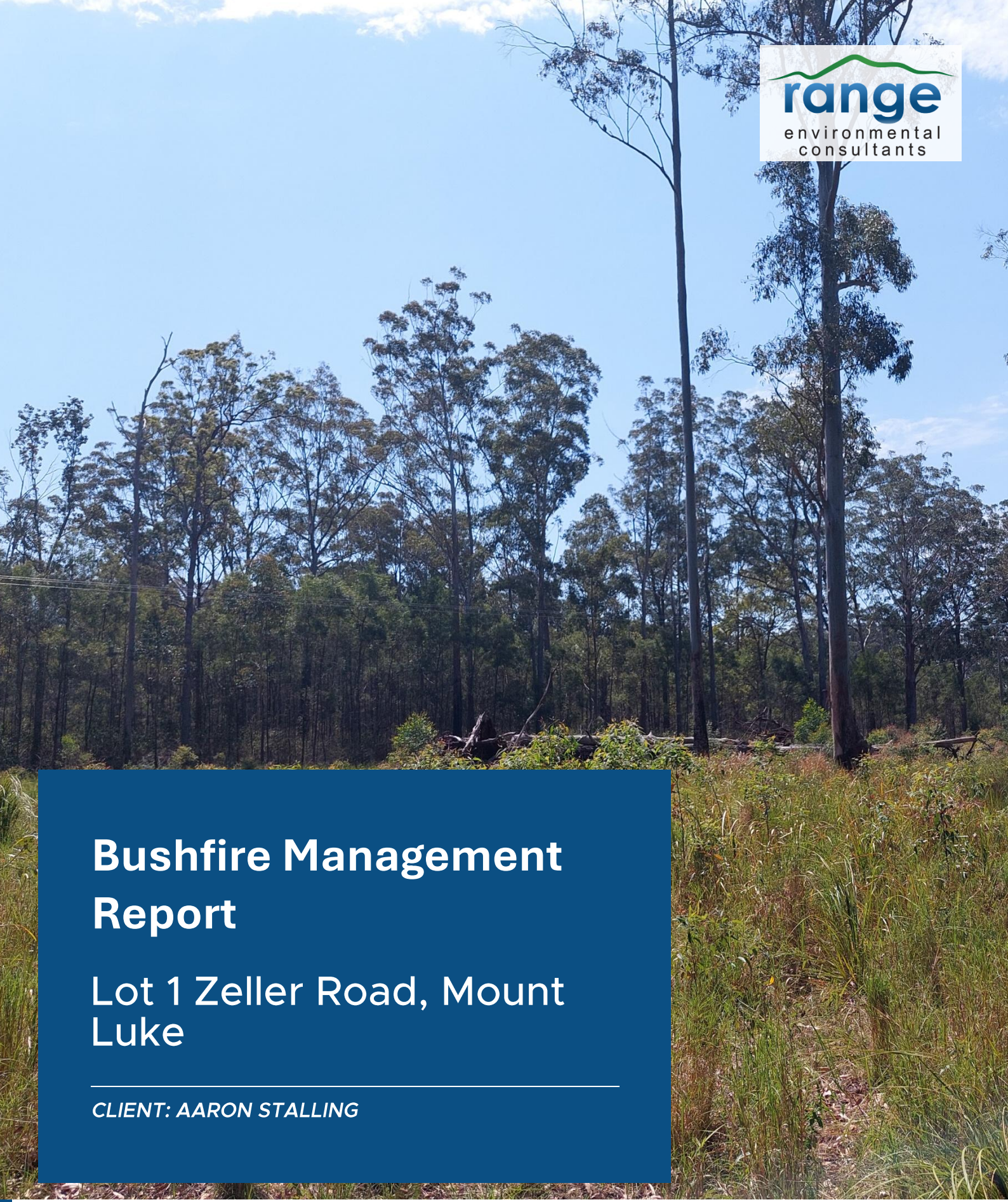
APPENDIX A – AMENDED BUSHFIRE MANAGEMENT REPORT

Range Environmental Consultants



Bushfire Management Report

Lot 1 Zeller Road, Mount Luke

CLIENT: AARON STALLING

PROJECT NO.	**J002898**
STATUS	**FINAL**
DATE	**1/06/2026**
VERSION	**2**

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Where site inspections, testing, surveying or fieldwork have taken place, this report is based on the site conditions and information made available by the Client or their agents or nominees during the visit, the visual observations and any subsequent discussions with regulatory authorities. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

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It must be borne in mind that the measures dealt with in this report cannot guarantee that a building will survive a bushfire event. This is due mainly to the unpredictable nature and behaviour of fire and the difficulties associated with extreme weather conditions.

