



KHS ECOLOGY & BUSHFIRE

Bushfire Assessment Report

*for proposed ecotourism development at 51 Atkinson Street,
Morts Estate, Lithgow
Lot 152/-/DP659519*

Lithgow Local Government Area



November 2023


Prepared by: KHS Ecology & Bushfire Pty Ltd

Prepared for: Property Owner, Mr Ben Harris

C/- Consulting and Environmental Services

Document details

Project details and declaration

Development type:	Special Fire Protection Purpose (SFPP), Ecotourism
Property Address:	51 Atkinson Street, Morts Estate, Lot 152/-/DP659519
Owner/Proponent:	Mr Ben Harris, Experience OZ Pty Ltd
Plan reference:	Consulting and Environmental Services site plan Version 9, dated 9/03/2023
Assessment method:	Calculation of the <10kW/m ² envelope for the refuge building, based on a performance analysis Method 2 of <i>Planning for Bush Fire Protection</i> 2019 applied using the Bush Fire Attack Assessor (BFAA) model. Site assessment based on Appendix A of <i>Planning for Bush Fire Protection</i> 2019 for determining the residential APZ and BAL 12.5 10kW/m ² envelope for the residential building.
Report date:	11/11/2023, valid for 12 months
Declaration:	This assessment has been prepared an Accredited Bushfire Planning and Design' (BPAD) Practitioner who is recognised as suitably qualified consultant by the NSW Rural Fire Service.  Dr Kate Hammill Accredited Bushfire Consultant (BPAD 29655) M: 0407021472 E: KHSecologybushfire@bigpond.com NOTE: The Method 2 bushfire modelling has been prepared by Harris Environmental Consulting, BPAD Level 3 Consultant (refer to Appendix B).

Document tracking

Date	Report version	Comment
28/3/2023	V1	Report to C&ES and client for comment/review
11/11/2023	V2 Final	Updated with dwelling as BAL 12.5 and reissued for DA submission

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Table of Contents

Document details	2
Executive summary	5
Abbreviations	7
1 Introduction	8
1.1 Background	8
1.2 Information sources	9
1.3 Property identification and zoning	9
1.4 The proposed development	11
1.5 Planning context	11
1.6 Aim of this report	12
1.7 Methodology	12
1.8 Site inspection	13
1.9 Consultation	13
1.10 Consultant qualifications	13
2 Site description and proposed development	14
2.1 Previous land use	14
2.2 Vegetation types	14
2.3 Biodiversity values	16
3 Bushfire assessment	18
3.1 Landscape setting	18
3.2 Visitor type and numbers	18
3.3 Road access	18
3.4 Fire weather	19
3.5 Hazard vegetation and slope	19
3.6 BAL distances	22
Refuge building	23
Residential buildings	23
4 Bushfire protection measures	25
4.1 APZs, construction and landscaping	25
Intent of measures	25
APZs	26
Construction	26
Landscaping	26
4.2 Access	27

Intent of measures.....	27
Access design	27
4.3 Services	28
Intent of measures.....	28
Water supply.....	28
Electricity services.....	29
Gas services	29
4.4 Emergency management.....	29
Intent of measures.....	29
BMPs proposed.....	29
4.5 BMPs summary tables.....	30
5 References	35
6 Appendix A – Site plans and bushfire layout (CES and KHS Ecology & Bushfire).....	36
7 Appendix B – Method 2 site analysis (Harris Environmental)	38

Tables and Figures

Table 1-1: Summary of consultant qualifications.....	13
Table 3-1. Bushfire hazard vegetation.	20
Table 3-2. Site analysis of the <10kW/m ² vegetation setback required for the refuge (based on Method 2 assessment in Appendix B).	23
Table 3-3. Minimum vegetation separation distances for <29kW/m ² residential, based on PBP Table A1.12.3 (for FFDI 80).	23
Table 4-1. PBP Performance Criteria, Acceptable Solutions and the design measures proposed for the development (as per PBP Tables 6a-d, Variations for Ecotourism).....	31
Figure 1-1. Property location. (Source: NSW Planning Portal, accessed 31/1/2023)	8
Figure 1-2. Land zoning (Source: Planning Portal, accessed 31/1/2023)	9
Figure 1-3. Bush Fire Prone Land mapping (Source: Planning Portal, accessed 31/1/2023).....	10
Figure 1-4. Flood Planning Area (Source: Planning Portal, accessed 31/1/2023)	10
Figure 1-5. Terrestrial Biodiversity (Source: Planning Portal, accessed 31/1/2023)	10
Figure 2-1. Biodiversity Values Map (Planning Portal, 31/1/2023) with the development area shown in orange outline.....	16
Figure 3-1. Bushfire site analysis with <10kW/m ² and <29kW/m ² envelopes and proposed building locations.	24
Figure 4-1. Schematic illustration of the APZ, including IPA and OPA (PBP 2019, Appendix 4).....	27
Figure 4-2. Multipoint vehicle turning options as per PBP 2019, one of these configurations must be provided at each turning area.....	28
Figure 4-3. Option for fire-fighting water supply configuration within a domestic supply tank.	29

Executive summary

This Bushfire Assessment Report has been prepared in support of an eco-tourist (also referred to as 'ecotourism') facility being proposed by Experience OZ Pty Ltd at 51 Atkinson Street, Morts Estate. The proposal will provide an accommodation venue for visitors to Lithgow, as well a private residence.

The property is identified as Lot 152/-/DP659519. The property is situated at the edge of existing residential development in Morts Estate, adjacent to the State Mine Gully Road which provides access onto the Newnes Plateau.

The development will comprise the following components and features.

- The installation of twelve (49 sqm) prefabricated manufactured cabins for either a two- or one-bedroom occupancy. All cabin buildings to be built to BAL 12.5 bushfire construction.
- A site manager's cabin (two-person capacity).
- A four-bedroom private family residence with a garage for the owner / site manager.
- A check-in building for receiving of guests upon arrival.
- A community building with laundry, shared bathroom and kitchen facilities. The community building is also designed to be the bushfire refuge in case of an emergency situation, located with <10kW/m² exposure and built to BAL 12.5 bushfire construction.
- Construction of infrastructure for driveways, carparking, water supply (combined reticulated supply and tank supply), sewer and connections, and electrical services to the cabins, dwelling and other buildings.
- Site layout and vegetation management zones to achieve the objectives for an eco-tourist facility in relation to protection of the natural environmental values and to provide a nature-based experience for visitors. Vegetation management and habitat restoration will occur along the creek corridor and adjoining open areas of the site.

A key provision for ecotourism is that the facility provides a suitable refuge for the residents, which in this case is proposed to be the community building in the centre of the site that will have a maximum exposure of 10kW/m² and be constructed to BAL-12.5 with vehicular access. The bushfire site analysis has identified the <10kW/m² envelope on the site, which is suitable for locating the refuge for the ecotourism facility. The cabins are not required to be built to bushfire standard, however will be built to BAL 12.5 standard for additional safety. All cabins will be located within 100m walking distance of the refuge building, as per the ecotourism requirement. Refer to the site plan and emergency access plan in **Appendix A**.

The construction of the private residence is proposed to be to BAL 12.5, as per section 3 (General) and section 4 (BAL 12.5) of Australian Standard AS3959 (2018) *Construction of buildings in bushfire-prone areas*. This is applicable to the position of the proposed dwelling relative to the property boundary and hazard vegetation which provides greater than the BAL 12.5 hazard set-back distances, as detailed in this report.

A summary of the BPMs proposed for the development ecotourism and residential components is provided in **Table 4-1** in this report. Further documentation to be prepared in conjunction with this report, includes:

- a 'bushfire management plan' to set out the site BMPs for the development, informed by this assessment and any conditions imposed by the consent authorities;
- a 'Bush Fire Emergency Management and Evacuation Plan' will also be prepared separately to address suitable emergency and evacuation arrangements for occupants of the facility.

Based on this assessment, it is concluded that the proposed ecotourism facility appears suitable for the lot size and location. The proposal is not remote or isolated and provides good access to safer residential areas

in the township of Lithgow. The suite of BMPs proposed in this assessment, if implemented, will provide adequate bushfire safety for visitors to the site, in accordance with RFS guidelines. Approval of the proposed development is recommended.

IMPORTANT NOTE: The final decisions relating to development approval and any conditions associated with approval are the jurisdiction of Lithgow City Council and the NSW Rural Fire Service. The consent authorities may differ in their findings or conclusions and/or may impose different requirements than those outlined in this report.

This assessment applies the NSW Government's standard methods and requirements set out in Planning for Bush Fire Protection 2019, as far as relevant to the site and type of development. The bushfire protection measures outlined in this report do not guarantee that the proposed buildings and/or occupants on the site would be unimpacted by bushfire under all circumstances.

Signed:



11/11/2023

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Abbreviations

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018, Construction of Buildings in Bushfire Prone Areas
BAL	Bushfire Attack Level
BC Act	Biodiversity Conservation Act 2016
BFSA	Bush Fire Safety Authority
BFAA	Bush Fire Attack Assessor software model based on Method 2 of PBP 2019
BPAD	Bushfire Planning and Design (Accreditation Scheme)
BPM	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
CEEC	Critically Endangered Ecological Community
DA	Development Application
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	(Federal) Environmental Protection and Biodiversity Conservation Act 1999
FDI	Fire Danger Index
FPAA	Fire Protection Association of Australia
IPA	Inner Protection Area
kW/m ²	Kilowatts per metre square
NCC	National Construction Code
PBP	Planning for Bush Fire Protection 2019
PCT	Plant Community Type (the NSW standard vegetation community-level classification)
RF Act	Rural Fires Act 1997
RFS	NSW Rural Fire Service
SFPP	Special Fire Protection Purpose
SWS	Static Water Supply
TEC	Threatened Ecological Community (as listed under the Biodiversity Conservation Act 2016)
VMP	Vegetation Management Plan

1 Introduction

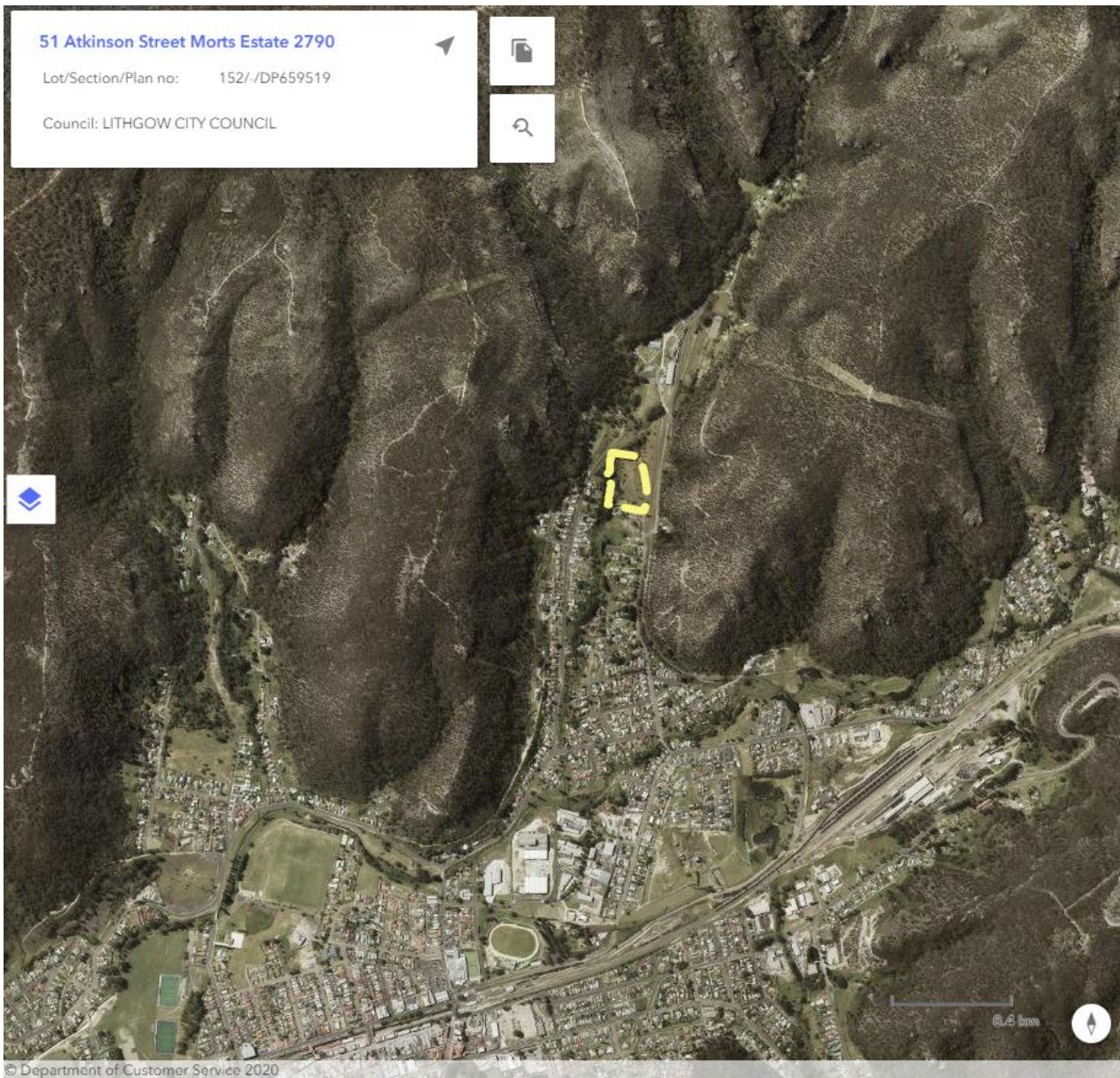
1.1 Background

KHS Ecology & Bushfire Pty Ltd was engaged in February 2022 by the owner of 51 Atkinson Street, Morts Estate Lithgow, Mr Ben Harris, to prepare a Bushfire Assessment Report in relation to the proposed ecotourism development at the property. The property is identified as Lot 152/-/DP659519.

