



Appendix P

Bushfire assessment



Bush Fire Assessment Report
in relation to the proposed
Modification of Consent (MOD1) under section 4.55 of
the EP&A Act
for:



Balranald Mineral Sands Project SSD-5285

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Document Tracking

Item	Detail
Project Name	Bush Fire Assessment Report, Balranald Mineral Sands Project Proposed Modification of Consent (MOD1)
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It should be borne in mind that the measures recommended in this report cannot guarantee that a building will survive a bush fire event on every occasion. This is due to the degree of vegetation management, the unpredictable behaviour of bushfires and extreme weather conditions. As such, the author is not liable to any person for any damage or loss whatsoever which has occurred or may occur in relation to the person taking action or not taking action based on the recommendations of this report.

NOTE: This bush fire assessment shall remain valid for 12 months from the date of issue.

Executive Summary

Bushfire Consulting Services was commissioned by EMM Consulting Pty Ltd (EMM) on behalf of Iluka Resources Limited (Iluka) to provide a bush fire assessment for the proposed modification (MOD1) to the State Significant Development (SSD) consent for the Balranald Mineral Sands Project (SSD-5285).

The proposed MOD1 would involve continuing underground mining trial wholly within a portion of the approved disturbance footprint of the West Balranald mine pursuant to the development consent (SSD-5285) and development of mineral processing infrastructure and a portion of the access road within a proposed new area of disturbance under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

The scope of the report is to consider any changes to the bush fire impacts as a result of proposed MOD1 and to assess the new infrastructure and the approved accommodation camp against *Planning for Bush Fire Protection 2019* (PBP). The report also includes a comparative assessment to confirm impacts will not be more significant than those approved under SSD-5285.

The subject site is mapped as designated bush fire prone land by Balranald Shire Council.

This report will support a modification report which will be submitted to the NSW Department of Planning, Infrastructure and Environment (DPIE) under the EP&A Act. MOD1 is exempt from requiring a bush fire safety authority (BFSA) and is not required to be assessed under s4.14 of the EP&A Act.

The approved accommodation camp will provide long term accommodation (exceeding six weeks in duration) for the construction and potential operational workforce and therefore the occupants will be familiar with their surroundings. As a result the maximum radiant heat level of 29kW/m² has been demonstrated, and a bush fire attack level (BAL) associated with the development of the accommodation facility has been recommended.

This report makes recommendations in accordance with the tailored objectives for this development type, and at a minimum, addresses

- asset protection zone requirements
- building construction standards
- water, gas and electricity provisions
- emergency management
- access provisions

Where all recommendations are implemented, the report concludes that the proposed MOD1 can comply with the objectives of Chapter 8 of the NSW RFS document '*Planning for Bush Fire Protection*'.

Compliance Summary

This Assessment has been Certified by: Nicole van Dorst BPAD-Level 3 Accredited Practitioner FPAA Cert No: BPAD23610	
Can the accommodation camp demonstrated a maximum radiant heat level of, 29kW/m ² ?	Yes
What is the recommended level of compliance with AS3959-2018 for the accommodation camp?	BAL 29 or less
Can this proposal comply with AS 3959-2018?	Yes
Does this development comply with the specific aim and objectives of PBP?	Yes
Is referral to the NSW Rural Fire Service (RFS) required?	No

List of Abbreviations

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018, <i>Construction of Buildings in Bushfire Prone Areas</i>
BAL	Bush Fire Attack Level
BFSA	Bush Fire Safety Authority
BPAD	Bushfire Planning and Design (Accreditation Scheme)
BPMs	Bush Fire Protection Measures
BPLM	Bush Fire Prone Land Map
Council	Balranald Shire Council
DA	Development Application
DEM	Digital Elevation Model
DPIE	Department of Planning Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act – 1979</i>
FDI	Fire Danger Index
FFDI	Forest Fire Danger Index
FPAA	Fire Protection Association of Australia
IPA	Inner Protection Area
kW/m ²	Kilowatts per metre squared
LiDAR	Light Detection and Ranging
LPMA	Land & Property Management Authority
NCC	National Construction Code
PBP	<i>Planning for Bush Fire Protection 2019</i>
RF Act	<i>Rural Fires Act – 1997</i>
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SIX	Spatial Information Exchange
SWS	Static Water Supply

1. Introduction

This report has been commissioned by EMM Consulting Pty Ltd (EMM) on behalf of Iluka Resources Limited (Iluka) to undertake a bush fire assessment of the proposed modification (MOD1) to the approved Balranald Mineral Sands Project (the Balranald Project) in south-western New South Wales (NSW).

The purpose of this bush fire assessment is to provide a comparison of predicted environmental impacts of the proposed modification against the predicted impacts of the approved project as detailed in section 4.

This report will support a modification report which will be submitted to the NSW Department of Planning, Infrastructure and Environment (DPIE) under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) as part of the proposed modification.

The subject property is “bush fire prone land” as per the Balranald Shire Council bush fire prone land map (Figure 4) as defined by section 10.3 (s10.3) of the EP&A Act and therefore the requirements stipulated by legislation apply to any new development on the site.

Planning for Bush Fire Protection (PBP) 2019 (Chapter 8) describes this type of development as “other development”. In order to comply with PBP the following conditions must be met:

- satisfy the aim and objectives of PBP outlined in Chapter 1 of the document;
- consider any issues listed for the specific purpose for the development set out in that chapter;
- Ensuring an asset protection zone (APZ) for the accommodation buildings based on a radiant heat threshold of 29kW/m²; and
- propose an appropriate combination of Bush Fire Protection Measures (BPMs).

In particular it is important to ensure that a defensible space is provided for the size and scale of the development. Proposed measures must operate in combination to minimise the impact of bush fire and ensure that access and services are adequate.

The bush fire assessment and recommendations are derived from the *RF Act*, the Rural Fire Service document *Planning for Bush Fire Protection 2019* and Australian Standard 3959-2018 '*Construction of Buildings in Bushfire Prone Areas*'.

2. Purpose of this Report

The purpose of this bush fire assessment is to provide a comparison of predicted environmental impacts of (proposed MOD1) against the predicted impacts of the approved project.

This report provides Iluka, the DPIE and the Rural Fire Service with a description of the proposed MOD1 as well as the vegetation type, slope and any other factors influencing the potential bush fire behaviour, sufficient to show that the modification will be protected from the potential bush fire threat as outlined in current legislation.

This assessment includes an analysis of the hazard, threat and subsequent risk to the development and provides recommendations that satisfy the aim and specific objectives of Chapter 8 of the NSW RFS document '*Planning for Bush Fire Protection*' (PBP).

3. Project Background

Iluka proposes to develop a mineral sand mine in south-western New South Wales (NSW), known as the Balranald Project. It includes construction, mining, primary processing and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits, located approximately 12 kilometres (km) and 66 km north-west of the town of Balranald (Balranald town), respectively.

An environmental impact statement (EIS) was prepared and submitted in 2015 to accompany a State significant development (SSD-5285) application under Part 4 of the EP&A Act for an open cut, truck and shovel mining method. Development consent was granted by DPIE under Part 4 of the EP&A Act on 5 April 2016. The Balranald Project also included undertaking a bulk

sampling activity at the West Balranald mine to test the removal of ore using underground mining methods.