It must also be stated that this report is based on site conditions prevailing at the time the inspection was undertaken. These conditions can and will change dependent on both weather conditions and the maintenance undertaken by property owners.

This fire report has been prepared on the basis that bushfire mitigation measures identified are implemented and maintained into the future. Failure to maintain these measures may contribute to the development being exposed to a higher level of bushfire threat and attack.

As site conditions can and will change over time this report is valid for a period of 2 years. Where this report is sought to be utilised greater than 2 years from issue date, Range Environmental Consultants are to be contacted to prepare an updated report which considers prevailing site conditions.

Document Control

Version	Purpose	Lead Author	Reviewer	Approved by	Date
1.	Final Report (J002613)	SM	GL	LMT	21/10/2025
2.	Final Report (J002898)	GL	HB	LMT	1/06/2026

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1 Introduction

An assessment of the site and its surrounds was undertaken to assist in the development of a fire plan for the purpose of ensuring that a removable dwelling to be established on the site meets the requirement of the Australian Standard, "Construction of buildings in bushfire-prone areas" (AS 3959-2018). This report provides recommendations for a number of measures that will assist in ensuring the safety of life and property and mitigating the impacts of bushfire.

The house site is located within an area of bushfire hazard as identified by the Toowoomba Regional Planning Scheme (TRPS) (2012 Version 28) mapping and by the Queensland Government State Planning Policy (SPP) bushfire mapping. The potential bushfire risk is due to the presence of unmanaged vegetation on the site and in the surrounding landscape. The implementation of the following measures will assist in mitigating the bushfire threat to an acceptable level for future residents and assets on the site.

A summary of site details is provided in Table 1.

Table 1 Site Characteristics

Details	Site Specific Details
Address	Lot 1 Zeller Road, Mount Luke
Lot on Plan	1 RP21723
Area	3.387 ha
Local Government Area	Toowoomba Regional Council (TRC)
Planning Scheme/Local Plan	Toowoomba Regional Planning Scheme (TRPS) 2012 Version 28
Bushfire Hazard Mapping	Medium Fire Risk (TRC) Very High Potential Bushfire Intensity and Potential Impact Buffer (SPP)
Vegetation Management Act 1999 (VMA 1999)	Category B & Category C
Area Classification/Zone	Limited development (Constrained land)
Water Supply	On site storage (10,000L)

The site is located in the locality of Mount Luke approximately 17 kilometres by road south of the town of Crows Nest and 30 kilometres by road northeast of the city of Toowoomba. Zeller Road is located on the western boundary of the site. Limited Development (Constrained Land) lots surround the site to the north, east and south with Open space located to the west in association with the plantation in Geham State Forest. The dwelling is located on a gently sloping site with the land falling to the southwest with underlying slopes in the order of 3% or 2 degrees.

Figure 1 provides an aerial view of the site (captured from Nearmap on 31 March 2025) and its context within the surrounding landscape. The proposed development will include the establishment of a removable dwelling on the site. Figure 2 illustrates the topography of the site.

The Bushfire Attack Level (BAL) that is likely to be experienced by a building in the event of a bushfire is determined by the type of vegetation present, its distance from the building and the slope of the land.

The following photographs were taken from the house site and show the nature of vegetation present in the vicinity of the dwelling.

Photograph 1 View to the north from the house site.

Photograph 2 View to the east from the house site.

Photograph 3 View to the south from the house site.

Photograph 4 View to the west from the house site.

Figure 1
Site Locality

Project:
Lot 1 Zeller Road,
Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 50 100

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling

The content of this document includes third party data. Range Environmental Consultants does not guarantee the accuracy of such data.

