass +/- Mitchell Grass Not Native 	<small>© OpenStreetMap (and) contributors, CC-BY-SA</small>



Date: 11/02/2021 Version: 2 Job No: 509754
 Coordinate System: GDA 1994 MGA Zone 55

Moree SAP Environmental Package (Stage 3)
Figure 3.2: Existing Vegetation Communities



Table 3.1 Description of vegetation within the SAP investigation area

Vegetation group	Vegetation type	Vegetation formation	Vegetation class (AS3959:2018)
55	Belah woodland on alluvial plains in central-north NSW	Semi-arid Woodlands (Grassy sub formation)	Brigalow Clay Plain Woodlands
1	Candidate Native Grasslands	Semi-arid Floodplain Grassland	Grassland
39	Coolibah – River Coolibah - Lignum shrubland on regularly flooded alluvial clay depressions in the Brigalow Belt South and eastern Darling Riverine Plains Bioregions	Freshwater Wetlands	Inland Floodplain Shrublands
27	Weeping Myall open woodland of the Darling Riverine Plains and Brigalow Belt South Bioregions	Semi-arid Woodlands (Grassy sub formation)	Riverine Plain Woodlands
52	Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	Semi-arid Floodplain Grassland	Grassland
56	Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Semi-arid Woodlands (Grassy sub formation)	Riverine Plain Woodlands

Native vegetation within the SAP investigation area and the broader landscape occurs in smaller, disconnected patches, primarily associated with drainage lines and roadsides. Areas within the SAP investigation area utilised for dry land cropping and grazing are not likely to be subject to large, intense grass fires capable of causing widespread damage. In general, cropped agricultural land has a fuel load that is largely reduced during harvesting events and may slow the spread of fire across the landscape. Furthermore, tracks and access roads have a greater potential to stop the movement of fire in a cropped landscape as fuel loads are lower and there is less chance for embers to jump breaks of this kind.

Summary: Native woodland and grassland which could support large fire runs is discontinuous and occupies a relatively small proportion of the SAP investigation area. The native woodland and grassland are broken up by a range of managed land uses and physical infrastructure. Managed pastures and cropping areas are highly productive and will support grassfires when sufficient fuels are present and cured. Smaller patches of native vegetation, primarily along drainage lines and roadsides, may support short fire runs when grass fuels are present and sufficiently cured. Mitigation measures such as slashed breaks, asset protection zones around structures, grazing, planned burning, harvesting controls or fire response are effective in mitigating bush fire risk and can be accommodated in the design of future development and ongoing management of the Moree SAP.

3.1.3 Topography

The landscape of the SAP investigation area generally consists of flat plains with gentle undulation with no obvious physical barriers to movement across the landscape (Office of the Environment and Heritage 2020). The SAP investigation area and broader surrounding landscape occurs within the Brigalow Belt South IBRA Bioregion, Northern Outwash Subregion with landform characteristics consisting of sloping plains.

The region is mostly absent of steep areas due to the flat nature of the landscape, with gentle slopes evident closer to drainage lines within the SAP investigation area. Two creeks are located within the SAP investigation area including Halls Creek running east-west and Clarks Creek orientated towards the south-west. The overall slope is generally falling toward the drainage lines and may contribute to a reduced risk of bush fire spread compared to steeper areas which would facilitate a more rapid movement of fire uphill. Flatter areas also require smaller setbacks between retained vegetation and new developments under PBP (NSWRFS 2019).



Summary: The flat to gentle slopes within the SAP investigation area provides a reduced fire risk compared to steeper locations. As the site is mostly flat or gently sloping the SAP investigation area requires smaller asset protection zone setbacks with larger potential development footprints than would be required in steeper environments.

3.1.4 Local climate

The climate of Moree is characterised by a distinct hot summer (December to February) and a cool drier winter (June to August), with no distinct dry season and increased rainfall over summer. Dry, hot and windy summer days provide conditions suitable for fuel curing, and in those years where these conditions persist large volumes of cured grass fuel develops. This risk may be further elevated after the initial rains following a drought period, when areas which are normally grazed by stock and native herbivores are de-stocked and a high volume of grass growth results.

The average rainfall at Moree is 557.5 mm annually. Average monthly rainfall varies between 22.8 mm in April and 79.4 mm in January. Rainfall tends to be lowest during autumn and the end of winter peaking in January during summer and June during winter. The mean monthly maximum temperatures of Moree ranges between 30.9°C in November and 34.3°C in January (refer Figure 3.3). July is the coldest month with a mean minimum temperature of 4.5°C (refer Figure 3.4) (Bureau of Meteorology 2020).

Summary: Annually Moree experiences hot wet summers, with bush fire risk elevated only in the seasons where hot dry conditions persist which enable grasses to cure. This risk is elevated further in a destocked landscape, particularly following a drought, where grass fuel levels are not mitigated through grazing. Mitigation measures such as slashed breaks and asset protection zones incorporated into the Moree SAP over the summer bush fire season will assist in mitigating these risks.