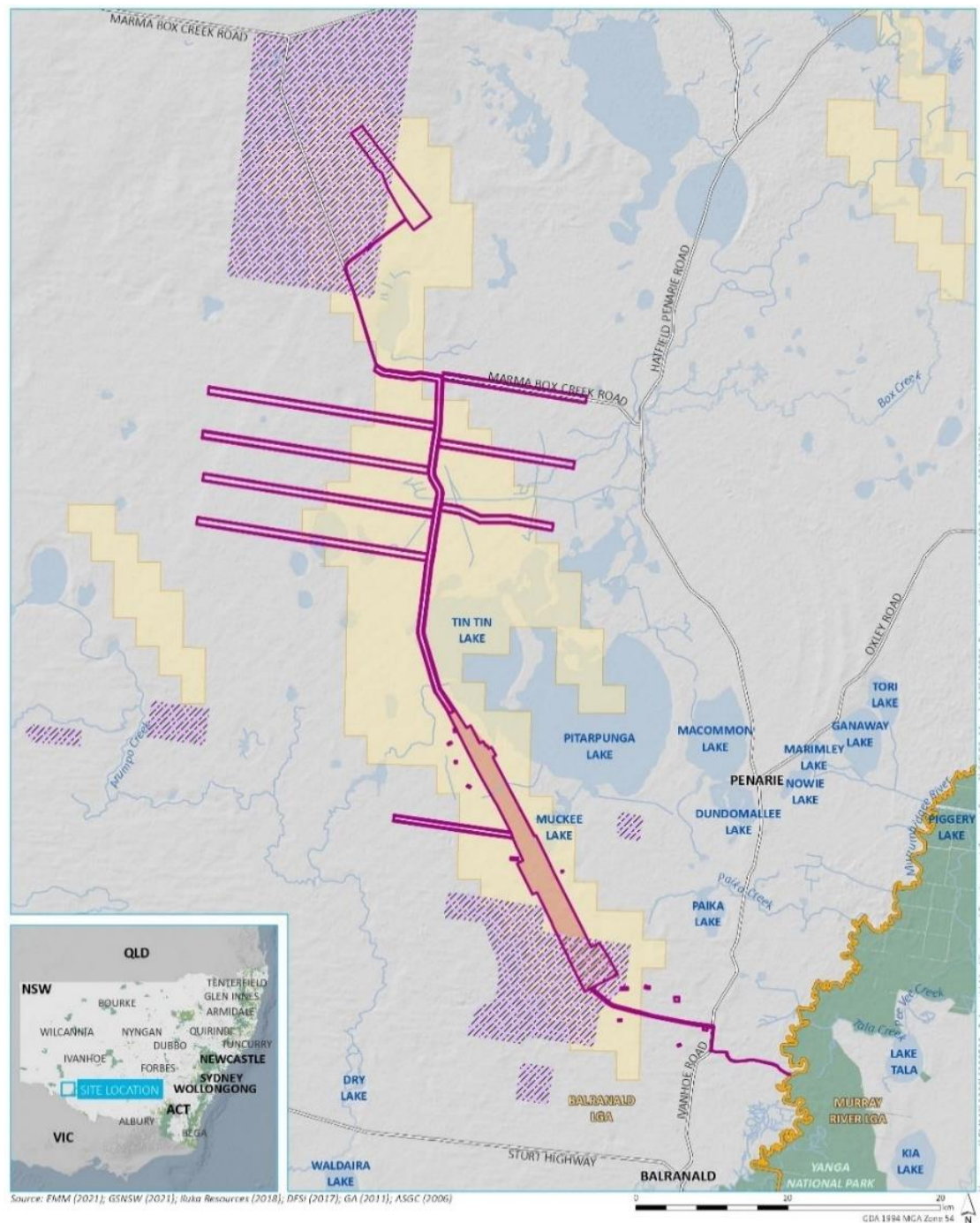
The regional setting and approved EIS project area are shown on Figure 1.

Since development consent was granted in April 2016, Iluka has undertaken the approved bulk sampling activity involving the extraction of mineralised material or ore, from depth within the approved disturbance area of the West Balranald mine.

The outcome of the bulk sampling activities confirmed the effectiveness of the underground mining method, validated key elements of the mining unit design and have been used to help guide the proposed modification to inform the potential suitability (i.e. commerciality and reduced environmental impacts) of underground mining as an alternative method for resource extraction for the Project.

Figure 1. Regional setting and EIS approved Balranald project area (SSD-5285)

Source: EMM Consulting Pty Ltd



4. Description of modification

The proposed MOD1 would involve continuing underground mining trial wholly within a portion of the approved disturbance footprint of the West Balranald mine pursuant to the development consent (SSD-5285) and development of mineral processing infrastructure and a portion of the access road within a proposed new area of disturbance under Part 4 of the EP&A Act.

The construction of infrastructure approved under the development consent would be undertaken to support the construction and operation for proposed underground mining, including mineral processing infrastructure, access roads, upgrade of external roads and intersections, gravel extraction, monitoring infrastructure, accommodation facility (refer Figure 2), road transport of ore offsite for downstream processing and other infrastructure as required.

The underground mining process would involve:

- clearing the footprint directly above the mining area – the area will be stripped of topsoil, subsoil and non-saline overburden to a nominal depth of 2 metres (m);
- on-path surface emplacement of treated sand tails into the space created by the above stripping;
- sequential underground mining of the ore;
- processing of the mined ore to separate the heavy mineral concentrate (HMC) from sand tails, sand fines and oversize;
- stockpiling of the HMC;
- backfilling of sand fines underground;
- replacement of non-saline overburden, subsoil and topsoil for rehabilitation and final landform; and
- environmental monitoring activities (including groundwater, geochemistry, subsidence, air quality and noise).

Ore is expected to be produced and processed at a rate no greater than approved under the development consent. The processing plant on site will produce a Heavy Mineral Concentrate (HMC) to generate two primary product streams; magnetic HMC and non-magnetic HMC. The product would be stockpiled and transported off-site for downstream processing with underground mining operations to be undertaken for a period of 6 years.