The property is situated at the edge of existing residential development in Morts Estate, adjacent to the State Mine Gully Road which provides access onto the Newnes Plateau (**Figure 1-1**).

The development plans have been prepared by Consulting and Environmental Services on behalf of the owner and Experience OZ Pty Ltd (refer to plans in **Appendix A**). This report sets out the bushfire protection measures proposed for the development to address the requirements of *Planning for Bush Fire Protection* 2019 for a mixed ecotourism and private residential development at the site.

Figure 1-1. Property location. (Source: NSW Planning Portal, accessed 31/1/2023)



1.2 Information sources

The following information and data sources were used to inform this assessment.

- Site assessments undertaken on 21/02/2022, 21/3/2022 and 13/2/2023 by Dr Kate Hammill of KHS Ecology & Bushfire Pty Ltd.
- Site plan and bushfire layout (dated 23/10/2023 and 30/10/2023) prepared by Consulting & Environmental Services in conjunction with earlier versions of this bushfire assessment and the Vegetation Management Plan prepared by KHS Ecology & Bushfire Pty Ltd (refer to **Appendix A**).
- *Planning for Bush Fire Protection 2019* (RFS 2019) (accessible online at www.rfs.nsw.gov.au).
- *Lithgow Local Environment Plan* (LEP) 2014. (<https://legislation.nsw.gov.au/view/html/inforce/current/epi-2014-0824>).
- NSW Government Planning Portal (<https://www.planningportal.nsw.gov.au/>) and spatial data including cadastre layers obtained from SIXMaps (www.maps.six.nsw.gov.au).
- Keith (2004) *Ocean Shores to Desert Dunes – The Vegetation of New South Wales and the ACT*, Department of Environment and Conservation (NSW) July 2004.

1.3 Property identification and zoning

The property identification and relevant zoning under the Lithgow LEP 2015 as identified on the Planning Portal is summarised below.

- Council: LITHGOW CITY COUNCIL
- Address: 51 ATKINSON STREET MORTS ESTATE 2790
- Lot/Section/Plan no: 152/-/DP659519
- Land zoning: C3 – Environmental Management (**Figure 1-2**)
- Bushfire Prone Land – Buffer (**Figure 1-3**)
- Minimum lot size: 40 ha
- Flood Planning Area – along the riparian corridor (**Figure 1-4**)
- LEP Terrestrial Biodiversity – not mapped (**Figure 1-5**)

Figure 1-2. Land zoning (Source: Planning Portal, accessed 31/1/2023)



Figure 1-3. Bush Fire Prone Land mapping (Source: Planning Portal, accessed 31/1/2023)

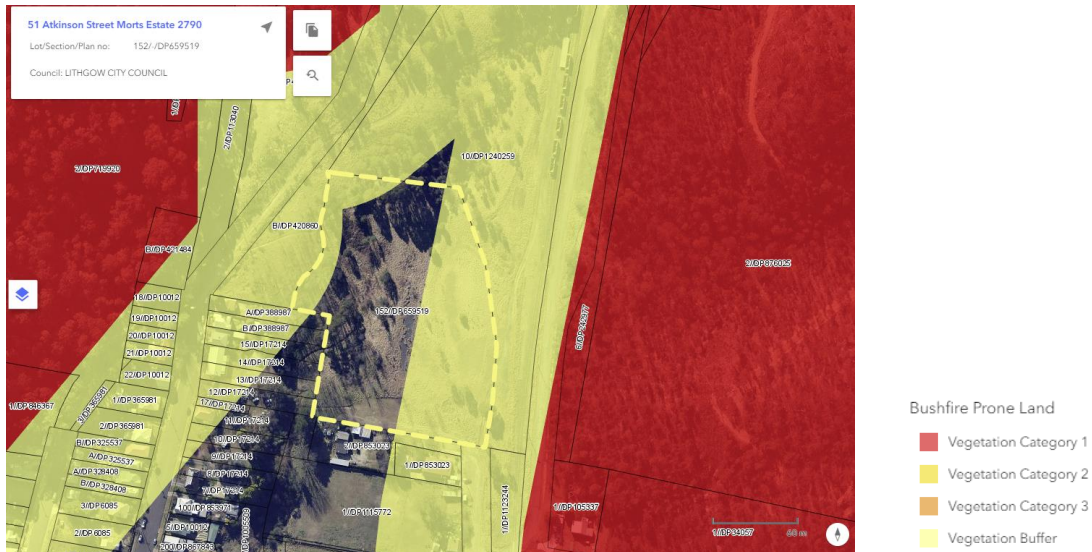


Figure 1-4. Flood Planning Area (Source: Planning Portal, accessed 31/1/2023)

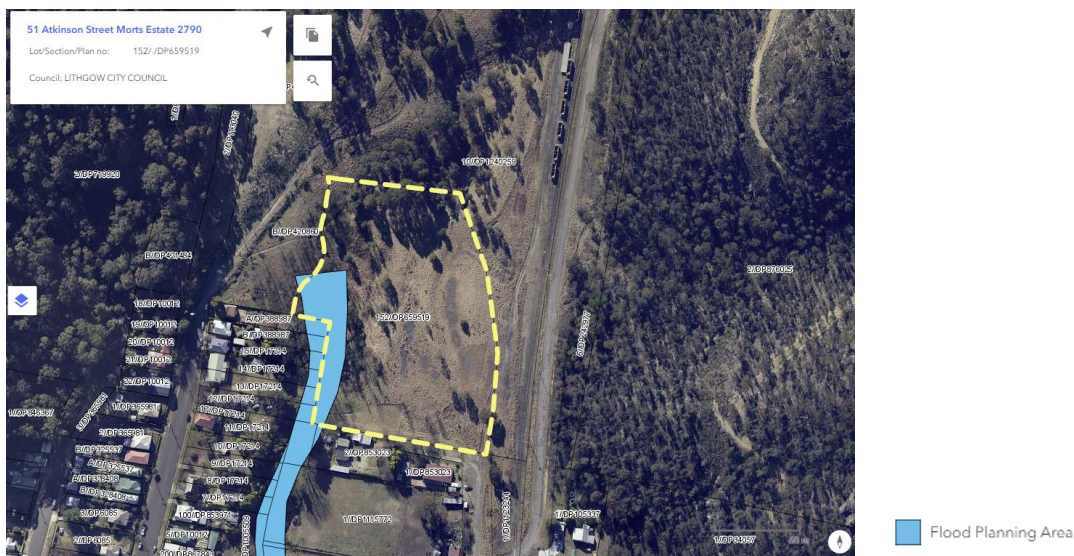
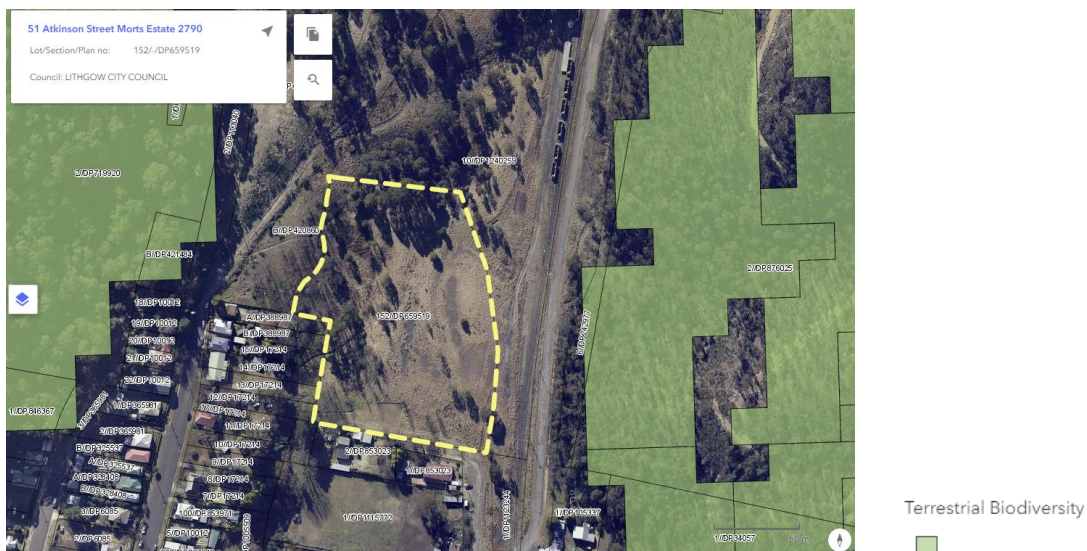


Figure 1-5. Terrestrial Biodiversity (Source: Planning Portal, accessed 31/1/2023)



1.4 The proposed development

The development application proposes an eco-tourist facility (also referred to as ‘ecotourism’) to provide an accommodation venue for visitors to Lithgow, including a private residence. The development is situated in the State Mine Gully and overlooks State Mine Gully creek and the surrounding escarpment.

The detailed proposal documentation has been collated by Consulting & Environmental Services. Relevant site plans are included at **Appendix A** of this report.

The development will comprise the following components and features.

- The installation of twelve (49 sqm) prefabricated manufactured cabins for either a two- or one-bedroom occupancy.
- A site manager’s cabin (two-person capacity).
- All cabin buildings are lightweight pre-constructed cabins. Roofs will be used for rainwater catchments, with energy efficiency supplemented with solar energy collection for hot water.
- A four-bedroom family residence with a garage for the owner / site manager.
- A check-in building for receiving of guests upon arrival.
- A community building with laundry, shared bathroom and kitchen facilities. The community building is designed for the purposes of a bushfire refuge and in case of an emergency situation.
- Construction of infrastructure for driveways, carparking, water supply (combined reticulated supply and tank supply), sewer and connections, and electrical services to the cabins, dwelling and other buildings.
- Site layout and vegetation management zones to achieve the objectives for an eco-tourist facility in relation to protection of the natural environmental values and to provide a nature-based experience for visitors. Vegetation management and habitat restoration will occur along the creek corridor and adjoining open areas of the site.

1.5 Planning context

The development is proposed as an Eco-tourist (or ‘ecotourism’) facility. There are particular objectives for this type of development as set out in the Local Government legislation and LEP. The objectives for Eco-tourist facilities are provided in clause 5.13 of the Lithgow LEP, as follows—

(a) to maintain the environmental and cultural values of land on which development for the purposes of eco-tourist facilities is carried out,

(b) to provide for sensitively designed and managed eco-tourist facilities that have minimal impact on the environment both on and off-site.

These objectives are being addressed by the overall site plan and approach to providing accommodation in a natural setting, habitat restoration along the State Mine Creek corridor, and other land restoration/remediation approaches. Refer to other relevant technical documentation prepared for the development application.

The property is zoned C3 – Environmental Management (**Figure 1-2**) and as such will need to address the objectives of the zoning. The LEP objectives for C3 land are below These objectives have been addressed in the Vegetation Management Plan and other relevant documentation accompanying the development application.

- To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.
- To provide for a limited range of development that does not have an adverse effect on those values.

- To facilitate the management of environmentally sensitive lands and riparian areas.
- To protect and conserve the vegetation and escarpment landscape surrounding Lithgow.
- To maintain or improve the water quality of receiving water catchments.