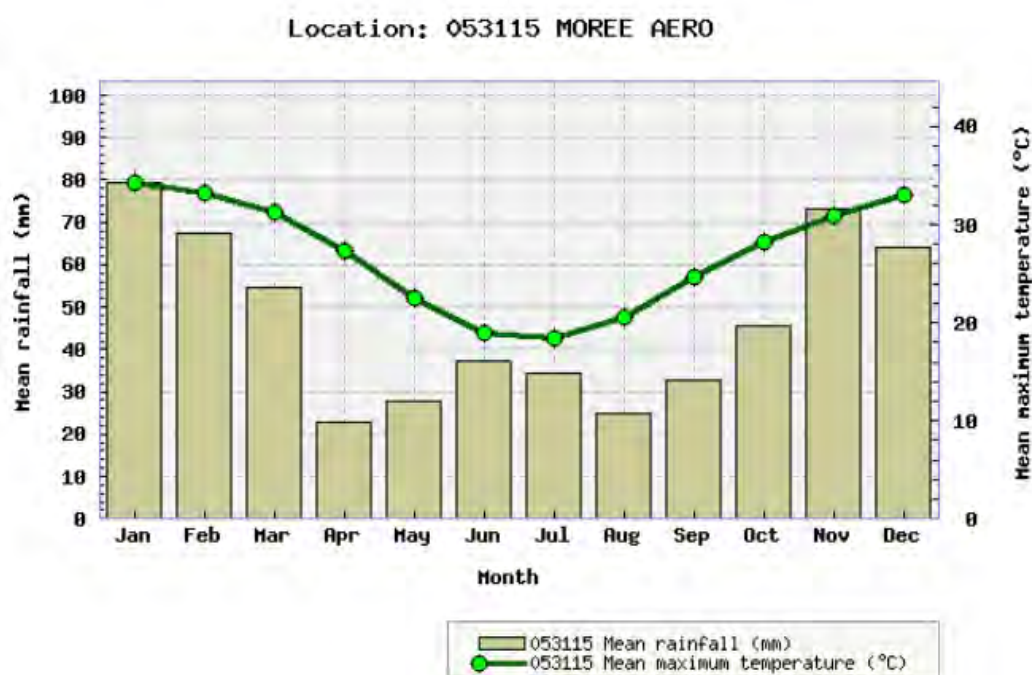


Figure 3.3 Moree annual average rainfall and maximum temperature

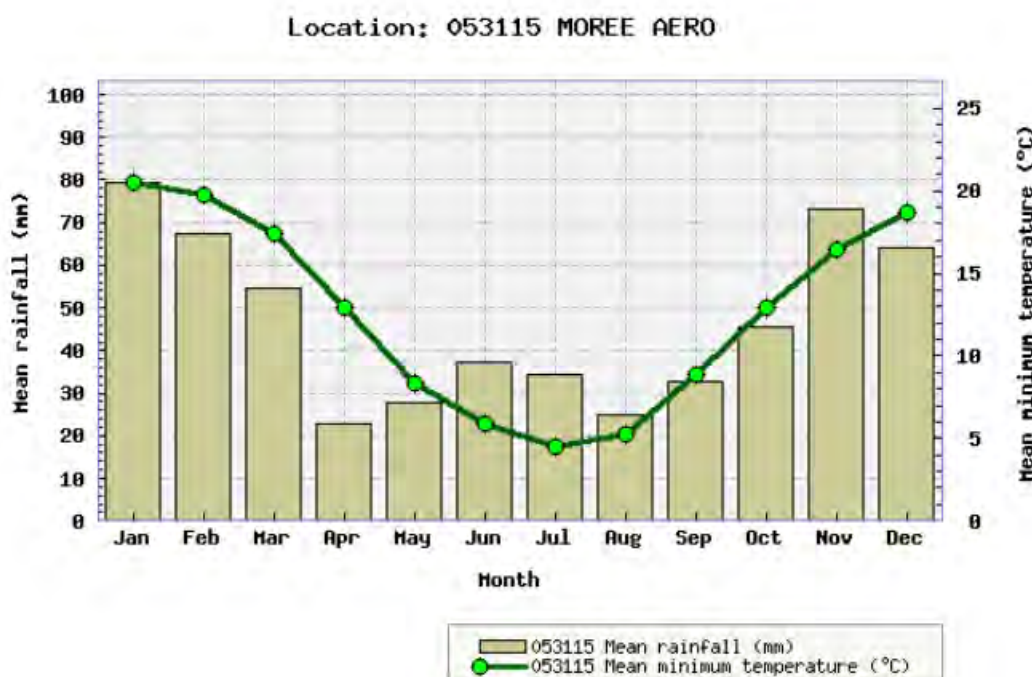


Figure 3.4 Moree annual average rainfall and minimum temperature

3.1.5 Potential bush fire behaviour

The landscape within the SAP investigation area has the potential to provide suitable conditions for grass fires in areas of natural grassland, pasture and cropping. Risk is particularly high in areas where pasture and native grasses have not been grazed by livestock or native fauna. Herbivores eating grass reduces grass fuel loads and where herbivores are not present this can result in a large volume of fuel which, once cured, can support grassfires more easily than eaten out or grazed areas. As such, the landscape has the potential to experience short-lived but fast-moving grass fires in these areas.

Vegetated riparian areas around waterways and drainage lines (refer Figure 3.5) or ungrazed grasslands and woodlands (refer Figure 3.6) have the potential to act like a wick carrying fire through the productive landscape, particularly during drought events when surface water is also greatly reduced. Furthermore, embers carried by burning leaves from trees within riparian areas have the potential to carry fire across the landscape beyond fire suppression boundaries (ie roads, slash breaks, watercourses). This risk would be significantly reduced during periods of higher rainfall when riparian areas would become saturated and act as a natural firebreak. Formed breaks such as roads, rail lines and maintained slash breaks can effectively slow or stop fire movement. Grazed pasture (refer Figure 3.7) and cropping areas (refer Figure 3.8) can also slow or limit fire spread when uncured, heavily grazed or harvested.

The majority of the SAP investigation area has been mapped as Category 3 vegetation in NSW Bush fire Prone Land (refer Figure 4.1). Areas mapped as Category 3 vegetation generally consist of grasslands, freshwater wetlands, semi-arid woodlands, alpine complex or arid shrubland. Vegetation within these areas are considered to pose a medium bush fire risk and require reduced asset protection zones compared to higher bush fire risk areas (NSWRFS 2015). However, grass fires can be highly intense in nature and move rapidly, but are short lived, with embers smaller and not as abundant as forest fires (NSWRFS 2019).

Summary: The Moree SAP is located within a landscape that can support fast moving but relatively short-lived grassfires, representing a medium fire risk.



3.1.6 Bush fire history

The Aboriginal people of the Gamillaroi Nation have lived in the region for thousands of years, and like Aboriginal people across Australia, actively used fire as a management tool (NSW Rural Fire Service 2014). Traditional Aboriginal peoples use of fire was central to life and used for a range of purposes including cultural, spiritual, landscape management to care for Country, to maintain and protect food resources, for travel routes, and to reduce bush fire risk (AFAC 2014). The native vegetation of the subject area is fire-maintained woodland and grassland, which requires fire for its regeneration and survival, which is evidence of the long influence of fire in the region. Very significant changes have occurred in this landscape and its management (such as the clearing and modification of vegetation for agriculture, and development of townships and linear infrastructure). Such changes are not specific to the region, and across Australia has resulted in equivalent changes to managed traditional fire regimes and bush fire impacts, with a reduction in ongoing use of managed fire and an increase in bush fires (AFAC 2014).

The Namoi-Gwydir region experiences 440 bush fires annually, of which ten are identified as being major fires (Namoi – Gwydir Bush Fire Management Committee 2018). The Namoi-Gwydir Bush Fire Risk Management Plan (Bush Fire Coordinating Committee 2018) identifies that larger fires are typically ignited by lightning as a result of dry summer storms, with smaller fires caused by farm machinery and deliberate ignition (both under permit and illegal (Bush Fire Coordinating Committee 2018)). The Moree SAP and adjoining area experiences a large number of small fires (<10 ha) throughout each summer, the majority of which are lit deliberately.

Summary: The fire regime in the landscape has changed with bush fires being a regular feature in the landscape, with a large number of smaller fires lit by arson annually within the Moree SAP investigation area.

3.1.7 Suppression and fire response difficulties

The fire landscape within the project area and broader region to the south of Moree is simple in complexity when considering bush fire landscape factors discussed throughout this report. Areas mapped as candidate native grassland occur throughout the site both east to west and north to south providing potential fire runs into the site. Given these fire runs are likely to occur in grasslands the resulting fires, although intense, are easier to contain and are relatively short lived compared to fires in woodlands and forests. Fire suppression is also assisted through the implementation of slashing to create strategic fire breaks. Fragmentation of the landscape due to existing disturbance and infrastructure (ie access tracks, highways, industrial development and agricultural land) provide fire suppression control options within the SAP.



Figure 3.5 Moree SAP – Drainage line vegetation



Figure 3.6 Moree SAP – Ungrazed woodland vegetation



Figure 3.7 Moree SAP – Managed grazing land



Figure 3.8 Moree SAP – Managed cropping land



New fire ignitions are likely to be detected quickly due to the generally flat topography of the project area reducing visual barriers to observers, proximity to Moree, and the presence of a major highway. The risk fire poses to cropping land means landholders have an invested interest in mitigating fire risk, by implementing fire breaks and ensuring adequate access and fast response in the event of a fire. The NSW RFS Namoi-Gwydir office is located at Tycannah Street less than 2 km north of the Moree Regional Airport at the northern end of the project area. Fire and Rescue NSW (FRNSW) is in the centre of Moree at 179 Balo Street (Gwydir Highway), Moree. The location of these fire fighting resources would facilitate prompt mobilisation of fire crews in the event of a fire within the investigation area.

Summary: The Moree SAP is within a highly visible landscape with relatively low risk bush fire risk factors. The proximity to major highways and roads means fire detection is quick, coupled with close proximity to local fire suppression resources resulting in relatively fast suppression of fire outbreaks.

3.2 Land use assessment

3.2.1 Emergency access and egress

The Newell Highway provides established all weather north-south access through the SAP investigation area. As a major highway the risk of getting trapped in the event of a fire is greatly reduced and it provides significant capacity for the evacuation of residents and workers responding to an emergency situation. The Gwydir Highway also provides east-west access from the Moree town centre facilitating alternative emergency evacuation routes in the event of a serious fire.

In the event of a fire occurring in the vicinity of the Moree SAP the required evacuation towards Moree may generate a short-term bottleneck in the unlikely event of high volumes of traffic entering the Moree township simultaneously. Northbound traffic can be stopped or redirected at the Tycannah Rest Area, approximately 17.5 km south of Moree.

Further, an alternative route to direct traffic to the east is currently available at Burrington Road to the south of Halls Creek. However, this route is intended to be closed as a result of transport planning for the SAP. To achieve compliance with PBP (NSWRFS 2019) a replacement alternate access route must be provided as part of the draft Structure Plan. At this stage of the master planning process for the SAP, this is most likely to be an upgraded Tapscott Road/Newell Highway intersection.

Summary: The capacity of the current road network to deal with evacuating residents and workers, and facilitate access from responding emergency services is well served by two highways and a sealed road network. While a complimentary study is evaluating the capacity of the road network to support increased traffic volumes associated with the development of the SAP, it is not anticipated that significant constraints will apply for future emergency access and egress.

3.2.2 Potential isolation points within the SAP investigation area

There does not appear to be areas within the SAP investigation area subject to isolation in the event of a bush fire. The landscape is divided by a number of barriers including the Newell Highway as well as smaller roads and access tracks. The active land use in the study area for agriculture, industry and aviation would also act as a barrier to fire movement particularly with cropped or heavily grazed paddocks. It is also expected bush fires would be rapidly detected facilitating prompt notification and evacuation of residents. It is not expected residents would become trapped within the project area in the event of a major bush fire.

Summary: The potential for development to be isolated in the event of a bush fire is not likely to be significant and would be highly localised based on the vegetation retained within the SAP investigation area.