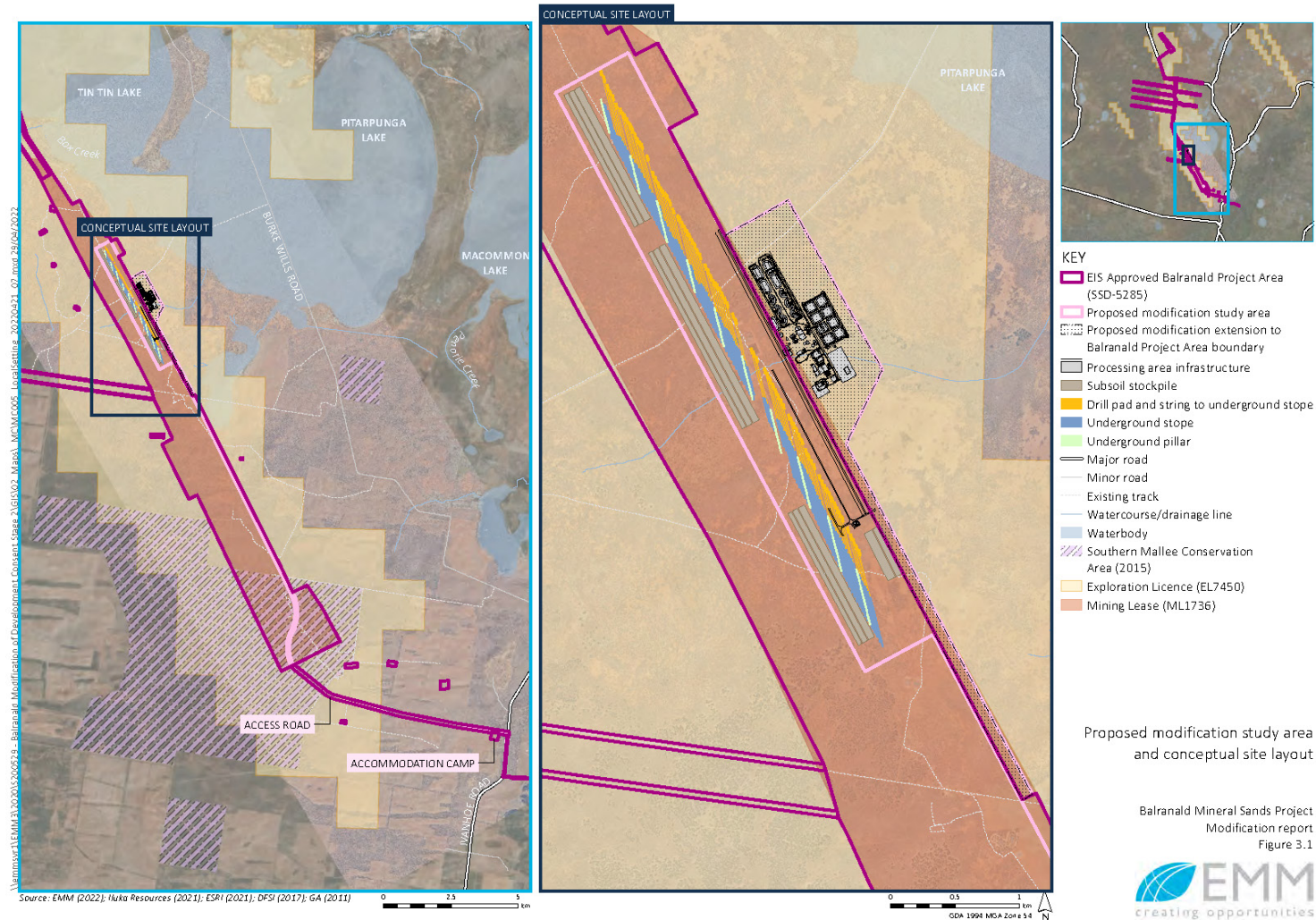
The proposed modification includes additional surface infrastructure such as – infrastructure corridor (comprising haul road and 22 kV transmission line) and construction of the accommodation facility for the construction and potential operational workforce (within the previously approved footprint).

Figure 2. Approved conceptual plan for accommodation facility

Source: 2015 EIS (SSD-5285)



Figure 3. Proposed modification and conceptual site layout Source: EMM Consulting Pty Ltd



5. Comparative assessment

The bush fire assessment from the Balranald Project EIS prepared by EMM in May 2015 considered the requirements outlined in PBP 2006 and more directly the two areas where habitable buildings were proposed to be constructed. (i.e., the processing area and the accommodation facility).

The assessment identified that the accommodation facility was not located on mapped bush fire prone land and therefore the bush fire assessment focused on the processing area only (i.e., administration facility and the workshop) based on the following parameters:

- The APZs recommended were based on a 10kW/m² radiant heat flux due to the mine context and building containing flammable / hazardous materials.
- Hazardous vegetation around the processing area was identified as semi-arid woodlands and arid woodlands
- Slope was determined as level and up to 5 degrees downslope

The following comparative assessment for proposed MOD1 has been undertaken against what has been approved under SSD-5285 (i.e., the bush fire assessment prepared as part of the original Balranald Project EIS) to consider any changes to bush fire impacts as a result of the MOD.

Management and Mitigation recommendations (2015 EIS)	Changes to bush fire impacts as a result of MOD1 (reflective of PBP 2019)
Minimum APZ's of 30m or 35m for the processing area, noting that all habitable buildings within the processing area would have an APZ of 300m or greater based on the disturbance boundary	No significant change to the 2015 EIS requirements. APZ's in excess of 100m are provided for the processing area and fuel storage areas due to the extent of the disturbance boundary. In accordance with PBP minimum APZ's of 7m are

Management and Mitigation recommendations (2015 EIS)	Changes to bush fire impacts as a result of MOD1 (reflective of PBP 2019)
	recommended to avoid BAL FZ/40 or 50m when following guidelines for SFPP setbacks.
No requirements for the accommodation facility due to its location outside of the mapping 100m buffer	Whilst the accommodation facilities are located over 100m from the Semi-arid Woodlands, they are within 50m of the disturbance boundary and are therefore affected by grassland vegetation. It is recommended that the accommodation buildings are provided with a minimum APZ setback of 10 – 11m from the southern, eastern, and western disturbance boundaries. The APZ's recommended do not extend beyond the disturbance boundary however it is recommended that the concept plan is amended to ensure all buildings are outside of the minimum APZ.
Preparation of a bush fire management plan to outline measure to minimise the risk of bushfire-related damage or ignition. This includes creation of a strategy for hazard reduction for areas that may regenerate	No changes to the 2015 EIS requirements The strategy for hazard reduction should ensure no regeneration within 10m (defendable space) of the processing facility and no regeneration within 10 – 11m of the accommodation buildings. No regeneration should occur within 100m of hazardous industry (i.e., diesel storage area)
Protection measures for electricity and gas services as follows; • where operationally practical, electrical transmission lines would preferably be placed	No changes to the 2015 EIS requirements.

Management and Mitigation recommendations (2015 EIS)	Changes to bush fire impacts as a result of MOD1 (reflective of PBP 2019)
underground. However, where overhead electrical transmission lines are used, they would be installed and managed in accordance with Essential Energy (2012) CEOP8008 Vegetation Management Plan • AS/NZS 1596 2008 The Storage and Handling of LP Gas would be followed for bottled gas installation and maintenance with metal piping to be used • there would be at least 10m between fixed gas cylinders and flammable materials • shielding would be placed on the side of the cylinders which face potential fires • release valves on gas cylinders that are close to buildings would be directed away from the building • and at least 2m from combustible material; metal connections would be used.	
Provision of water for firefighting through the: • provision of dedicated fire water storage tank at the processing area and utilisation of existing dam	No changes to the 2015 EIS requirements for the processing plant. If fire hydrants cannot be provided for the accommodation facility a static water supply (5,000L per donga) is to be provided.