The property is mapped as bush fire prone land (refer to **Figure 1-3**). Section 4.14 of the *Environmental Planning and Assessment Act 1979* requires developments on bush fire prone land to satisfy the NSW Rural Fire Service (RFS) document, *Planning for Bush Fire Protection 2019* (PBP). The proposal is a type of SFPP development, 'ecotourism', and is required to address the provisions of PBP, Chapter 6 *Special Fire Protection Purpose developments*. The specific objectives for SFPP developments, as stated in section 6.2 of PBP, are to:

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

The NSW Rural Fire Service will review the proposal and provide Council with recommended for bushfire protection measures, as informed by the assessment presented in this report.

1.6 Aim of this report

This report provides the required bushfire assessment report for the proposed development due to the site being located on bush fire prone land. The report is intended to inform the review of the development application by Lithgow City Council and the NSW Rural Fire Service, who are the consent authorities for the proposal.

The BMPs described in this report aim to achieve the intent of measures and performance criteria set out in PBP Chapter 6, *Special Fire Protection Purpose developments*, Tables 6.8a -d, as relevant to an 'ecotourism' type of development. There is also a residential component to the proposal, with a private dwelling being proposed for the property owner. The BMPs for the residential component have been formulated to address PBP Chapter 7, *Residential Infill Development*.

1.7 Methodology

The bushfire site analysis has been undertaken according to PBP Appendix 1 *Site Assessment Methodology*. The analysis is informed by a combination of site observations and desktop mapping utilising satellite imagery and relevant spatial data layers. The analysis comprises two components.

- (a) Identification of the available $<10\text{kW/m}^2$ envelope on the site for a suitable location for the 'refuge' building for ecotourism. This has been determined using the Bushfire Attack Assessor Program licensed by Newcastle Bushfire Consulting (NBC 2020). The analysis has been applied iteratively in the Bushfire Attack Assessor Program to determine the vegetation separation distances required to achieve a radiant heat emission of $<10\text{kW/m}^2$, based on the hazard vegetation on each aspect surrounding the site. The details of the Method 2 bushfire calculations are included in **Appendix A**.
- (b) Assessment of the Bushfire Attack Level (BAL) for the proposed Managers Residence to achieve $<29\text{kW/m}^2$, appropriate for residential infill development, based on the hazard vegetation on each

aspect surrounding the site. This assessment is based on the distances in PBP Table A1.12.3 used to determine APZ for residential development and based on FFDI 80 relevant to Lithgow.

1.8 Site inspection

Site inspections were undertaken by the bushfire consultant on three occasions during 2022 and on 21/02/2022, 21/3/2022 and 13/2/2023 to assess the site features, hazard vegetation and slope relevant to the bushfire assessment.

1.9 Consultation

Consultation during the preparation of this report has been undertaken with Dr Jane Aiken of Consulting and Environmental Services and the property owner, Mr Ben Harris. This has included discussion of the ecotourism objectives of the project, site layout and design, bushfire protection measures and environmental considerations. Consultation with Katherine Harris of Harris Environmental was undertaken in relation to the AS3959 Method 2 analysis and use of the Bushfire Attack Assessor Program (NBC 2020) (refer to **Appendix B**).

1.10 Consultant qualifications

This report has been prepared by Dr Kate Hammill of KHS Ecology & Bushfire Pty Ltd in conjunction with a Method 2 bushfire analysis completed by Katherine Harris of Harris Environmental. Consultant qualifications are summarised in **Table 1-1**.

Table 1-1: Summary of consultant qualifications

Consultant	Qualifications / experience
Dr Kate Hammill, KHS Ecology & Bushfire – report author	Bushfire Planning and Design (BPAD) NSW Level 2 Consultant (BPAD 29655) Biodiversity Assessment Methodology (BAM) accredited assessor (BAAS18022). Practicing member of the NSW Ecological Consultants Association (NSW ECA). 18 years ecological research and consulting experience, in the Greater Blue Mountain, Central Tablelands, Central West, Far West, North West Slopes and Sydney regions NSW. PhD native vegetation restoration (University of Sydney). Bachelor of Science majoring in Botany / Zoology / Microbiology (University of Sydney). Graduate Diploma in Bushfire Protection (University of Western Sydney).
Katherine Harris, Harris Environmental Consulting – Method 2 analysis	Bushfire Planning and Design (BPAD) NSW Level 3 Consultant (BPAD 26927) GRAD DIP BUSH FIRE PROTECTION, UWS GRAD DIP ENVIRO MANG HERTS, UK, GRAD DIP NAT RES UNE, BSC APP SC, AGRICULTURE HAC

2 Site description and proposed development

2.1 Previous land use

A review of land use undertaken by Consulting & Environmental Services has identified the previously use of the land on Lot 152 was for the purposes of the State Coal Mine, which ceased workings in June 1964. The current land use on and surrounding the subject lot is summarised as follows.

- The site at 51 Atkinson Street (Lot 152) is an allotment formerly part of the State Coal Mine, now private land. The lot has landfill of coal mine rejects which will underly and be surface-rehabilitated by the proposed development.
- Land to the north adjoining Lot 152 is Lot 10 and this is land remaining as part of the State Mine Heritage Park.
- Land to the south is residential, with access to the subject lot from Atkinson Street (a public road) via the south boundary.
- Land to the west includes the State Mine Creek and to the west of the creek is Macauley Steet with residential homes, and the spoil dumps draining into the State Mine Creek.
- Land to the east is Lot 10 and contains the railway transport corridor that serviced the State Mine and is now part of the State Mine Heritage Park.

2.2 Vegetation types

The vegetation at the property has been described in the Vegetation Management Plan. Different areas of the property support different types of vegetation, as described below. The vegetation along the creek corridor is currently regenerating from the 2019/2020 bushfire, as evidenced by the presence of tree saplings and resprouting/regrowth on mature trees.

Eastern portion of the site: The construction area for the proposed development is situated on coal spoil fill (refer to Consulting & Environmental Services report/s). The vegetation here consists of non-native grasses dominated by *Eragrostis curvula* (African Lovegrass) and other weeds including *Conyza bonariensis* (Flaxleaf Fleabane), *Rubus anglocandicans* (Blackberry), *Cytisus scoparius subsp. scoparius* (English Broom), *Verbena* spp. (Purple Top). Due to their being no natural soil profile and the vegetation comprising non-native species, the vegetation in this area does not warrant being classified as a native vegetation PCT. Refer to photographs below.



State Mine Creek corridor: The immediate creek corridor supports remnant trees of the community type ‘Western Blue Mountains Sheltered Shale Forest’ (PCT 3227) along with various exotic trees and weeds including blackberry and privet (currently being controlled by the land owner). PCT 3227 is classified within the Wet Sclerophyll Forests (Shrubby sub-formation) and Southern Escarpment Wet Sclerophyll Forests of Keith (2004). This community is present as stands of eucalypts along the creek backs comprising the following species:

- *Eucalyptus cypellocarpa* (Mountain Gum),
- *Eucalyptus radiata* (Narrow-leaved Peppermint),
- *Eucalyptus viminalis* (Ribbon Gum),
- *Acacia* species.

There is very native understorey present due to the coal spoil fill and dominance of weeds. Some species or native groundcover are present, including *Pteridium esculentum* (Bracken), *Austrostipa pubescens* (Tall Speargrass), *Coronidium scorpioides* (Button Everlasting) and *Microlaena stipoides* (Weeping Grass). Refer to photographs below.



Neighbouring land to the north: On the State Mine Heritage Park land (Lot 10) there is forest along the creek corridor and adjoining grassland and sparse trees between the creek and the railway line / State Mine Gully Road.

Neighbouring land to the east: East of State Mine Gully Road is crown land with steep slopes of intact forest of the community type 'Western Blue Mountains Sheltered Shale Forest' (PCT 3227). This area is connected to the larger expanse of bushfire hazard vegetation of the Newnes Plateau.

Neighbouring land to the west: West of State Mine Creek is private property. This area comprises non-native vegetation consisting of dense thicket of deciduous trees (*Robinia* spp.) and gardens associated with the adjoining residential areas.

Neighbouring land to the south: This area has existing residential development with houses, ornamental/deciduous trees and managed gardens, which is considered to be non-hazard for the bushfire assessment.

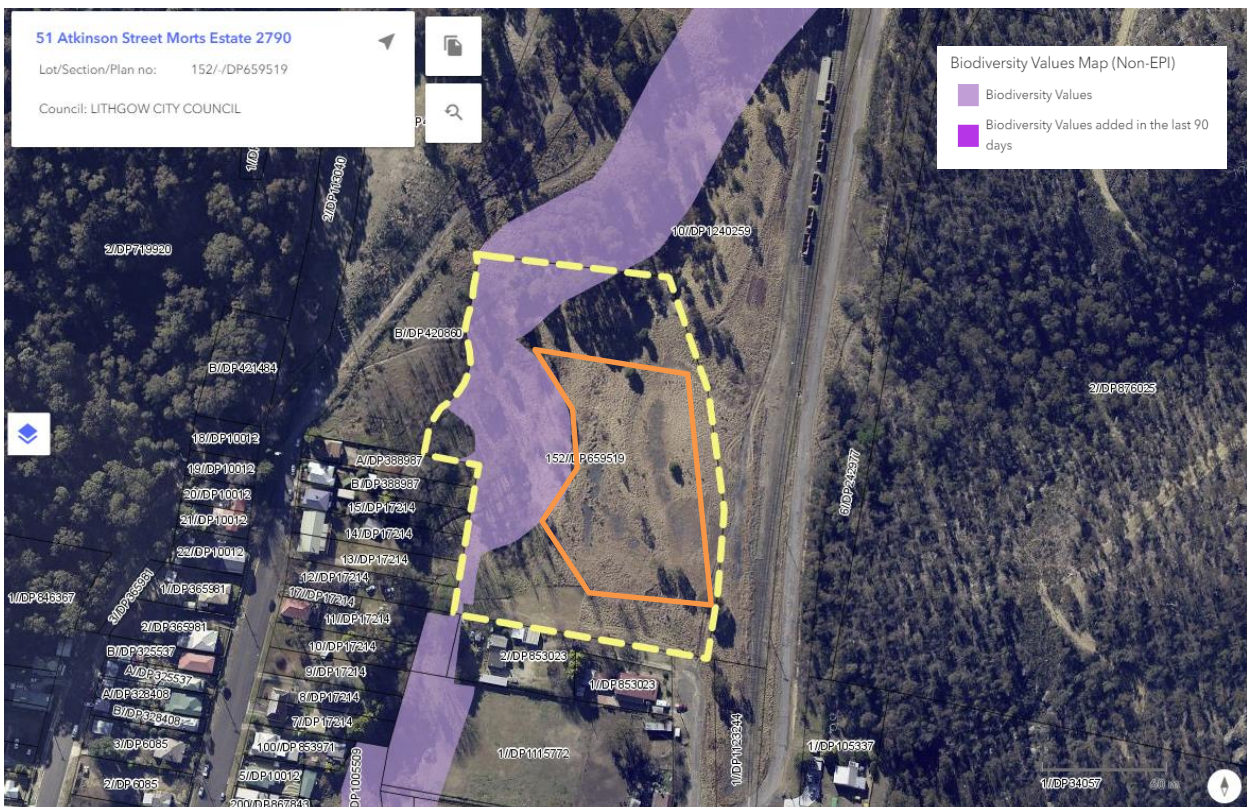
2.3 Biodiversity values

The State Mine Creek corridor provides habitat and connectivity for local native wildlife, including birds, wombats and macropods. The creek provides aquatic habitat and water supply for native wildlife. Locally, there are records for the following threatened fauna: Koala, Powerful Owl, Gang Gang Cockatoo, Greater Glider. These species preferred habitat is tall gully forests and hence may utilise forest along the State Mine Creek corridor on the property, at least from time to time, although the preferred habitat areas would be further upstream away from urban development.

The State Mine Creek corridor is included on the Biodiversity Values Map (**Figure 2-1**). Parts of the BV map land is highly disturbed with coal fill, exotic trees, blackberry and privet, but there are also the stands of native forest trees of *Eucalyptus cypellocarpa* and *Eucalyptus radiata*. It is intended that the vegetation along the creek corridor will be managed for weed control and restoration as habitat for wildlife.

It is important to note that the vegetation management along the creek corridor will need to maintain low fuel loads for mitigating bushfire risk to the site.

Figure 2-1. Biodiversity Values Map (Planning Portal, 31/1/2023) with the development area shown in orange outline.



3 Bushfire assessment

3.1 Landscape setting

Key features of the site relevant to the bushfire assessment include the following. These features have been considered and input into the radiant heat calculations.