3.3 Emergency services

3.3.1 Current and future capacity

As identified in Section 3.1.7, the SAP investigation area is serviced by both FRNSW and NSWRFSS which have resources located nearby. The Moree FRNSW Station is located at Balo Street in the Moree town centre and the NSW Rural Fire Service is located at Tycannah Street at the southern end of Moree, with local volunteer brigades dispersed in the surrounding landscape. Additionally, there are a number of fixed wing bomber aircraft used for fire fighting based out of Moree Regional Airport which, if available, can be tasked to local fire fighting operations. NSW Police, NSW Ambulance and the NSW State Emergency Services will also assist in active support roles in bush fire 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 SAP investigation area over the coming years.

Summary: There are a range of existing emergency services organisations present in Moree. The Moree SAP will result in further industrial expansion to the south of Moree although at this stage of the investigation the extent and type of development is yet to be determined. Once the scale and type of development is known, a decision to scale up fire fighting resources in the region can be made.

3.3.2 Ability of emergency services to respond

Currently emergency services are not expected to be over utilised and are likely to have capacity to adequately implement suppression strategies and address emergency situations as they unfold due to the close proximity of the development to Moree township. Additional volunteer NSWRFSS resources can be deployed from surrounding areas. Additional capacity may be required depending on the type and scale of development needed (refer Section 3.3.1).

Summary: The close proximity of the Moree SAP to the town with a good road network in place provides an enhanced opportunity for emergency response.

3.4 Infrastructure

3.4.1 Water supply

The final Structure Plan for the SAP will be required to meet appropriate standards as identified in PBP (NSWRFS 2019). Of note, this will include the following standards:

- Location of any potentially hazardous industries within the SAP (eg service stations and/or fuel storage facilities) away from bush fire prone land
- Confirmation and details of how the reticulated water system can deal with a major bush fire event and structural fires within the site in terms of pressures, flows, and spacing of hydrants
- New hydrants located outside parking reserves and road carriageways
- Hydrants which are to meet standards in terms of design, installation and commissioning hydrant pressures in accordance with the relevant clauses of *AS 2419.1:2005 - Fire hydrant installations*

The draft Structure Plan includes the Moree Water Park located within the Resource Recovery/Recreation Precinct. This provides the SAP with a potential water source in the event there is a bush fire.

Summary: The Moree SAP will be required to provide a water supply for fire fighting in accordance with the required Building Code of Australia, Australian Standards and PBP (NSWRFS 2019).



3.4.2 Power and gas

The Moree Solar Farm is identified within the draft Structure Plan to the south and feeds solar generated energy into the grid via existing overhead powerline infrastructure. Project approval was provided for the Moree Solar Farm by the Minister for Planning and Infrastructure in 2011 and included the requirements for construction and operation to manage fuels, asset protection zones, emergency access and egress, power and gas provision, and emergency management planning within the solar farm site.

However, it is noted that the generated energy from the Moree Solar Farm does not supply power to the local region. As such, the proposed Solar/Hydrogen Precincts identified within the draft Structure Plan create the opportunity for the SAP to provide solar energy production that meets the energy requirements of future land uses within the SAP.

Within the Moree SAP underground energy distribution would reduce potential risks associated with ignition of vegetation from overhead powerlines. Gas supply must be able to meet the required Australian Standards.

Summary: The Moree SAP will be required to provide a power and gas supply in accordance with the required Building Code of Australian, Australian Standards and PBP (NSWRFS 2019).

3.4.3 Adjoining land use

Land use within the project area is predominantly for agricultural purposes. Vegetation setbacks and construction in accordance with *AS3959:2018 – Construction of buildings in bush fire-prone areas* (AS3959:2018) is required for all developments within the SAP that are within mapped BFPL.

Summary: Areas within the SAP adjoining BFPL are required to meet the vegetation setbacks (asset protection zone) requirements of PBP (NSWRFS 2019) and the construction requirements of AS3959:2018.

3.5 Summary

The desktop baseline analysis confirmed that the Moree SAP investigation area is potentially suitable for development based on consideration of bush fire landscape assessment, land use assessment, access and egress, emergency services capacity and risk profile of adjoining lands. Based on these factors it is anticipated that new development within the Moree SAP will be able to meet the requirements of PBP (NSWRFS 2019) and the Building Code of Australia (BCA), and be designed and constructed in accordance with the relevant Australian Standards to mitigate bush fire risk.

3.6 Constraints and opportunities

3.6.1 Constraints

Within the Moree SAP investigation area key potential constraints and risks of bush fire are not considered to be significant as these risks can be appropriately mitigated through the design and coordination of future development. Potential constraints that have been considered in this analysis include:

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



3.6.2 Opportunities

The Bush Fire Baseline Analysis (Aurecon 2020) confirmed at a strategic level that the Moree SAP investigation area is well suited to future development which can potentially mitigate bush fire risks through design and construction. Mitigation measures such as slashed breaks, asset protection zones around structures, grazing, planned burning, harvesting controls or fire response are effective to mitigate bush fire risk and can be accommodated in the design of future development and ongoing management of the Moree SAP. Further analysis in this stage (ie Stage 3, this report) of the master planning process confirms this suitability.



4 Bush fire testing criteria of preferred scenario

4.1 Bush fire assessment

The Australian Standard AS3959:2018 – *Construction of Buildings in Bush Fire-prone Areas* (AS3959:2018) was used as the methodology to determine the constraints associated with bush fire risk. The AS3959:2018 is used to identify setbacks and construction standards based on the bush fire attack level (BAL).

This bush fire assessment identifies how the draft Structure Plan addresses the aims and objectives of the PBP (NSWRFS 2019). For the purposes of this assessment, it has been assumed that development will occur (and vegetation cleared) within all precincts identified as part of the draft Structure Plan. Where development within the SAP is staged over a number of years or only partially developed, all new development that adjoins bush fire prone land (see Figure 4.1) must meet the requirements of PBP (NSWRFS 2019) in relation to:

- Asset protection zones
- Construction requirements
- Access
- Water supply and services
- Plans and emergency procedures

While the measures identified in this report when fully implemented can assist in reducing the residual fire risk for assets constructed within the SAP, they cannot fully guarantee assets will survive a bushfire or grassfire on every occasion due to the unpredictable nature of bushfires and extreme weather. Continual evaluation and review of this document, fire risk conditions at the site and updating management practices when necessary may assist in further reducing the residual fire risk to assets for each stage of its development.

4.2 Application of Bush Fire Attack Level mapping

In the context of the Moree SAP, the AS3959:2018 construction standard applies to all development within 100 m of the bushfire hazard (retained vegetation), and the BAL mapping will only extend 100 m from the vegetation hazard. Buildings located in areas closer to the vegetation hazard are expected to be exposed to increasing levels of ember attack, radiant heat and direct flame contact, with the highest BAL levels nearest the vegetation hazard (ie BAL-FZ (Flame Zone) decreasing through the following levels, BAL-40, BAL-29, BAL-19 and then BAL12.5).

BAL contour maps have been prepared and are based on the inputs of forest fire danger index, predominant vegetation type, and slope. These BAL contour maps have been prepared using CSIRO's Spark BAL mapping tool which Aurecon is licenced to use.

4.3 Forest Fire Danger Index

The default forest fire danger index (FDI) for NSW general areas (excluding alpine areas, Greater Hunter, Greater Sydney, Illawarra/Shoalhaven, Far South Coast and Southern Ranges fire weather districts) is FDI 80, which was used as an input into the Spark BAL tool.

4.4 Predominant vegetation

As the Bushfire Baseline Analysis (Aurecon 2020) detailed, the SAP investigation area consists predominantly of land that has undergone historical clearing for the purpose of:



- Dry land cropping
- Urban and intensive uses
- Intensive animal and plant production
- Grazing, modified pasture
- Manufacturing and industrial uses

Remnant and regenerated habitat within the SAP investigation area consists of woodland areas which are largely restricted to Halls Creek running east to west through the middle of the SAP investigation area and to the south of Moree Regional Airport. Areas mapped as native grassland occur within the Newell Highway corridor along the south-western boundary and in the centre of the SAP investigation area, adjoining Halls Creek and at the north-west and north-eastern boundaries.

The classification of this vegetation within 140m of the proposed master planning area is shown in Table 4.1. It has been assessed in accordance with PBP (NSWRFS 2019) and the Australian Standard (AS3959:2018 *Construction of Buildings in Bushfire-Prone Areas* (AS3959:2018) (Standards Australia 2018).