Management and Mitigation recommendations (2015 EIS)	Changes to bush fire impacts as a result of MOD1 (reflective of PBP 2019)
• Water carts may be fitted with water cannons or other suitable mobile firefighting equipment • Fire hydrants at building would be spaced, sized and pressured in accordance with AS2419.1-2005 Fire Hydrant Installations – System Design, Installation and Commissioning	
Access to and within the project area in accordance with PBP • there would be a minimum vertical clearance of 4 m to any overhead obstructions including branches • there would be a minimum carriageway of 4 m with 1 m clearance on each side • there would be a maximum grade of 15 if sealed and less than 10 if unsealed • crossfall would not be more than 10 • dead end roads are not recommended by the PBP guidelines; however, when they are unavoidable • turning circles would be provided with a minimum 12 m outer radius at the end of these roads.	No changes to the 2015 EIS requirements however the following additional access requirements are to apply to the accommodation facility to ensure compliance with Section 5.3.2 of PBP. (i.e., it is recommended that a perimeter road (8m wide minimum) is provided.

Management and Mitigation recommendations (2015 EIS)	Changes to bush fire impacts as a result of MOD1 (reflective of PBP 2019)
All building would be designed in accordance with the general bush fire construction levels in AS3959-2009 Construction of building in Bush Fire Prone Areas.	Accommodations buildings are to comply with the relevant BAL rating depending on their final location (refer Figure 7).

The Minister for Planning issued the following bush fire related conditions of consent on 5th April 2016 (SSD-5285).

- **Condition 29** The Applicant shall:
 - (a) ensure that the development is suitably equipped to respond to any fires on site; and
 - (b) assist the RFS, emergency services and National Parks and Wildlife Service as much as practicable in response to fires in the vicinity of the site.
- **Condition 17(c)** – Biodiversity Management Plan, includes a requirement to provide a detailed description of the measures that would be implemented for bush fire management.

6. Site Assessment

The assessment relates to the proposed MOD1 and approved accommodation facility shown in the site plans (reference Figure 1, 2 & 3).

The site is mapped as bush fire prone (Figure 4 & 5) with Category 1 and Category 2 vegetation located outside of the disturbance boundary surrounding the proposed processing area and approximately 100m or more to the east and north of the accommodation facility.

Bushfire Prone Land - Processing Area

Legend:

- Site Layout
- Site Disturbance Boundary
- EIS 2014 Boundary
- Cadastre (NSW DCDB)
- BFP Vegetation Buffer
- BFP Vegetation Category 1
- BFP Vegetation Category 2

Scale: 1:15,000

Scale Bar: 0, 250, 500, 750, 1,000, 2,000 Meters

North Arrow

Map Information:

- Projected Coordinate System: GDA 2020 Zone 56
- DATE: 22/12/2021
- Map Version: 1.1

Map Description:

Bushfire Prone Land: RFS 28/08/2021
Aerial Imagery: NSW LPI 2019
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Bushfire Prone Land - Accommodation Facility

Legend:

- Site Layout
- Site Disturbance Boundary
- EIS 2014 Boundary
- Cadastre (NSW DCDB)
- BFP Vegetation Buffer
- BFP Vegetation Category 1
- BFP Vegetation Category 2

Scale: 1:15,000

SITE: Balranald Mineral Sands, Balranald NSW

Projected Coordinate System: GDA 2020 Zone 56

DATE: 22/12/2021

Map Version: 1.1

Bushfire Prone Land: RFS 28/08/2021
Aerial Imagery: NSW LPI 2019
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Vegetation types have been determined by 2021 ecology field surveys for MOD1 (EMM 2021) and 'Ocean Shores to Desert Dunes' by David Keith (Keith 2004).

7. Identify APZs

7.1 Determine Vegetation Formations

The hazardous vegetation formations for each aspect of the processing area and accommodation facility within 140m of the assets have been identified according to Keith (2004).

Based on the determination of vegetation formation using the Keith (2004) Identification Key, and survey undertaken by EMM the primary bushland vegetation having the potential to affect the subject building is most representative of Semi-Arid Woodland to north and east of the accommodation facility and grassland to the south and west.

The area surrounding the processing area will be managed for distances of greater than 100m.

The vegetation identified on site has been surveyed by EMM and is:

Vegetation community	Vegetation class	Vegetation formation
Pearl Bluebush Low Open Shrubland	Aeolian Chenopod Shrubland	Arid shrublands
Old Man Saltbush Shrubland	Riverine Chenopod Shrubland	
Black Box Grassy Open Woodland	Inland Floodplain Woodland	Semi-arid Woodland (grassy sub-formation)
Chenopod Sandplain Mallee Woodland	Sand Plain Mallee Woodlands	Semi-arid Woodlands (shrubby sub-formation)

Where mixes of vegetation formations are located together, the vegetation formation providing the greater hazard is used for the purpose of this assessment.

7.2 The effective slope

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the level of radiant heat flux. The effective slope of the land from the new building for a distance of 100m is derived from a site assessment combined with the most detailed contour data available. The slope is then categorised into one of following classes, relative to the location of the hazard:

- all upslope vegetation (considered 0 degrees)
- >0 to 5 degrees downslope vegetation
- >5 degrees to 10 degrees downslope vegetation
- >10 degrees to 15 degrees downslope vegetation, and
- >15 degrees to 20 degrees downslope vegetation.

For the purpose of this report 2m DEM data has been sourced from NSW Spatial Services which is captured using LiDAR and has a horizontal accuracy of 0.3m and vertical accuracy of 0.8m at 95%.

The effective slope has been measured manually via a desktop assessment over a distance of 100m from the proposed processing area and accommodation facility, under the classified vegetation community constituting the hazard.

The slope is detailed within the tables provided in Section 8.4 and is generally level to 0-5 degrees downslope.

7.3 Fire Weather

The development is located in the Balranald Council area, a part of the South Western Region, which has a Fire Danger Index (FDI) of 80.

7.4 Determination of APZs

An APZ is a fuel-reduced area surrounding a built asset or structure. An APZ provides a buffer zone between a bush fire hazard and an asset and an area of reduced bush fire fuel that allows

suppression of fire. It also provides an area from which backburning or hazard reduction can be conducted, and allows emergency services access as well as providing a relatively safe area for firefighters to defend property.

7.4.1 Proposed Processing Plant

The buildings associated with the Processing Area are for the most part considered Class 5 – 8 buildings. These include processing plant, maintenance areas and workshops, administration offices and amenities.