- The site is situated in the valley with surrounding slopes rising to the Newnes Plateau. The site is adjacent to the State Mine Gully Creek, which flows to the south to Farmers Creek.
- Vegetation is predominantly non-native trees and weed grasses, mixed with small patches of remnant and regenerating eucalypts. The fragmented nature of the vegetation in the valley, on the north side of the development site, on the State Mine Heritage Park land makes relevant the considerations of PBP section A1.11 *Assessing remnant bushland and narrow vegetation corridors*.
- There are dense stands of exotic trees (privet and *Robinia*) along the creek corridor, high density of cover (>70%). These areas occur on the south and west sides of the development site. This vegetation is considered equivalent to Rainforest, based on the guidance in PBP section A1.9 *Exotic vegetation*.
- Prior land use and disturbance (including coal spoil fill area) limits the potential for regeneration of native forest to the immediate creek corridor only.

3.2 Visitor type and numbers

The proposed development is categorised as 'ecotourism'. Bushfire protection measures need to provide for the safety of visitors staying at the site, including tourists and families who will be unfamiliar with the location and bushfire risk. For ecotourism, a suitable refuge on site is required to provide an emergency shelter option for all visitors on site in the event of a bushfire, if relocation is not possible or safe. The proposed development includes 9 two-bedroom units (each four person capacity) and 9 singles units (each one person capacity), providing visitor accommodation for a total of 45 persons. This is the number of people that would need to fit within a designated shelter building.

Note that the site manager's unit (two person capacity) and the owner's /manager's residence (five person capacity) are private residential buildings and do not require use of the refuge building.

3.3 Road access

The site is accessed from Atkinson Street, which is a public no-through road in this location. Atkinson Street directly connects with State Mine Gully Road, which provides access from Lithgow centre and Morts Estate with the State Mine Gully and Newnes Plateau.

The proposed development site at 51 Atkinson Street is situated approximately 820m from the main through-road providing access to the centre of Lithgow to the southwest. This route passes through the residential non-hazard areas along Atkinson Street.

The development is therefore not remote nor is the access through hazard vegetation and can be readily accessed either by car, bus or on foot from safer built-up areas away from the bushfire hazard.

3.4 Fire weather

The relevant Forest Fire Danger Index (FFDI) for Lithgow LGA is FFDI 80. This FFDI level has been applied in the NBC Bushfire Attack Assessor Program for the calculation of the <10kW/m² envelope on the site and to determine suitable APZ distances for residential development (as per PBP Table A1.12.3).

3.5 Hazard vegetation and slope



The hazard vegetation has been assessed out to 140 m in accordance with PBP Appendix 1 *Site Assessment Methodology*.


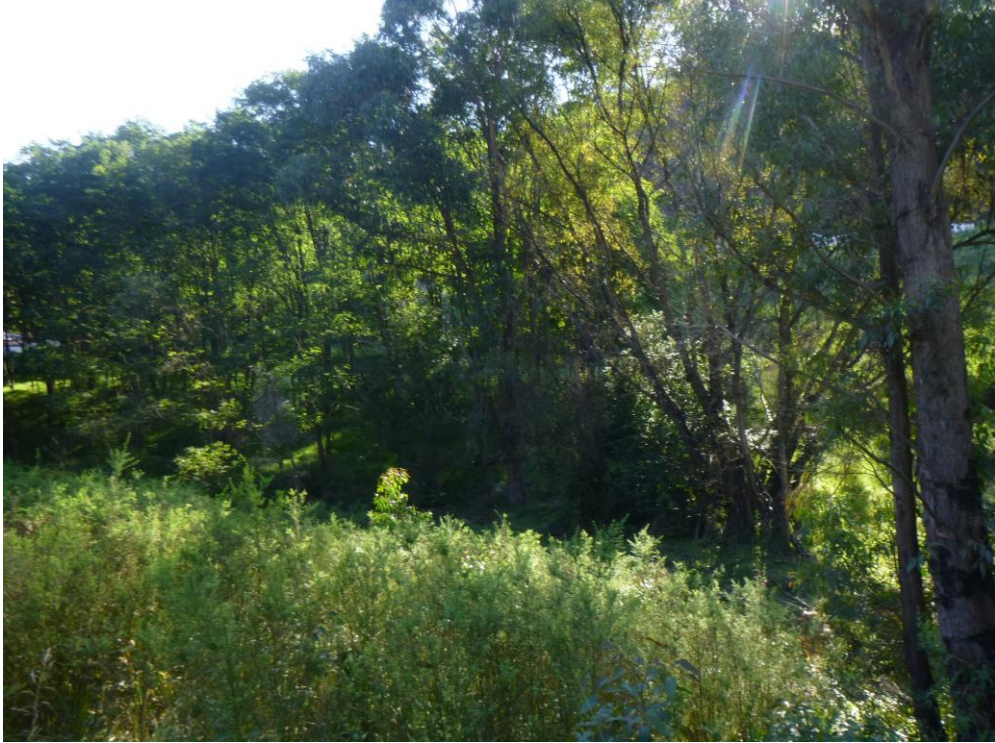
The hazard vegetation and slope affecting the site is described below.



- NORTH: Grassland within the property, then patches of eucalypt trees with grassy understorey along the riparian corridor of State Mine Creek. The hazard vegetation on this side is assessed as Rainforest (equivalent). The slope relative to the development site is initially downslope then upslope further north.
- EAST: Grassland within the property, then non-hazard on the railway/road corridor, then Forest on the upslope land to the east of State Mine Gully Road. The slope relative to the development site is flat/upslope.
- SOUTH: Grassland within the property, then residential development with gardens and deciduous trees.
- WEST: Grassland with native and non-native scattered individual trees and patches of trees of *Casuarina glauca* (River Oak - planted), *Eucalyptus cypellocarpa* (Monkey Gum), *Betula pendula* (Silver Birch) and *Robinia* spp. (Black/Honey Locust) along the creek and adjoining slopes. This is considered to be low threat vegetation due to the trees being mixed native and non-native/deciduous and the eucalypts being present in a narrow strip of less than 20 width along the creek corridor.

Photographs and descriptions of the hazard affecting the site are included in **Table 3-1**.

Table 3-1. Bushfire hazard vegetation.

Hazard and direction	
<p>NORTH: Remnant trees (Rainforest equivalent), downslope 11deg for 20m to the creek (foreground), then upslope (background in this view)</p> <p><i>Note: The property boundary is indicated by the yellow dashed line. Coal spoil fill occurs under the grassland areas and limits the growth of trees.</i></p>	
<p>EAST: Grassland flat to the road/rail corridor, then Forest upslope on the adjoining steep slopes on the east side of State Mine Gully Road.</p>	

Hazard and direction	
<p>NORTHWEST</p> <p>Remnant trees (Rainforest equivalent), downslope 11deg for 20m to the creek (foreground), then Forest upslope (far background in this view)</p>	
<p>WEST</p> <p>Exotic (deciduous) trees of <i>Robinia</i> sp., upslope on the west side of the creek</p> <p>Vegetation in the foreground will be managed to control woody weeds (Broome and blackberry)</p>	

Hazard and direction	
<p>SOUTHWEST: Predominantly exotic (deciduous) trees of <i>Robinia</i> sp., with occasional eucalypts, upslope on the west side of the creek Vegetation in the foreground will be managed to control woody weeds (Broome and blackberry)</p>	
<p>SOUTH: Managed grassland and non-hazard residential development</p>	

3.6 BAL distances

The site analysis of hazard vegetation and slope and hazard separation distances calculated for a $<10\text{kW/m}^2$ refuge envelope and a $<29\text{kW/m}^2$ residential envelope is shown at **Figure 3-1**. The two analyses (for the refuge and residential envelopes) are described below. The analysis includes the hazard setbacks required for BAL 12.5, which can be achieved for the residential dwelling in this case.

Refuge building

The vegetation separation distances required to achieve the $<10\text{kW/m}^2$ radiant heat exposure suitable for a refuge are as follows, as detailed in **Table 3-2** below and **Appendix B**.

- 32 m on the east
- 55 m on the north
- 33 m on the southwest
- 14 m on the west

Table 3-2. Site analysis of the $<10\text{kW/m}^2$ vegetation setback required for the refuge (based on Method 2 assessment in Appendix B).

Direction	Vegetation and slope	Distance to Vegetation	Assessed Radiant Heat Flux
EAST	Forest, Upslope 15 deg	38 m	9.61 kW/m ²
	Grassland, Upslope	32 m	9.91 kW/m ²
NORTH	Remnant Forest (Rainforest), Downslope 11 deg	55 m	9.29 kW/m ²
WEST	Exotic trees (Rainforest), Upslope	14 m	9.9 kW/m ²
	Forest, Upslope	81 m	2.92 kW/m ²

Residential buildings

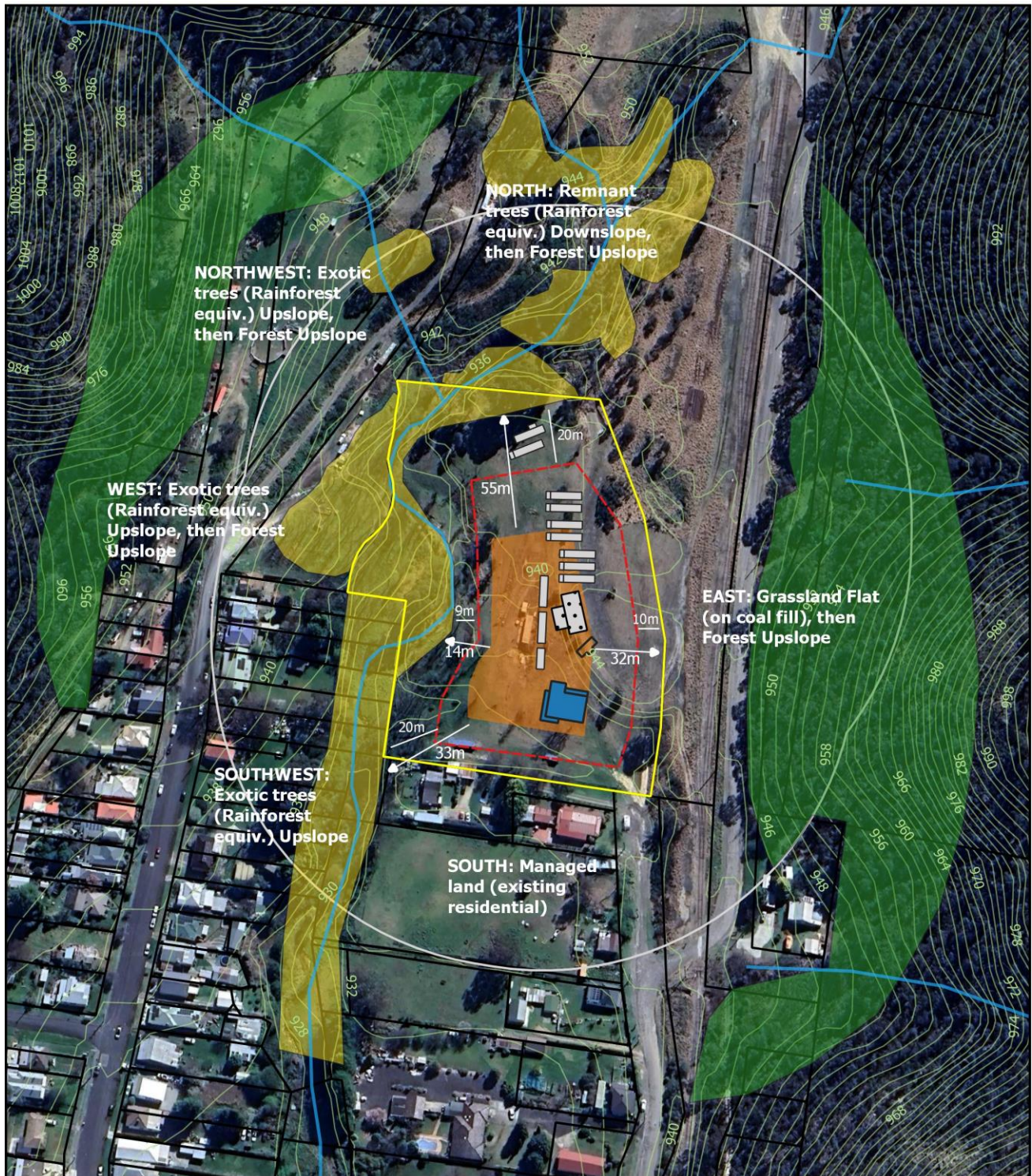
The vegetation separation distances required to achieve an APZ $<29\text{kW/m}^2$ suitable for a residential building, also for BAL 12.5, are detailed in **Table 3-3**.