Vegetation within and immediately surrounding the SAP investigation area according to the relevant plant community types (PCT), vegetation formations and vegetation classes are shown in Table 4.1.

It is the assumption for this bush fire assessment that all vegetation within the precincts identified as part of the draft Structure Plan (with the exception of the biodiversity protection area to the north) will be cleared. Further, it has been assumed that vegetation will be retained within the travelling stock reserve (with the exception of the Intermodal Facility), along watercourses and drainage lines.

Further, it is acknowledged that development within the SAP will be staged over a period of 30+ years. As such, where bush fire prone land remains undeveloped and undisturbed within the SAP over an extended period, new development adjacent to or in proximity to this land will be required to comply with the requirements of PBP (NSWRFS 2019).

Table 4.1 Classification of vegetation

Vegetation group	Vegetation type	Vegetation formation	Vegetation class (AS3959:2018)
55	Belah woodland on alluvial plains in central-north NSW	Semi-arid Woodlands (Grassy sub formation)	Brigalow Clay Plain Woodlands
1	Candidate Native Grasslands	Semi-arid Floodplain Grassland	Grassland
39	Coolibah – River Coolibah - Lignum shrubland on regularly flooded alluvial clay depressions in the Brigalow Belt South and eastern Darling Riverine Plains Bioregions	Freshwater Wetlands	Inland Floodplain Shrublands
27	Weeping Myall open woodland of the Darling Riverine Plains and Brigalow Belt South Bioregions	Semi-arid Woodlands (Grassy sub formation)	Riverine Plain Woodlands
52	Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	Semi-arid Floodplain Grassland	Grassland
56	Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Semi-arid Woodlands (Grassy sub formation)	Riverine Plain Woodlands

For the purposes of the Spark-BAL mapping utilised for the bushfire assessment of the preferred scenario, the vegetation has been based on existing and field verified PCT mapping (Aurecon 2020a) where vegetation is to be retained, as well as the inclusion of 'revegetation' areas from the scenarios (Moree Special Activation Precinct Package A Scenarios Report, WSP 2020) and drainage feature setbacks. The vegetation classification utilised as a model input was 'woodland'.



4.5 Bush fire prone land

The Moree SAP investigation area includes large areas which are mapped as bush fire prone land. As such, all new development within the Moree SAP must comply with the NSW Rural Fire Service's PBP (NSWRFS 2019). The identification of BFPL is a requirement under Section 10.3 of the EP&A Act. The majority of the SAP investigation area is mapped as BFPL (Vegetation Category 3 and Vegetation Buffer) (refer Figure 4.1), with the exception of the Moree Regional Airport, industrial estate east of the Airport, the area south of Burrington Road and the grain store on the Gwydir Highway.

4.6 Effective slope

The classification of effective slope has been assessed in accordance with AS3959:2018 and PBP (NSWRFS 2019). Slope classes used to complete BAL mapping are shown in Figure 4.2, being a slope class of >0-5 degrees for the preferred scenario analysis. The effective slope was used to complete Bushfire Attack Level mapping and to confirm that APZ widths comply with the requirements of PBP (NSWRFS 2019), as discussed further in Section 0.

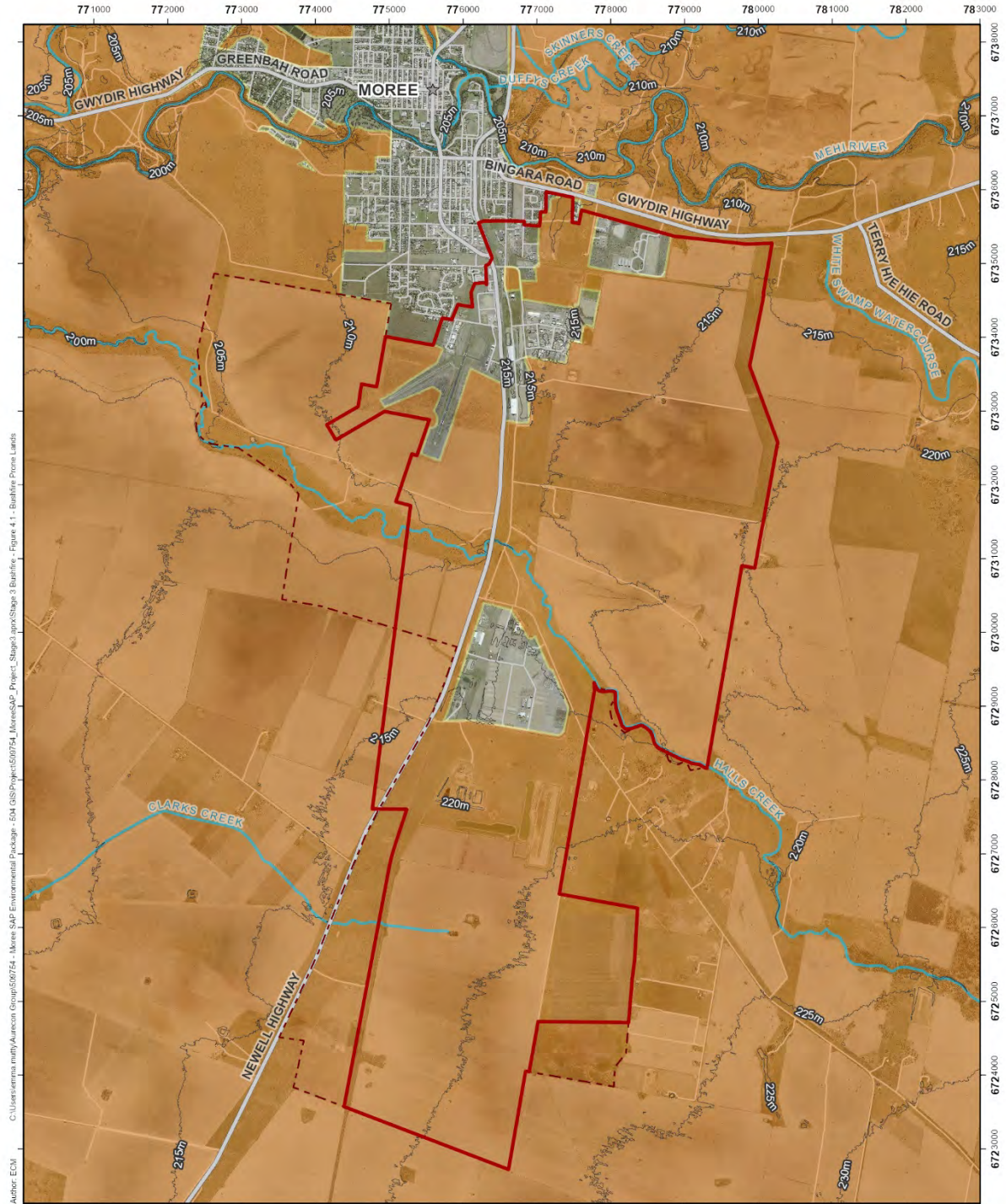
4.7 Environmental features and Threatened Species

The Biodiversity Report for Moree SAP (Aurecon 2020a) identified that there are 5 threatened species, communities or populations listed under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) recorded within Moree SAP area, as follows:

- Creeping tick-trefoil (*Desmodium campylocaulon*) and
- Finger panic grass (*Digitaria porrecta*)
- Bluegrass (*Dichanthium setosum*)
- Slender Darling Pea (*Swainsona murrayana*)
- Magpie goose (*Anseranas semipalmata*).

4.8 Aboriginal Cultural Heritage

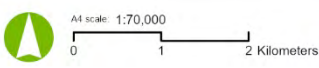
The Heritage Baseline Analysis report for Moree SAP identified that there are 15 Aboriginal sites or places recorded to occur within one kilometre of the Moree SAP area, and there are 10 Aboriginal sites present within Moree SAP investigation area (Aurecon 2020).