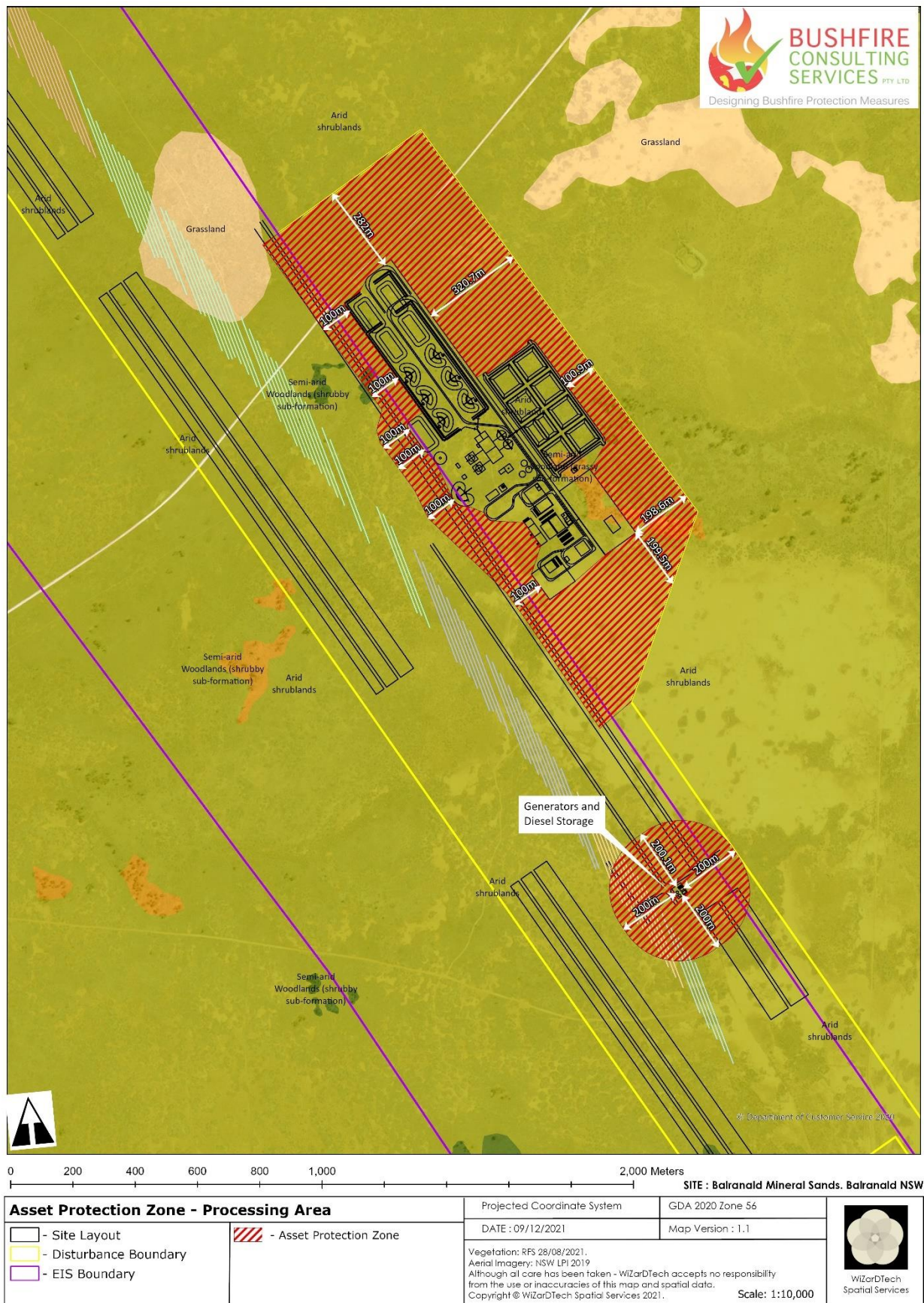
For buildings with occupants, potential building footprints should not be exposed to radiant heat levels exceeding 29kW/m^2 , in order to meet PBP requirements. Where radiant heat levels of $\leq 29\text{kW/m}^2$ can be demonstrated it is anticipated that the building will not be subject to flame contact during a bush fire. Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

To identify the appropriate APZ, the relevant Forest Fire Danger Index (FFDI), vegetation formation and effective slope are matched using Table A1.12.3 of PBP.

Table A1.12.3 of PBP – Processing Area - Minimum distances for APZs – other development, FFDI 80 areas (<29kW/m², 1090K)

Aspect	Distance from hazard	Vegetation Classification	Slope Under Classified Vegetation	Minimum APZ required (BAL 29)
North	>282m	N/A	Level to upslope	N/A
East	>100m	Semi-Arid Woodland	Level to upslope	5m
South	>198m	N/A	Level to upslope	N/A
West	>100m	N/A	Level to upslope	N/A

Figure 6. Asset Protection Zones - Processing Area.



7.4.2 Proposed Accommodation facility

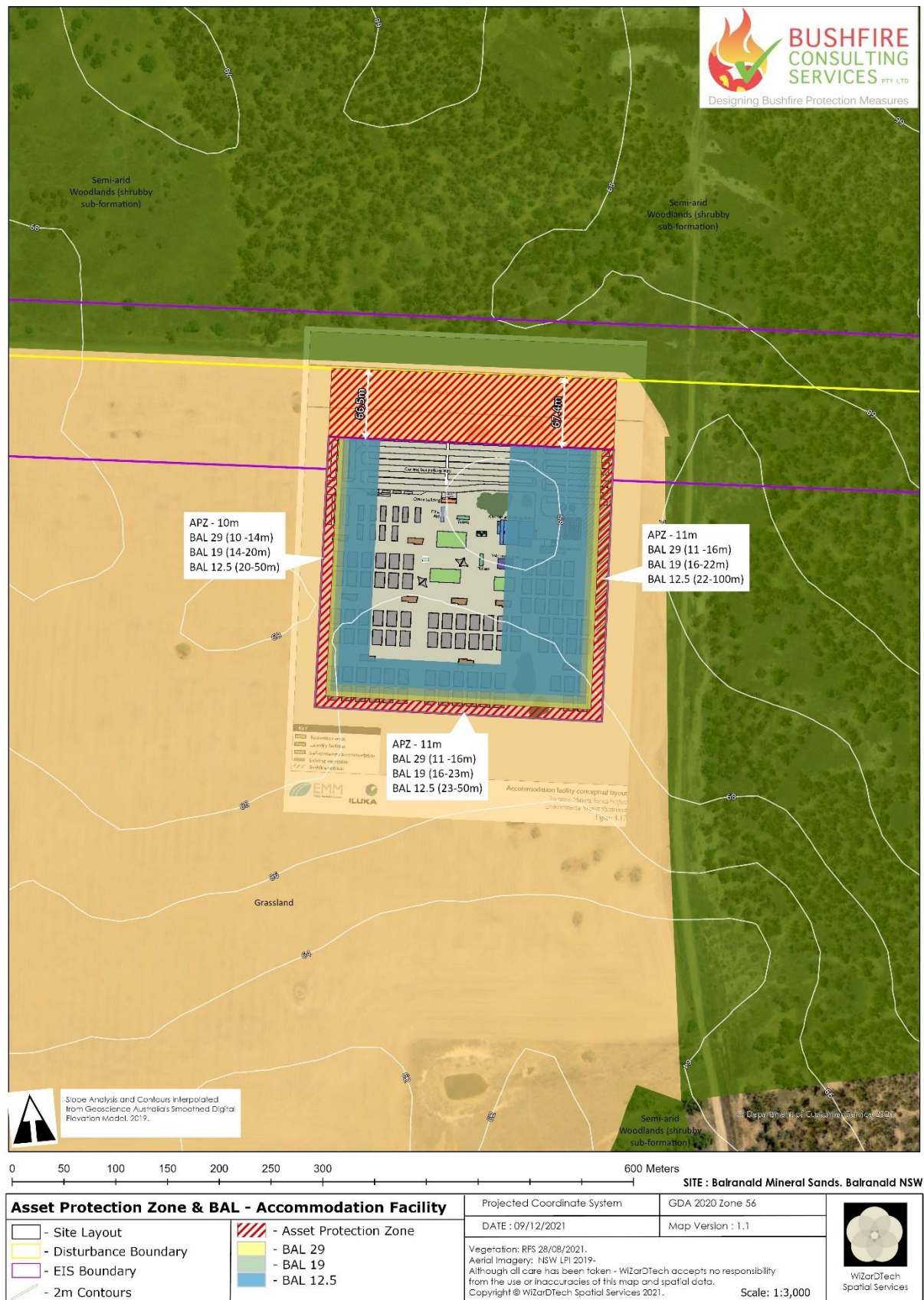
The accommodation facility is to be assessed using the same principles and criteria associated with subdivision in bush fire prone areas. This includes ensuring an APZ based on a radiant heat threshold of 29kW/m² for any new dwellings. The accommodation buildings will be portable demountable structures that will be transported and assembled on site.