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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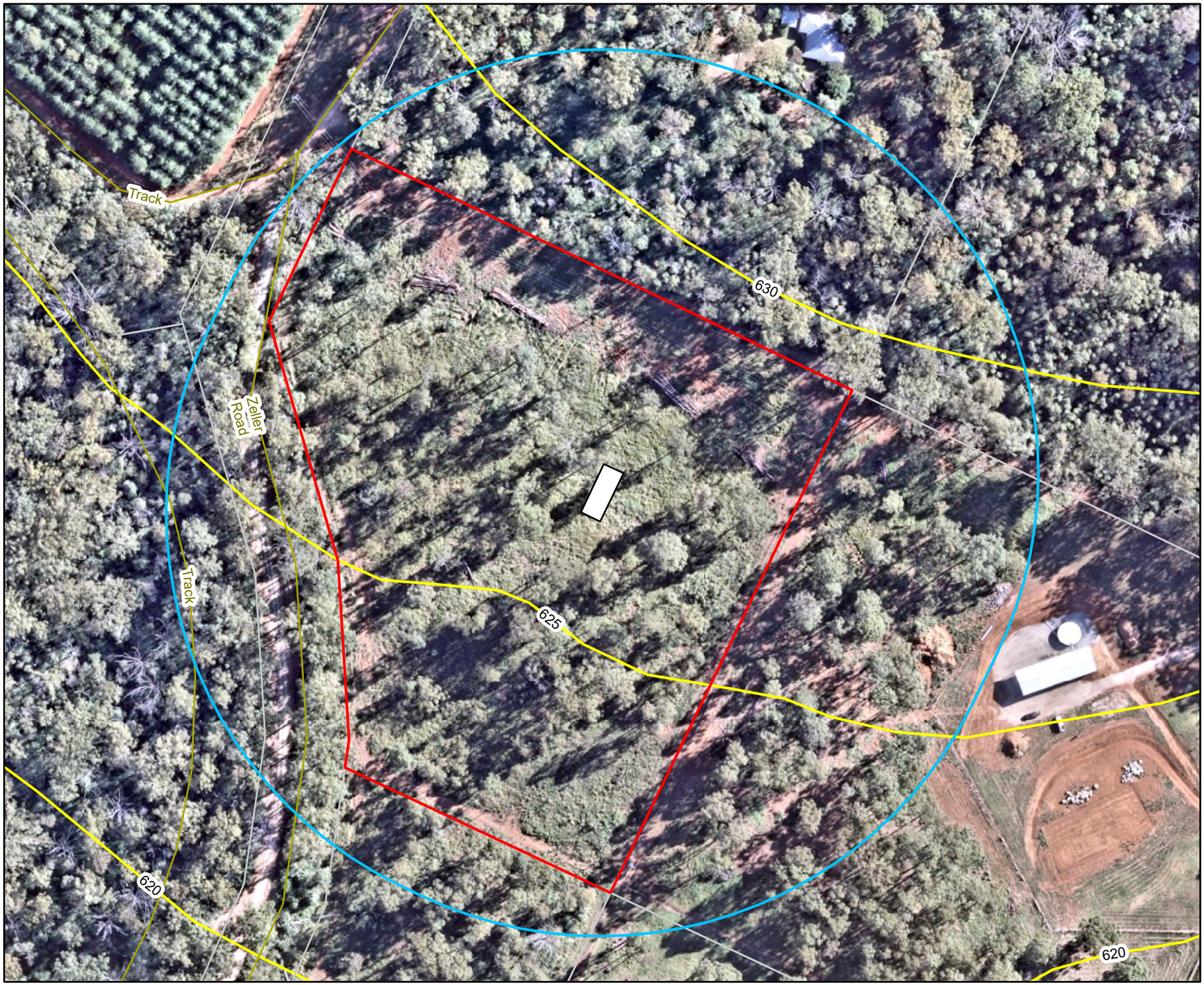

Figure 2 Topography of the Site

Project:
Lot 1 Zeller Road, Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 20 40

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling
- Contours (5m)
- 150m buffer

The content of this document includes third party data. Range Environmental Consultants does not guarantee the accuracy of such data.

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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2 Bushfire and vegetation

2.1 Bushfire

The TRPS (2012 Version 28) mapping identifies that the house site is located within an area of Medium bushfire risk (Figure 4). The SPP mapping identifies the house site is located within an area of Very high potential bushfire intensity (Figure 5). The mapped bushfire risk is due to the presence of unmanaged vegetation on the site and in the surrounding landscape.

Under adverse conditions, a bushfire is likely to approach from any direction. Severe fire weather conditions are typically associated with strong westerly to northerly winds. Bushfires in the area have the potential to generate quantities of embers that could impact on the building even though the fire does not necessarily reach it.

2.2 Vegetation details

An assessment of the vegetation was undertaken to assist in the development of a fire plan for the purpose of ensuring that a removable dwelling to be established on the site meets the requirements of the Australian Standard, AS 3959-2018. The current Vegetation Management Supporting Map identifies that vegetation at the site is mapped as Category B (remnant) and Category C (high-value regrowth), with vegetation in proximity to the house site comprising mapped Regional Ecosystem (RE) 12.5.6c (Figure 6).

The mapped Regional Ecosystem across the site typically aligns with a tall open forest structure. Eucalyptus species were the dominant mature overstorey species present on the site with heights in the order of 30-35 metres. The canopy layer on the site aligned with a tall open forest structure, with grassy groundcover and sparse woody environmental weed lantana.

A component of assessing potential bushfire attack is to determine the vegetation type, its distance from the dwelling and whether vegetation is upslope or downslope of the building.