Author: EDM
 C:\Users\emma.mully\Aurecon Group\509754 - Moree SAP Environmental Package - 5M GIS\Project\509754_Lines\SAP_Project_Shape3.aprx\Stage 3 Buffer.aprx - Figure 4.1 - Bushfire Prone Lands

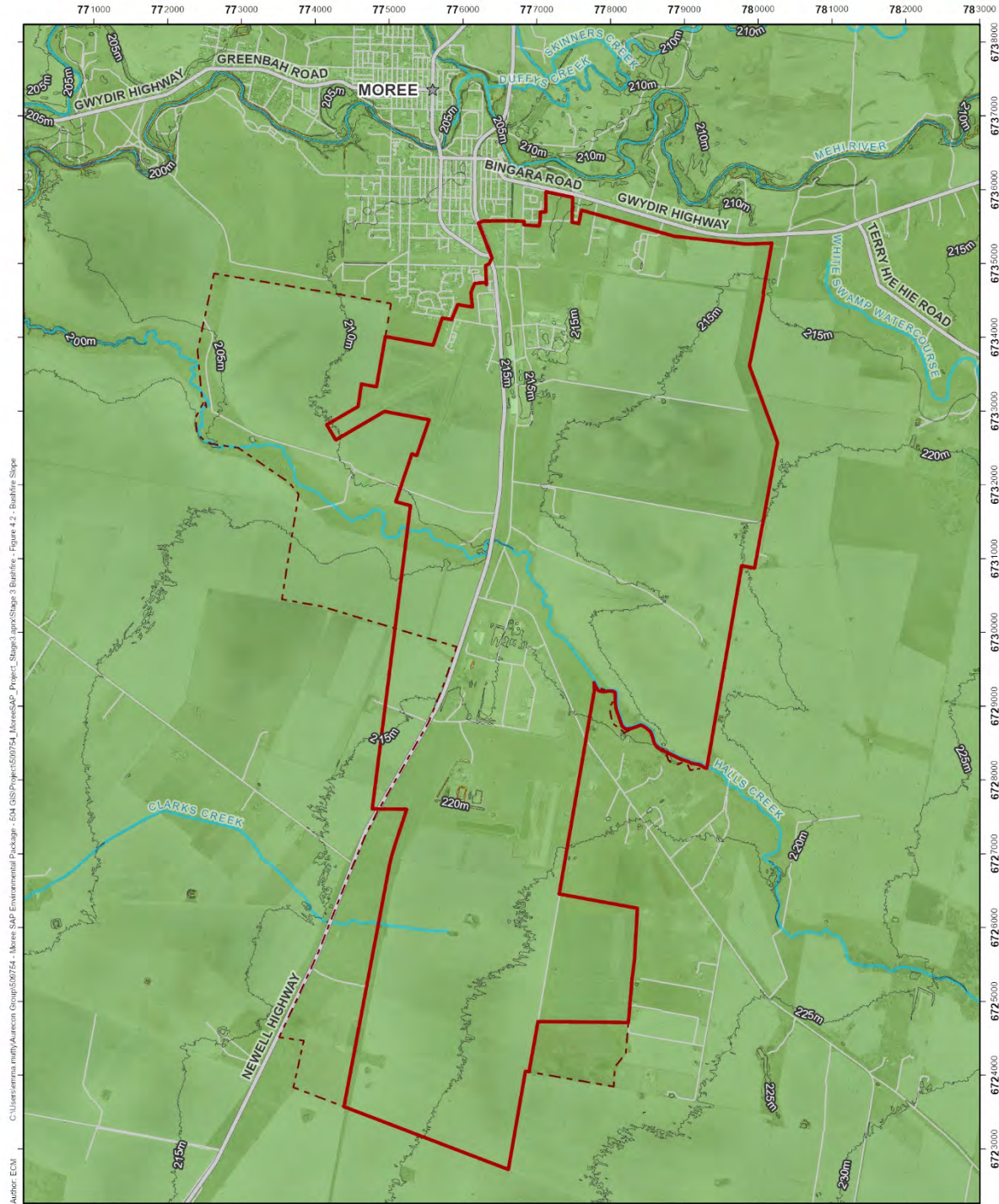
★ Town	— SAP investigation area
— Roads	▭ Proposed SAP Boundary
— Major Roads	▭ Bush fire Prone Land
~ Contour (5m)	▭ Vegetation Category 3
~ Watercourse	▭ Vegetation Buffer

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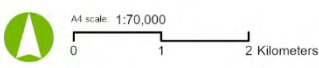
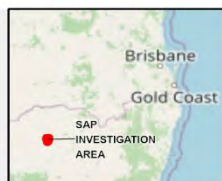
Moree SAP Environmental Package (Stage 3)
 Figure 4.1: Bush fire prone lands



Author: EDM
 C:\Users\emma.mully\Aurecon Group\509754 - Moree SAP Environmental Package - 5M GIS\Project\509754_InvEnvSAP_Project_Shape\Stage 3 Briefing - Figure 4.2 - Slope Shape

★ Town	Watercourse	Slope (degrees)
Roads	SAP investigation area	0 - 5
Major Roads	Proposed SAP Boundary	5 - 10
Contour (5m)		10 - 15
		15 - 20
		>20

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Moree SAP Environmental Package (Stage 3)

Figure 4.2: Slope



5 Bushfire assessment

The section provides an assessment of how the draft Structure Plan addresses the PBP (NSWRFS 2019) requirements, particularly in relation to:

- Asset protection zones
- Construction requirements
- Access
- Water supply and services
- Plans and emergency procedures

This assessment has reviewed the draft Structure Plan in its entirety and assumed that all land within the precincts (with the exception of the biodiversity protection area to the north) will be cleared and developed. However, it is acknowledged that development within the SAP will be staged over a period of 30+ years. As such, where bush fire prone land remains undeveloped and undisturbed within the SAP over an extended period, new development adjacent to or in proximity to this land will be required to comply with the requirements of PBP (NSWRFS 2019).

5.1 Asset Protection Zones

5.1.1 APZ location

An Asset Protection Zone (APZ) is a buffer zone between a bushfire hazard and buildings. The APZ is managed to minimise fuel loads and reduce potential radiant heat levels, flame, localised smoke and ember attack.

APZ extents which are required for new developments under PBP (NSWRFS 2019) are shown in Table 5.1. The default for the Moree SAP area is Fire Danger Index 80. As identified in PBP (NSWRFS 2019), new subdivision developments should not have a heat level exposure to buildings > 29 kW/m² and BAL maps prepared for each scenario can be used as a guide to determine setbacks required between a standard development and vegetation hazard.

Additional setbacks are required for special fire protection purposes (SFPP) developments. Special Fire Protection Purposes (SFPP) developments are defined in PBP, *Rural Fires Act 1997* and *Rural Fires Regulation 2013* as any development built for the purpose of the following:

- A school,
- A child care centre,
- A hospital (including a hospital for the mentally ill or mentally disordered),
- A hotel, motel or other tourist accommodation,
- A building wholly or principally used as a home or other establishment for mentally incapacitated persons,
- Seniors housing within the meaning of State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004,
- A group home within the meaning of State Environmental Planning Policy No 9—Group Homes,
- A retirement village,
- Any other purpose prescribed by the regulations.



Table 5.1 APZ Calculation (FDI 80) for new (non-SFPP) developments under PBP

Vegetation formation	Up slopes and flat (m)	>0-5 degrees (m)	>5-10 degrees (m)	>10-15 degrees (m)	>15-20 degrees (m)
Woodland	11	13	17	21	27
Grassland	10	11	12	14	16
Forested wetland	8	10	13	17	22

The APZ extent required for a new subdivision is based on BAL-29 as per table A1.12.6 of PBP (2019) and is as shown in **Figure 4** for the SAP when fully developed. With regard to staging development within the SAP, it is noted that APZs will also be required for any new development that adjoins bush fire prone land which is undeveloped or yet to be developed.

Any SFPP require larger APZs than standard subdivisions, and SFPP developments within the Moree SAP will be required to accommodate larger APZs as per Table A1.12.1 of PBP. Motels, hotels and/or other workers accommodations are potential SFPPs and may be permissible within the Gateway Precinct of the draft Structure Plan. The potential for these SFPP developments and their associated APZ requirements should be considered in future design stages of the SAP.

5.1.2 APZ management

The management of vegetation within the APZ must be in accordance with the NSWRFSS requirements for an APZ (as identified in PBP (NSWRFS 2019)) as summarised below:

- APZs are to be in place before, and maintained continuously through, the bushfire season (the statutory Bush Fire Danger Period runs from 1 October to 31 March unless adjusted by the Commissioner of the NSWRFSS).
- Tree canopy cover should be less than 30%; and canopies should be separated by 2 to 5m.
- Shrubs should not form a continuous canopy; and shrubs should form no more than 20% of ground cover.
- Grass should be kept mown to a height of less than 100 millimetres (mm); and leaf and other debris should be removed.

5.2 Construction requirements

New construction, including additions to existing buildings, must be in accordance with the Bushfire Attack Level (BAL) required under AS3959:2018. BAL maps were prepared using CSIRO's Spark BAL mapping tool in accordance with Table 2.5 of AS3959:2018.