Table A1.12.3 of PBP – Accommodation Facility Minimum distances for APZs – Residential development, FFDI 80 areas (<29kW/m², 1090K)

Aspect	Vegetation Classification	Slope Under Classified Vegetation	Minimum APZ required (BAL 29)
North	Semi-Arid Woodland	Level to upslope	11m
East	Semi-Arid Woodland	Level to upslope	11m
South	Grassland	Downslope >0- 5°	11m
West	Grassland	Level to upslope	10m

The concept plan for the proposed accommodation facility has been approved and is subject to further design engineering. Iluka will ensure the final design layout complies with the minimum APZ requirements.

Figure 7. Asset Protection Zones & BAL setbacks for Accommodation Facility.



8. Bush Fire Protection Measures

8.1 Asset Protection Zones

Intent of measures: to provide suitable building design, construction and sufficient space to ensure that radiant heat levels do not exceed critical limits for firefighters and other emergency services personnel undertaking operations, including supporting or evacuating occupants.

The following table outlines the APZ requirements for the accommodation facility. The processing area will be surrounded by managed land in excess of 100m and therefore complies with the aims and objectives of PBP.

Table A5.3a of PBP – Performance criteria and acceptable solutions for APZs

Performance criteria (accommodation facility)	Solution	Compliance	
		Acceptable solution	Performance criteria
Potential building footprints will not be exposed to radiant heat levels exceeding 29kW/m ² on each proposed lot	An APZ is provided in accordance with Table A1.12.3 in Appendix 1 of <i>PBP</i> .	☒	
APZs are managed and maintained to prevent the spread of a fire towards the building	APZs are managed in accordance with the requirements of Appendix 4	☒	
The APZ is provided in perpetuity	APZs are wholly within the boundaries of the development site	☒	
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	The APZ is located on lands with a slope of less than 18°	☒	

Performance criteria (accommodation facility)	Solution	Compliance	
		Acceptable solution	Performance criteria
Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions	Landscaping is in accordance with Appendix 4	☒	
	Fencing is constructed in accordance with section 7.6 (refer Note 1 below)		
Note 1: Section 7.6 of PBP states that all fences in bush fire prone areas should be made of either hardwood or non-combustible material. However, in circumstances where the fence is within 6m of a building or in areas of BAL 29 or greater, they should be made of non-combustible material only.			

8.2 Identify Construction Requirements

The appropriate construction requirements for the accommodation facility are determined by matching the relevant FFDI, vegetation type, the distance measured from the edge of the unmanaged vegetation to the closest external wall to identify the BAL using the relevant tables from PBP. These construction requirements are located in section 3 of AS3959-2018.

PBP Table A1.12.6 Determination of BAL, FFDI 80 – accommodation facility

Aspect	Distance from hazard	Vegetation Classification	Effective Slope Under Classified Vegetation	Bush Fire Attack Level (BAL) required
North	>100m	N/A	N/A	N/A
East	11m	Semi-Arid Woodland	Level to upslope	BAL 29 (11-<16) BAL 19 (16-<22) BAL 12.5 (22-<100m)
South	11m	Grassland	Downslope >0- 5°	BAL 29 (11-<16) BAL 19 (16-<23) BAL 12.5 (23-<50m)
West	10m	Grassland	Level to upslope	BAL 29 (10-<14)

Aspect	Distance from hazard	Vegetation Classification	Effective Slope Under Classified Vegetation	Bush Fire Attack Level (BAL) required
				BAL 19 (14-<20) BAL 12.5 (20-<50m)

The concept plan for the proposed accommodation facility has been approved and is subject to further design engineering. Iluka will ensure the final design layout complies with the minimum APZ and BAL requirements.

The NCC does not provide any bush fire specific requirements for buildings of Class 5-8 (i.e. processing area) and as such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions.

The results of the bush fire attack assessment (as calculated within section 8.4 of this report) show the processing area is located over 100m from bush fire prone vegetation. As a result, no bush fire construction standards will apply to these buildings.

8.3 Access

There are two primary access roads that have been approved to be constructed as part of the Balranald Project, the West Balranald access road the Nepean access Road. For proposed MOD1, a haul road, internal roads and carparking at the processing area and perimeter road and carparking at the accommodation facility are proposed to be constructed (refer Figures 2 and 3).

The following tables outline the acceptable solutions that are to be implemented to satisfy and ensure compliance with the performance criteria for access.

Table 5.3b of PBP – Performance criteria and acceptable solutions for access (general)

Performance criteria	Acceptable solution	Compliance	
		Acceptable solution	Performance criteria
Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	Property access roads are two-wheel drive, all weather roads.	☒	
	Perimeter roads are provided for residential subdivisions of three or more allotments.	The accommodation facility is to be provided with a perimeter road (this can be unsealed).	
	Subdivisions of three or more allotments have more than one access in and out of the development.	☒	
	Traffic management devices are constructed to not prohibit access by emergency services vehicles.	☒	
Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	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	☒	

Performance criteria	Acceptable solution	Compliance	
		Acceptable solution	Performance criteria
	Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200m in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end.	☒	
	Where kerb and guttering are 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 or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.	N/A	
	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.	N/A	

Performance criteria	Acceptable solution	Compliance	
		Acceptable solution	Performance criteria
The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.	☒	
There is appropriate access to water supply.	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005	N/A	

8.4 Perimeter Roads (accommodation facility)

The following table outlines the acceptable solutions that are to be implemented to satisfy and ensure compliance with the performance criteria for perimeter access.

Table 5.3b of PBP – Performance criteria and acceptable solutions for access (perimeter roads)

Performance Criteria	Acceptable Solutions	Compliance	
		Acceptable solution	Acceptable solution
Perimeter access roads are designed to allow safe access and egress for firefighting vehicles while occupants are evacuating as well as providing a safe operational environment for emergency service	There are two-way sealed roads	☒	
	Minimum 8m carriageway width kerb to kerb	Perimeter road around accommodation facility to be 8m (this can be unsealed)	
	Parking is provided outside of the carriageway width	☒	

Performance Criteria	Acceptable Solutions	Compliance	
		Acceptable solution	Acceptable solution
personnel during firefighting and emergency management on the interface	Hydrants are to be located clear of parking areas	N/A	
	There 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	☒	
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches is provided	☒	

8.5 Non-Perimeter Roads (accommodation facility)

The following table outlines the acceptable solutions that are to be implemented to satisfy and ensure compliance with the performance criteria for non-perimeter access roads.