Based on the site plan and position of the proposed dwelling (refer to **Appendix A**), the achieved set back from hazard vegetation achieves a BAL 12.5 rating for dwelling construction.

Table 3-3. Minimum vegetation separation distances for $<29\text{kW/m}^2$ residential, based on PBP Table A1.12.3 (for FFDI 80).

Direction	Vegetation and slope	Minimum APZ distance for $<29\text{kW/m}^2$ (from PBP Table A1.12.3 for FFDI 80)	Minimum distance for BAL 12.5 (from PBP Table A1.12.6 for FFDI 80)	Proposed setback to dwelling (refer to site plan Appendix A)
EAST	Forest Upslope	20 m	40 m	33 m
	Grassland Upslope	10 m	20 m	
NORTH	Remnant Forest (Rainforest) Downslope 11 deg	20 m	40 m	85 m
WEST	Exotic trees (Rainforest) Upslope	9 m	20 m	>35 m
	Forest Upslope	20 m	40 m	

Figure 3-1. Bushfire site analysis with <10kW/m² and <29kW/m² envelopes and proposed building locations.



SITE BUSHFIRE ANALYSIS - Proposed Ecotourism Facility
51 Atkinson Street, Morts Estate LITHGOW

- | | | |
|--------------------|------------------------------|----------------------------------|
| Property boundary | <10kWm ² envelope | Proposed Residential dwelling |
| 140m buffer | <29kWm ² envelope | Proposed Ecotourism Cabins |
| Mapped watercourse | Hazard vegetation | Proposed Community Bldg / REFUGE |
| | Forest | |
| | Rainforest (equiv.) | |

0 20 40 60 80 m
 GDA94 MGA Zone 56



Base map: Google Satellite Imagery
 Prepared by: KHS Ecology & Bushfire
 Version date: 10/11/2023
 This map is indicative only and not
 guaranteed to be free of errors or omissions.
 All distances must be verified on site.

4 Bushfire protection measures

The BPMs for SFPP development (as per Chapter 6 of PBP) include provisions for:

- APZ and landscaping;
- Building construction;
- Access;
- Water supply;
- Electricity services;
- Gas services;
- Emergency management.

The bushfire protection measures described in this report have been formulated for a subcategory of SFPP development, ecotourism. These include the provision of a building to serve as a refuge, appropriate access, water supply, services and recommendations for emergency management.

A 'Bush Fire Emergency Management and Evacuation Plan' will be prepared separately for the development.

As stated in PBP (section 6.3.1), the bushfire protection requirements for ecotourism are:

Ecotourism – Due to its focus on the natural environment and creating minimal impact, the principles of ecotourism and the establishment of APZs for bush fire mitigation are often in conflict. All relevant parties must accept that there is an increase for the potential for loss of structures due to the competing objectives to reduce the environmental footprints of these types of developments. The emphasis is therefore placed on emergency management, leaving early and non-operation on days of extreme or catastrophic fire weather.

At least one building must be provided on site that can be used as a refuge for the maximum number of occupants on site. The building must have a minimum 10kW/m² APZ, be constructed to BAL-12.5 and have vehicular access. Cabins must be within a 100m walking distance of the refuge building.

These requirements can be achieved by addressing the performance criteria in PBP section 6.8 for SFPP development, as relevant to ecotourism.

In particular, the refuge building must have a maximum exposure of 10kW/m² and be located within 100m of visitor accommodation. The refuge building must also be of a suitable size for the maximum number of tourists on the site, in this case 45 persons.

4.1 APZs, construction and landscaping

Intent of measures

For SFPP ecotourism, the intent of measures is 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 (PBP section 6.8.1).

For residential, the intent of measures is to provide APZs commensurate with the construction of the building and maintained to prevent the spread of a fire to the building, provide defensible space and access, services and landscaping to aid firefighting operations.

APZs

For SFPP ecotourism, the APZ distances required to achieve the $<10\text{kW/m}^2$ radiant heat exposure around the cabins which will be the identified refuge buildings (for a 45 person capacity in an emergency) are as follows.

- 32 m on the east
- 55 m on the north
- 33 m on the west

Based on the site plan and position of the proposed dwelling (refer to **Appendix A**), the achieved set back from hazard vegetation is as follows, which achieves a **BAL 12.5 rating for dwelling construction**.

- 33 m measured from the property boundary on the east side.
- 85 m measured from the property boundary on the north side.
- Between 35 m and 60 m on the west side, relative to exotic trees to the west (equivalent to Rainforest hazard) and forest to the northwest.

Construction

For SFPP ecotourism, the building/s intended to serve a bushfire refuge are to be built to a minimum BAL 12.5 standard, as per section 3 (General) and section 5 (BAL 12.5) of Australian Standard AS3959 (2018) *Construction of buildings in bushfire-prone areas*. The allocated refuge building will serve as a last resort option if it is not safe to leave the site. This needs to be clearly defined on the plans and in operation documents, including the Bushfire Fire Emergency Plan.

The other cabin accommodation does not need to be built to any bushfire standard (for ecotourism), although in this case each cabin will be constructed to BAL 12.5 standard (as advised by the property owner). This provides a degree of resilience of assets on the site, although the cabins should not be considered as providing refuge from bushfire, except any that are identified as being suitable for a refuge based on the site analysis in this report.

The construction of the private residence is proposed to be to BAL 12.5, as per section 3 (General) and section 4 (BAL 12.5) of Australian Standard AS3959 (2018) *Construction of buildings in bushfire-prone areas*. This is applicable to the position of the proposed dwelling relative to the property boundary and hazard vegetation, as detailed above.

Landscaping

Landscaping on bushfire development sites can, if designed and maintained appropriately, minimise bushfire risk to buildings and provide a defensible space for emergency services personnel to operate during a bushfire incident. A defensible space is an area well-separated from the bushfire hazard and near the fire-fighting water supply and ideally with options for shielding behind non-flammable structures, providing a relatively safe space for emergency services personnel to extinguish spot fires and burning embers. This activity is usually limited to periods before the fire arrives (when the site may be subject to ember attack ahead of the fire front) and after the passage of the fire front (when fire hotspots can lead to building ignition).

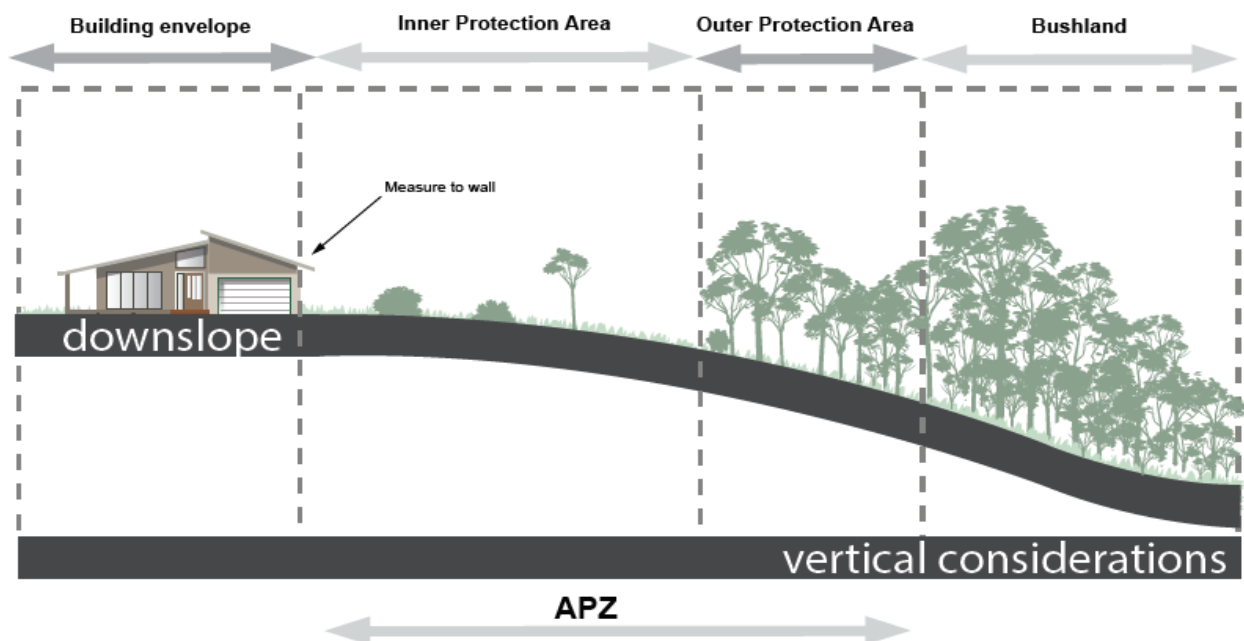
A schematic of the general appearance of the APZ is shown in **Figure 4-1** below.

Low-flammability plantings, gravel areas, stone walls, etc that are maintained to be free of fine fuels, will reduce the spread of fire to the building and should be incorporated into the landscaping for the development due to the bushland setting.

Guidelines and specifications for landscaping and vegetation management within the APZ are provided in PBP Appendix 4 and include the following principles.

- Trees to be maintained at a canopy cover of <15%, with a crown separation of at least 2 to 5 m between canopies. Trees and shrubs are to be maintained to have no over-hanging branches over the roof, and a non-continuous canopy.
- Understorey vegetation, if present, shrubs to be thinned and maintained as sparse or absent, or planted in clumps well separated from trees.
- Ground-layer vegetation maintained as low-cut grass or lawn by mowing or slashing.
- Leaf litter, sticks and fallen timber removed to avoid accumulation of flammable surface fuels.
- Paving or gravel used for landscaping in the immediate curtilage of buildings, to provide defensible space and avoid providing a path for fire spread to buildings.
- Ornamental grasses, grass-like plants and other fine fuels are not to be used for landscaping near the house, as these contribute to the bushfire fuels.
- Succulent plants and/or pebbles as mulch are non-flammable and are recommended for landscaped areas including near the dwelling. Woodchip mulch should be used only where necessary and to a very limited extent near the dwelling.

Figure 4-1. Schematic illustration of the APZ, including IPA and OPA (PBP 2019, Appendix 4).



4.2 Access

Intent of measures

For SFPP ecotourism, the intent is to provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area (refer to PBP section 6.8.2).

For residential, the intent is to provide access, services and landscaping to aid firefighting operations.

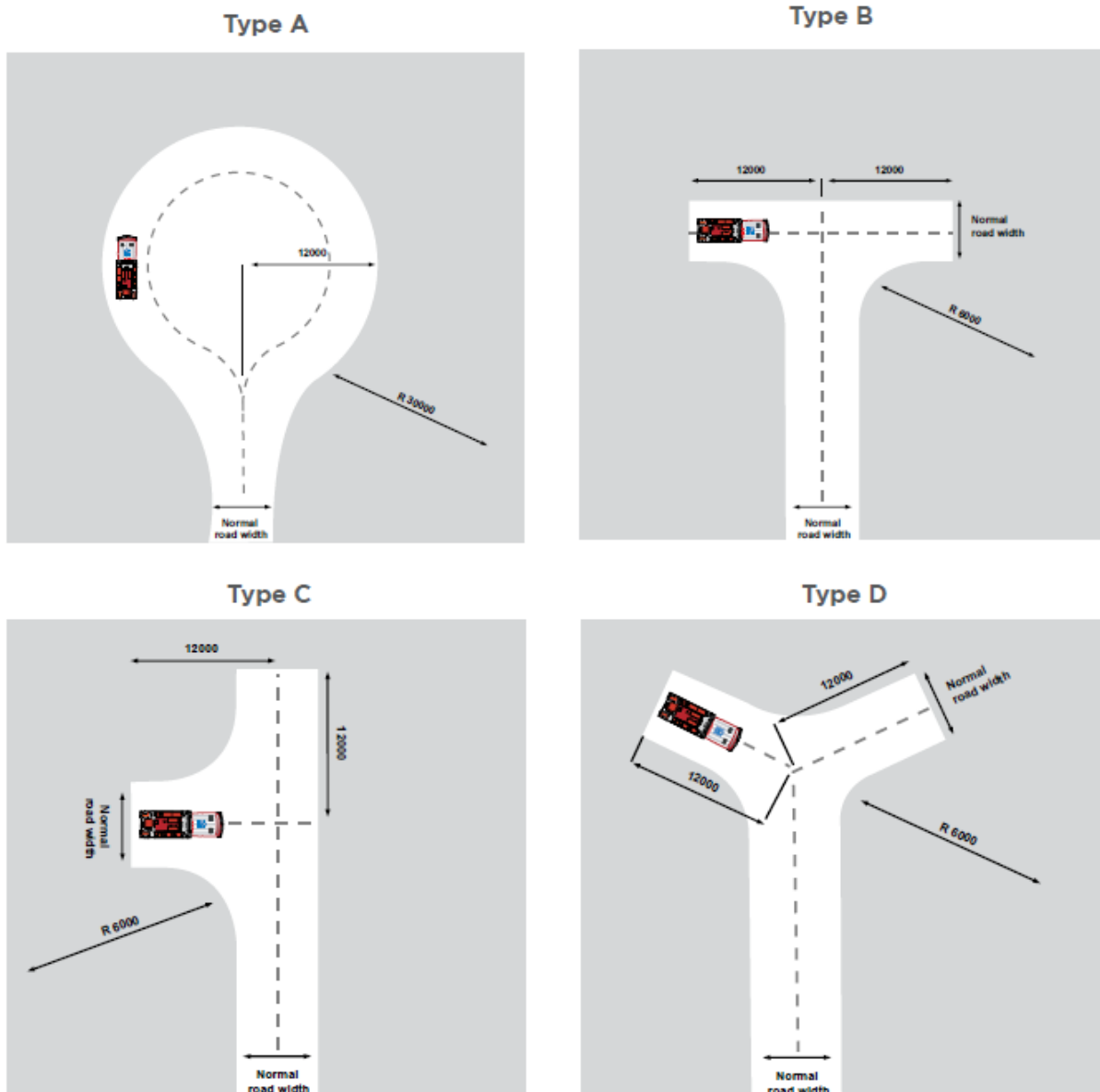
Access design

Vehicle access to the site is required to be all-weather surface and providing stand areas and turning space for both resident and emergency vehicles. There are no creek or watercourse crossings.