The mapped BAL under AS3959:2018 for Moree SAP is shown in Figure 5.1. SFPP developments are to be in located in areas no greater than 10kWm² (ie less than BAL 12.5). Construction requirements will also apply for any new development within the SAP that adjoins bush fire prone land which is undeveloped or yet to be developed.



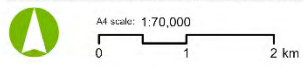
Author: AS
 C:\Users\Carmin.Braja\Aurecon Group\509754 - Moree SAP Environmental Package - SWI GIS\Projects\509754 - MoreeSAP - Project - Stage3 - BAL map\Stage 3 Figure 5.0 - Bush Fire Attack Level (BAL) mapping

★ Town	--- SAP investigation area	BAL Radiant Heat (kw/m ²)
— Roads	--- Proposed SAP Boundary	12.5
— Inland Rail Corridor	--- Regional enterprise	19
--- Moree Inverell Railway	--- Moree Airport	29
--- Watercourse	--- Vegetated areas*	40
		--- 100 m guideline



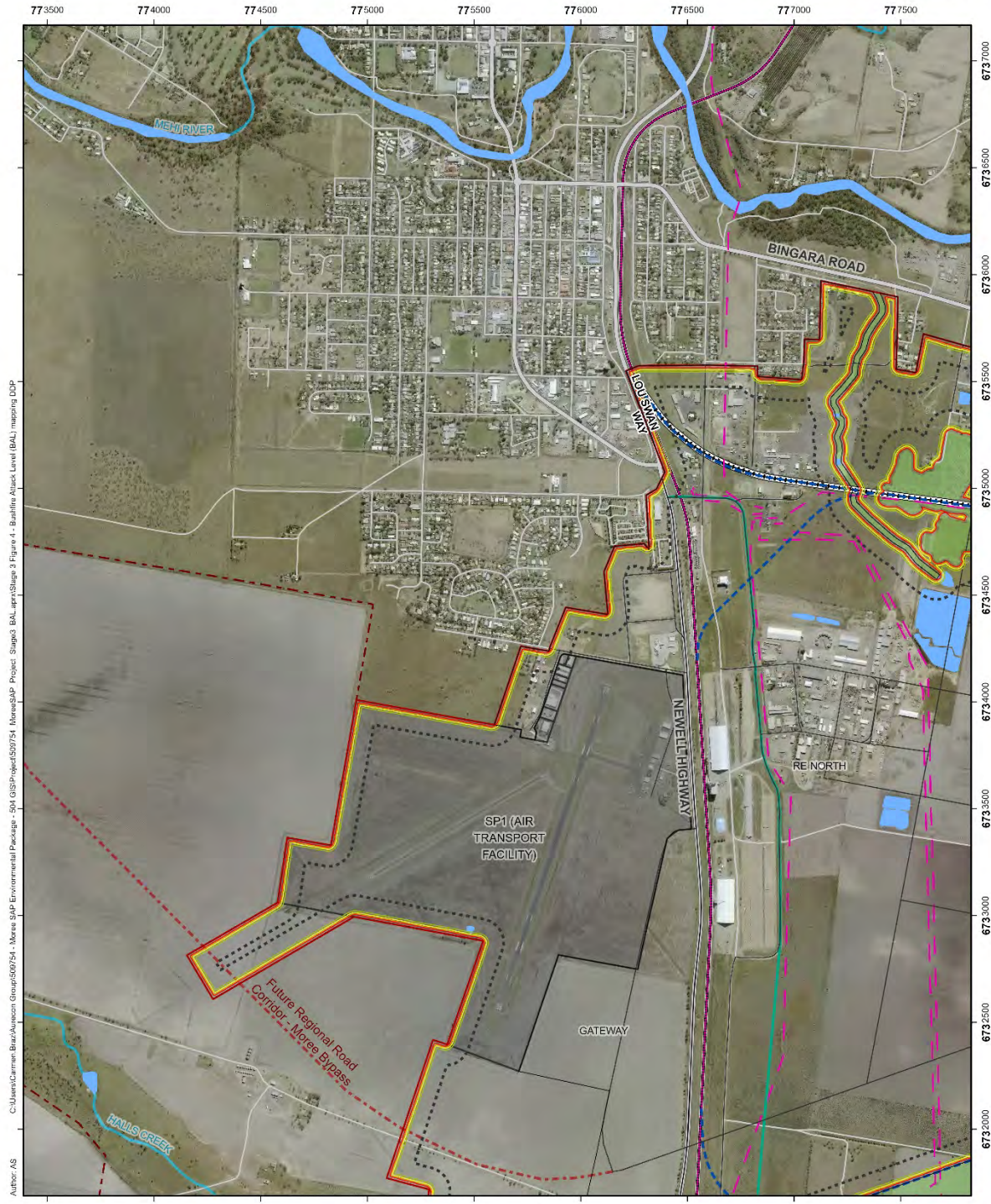
Sources: ESRI, Aurecon Group, DPIE, Open Street Map

*Based on TSR (amended), biodiversity protection, and riparian corridor buffers



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Moree SAP Environmental Package (Stage 3)
Figure 5.0: Bush fire Attack Level (BAL) mapping



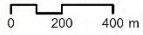
Author: AS
 Collins/Carmen Broekhuizen Group/509754 - Moree SAP Environmental Package - SA GIS/Project/509754 - Moree SAP - BAL map/Stage 3 Figure 4 - Bushfire Attack Level (BAL) mapping DDP

★ Town	--- North-East Intermodal Loop	▭ Proposed SAP Boundary	BAL Radiant Heat (kw/m2)
— Roads	--- Future Moree Bypass	▭ Regional enterprise	12.5
— SAP Road network	— Rail Bypass	▭ Moree Airport	19
— Inland Rail Corridor	— North-South Connector	▭ Vegetated areas*	29
— Moree Inverell Railway	--- Existing transmission line		40
— Watercourse	▭ SAP investigation area		--- 100 m guideline

*Based on TSR (amended), biodiversity protection, and riparian corridor buffers

Sources: ESRI, Aurecon Group, DPIE, Open Street Map

A4 scale: 1:24,000



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Moree SAP Environmental Package (Stage 3)
Figure 5.1: Bush fire Attack Level (BAL) mapping

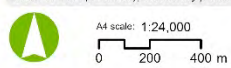


C:\Users\Carmen.Bradburn@aurecon.com\Documents\Projects\509754 - Moree SAP Environmental Package - 504 GIS\Project\509754 - Moree SAP - Project - Stage3 - BAL - map\Figure 4 - Bushfire Attack Level (BAL) mapping DCP
 Author: AS

★ Town	--- North-East Intermodal Loop	▭ Proposed SAP Boundary	BAL Radiant Heat (kw/m2)
— Roads	--- Future Moree Bypass	▭ Regional enterprise	12.5
— SAP Road network	— Rail Bypass	▭ Moree Airport	19
— Inland Rail Corridor	— North-South Connector	▭ Vegetated areas*	29
— Moree Inverell Railway	— Existing transmission line		40
— Watercourse	▭ SAP investigation area		100 m guideline

*Based on TSR (amended), biodiversity protection, and riparian corridor buffers

Sources: ESRI, Aurecon Group, DPIE, Open Street Map



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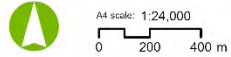
Moree SAP Environmental Package (Stage 3)
Figure 5.2: Bush fire Attack Level (BAL) mapping



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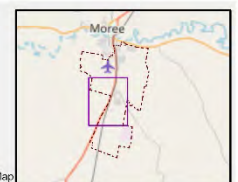
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| ★ Town | --- North-East Intermodal Loop | ▭ Proposed SAP Boundary | BAL Radiant Heat (kw/m2) |
| — Roads | --- Future Moree Bypass | ▭ Regional enterprise | 12.5 |
| — SAP Road network | — Rail Bypass | ▭ Moree Airport | 19 |
| — Inland Rail Corridor | — North-South Connector | ▭ Vegetated areas* | 29 |
| — Moree Inverell Railway | — Existing transmission line | | 40 |
| — Watercourse | --- SAP investigation area | | --- 100 m guideline |