Table 5.3b of PBP – Performance criteria and acceptable solutions for access (non-perimeter roads)

Performance Criteria	Acceptable solutions	Compliance	
		Acceptable solution	Acceptable solution
Non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while occupants are evacuating	Minimum 5.5m carriageway width kerb to kerb	☒	
	Parking is provided outside of the carriageway width	☒	
	Hydrants are located clear of parking areas	N/A	
	Roads 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 road crossfall does not exceed 3 degrees	☒	
	A minimum vertical clearance of 4m to any	☒	

Performance Criteria	Acceptable solutions	Compliance	
		Acceptable solution	Acceptable solution
	overhanging obstructions, including tree branches is provided.		

8.6 Services – Water

The accommodation facility and processing area may be supplied with potable water by fresh water pipeline, reverse osmosis plant or transported by truck.

Where a reticulated water supply cannot be provided a static supply is to be provided in accordance with the acceptable solutions to satisfy and ensure compliance with the performance criteria.

Table 5.3c of PBP – Performance criteria and acceptable solutions for water supplies

Performance criteria	Acceptable solutions	Compliance	
		Acceptable solution	Performance criteria
Adequate water supply is provided for firefighting purposes.	A static water supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed	A static water supply of 5,000L for each occupied donga is to be provided.	
	Static water supplies shall comply with Table 5.3d of PBP.		

Performance criteria	Acceptable solutions	Compliance	
		Acceptable solution	Performance criteria
A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; 65mm <i>Storz</i> outlet with a ball valve is fitted to the outlet;	☒	
	Ball valve and pipes are adequate for water flow and are metal;	☒	
	Supply pipes from tank to ball valve have the same bore size to ensure flow volume;	☒	
	Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank;	☒	
	A hardened ground surface for truck access is supplied within 4m;	☒	
	Above-ground tanks are manufactured from concrete or metal;	☒	
A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	Raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F of AS 3959);	☒	
	Unobstructed access can be provided at all times;	☒	
	Underground tanks are clearly marked;	☒	

Performance criteria	Acceptable solutions	Compliance	
		Acceptable solution	Performance criteria
	Tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters;	☒	
	All exposed water pipes external to the building are metal, including any fittings;	☒	
	Where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump, and are shielded against bush fire attack; any hose and reel for firefighting connected to the pump shall be 19mm internal diameter;	☒	
	Fire hose reels are constructed in accordance with <i>AS/NZS 1221:1997</i> , and installed in accordance with the relevant clauses of <i>AS 2441:2005</i> .		

As outlined in the EIS (2015) the following additional measures are recommended.

- provision of dedicated fire water storage tank at the processing area and utilisation of existing dam
- water carts may be fitted with water cannons or other suitable mobile fire fighting equipment

8.7 Electricity Services

The proposal includes the installation of a 22kV transmission line within the haul road / infrastructure corridor. There is also a telecommunication tower approved for the project, consisting of a 70m self-supporting lattice tower to be located within the surface

infrastructure area to the west of the workshops. The APZ's provided for the tower will exceed the minimum 10m requirement.

The following table outlines the acceptable solutions that are to be implemented to satisfy and ensure compliance with the performance criteria for electricity services.

Table 5.3c of PBP – Performance criteria and acceptable solutions for electricity services

Performance criteria	Acceptable solution	Compliance	
		Acceptable solution	Performance criteria
Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	N/A	N/A
	Where overhead electrical transmission lines are proposed: - lines are installed with short pole spacing (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.	☑	

8.8 Gas Services

The following table outlines the acceptable solutions that are to be implemented to satisfy and ensure compliance with the performance criteria for gas services.

Table 5.3c of PBP – Performance criteria and acceptable solutions for gas services

Performance criteria	Acceptable solution	Compliance	
		Acceptable solution	Performance criteria
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas bottles are to be installed and maintained in accordance with <i>AS/NZS 1596 (2014)</i> , the requirements of relevant authorities and metal piping is to be used.	☒	
	All fixed gas cylinders are to be kept clear of 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.	☒	
	Above ground gas service pipes are metal, including and up to any outlets.	☒	

8.8 Issues specific to buildings of Class 5 to 8 under the NCC

Whilst bush fire is not captured in the NCC for Class 5-8 buildings, a number of objectives are applied under section 8.3.1 of *PBP* in relation to access, water supply and services, and emergency and evacuation planning. The following table outlines the proposals compliance with the specific objectives for buildings of Class 5-8 (i.e., processing area)

Objective	Compliance statement
To provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation.	Access provided in accordance with section 9.3 of this report.
To provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development.	A Bush Fire Emergency Management and Evacuation Plan is to be prepared by Iluka consistent with the NSW RFS publication: <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i> , and AS3745:2010.
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	Services provided in accordance with sections 9.6 – 9.8 of this report.
Provide for the storage of hazardous materials away from the hazard wherever possible.	The storage of hazards materials is well over 200m from bush fire prone vegetation Storage and handling of hazardous materials in accordance with: • AS1940:2017 The storage and handling of flammable and combustible liquids • AS4897-2008 The design, installation and operation of underground petroleum storage • AS/NZS 1596:2014 The storage and handling of LP Gas

Objective	Compliance statement
	The recommendations of the Multi-level Risk Assessment prepared for the proposed development in accordance with SEPP 33

8.9 Issues specific to hazardous industry

Some developments are considered by their very nature to be hazardous, as much for their ability to start bush fires as their susceptibility to bush fire impacts.

Whilst mineral sands is not identified as a potentially hazardous industry in SEPP 33, the Balranald Project may be determined to be a potentially hazardous development if the storage of dangerous goods exceeds the thresholds of applying SEPP 33.

The bulk hazardous materials that the proposed MOD1 will use are diesel, petrol, other hydrocarbons (oils, greases, degreaser and kerosene) and liquefied petroleum gas (LPG) and/or liquefied natural gas (LNG). The storage of these materials is outlined below:

8.9.1 Diesel

A generator, diesel storage and refuelling facility will be provided approximately 1km south of the processing area processing area within the approved disturbance footprint. Diesel will be stored and handled on-site in accordance with AS 1940:2004 and is located approximately 200m from the nearest bush fire prone vegetation.

8.9.2 Petrol

Petrol will be stored and handled onsite for light vehicles, mobile equipment and portable machinery. It will be stored in the same area as the diesel storage and refuelling facility. Petrol will be stored and handled onsite in accordance with AS 1940:2004 and is located approximately 200m from the nearest bush fire prone vegetation.

8.9.3 Other hydrocarbons

Oil is classified as a Class 3 flammable liquid under the ADGC. The quantities of hydrocarbons including grease, degreaser, kerosene and oil will retain appropriate setbacks to site boundaries specified in Applying SEPP 33. Hydrocarbons will be stored and handled in accordance with AS 1940:2004 and will be located over 100m from the nearest bush fire prone vegetation.