Internal site access will need to be upgraded to provide an all-weather gravel surface. A vehicle stand area and turning space will need to be provided near the refuge cabins and the fire-fighting water tanks. The

turning area needs to be consistent with one of the options in PBP Appendix 3 (**Figure 4-2**). Refer to site plan for layout of the access across the site.

Figure 4-2. Multipoint vehicle turning options as per PBP 2019, one of these configurations must be provided at each turning area.



4.3 Services

Intent of measures

For SFPP ecotourism, the intent is to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building (PBP section 6.8.3).

For residential, the intent is to provide access, services and landscaping to aid firefighting operations.

Water supply

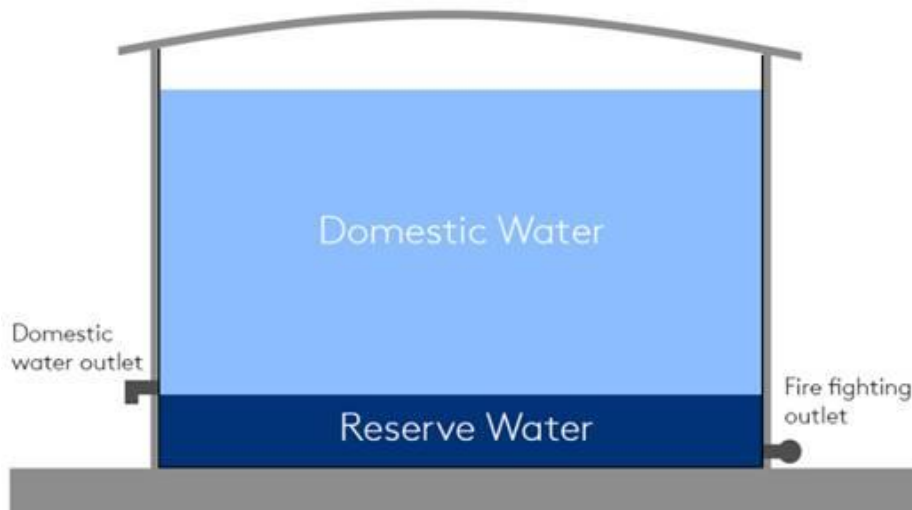
Mains water supply is provided to the site as follows:

- Fire hydrant is located at the southern end of the property, providing access to reticulated firefighting water supply

- A reticulated supply connection is also provided in the centre of the property, near the check in building.

Static water supply (SWS) tanks providing additional firefighting water supply will also be provided. The tank configuration required is shown in **Figure 4-3**, to ensure a reserve volume of 20000L for firefighting. The SWS tanks need to be either concrete or metal tank with a 65 mm metal Storz fitting and positioned near the vehicle stand areas suitable for access by bushfire and emergency vehicles and personnel.

Figure 4-3. Option for fire-fighting water supply configuration within a domestic supply tank.



Electricity services

Where possible, electricity supply should be provided via underground power lines from mains to all buildings and related infrastructure.

Vegetation around any aerial electricity supply lines must to be managed to limit the possibility of trees and branches falling on the power lines and thereby reduce ignition risk on the site.

Gas services

Gas cylinders, if proposed, must be installed to be clear of all flammable materials, separated to a distance of at least 10 m from, installed so as to be shielded from main hazard vegetation, and away from the most likely run of fire towards the building. All above-ground gas service pipes, connections and fittings are metal.

4.4 Emergency management

Intent of measures

To provide suitable emergency and evacuation arrangements for occupants of SFPP developments (PBP section 6.8.3).

BMPs proposed

A 'Bush Fire Emergency Management and Evacuation Plan' is required for SFPP ecotourism developments, to address planning and procedures for safety of occupants under different scenarios of bushfire threat. This required to be prepared following the RFS document: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan* (RFS 2014).

Emergency measures to be addressed in the Bush Fire Emergency Management and Evacuation Plan should include the following, at a minimum.

- Responsible personnel, in this case a site manager is proposed on site who would be responsible for monitoring weather conditions, bushfire incidents and activating emergency procedures, as per the plan.
- Bushfire threat monitoring procedures and responsibilities, including identification of triggers to implement different emergency procedures in relation to seasonal conditions, fire danger rating and predictions, current bushfire alerts, communications / notifications procedures with emergency services, and also considering the number of people on site at the time.
- Contingency options need to be carefully formulated to address safety of residents/visitors on site under different scenarios of bushfire threat. This would include site closure in certain extreme weather scenarios or if there are fires nearby, early relocation of residents if a bushfire occurs nearby, seeking refuge on site
- Identification of the refuge building/s that provide shelter for the occupants as a fire approaches and passes through the site, if early.
- Landscaping maintenance prior to and during the bushfire season to ensure low-flammability plantings, gravel areas, stone walls, etc that are maintained to be free of fine fuels, will reduce the spread of fire to the building. This is a consideration for the current development due to the fire-exposed bushland setting.

Other measures proposed by the property owner include:

- A 1000L firefighting trailer on site
- Fire hose provided at the mains water supply in the centre of the site, near the check-in building and Site manager's cabin.
- Close proximity to the RFS staging area at State Mine Railway Heritage Museum, to the north of the site.

4.5 *BMPs summary tables*

A summary of the BMPs proposed for the development ecotourism and residential components is provided in **Table 4-1**.

Also refer to the site plan and emergency access plan in **Appendix A** for additional details on the BMPs proposed for the development.

Table 4-1. PBP Performance Criteria, Acceptable Solutions and the design measures proposed for the development (as per PBP Tables 6a-d, Variations for Ecotourism).

Performance Criteria	Design measures proposed for the development	PBP 2019 compliance achieved
<p><u>ASSET PROTECTION ZONE - SFPP Ecotourism:</u> Radiant heat levels of greater than 10kW/m² (1200K) are not experienced by emergency service personnel and occupants during firefighting and emergency management around a building on site that can be used as a refuge.</p>	<p>The cabins need to be positioned so as to be exposed to radiant heat levels of no greater than 10kW/m² (1200K) at the building, which requires the following APZs:</p> <ul style="list-style-type: none"> • 32 m on the east; • 55 m on the north; • 33 m on the southwest; and • 14 m on the west. <p>The APZ will need to be managed in perpetuity for the life of development, through landscape design and vegetation management practices to achieve the low fuel standard in accordance with PBP Appendix 4.</p>	<p>Yes, can be compliant subject to siting of the refuge cabins within the 10kW/m² envelope, as shown in Figure 3-1.</p>
<p><u>ASSET PROTECTION ZONE - residential:</u> An APZ is commensurate with the construction of the building; Defendable space is provided.</p>	<p>The assessed APZ distances for residential <29kW/m² radiant heat exposure are as follows:</p> <ul style="list-style-type: none"> • Minimum 10 m from the east boundary (relative to the Grassland hazard); • Minimum 20 m on the north (relative to the remnant Forest, equivalent to Rainforest hazard); • Minimum 33 m on the southwest (relative to exotic trees, equivalent to Rainforest hazard); and • Minimum 9 m on the west (relative to exotic trees, equivalent to Rainforest hazard). <p>The APZ will need to be managed in perpetuity for the life of development, through landscape design and vegetation management practices to achieve the low fuel standard in accordance with PBP Appendix 4.</p>	<p>Yes, complies with residential <29kW/m² envelope, as shown in Figure 3-1. The proposed dwelling achieves a BAL 12.5 APZ.</p>
<p><u>CONSTRUCTION - SFPP Ecotourism:</u> Occupants of the ecotourism facility are provided with appropriate shelter in the event of a bush fire</p>	<p>The proposal includes a provision of a designated refuge building on site, the community building, within the <10kW/m² radiant heat envelope and built to BAL 12.5 standard. The refuge is to provide space for the proposed visitor capacity of 45 persons, as per the current plans.</p> <p>Construction of the refuge is to be in accordance with AS 3959 for BAL 12.5 or NASH standard and section 7.5 of PBP.</p> <p>Attached Class 10a buildings (carport, garage or shed) are either separated from the refuge cabin buildings by at least 6m or by a fire-rated wall. If not separated then the carport, garage or shed must be of equivalent construction level to BAL 12.5.</p>	<p>Yes, can be compliant subject to detailed building and construction specifications / plans. The refuge building is located within the 10kW/m² envelope, as shown in Figure 3-1 and will be built to BAL 12.5 standard.</p>

Performance Criteria	Design measures proposed for the development	PBP 2019 compliance achieved
<p><u>CONSTRUCTION - Residential</u> <i>The proposed building can withstand bush fire attack in the form of embers, radiant heat and flame contact.</i> <i>Proposed fences and gates are designed to minimise the spread of bush fire.</i> <i>Proposed Class 10a buildings are designed to minimise the spread of bush fire.</i></p>	<p>Residential building is to be constructed to minimum BAL 12.5 standards in accordance with the <i>Building Code of Australia</i>, and section 3 and section 4 of AS3959. – which is appropriate to the setbacks able to be achieved on site.</p> <p>The NSW variation to the BCA required in section 7.5 of PBP 2019, are relevant.</p> <p>There are to be no flammable (e.g. brush) fences or gates.</p> <p>Attached Class 10a buildings (carport, garage or shed) are either separated from the dwelling buildings by at least 6m or by a fire-rated wall. If not separated then the carport, garage or shed must be of equivalent construction level to the dwelling.</p>	<p>Yes, can be compliant, subject to detailed building and construction specifications / plans. The dwelling is located within the 10kW/m² envelope, as shown in Figure 3-1 and will be built to BAL 12.5 standard.</p>
<p><u>LANDSCAPING</u> <i>Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.</i></p>	<p>Landscaping is to be consistent with the RFS Asset protection zone standards in Appendix 4 of PBP 2019.</p> <p>Fencing is constructed in accordance with section 7.6 of PBP.</p> <p>A clear area of low-cut grass or paving or gravel is maintained adjacent the dwelling building, to provide defensible space.</p> <p>Landscaping is to avoid ornamental grasses, grass-like plants and other fine fuels near buildings, as these contribute to the bushfire fuels. Succulent plants and/or pebbles as mulch are non-flammable and are recommended for landscaped areas near buildings. Woodchip mulch should be used only where necessary and to a very limited extent. Trees and shrubs are to be maintained to have no over-hanging branches over the roof, and a non-continuous canopy.</p>	<p>Yes, subject to Council approval to establish the APZ, the ongoing maintenance responsibility of the owner/ site manager.</p>
<p><u>ACCESS – SFPP ecotourism</u> <i>The intent may be achieved where firefighting vehicles are provided with safe, all-weather access to the proposed refuge building</i></p>	<p>Vehicle access is to be provided to provide:</p> <ul style="list-style-type: none"> • All-weather road to the refuge cabin; • Emergency vehicle stand area is provided next to the fire fighting water supply, • Emergency vehicle turning area provided adjacent to the fire-fighting water supply in accordance with Type B, C or D in PBP 2019 (see Figure 4-2). 	<p>Yes, can be compliant, subject to access being provided as per the site plan and this report.</p>