*Based on TSR (amended), biodiversity protection, and riparian corridor buffers

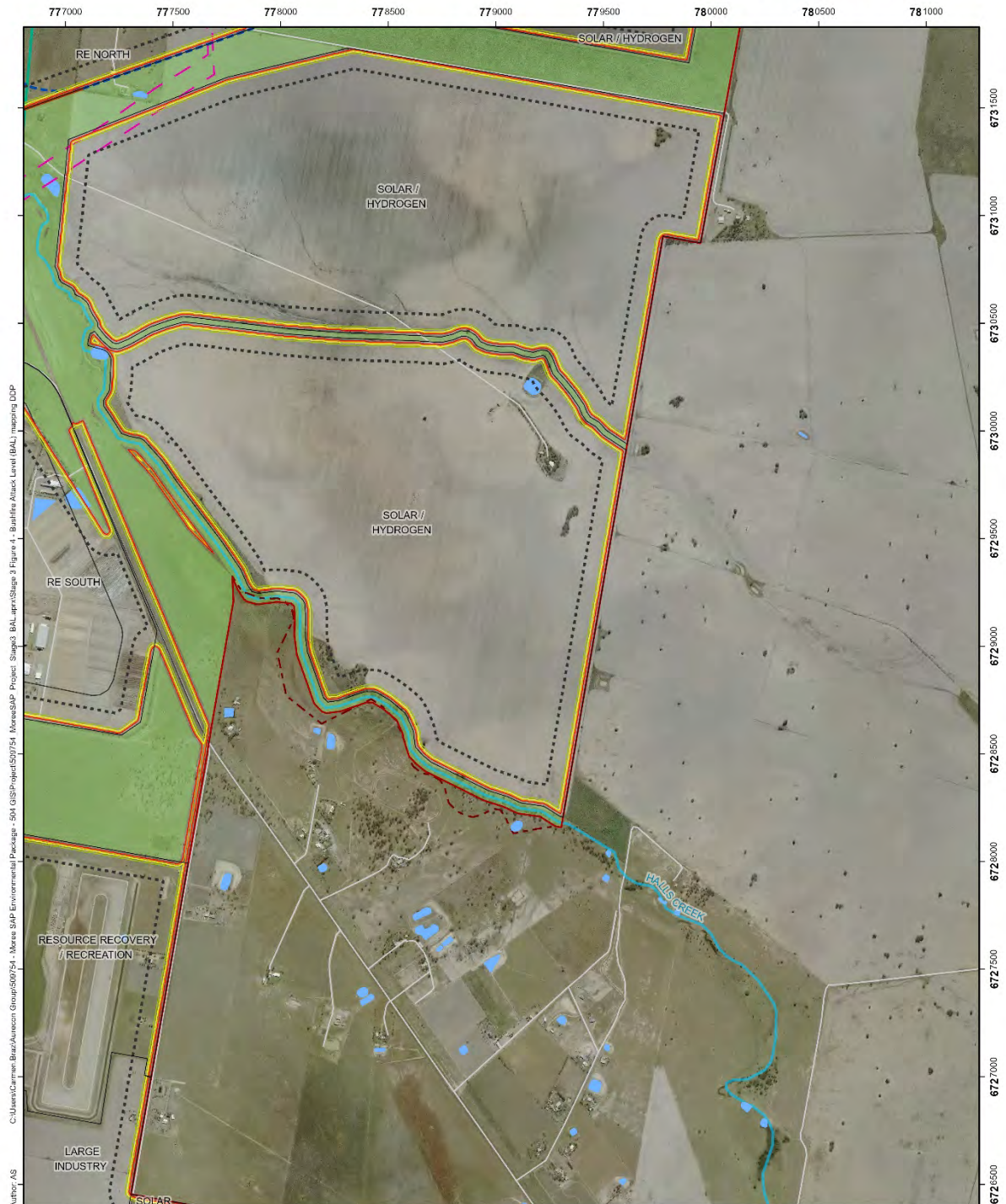


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Moree SAP Environmental Package (Stage 3)
Figure 5.3: Bush fire Attack Level (BAL) mapping



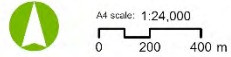
Sources: ESRI, Aurecon Group, DPIE, Open Street Map



C:\Users\Carmel.Bradburn@aurecon.com\Documents\Projects\509754 - Moree SAP Environmental Package - SW GIS\Project\509754 - Moree SAP - Project - Stage 3 - BAL - map\Stage 3 Figure 4 - Bushfire Attack Level (BAL) mapping DDP
 Author: AS

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|--------------------------|--------------------------------|-------------------------|--------------------------|
| ★ Town | --- North-East Intermodal Loop | ▭ Proposed SAP Boundary | BAL Radiant Heat (kw/m2) |
| — Roads | --- Future Moree Bypass | ▭ Regional enterprise | 12.5 |
| — SAP Road network | — Rail Bypass | ▭ Moree Airport | 19 |
| — Inland Rail Corridor | — North-South Connector | ▭ Vegetated areas* | 29 |
| — Moree Inverell Railway | — Existing transmission line | | 40 |
| — Watercourse | --- SAP investigation area | | --- 100 m guideline |

*Based on TSR (amended), biodiversity protection, and riparian corridor buffers



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 Coordinate System: GDA 1994 MGA Zone 55

Moree SAP Environmental Package (Stage 3)
Figure 5.4: Bush fire Attack Level (BAL) mapping



Sources: ESRI, Aurecon Group, DPIE, Open Street Map

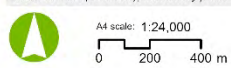


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 Author: AS

★ Town	--- North-East Intermodal Loop	▭ Proposed SAP Boundary	BAL Radiant Heat (kw/m2)
— Roads	--- Future Moree Bypass	▭ Regional enterprise	12.5
— SAP Road network	— Rail Bypass	▭ Moree Airport	19
— Inland Rail Corridor	— North-South Connector	▭ Vegetated areas*	29
— Moree Inverell Railway	— Existing transmission line		40
— Watercourse	▭ SAP investigation area		--- 100 m guideline

*Based on TSR (amended), biodiversity protection, and riparian corridor buffers

Sources: ESRI, Aurecon Group, DPIE, Open Street Map



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Moree SAP Environmental Package (Stage 3)
Figure 5.5: Bush fire Attack Level (BAL) mapping

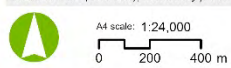


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 Author: AS

★ Town	--- North-East Intermodal Loop	▭ Proposed SAP Boundary	BAL Radiant Heat (kw/m2)
— Roads	--- Future Moree Bypass	▭ Regional enterprise	12.5
— SAP Road network	— Rail Bypass	▭ Moree Airport	19
— Inland Rail Corridor	— North-South Connector	▭ Vegetated areas*	29
— Moree Inverell Railway	— Existing transmission line		40
— Watercourse	▭ SAP investigation area		--- 100 m guideline

*Based on TSR (amended), biodiversity protection, and riparian corridor buffers

Sources: ESRI, Aurecon Group, DPIE, Open Street Map



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 Coordinate System: GDA 1994 MGA Zone 55

Moree SAP Environmental Package (Stage 3)
Figure 5.6: Bush fire Attack Level (BAL) mapping



5.3 Access

PBP (NSWRFS 2019) identifies a number of performance measures and acceptable solutions for new residential and rural subdivisions that can be applied to the Moree SAP preferred scenario, as the staged development occurs. It is noted that the internal road network provided in the master plan stage of design currently does not show secondary access, or provide detail around perimeter roads. To achieve compliance with PBP, a number of acceptable solutions listed as non-compliant in Table 5.2 will need to be considered during concept design stage to meet statutory requirements, including where the SAP is developed in discrete stages.

Table 5.2 Performance criteria and acceptable solutions for access compliance

Performance Criteria	Acceptable Solutions	Comment	Compliance
The intent may be achieved where:			
Firefighting vehicles are provided with safe, all-weather access to structures.	<ul style="list-style-type: none"> a) property access roads are two-wheel drive, all-weather roads; b) perimeter roads are provided for residential subdivisions of three or more allotments; c) subdivisions of three or more allotments have more than one access in and out of the development; d) traffic management devices are constructed to not prohibit access by emergency services vehicles; e) 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; f) all roads are through roads; g) dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; h) where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; i) 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 j) one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression. 	<p>Note (c): The perimeter roads shown are not located on the boundary of vegetated areas and do not separate the vegetation from the hazard. Internal road network is not detailed in master plan stage for all precincts and will be considered in concept design stage.</p> <p>Note (i): Two areas are landlocked, which will need to be considered in concept design stage.</p>	<ul style="list-style-type: none"> a) Complies b) Requires further assessment and incorporation into concept design to achieve compliance c) Requires further assessment and incorporation into concept design to achieve compliance d) Complies e) Complies f) Requires further assessment and incorporation into concept design to achieve compliance g) Requires further assessment and incorporation into concept design to achieve compliance h) Complies i) See regional enterprise area - cannot be assessed (it is likely the two solar hydrogen precincts might not comply as they are landlocked) j) Unlikely to be applicable