8.9.4 Liquid petroleum gas

The gas supply will be either LPG or LNG and will be stored in above ground gas tanks in the processing area near the ilmenite separation plant (ISP). The gas supply to the ISP will be via a buried pipeline. The ADGC classifies LPG and LNG as a Class 2.1 flammable gas. LPG or LNG will be stored in accordance with AS/NZS 1596:2008 and will be located over 300m from the nearest bush fire prone vegetation.

A detailed hazard analysis and multi-level risk assessment for the proposed development has been undertaken in accordance with SEPP 33 Hazardous and Offensive Development and NSW Department of Planning Hazardous Industry Planning Advisory Papers (HIPAPs) as part of the original SSD application. The report included a range of mitigation measures to reduce the risk of fire to users of the site and surrounding development to an acceptable level. Additionally, the consequences of an ignition within bushland adjacent to the proposed MOD1 are reduced due to the storage of these hazardous materials well within the disturbance footprint and over 200m from bush fire prone vegetation. This setback will provide a defensible space and sufficient separation distance to prevent flame contact and limit radiant heat impact on vulnerable infrastructure.

The following table outlines the proposed performance solutions and compliance with the specific objectives for hazardous industry.

Objective	Solution
Must address the appropriate protection measures to be provided commensurate with the bush fire hazards and associated risks.	Implement the recommendations of the Multi-level Risk Assessment prepared for the proposed development in accordance with SEPP 33 Provision of APZs in excess of 200m.
Care should also be taken to ensure that such facilities do not impact on existing developments.	Provision of access, water, electricity and gas supply in accordance in accordance with sections 9.6 – 9.8 of this report.

9. Recommendations

The following recommendations are made for the bush fire measures for the proposed MOD1 for the Balranald Mineral Sands Project and are based upon the relevant provisions of the NSW Rural Fire Service Guideline entitled Planning for Bush Fire Protection 2019.

1. Asset Protection Zones

At the commencement of the development, and in perpetuity, the curtilage surrounding the accommodation facility shall be managed as an Inner Protection Area (IPA) Asset Protection Zone from the proposal for a minimum distance of 11m to the east and south, 10m to the west and to the disturbance boundary to the north, as outlined in PBP 2019 Appendix 4.

2. Access

The accommodation facility is to be provided with an access network in compliance with Section 5.3.2 of Planning for Bush Fire Protection.

3. Water Supply

A static water supply of at least 5, 000L per occupied donga is to be provided at the accommodation facility. A connection for firefighting purposes is to be located within the IPA or non-hazard side and away from the structure. Water supply is to comply with Table 5.3c of PBP 2019.

As outlined in the 2015 EIS the following additional measures are recommended.

- provision of dedicated fire water storage tank at the processing area and utilisation of existing dam
- water carts may be fitted with water cannons or other suitable mobile fire fighting equipment

4. Construction Standards

Accommodation facility buildings shall comply with the relevant BAL rating as outlined in AS3959-2018 'Construction of buildings in bush fire-prone areas', as varied by the applicable additional construction requirements of PBP section 7.5 (shown as Appendix 4 below).

5. Electricity Services

Overhead, electrical transmission lines are proposed as follows:

- i) lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and
- ii) 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

6. Gas Services

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.

7. Fences and gates

All fences and gates are constructed of either hardwood or non-combustible material, however, if located within 6m of the building, they are to be constructed from non-combustible material only.

8. Landscaping

Landscaping within the APZ is to comply with the NSW RFS 'Asset protection zone standards' (PBP Appendix 4)

9. Emergency and Evacuation Planning

A Bush Fire Emergency Management and Evacuation Plan should be prepared consistent with the:

- The NSW RFS document: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan;
- Australian Standard AS 3745:2010 Planning for emergencies in facilities; and

The Bush Fire Emergency Management and Evacuation Plan should include planning for the early relocation of occupants.

10. Bush Fire Management Plan

A bush fire management plan should be prepared to outline measure to minimise the risk of bushfire-related damage or ignition. This includes creation of a strategy for hazard reduction for areas that may regenerate.

10. Summary

This report consists of a bush fire assessment for the proposed MOD1 to the State Significant Development (SSD) consent for the Balranald Mineral Sands Project (SSD-5285).

The report concludes that the proposed modification is on designated bush fire prone land and the legislative requirements for development in bush fire prone areas are applicable.

This report has considered all the elements of bush fire attack and the development satisfies the aim, specific objectives, the intent and performance criteria of Chapter 8 of the NSW RFS document 'Planning for Bush Fire Protection', subject to implementation of the recommendations made by this report.

This report is a bush fire assessment that provides the required information to assist DPIE and the Rural Fire Service in determining compliance in accordance with Planning for Bush Fire Protection and AS3959-2018. DPIE is the consenting authority and MOD1 must comply with the recommendations included in the SSD conditions of consent.



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(a person who is recognised by the NSW Rural Fire Service as a suitably qualified consultant in bush fire risk assessment)

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11. References

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12. Legislation

Environmental Planning & Assessment Act 1979

Rural Fires Act 1997

Rural Fires Regulation 2013

Appendix 1 – Photos of Site and Surrounds

Source: EMM P/L 18/11/2021



Vegetation over 100m to the north of the accommodation facility



Grassland and access road to the east of the accommodation facility



Grassland to the south of the accommodation facility

Appendix 2 - Modifications of section 7.5 of PBP

7.5 Additional construction requirements

To ensure the performance criteria for construction standards given in section 7.4 can be met, PBP adopts additional measures over and above AS 3959 and NASH Standard as follows:

- construction measures for ember protection at BAL-12.5 and BAL-19 provided by AS 3959
- construction measures for development in BAL-FZ; and
- requirements over and above the performance criteria contained within AS 1530.8.1 and AS 1530.8.2 apply in regards to flaming.

7.5.1 Ember protection

Based on the findings from the 2009 Victorian Bush Fires Royal Commission, PBP aims to maintain the safety levels previously provided by AS 3959:1999 in relation to ember protection at lower Bush Fire Attack Levels.

In particular, the areas addressed are in relation to:

- sarking;
- subfloor screening;
- floors;
- verandas, decks, steps, ramps and landings;
- timber support posts and beams; and
- fascias and bargeboards.

7.5.2 NSW State Variations under G5.2(a) (i) and 3.10.5.0(c)(i) of the NCC

Certain provisions of AS 3959 are varied in NSW based on the findings of the Victorian Bush Fires Royal Commission and bush fire industry research.

The following variations to AS 3959 apply in NSW for the purposes of NSW G5.2(a)(i) of Volume One and NSW 3.10.5.0(c)(i) of Volume Two of the NCC;

- clause 3.10 of AS 3959 is deleted and any sarking used for BAL-12.5, BAL-19, BAL-29 or BAL-40 shall:
 - be non-combustible; or

- comply with AS/NZS 4200.1, be installed on the outside of the frame and have a flammability index of not more than 5 as determined by AS 1530.2; and
- clause 5.2 and 6.2 of AS 3959 is replaced by clause 7.2 of AS 3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL; and
- clause 5.7 and 6.7 of AS 3959 is replaced by clause 7.7 of AS 3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL; and
 - fascias and bargeboards, in BAL-40, shall comply with:
 - clause 8.4.1(b) of AS 3959; or
 - clause 8.6.6 of AS 3959.