Performance Criteria	Design measures proposed for the development	PBP 2019 compliance achieved
<p><u>ACCESS - Residential</u> <i>Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation. The capacity of access roads is adequate for firefighting vehicles. There is appropriate access to water supply. Firefighting vehicles can access the dwelling and exit the property safely.</i></p>	<p>Vehicle access to the residential building is to provide:</p> <ul style="list-style-type: none"> • All-weather road to the dwelling; • Emergency vehicle stand area is provided next to the fire fighting water supply, • Emergency vehicle turning area provided adjacent to the fire-fighting water supply in accordance with Type B, C or D in PBP 2019 (see Figure 4-2). 	<p>Yes, can be compliant, with upgrade to driveway and provision of turning bay.</p>
<p><u>WATER SUPPLY</u> <i>An adequate water supply is provided for firefighting purposes. Water supplies are located at regular intervals; and the water supply is accessible and reliable for firefighting operations. Flows and pressure are appropriate. the integrity of the water supply is maintained. A static water supply is provided for firefighting purposes in areas where reticulated water is not available.</i></p>	<p>Reticulated water supply is available at the site in two locations.</p> <ul style="list-style-type: none"> • Existing in ground fire hydrant located at the southern entry to the property, providing access to reticulated firefighting water supply • A reticulated supply connection is also provided in the centre of the property, near the proposed check in building. <p>Additional SWS tanks, a pump and fire hose reels are proposed and should be provided as follows:</p> <ul style="list-style-type: none"> • SWS tank with 20,000L firefighting water reserved with a 65 mm Storz valve - refer to tank configuration shown in Figure 4-3. • The tank and all external pipes and fittings must be metal. • Diesel fire-fighting pump with 60m fire hose is provided at the SWS tank in case of pressure failure in the reticulated supply. • Hose reel provided near buildings made in accordance with AS/NZS 1221:1997 <i>Fire hose reels</i> and installed in accordance with AS/NZS 2441:2005 <i>Installation of fire hose reels</i>. 	<p>Yes, can be compliant. Water supply to be detailed in the building and construction specifications / plans.</p> <p>The SWS supply is additional to the requirement and provided as an additional bushfire protection measure.</p>
<p><u>ELECTRICITY SERVICES</u> <i>The intent may be achieved where: location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.</i></p>	<p>Where possible, electricity supply will be provided via underground power lines from mains to the house.</p> <p>Vegetation around any aerial supply lines needs to be managed to limit the possibility of trees and branches falling on the power lines and thereby limit the possibility of ignition of surrounding bush land or the fabric of buildings.</p>	<p>Yes, can be compliant. Electricity supply to be detailed in the building and construction specifications / plans.</p>
<p><u>GAS SERVICES</u> <i>The intent may be achieved where: location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.</i></p>	<p>Gas cylinders need to be kept clear of all flammable material to a distance of 10 m and shielded from hazard vegetation.</p> <p>All above-ground gas service pipes, connections and fittings are metal.</p>	<p>Yes, can be compliant. Gas supply to be detailed in the building and construction specifications / plans.</p>

Performance Criteria	Design measures proposed for the development	PBP 2019 compliance achieved
<u>EMERGENCY MANAGEMENT</u> <i>A bush fire emergency and evacuation management plan is prepared.</i>	<p>A 'Bush Fire Emergency Management and Evacuation Plan' is required for SFPP ecotourism developments, to address emergency procedures and resident safety. This should address different scenarios of bushfire threat.</p> <p>The plan is to be prepared following the RFS document: <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i> (RFS 2014).</p>	<p>Yes, can be compliant, subject to details included in site plan and operational documents. Refer to the site plan and emergency access plan in Appendix A.</p>

5 References

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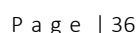
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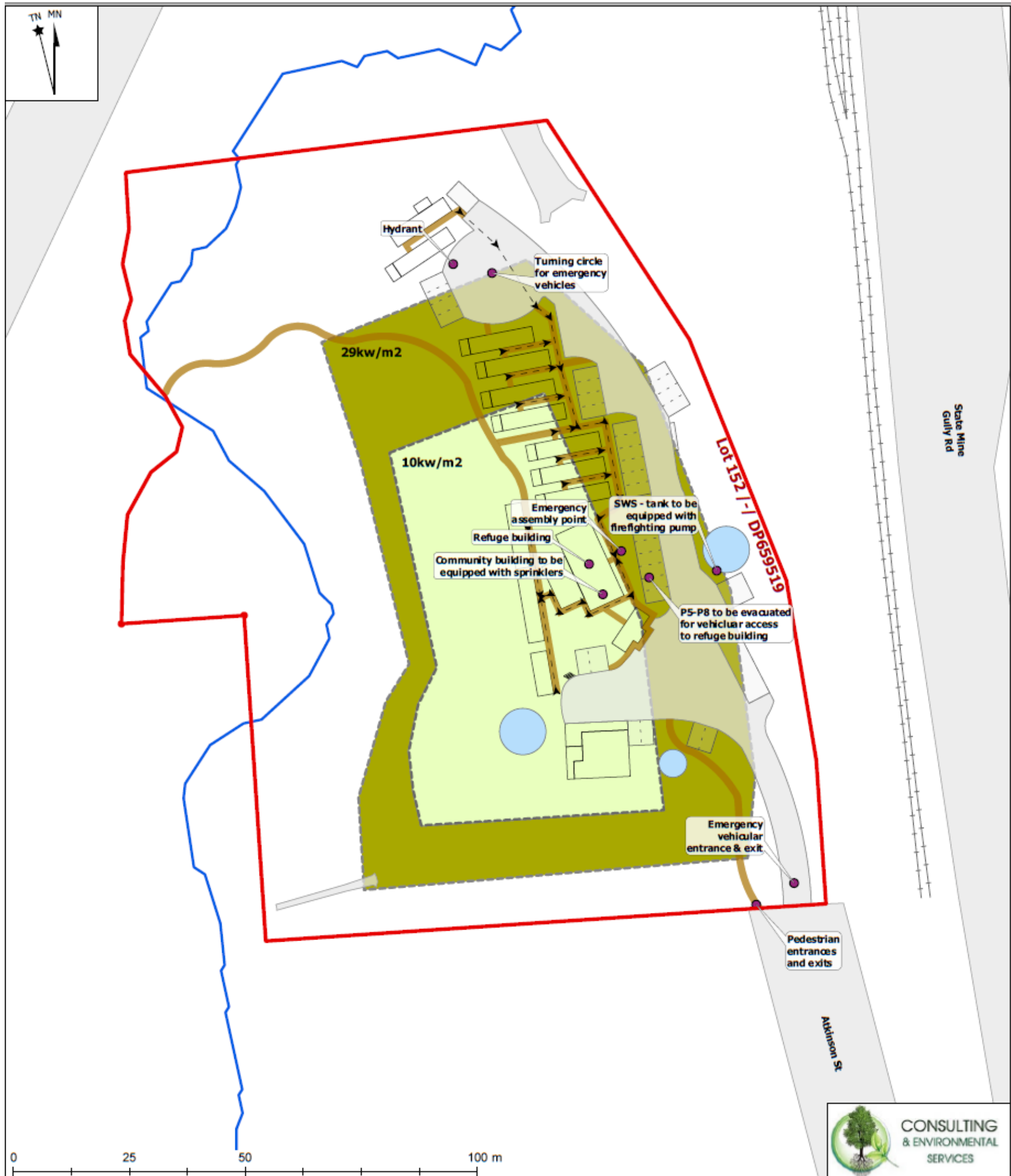
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RFS (2014) A guide to developing a Bush Fire Emergency Management and Evacuation Plan, published by the NSW Rural Fire Service, Granville (assessed at https://www.rfs.nsw.gov.au/_data/assets/pdf_file/0003/29271/DPP1079-Emergency-management-and-evacuation-plan-FORM.pdf)

Standards Australia (2018) Australian Standard AS 3959—2018 *Construction of buildings in bushfire-prone areas*, Standards Australia, Sydney.





<p>Legend</p> <ul style="list-style-type: none"> Lot 152 +/- DP659519 (2.085 ha; Land zoning: C3 - Environmental Management) Lots Road reserve State Mine Creek Proposed cabins, other buildings and car spaces Proposed driveway Proposed walkways Water tanks Railway tracks 	<p>Emergency sheltering and evacuation routes</p> <ul style="list-style-type: none"> Evacuation to offsite refuges Walking routes to bushfire refuge onsite (community building) and to emergency assembly point <p>Bushfire assessment zones *</p> <ul style="list-style-type: none"> Envelope <10kW/m² Envelope <29kW/m² <p>* These areas have been modelled by KHS Ecology & Bushfire to have a maximum exposure of 10kW/m² / 29kW/m². The 10kW/m² envelope is suitable for the on-site bush fire refuge for sheltering and can be considered the safest space during a bush fire emergency.</p>	<p>Cadastral - Department of Customer Service, 2018.</p> <p>EPI: State Government of NSW and Department of Planning, Industry and Environment.</p> <p>Creek location calculated from 1m DEM from Spatial Services, NSW Government (August 2011). Volumes of cut and fill calculated in QGIS using the 1m DEM from 2011. Values may be used as a guideline only.</p> <p>Plan in accordance with refuge & residential zone overlay - Contour and detail by CEH Survey (Plan no: 5800_SBA; date: 25/05/2023).</p> <p>This design plan proposed must be verified accurately when used for construction purposes. Map produced in ArcGIS Pro 3.1.</p> <p>Scale 1:750 at A3. Map orientation to magnetic north. GDA 2020 MGA Zone 56.</p>	<p>Consulting & Environmental Services cessolls.com.au - on behalf of the client.</p> <p>Drawing title: EMERGENCY MANAGEMENT & EVACUATION - PAGE 1 - EXPERIENCE OZ ECOTOURISM FACILITY</p> <p>Client: Experience OZ Pty Ltd Lot/DP: Lot 152 DP659519 Site address: 51 Atkinson St Mort's Estate Lithgow 2790 NSW</p> <p>Project number: 136-2107 Drawing number: 41-2107 Date: 30/10/2023, Version: 3</p> <p>Drawn by: M.H. Environmental Drafting.</p>
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7 Appendix B – Method 2 site analysis (Harris Environmental)



February 17, 2023

51 Atkinson Street Morts Estate

Harris Environmental has been engaged to provide an assessment of the available $<10\text{kW/m}^2$ envelope within the subject lot at 51 Atkinson Street, Morts Estate

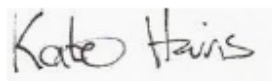
Method 2 AS3959 has been used to calculate the radiant heat emission utilising the Bushfire Attack Assessor Program licensed by Newcastle Bushfire Consulting (*NBC 2020*). Full details of the assessment are in Appendix ii and the summarised findings presented in Table 1 and 2.

Figure 1 shows the the effective slopes and vegetation classification within 140 m of the subject lot. An FDI of 80 and a Flame Temp (K) of 100 has been used in this assessment. As shown in Table 1, the subject lot can achieve an area in accordance with $<10\text{kW/m}^2$.

To achieve the $<10\text{kW/m}^2$ building envelope, the following Asset Protection Zones are required:

- 32 m on east;
- 55 m on the north and ;
- 33 m on the south west.

Kind Regards

A handwritten signature in black ink that reads "Kate Harris".