Performance Criteria	Acceptable Solutions	Comment	Compliance
The capacity of access roads is adequate for firefighting vehicles.	k) 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.	-	k) Complies
There is appropriate access to water supply.	l) hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; m) hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and n) there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	-	l) Complies m) Complies n) Complies
Perimeter 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.	p) are two-way sealed roads; q) minimum 8m carriageway width kerb to kerb; r) parking is provided outside of the carriageway width; s) hydrants are located clear of parking areas; t) are through roads, and these are linked to the internal road system at an interval of no greater than 500m; u) curves of roads have a minimum inner radius of 6m; v) the maximum grade road is 15 degrees and average grade of not more than 10 degrees; w) the road crossfall does not exceed 3 degrees; and x) a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	-	p) Complies q) Complies r) Complies s) Complies t) Requires further assessment and incorporation into concept design to achieve compliance u) Complies v) Complies w) Complies x) Complies



Performance Criteria	Acceptable Solutions	Comment	Compliance
Non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	<ul style="list-style-type: none"> y) minimum 5.5m carriageway width kerb to kerb; z) parking is provided outside of the carriageway width; aa) hydrants are located clear of parking areas; bb) roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; cc) curves of roads have a minimum inner radius of 6m; dd) the road crossfall does not exceed 3 degrees; ee) a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided. 	-	<ul style="list-style-type: none"> y) Complies z) Complies aa) Complies bb) Requires further assessment and incorporation into concept design to achieve compliance cc) Complies dd) Complies ee) Complies

Table note:

It is recommended that a detailed concept design address and consider these acceptable solutions to achieve compliance with PBP.

5.4 Services

Services (water supply, electricity and gas) are required to meet the following acceptable solutions of PBP (NSWRFS 2019):

Table 5.3 Performance criteria and acceptable solutions for services compliance

Performance Criteria	Acceptable Solutions	Comment	Compliance
The intent may be achieved where:			
Adequate water supplies are provided for firefighting purposes	<ul style="list-style-type: none"> a) reticulated water is to be provided to the development where available b) a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed 	-	<ul style="list-style-type: none"> a) Complies b) Complies
Water supplies are located at regular intervals; and the water supply is accessible and reliable for firefighting operations.	<ul style="list-style-type: none"> c) Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005 Fire Hydrant Installations - System Design, Installation and Commissioning (AS 2419.1:2005) (Standards Australia 2005) d) Hydrants are not located within any road carriageway e) Reticulated water supply uses a ring main system for areas with perimeter roads 	The site may not be provided with a Fire Services "Ring Main", but will likely be provided with a Domestic Water "Ring Main"	<ul style="list-style-type: none"> c) Complies d) Complies e) Complies



Performance Criteria	Acceptable Solutions	Comment	Compliance
Flows and pressure are appropriate	f) Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005	If flows and pressure available within the Ring Main fall below the minimum requirement in later design stages, an alternative performance solution may be proposed to meet Building Code of Australia requirements and NSWRFs requirements, that boosters are provided locally to any building requiring fire hydrant coverage. It will be expected that where fire hydrant use is required, the fire fighting appliance will be connected to facilitate fire fighting activities.	f) Complies (if a compliant performance solution is accepted)
The integrity of the water supply is maintained	g) All above-ground water service pipes are metal, including and up to any taps h) Above-ground water storage tanks shall be of concrete or metal i) Fire hose reels are constructed in accordance with AS/NZS 1221:1997 Fire hose reels (Standards Australia 1997) and installed in accordance with the relevant clauses of AS 2441:2005 Installation of fire hose reels (Standards Australia 2005).		g) Complies h) Complies i) Complies
Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	j) where practicable, electrical transmission lines are underground; k) where overhead, electrical transmission lines are proposed as follows: <ul style="list-style-type: none"> ■ lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and ■ no part of a tree is closer to a power line than the distance set out in ISSC3 Guideline for Managing Vegetation Near Power Lines. 		j) Complies k) Not applicable



Performance Criteria	Acceptable Solutions	Comment	Compliance
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings	<p>l) reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas (Standards Australia 2008), the requirements of relevant authorities, and metal piping is used;</p> <p>m) all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;</p> <p>n) connections to and from gas cylinders are metal;</p> <p>o) polymer-sheathed flexible gas supply lines are not used;</p> <p>p) above-ground gas service pipes are metal, including and up to any outlets.</p>		<p>l) Complies</p> <p>m) Complies</p> <p>n) Complies</p> <p>o) Complies</p> <p>p) Complies</p>

5.5 Plans and emergency procedures

The following emergency management plans and procedures have been prepared for the Moree SAP area:

- Namoi – Gwydir Bush Fire Management Committee Bush Fire Risk Management Plan 2018
- Hazardous industries (such as those involved with chemical goods storage, Bio-Energy production, waste processing, agricultural by-products processing or production, battery storage, and hydrogen production) may require a separate Fire Safety Study prepared under the DPIE Hazardous Industry Planning and Assessment Papers.



6 Recommendations

The following recommendations are made:

- APZs are maintained in accordance with the dimensions and requirements identified within Appendix 4 of PBP (NSWRFS 2019) for all areas adjoining bush fire prone land, including as part of a staged or partial development of the SAP
- All landscaping complies with the Appendix 4 of PBP (NSWRFS 2019) and relevant environmental approvals to the BC Act
- All new construction within the Moree SAP which directly adjoins bush fire prone areas (including areas of staged development) is a minimum of BAL12.5 (or greater) under AS3959:2018 as required by PBP (NSWRFS 2019)
- Existing access and egress provides all weather access to structures within Moree SAP, including primary and alternative access. The requirements for access identified in PBP (NSWRFS 2019) must be met for all stages of development within the SAP.
- Hydrants are installed to achieve compliance with AS 2419.1 – 2005 Fire Hydrant Installations - System Design, Installation and Commissioning (AS 2419)
- Any gas services are installed and maintained in accordance with AS/NZS 1596-2008 The storage and handling of LP gas (Standards Australia, 2008)
- Electrical services must comply with requirements of Chapter 5 of PBP (NSWRFS 2019)
- The bush fire emergency plan for the site is reviewed annually and updated as new stages of development occur within the SAP
- Future concept design of the SAP is to be developed, addressing all performance criteria required by PBP set out in Section 5.3 and Section 5.4 to achieve statutory compliance



7 Summary

This report provides a bushfire assessment of the preferred scenario development of Moree SAP.

Moree SAP is located on mapped bush fire prone land and legislative requirements for new construction at the site are applicable to all stages of the development of the SAP. The construction of the Moree SAP will be designed to ensure compliance with the requirements of PBP (NSWRFS 2019) and consider the various stages of development of the draft Structure Plan.

This bushfire assessment report has considered the range of risk factors associated with bushfires at the site. Providing the proposed preferred scenario is constructed and maintained in accordance with the requirements identified in Section 5 and recommendations made in Section 6 it is concluded that the proposed reconstruction will satisfy the objectives and performance requirements of the Building Code of Australia, PBP (NSWRFS 2019) and Australian Standard AS3959:2018.



8 References

Aurecon (2020a), Moree Special Activation Precinct – Biodiversity report, prepared for Department of Planning, Industry and Environment, 1 December 2020

Aurecon (2020b), Moree Special Activation Precinct – Bushfire Baseline Analysis, prepared for Department of Planning, Industry and Environment, 26 August 2020

Aurecon (2020c), Moree Special Activation Precinct – Bush Fire Scenarios Report, prepared for Department of Planning, Industry and Environment, 5 November 2020

NSW Rural Fire Service (2018) *Namoi – Gwydir Bush Fire Management Committee Bush Fire Risk Management Plan 2018*. Bush Fire Coordinating Committee – Policy No 1/2008 Adopted by the Bush Fire Coordinating Committee - Minute No. 24/2008

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

Standards Australia (2018) *Australian Standard AS3959-2018 Construction of buildings in bushfire-prone areas*. Standards Australia, Sydney

Standards Australia (2005) *AS 2441 Installation of fire hose reels* Standards Australia, Sydney

Standards Australia (2005) *AS 2419.1 Fire hydrant installations - System design, installation and commissioning*. Standards Australia, Sydney

Standards Australia (2014) *AS/NZS 1596 The storage and handling of LP Gas*. Standards Australia Sydney

Standards Australia (1997) *AS/NZS 1221 Fire hose reels*. Standards Australia Sydney

WSP (2020), Moree Special Activation Precinct Package A Scenarios Report, prepared for Department of Planning, Industry and Environment, September 2020

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