Katherine Harris
BPAD-L3-26927
GRAD DIP BUSH FIRE PROTECTION, UWS
GRAD DIP ENVIRO MANG HERTS, UK,
GRAD DIP NAT RES UNE,
BSC APP SC, AGRICULTURE HAC

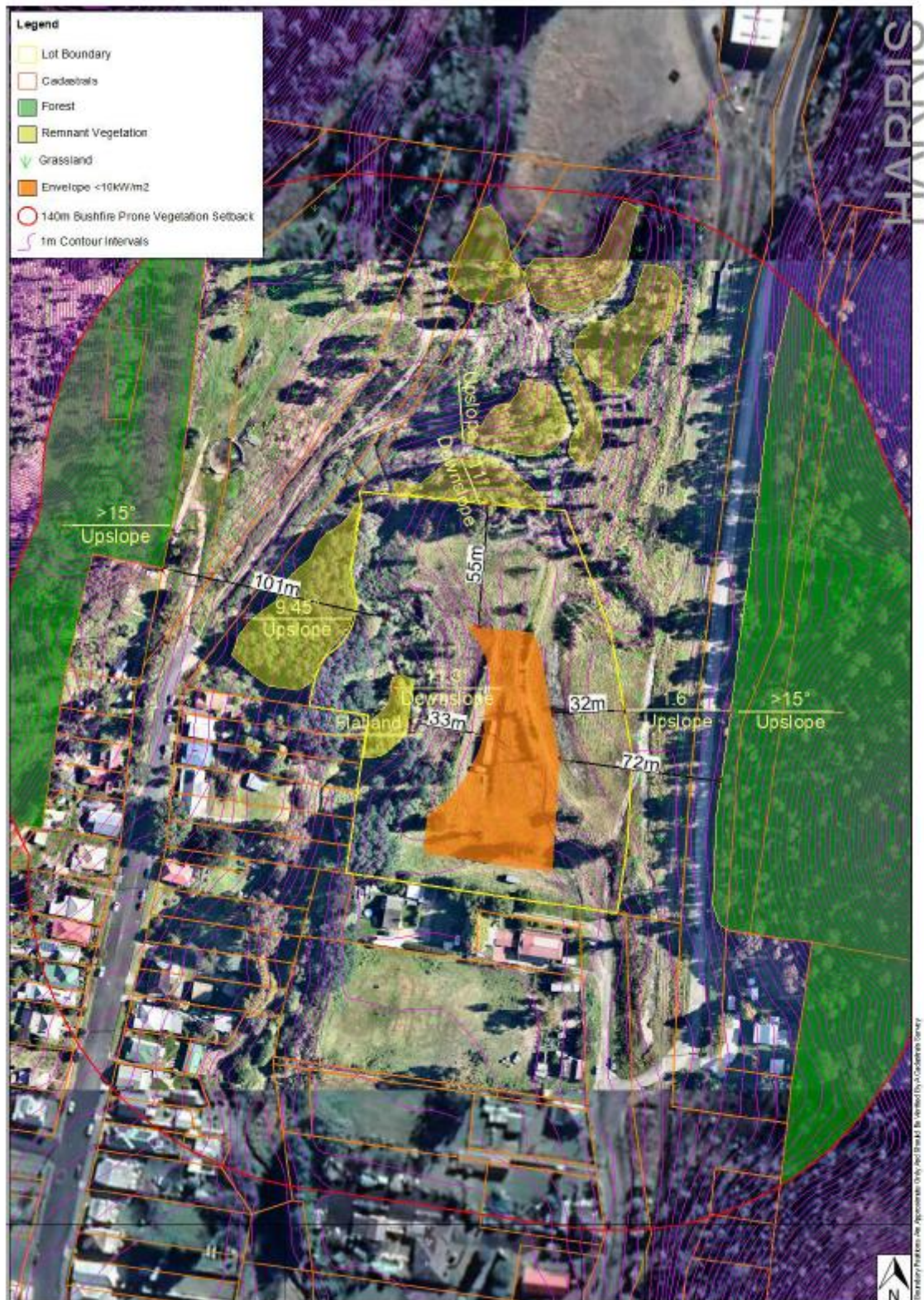
Table 1 APZ and BAL Determination

	<i>EAST</i>	<i>EAST</i>	<i>NORTH</i>	<i>SOUTH WEST</i>	<i>WEST</i>	<i>WEST</i>
Vegetation	Forest	Grassland	Remnant	Remnant	Remnant	Forest
Gradient	Upslope	Upslope	Upslope	Flatland	Upslope	Upslope
Method 2 AS3959 <10kW/m2	38 m	32 m	55 m	33 m	14 m	81 m
BAL Required	BAL 12.5	BAL 12.5	BAL 12.5	BAL 12.5	BAL 12.5	BAL 12.5

Table 2 Method 2 (NBC, 2020)

	Eastern Elevation	Eastern Elevation	Northern Elevation	South Western Elevation	Western Elevation	Western Elevation
Fuel load	Forest	Grassland	Remnant (Rainforest)	Remnant (Rainforest)	Remnant (Rainforest)	Forest
Vegetation Slope	15 degrees Upslope	1.6 degrees Upslope	11 degrees downslope	Flatland	9.45 degrees Upslope	15 degrees Upslope
Site Slope	3.6 degrees downslope	1.6 degrees Upslope	Flatland	11.3 degrees downslope	11.3 degrees downslope	11.3 degrees downslope
Distance to Vegetation from facade	38 m	32 m	55 m	33 m	14 m	81 m
Radiant Heat Flux (kW/m ²)	9.61 kW/m ²	9.91 kW/m ²	9.29 kW/m ²	9.69 kW/m ²	9.9 kW/m ²	2.92 kW/m ²

Figure 1 Slope and Vegetation within 140 m of subject site



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NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 14/02/2023

Assessment Date: 9/02/2023

Site Street Address: 51 Atkinson Street, Morts Estate

Assessor: Katherine Harris; Harris Environmental Consulting

Local Government Area: Lithgow

Alpine Area: No

Equations Used

Transmissivity: Fuss and Hammins, 2002
 Flame Length: RFS PBP, 2001/Vesta/Catchpole
 Rate of Fire Spread: Noble et al., 1980
 Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
 Peak Elevation of Receiver: Tan et al., 2005
 Peak Flame Angle: Tan et al., 2005

Run Description: East

Vegetation Information

Vegetation Type: Forest (including Coastal Swamp Forest)

Vegetation Group: Forest and Woodland

Vegetation Slope: 15 Degrees

Vegetation Slope Type: Upslope

Surface Fuel Load(t/ha): 22

Overall Fuel Load(t/ha): 36.1

Vegetation Height(m): 2

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 3.6 Degrees

Site Slope Type: Downslope

Elevation of Receiver(m): Default

APZ/Separation(m): 38

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K): 1200

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 25

Heat of Combustion(kJ/kg): 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 80

Program Outputs

Level of Construction: BAL 12.5

Peak Elevation of Receiver(m): 2.19

Radiant Heat(kW/m²): 9.61

Flame Angle (degrees): 85

Flame Length(m): 9.21

Maximum View Factor: 0.108

Rate Of Spread (km/h): 0.75

Inner Protection Area(m): 22

Transmissivity: 0.798

Outer Protection Area(m): 16

Fire Intensity(kW/m): 13993

Run Description: East 2	
<u>Vegetation Information</u>	
Vegetation Type:	Grassland
Vegetation Group:	Grassland
Vegetation Slope:	1.6 Degrees
Vegetation Slope Type:	Upslope
Surface Fuel Load(t/ha):	6
Overall Fuel Load(t/ha):	6
Vegetation Height(m):	0
	Only Applicable to Shrub/Scrub and Vesta
<u>Site Information</u>	
Site Slope	1.6 Degrees
Site Slope Type:	Upslope
Elevation of Receiver(m)	Default
APZ/Separation(m):	32
<u>Fire Inputs</u>	
Veg./Flame Width(m):	100
Flame Temp(K):	1200
<u>Calculation Parameters</u>	
Flame Emissivity:	95
Relative Humidity(%):	25
Heat of Combustion(kJ/kg)	18600
Ambient Temp(K):	308
Moisture Factor:	5
FDI:	110
<u>Program Outputs</u>	
Level of Construction	BAL 12.5
Peak Elevation of Receiver(m)	4.6
Radiant Heat(kW/m2):	9.91
Flame Angle (degrees):	80
Flame Length(m):	7.51
Maximum View Factor:	0.109
Rate Of Spread (km/h):	12.81
Inner Protection Area(m):	32
Transmissivity:	0.811
Outer Protection Area(m):	0
Fire Intensity(kW/m):	39696
Run Description: North	
<u>Vegetation Information</u>	
Vegetation Type:	Rainforest
Vegetation Group:	Forest and Woodland
Vegetation Slope:	11 Degrees
Vegetation Slope Type:	Downslope
Surface Fuel Load(t/ha):	10
Overall Fuel Load(t/ha):	13.2
Vegetation Height(m):	2
	Only Applicable to Shrub/Scrub and Vesta
<u>Site Information</u>	
Site Slope	0 Degrees
Site Slope Type:	Level
Elevation of Receiver(m)	Default
APZ/Separation(m):	55
<u>Fire Inputs</u>	
Veg./Flame Width(m):	100
Flame Temp(K):	1200
<u>Calculation Parameters</u>	
Flame Emissivity:	95
Relative Humidity(%):	25
Heat of Combustion(kJ/kg)	18600
Ambient Temp(K):	308
Moisture Factor:	5
FDI:	80
<u>Program Outputs</u>	
Level of Construction	BAL 12.5
Peak Elevation of Receiver(m)	7.32
Radiant Heat(kW/m2):	9.29
Flame Angle (degrees):	79
Flame Length(m):	14.91
Maximum View Factor:	0.108
Rate Of Spread (km/h):	2.05
Inner Protection Area(m):	55
Transmissivity:	0.773
Outer Protection Area(m):	0
Fire Intensity(kW/m):	13986

Run Description: South West	
<u>Vegetation Information</u>	
Vegetation Type:	Rainforest
Vegetation Group:	Forest and Woodland
Vegetation Slope:	0 Degrees
Vegetation Slope Type:	Level
Surface Fuel Load(t/ha):	10
Overall Fuel Load(t/ha):	13.2
Vegetation Height(m):	2
Only Applicable to Shrub/Scrub and Vesta	
<u>Site Information</u>	
Site Slope	11.3 Degrees
Site Slope Type:	Downslope
Elevation of Receiver(m)	Default
APZ/Separation(m):	33
<u>Fire Inputs</u>	
Veg./Flame Width(m):	100
Flame Temp(K):	1200
<u>Calculation Parameters</u>	
Flame Emissivity:	95
Relative Humidity(%):	25
Heat of Combustion(kJ/kg)	18600
Ambient Temp(K):	308
Moisture Factor:	5
FDI:	80
<u>Program Outputs</u>	
Level of Construction	BAL 12.5
Peak Elevation of Receiver(m)	0
Radiant Heat(kW/m2):	9.69
Flame Angle (degrees):	93
Flame Length(m):	7.82
Maximum View Factor:	0.107
Rate Of Spread (km/h):	0.96
Inner Protection Area(m):	33
Transmissivity:	0.807
Outer Protection Area(m):	0
Fire Intensity(kW/m):	6547
Run Description: West	
<u>Vegetation Information</u>	
Vegetation Type:	Rainforest
Vegetation Group:	Forest and Woodland
Vegetation Slope:	9.45 Degrees
Vegetation Slope Type:	Upslope
Surface Fuel Load(t/ha):	10
Overall Fuel Load(t/ha):	13.2
Vegetation Height(m):	2
Only Applicable to Shrub/Scrub and Vesta	
<u>Site Information</u>	
Site Slope	11.3 Degrees
Site Slope Type:	Downslope
Elevation of Receiver(m)	Default
APZ/Separation(m):	14
<u>Fire Inputs</u>	
Veg./Flame Width(m):	16.11
Flame Temp(K):	1200
<u>Calculation Parameters</u>	
Flame Emissivity:	95
Relative Humidity(%):	25
Heat of Combustion(kJ/kg)	18600
Ambient Temp(K):	308
Moisture Factor:	5
FDI:	80
<u>Program Outputs</u>	
Level of Construction	BAL 12.5
Peak Elevation of Receiver(m)	0
Radiant Heat(kW/m2):	9.9
Flame Angle (degrees):	85
Flame Length(m):	4.83
Maximum View Factor:	0.103
Rate Of Spread (km/h):	0.5
Inner Protection Area(m):	14
Transmissivity:	0.858
Outer Protection Area(m):	0
Fire Intensity(kW/m):	3411

Run Description:		West 2	
<u>Vegetation Information</u>			
Vegetation Type:		Forest (including Coastal Swamp Forest)	
Vegetation Group:		Forest and Woodland	
Vegetation Slope:		15 Degrees	Vegetation Slope Type: Upslope
Surface Fuel Load(t/ha):		22	Overall Fuel Load(t/ha): 36.1
Vegetation Height(m):		2	Only Applicable to Shrub/Scrub and Vesta
<u>Site Information</u>			
Site Slope		11.3 Degrees	Site Slope Type: Downslope
Elevation of Receiver(m)		Default	APZ/Separation(m): 81
<u>Fire Inputs</u>			
Veg./Flame Width(m):		100	Flame Temp(K): 1200
<u>Calculation Parameters</u>			
Flame Emissivity:		95	Relative Humidity(%): 25
Heat of Combustion(kJ/kg)		18600	Ambient Temp(K): 308
Moisture Factor:		5	FDI: 80
<u>Program Outputs</u>			
Level of Construction		BAL 12.5	Peak Elevation of Receiver(m) 0
Radiant Heat(kW/m2):		2.92	Flame Angle (degrees): 96
Flame Length(m):		9.21	Maximum View Factor: 0.035
Rate Of Spread (km/h):		0.75	Inner Protection Area(m): 54
Transmissivity:		0.746	Outer Protection Area(m): 27
Fire Intensity(kW/m):		13993	