'In assessing vegetation classes for forests, woodlands and rainforests, the classified vegetation will be determined by the unmanaged understorey rather than either the canopy (drip line) or trunk of any trees'. (AS3959-2018)

Effective underlying slope of land	**2 degrees downslope** and **0 degrees upslope**
Separation distance between building and hazardous vegetation	**>35m south, east and west,** and **>44m north**
Bushfire Attack Level (BAL)	**19**

Figure 3 Determination of distance from classified vegetation and effective slope of land.

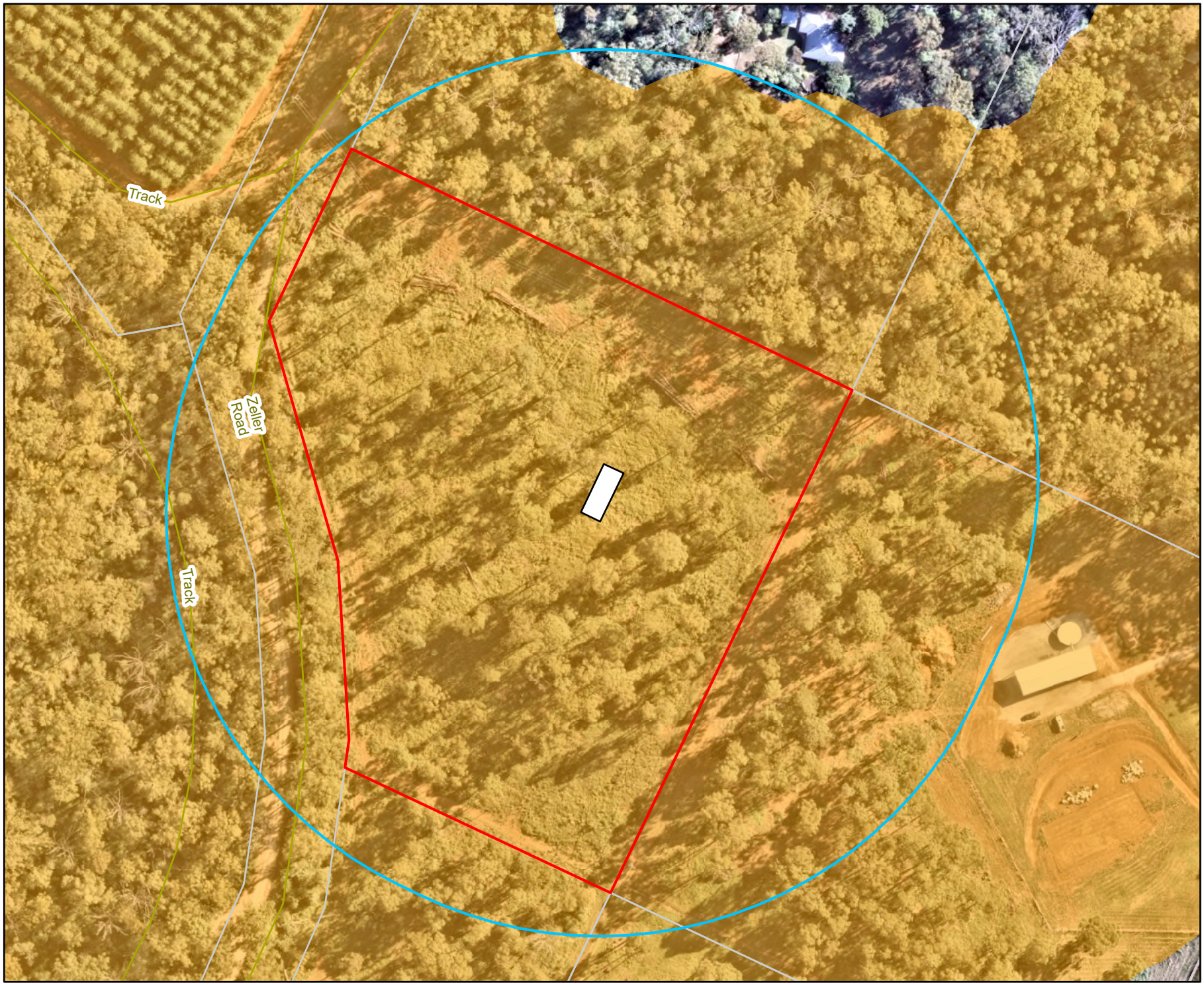

Figure 4
TRC Bushfire Hazard Map

Project:
Lot 1 Zeller Road, Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 20 40

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling
- 150m buffer
- High Bushfire Hazard
- Medium Bushfire Hazard

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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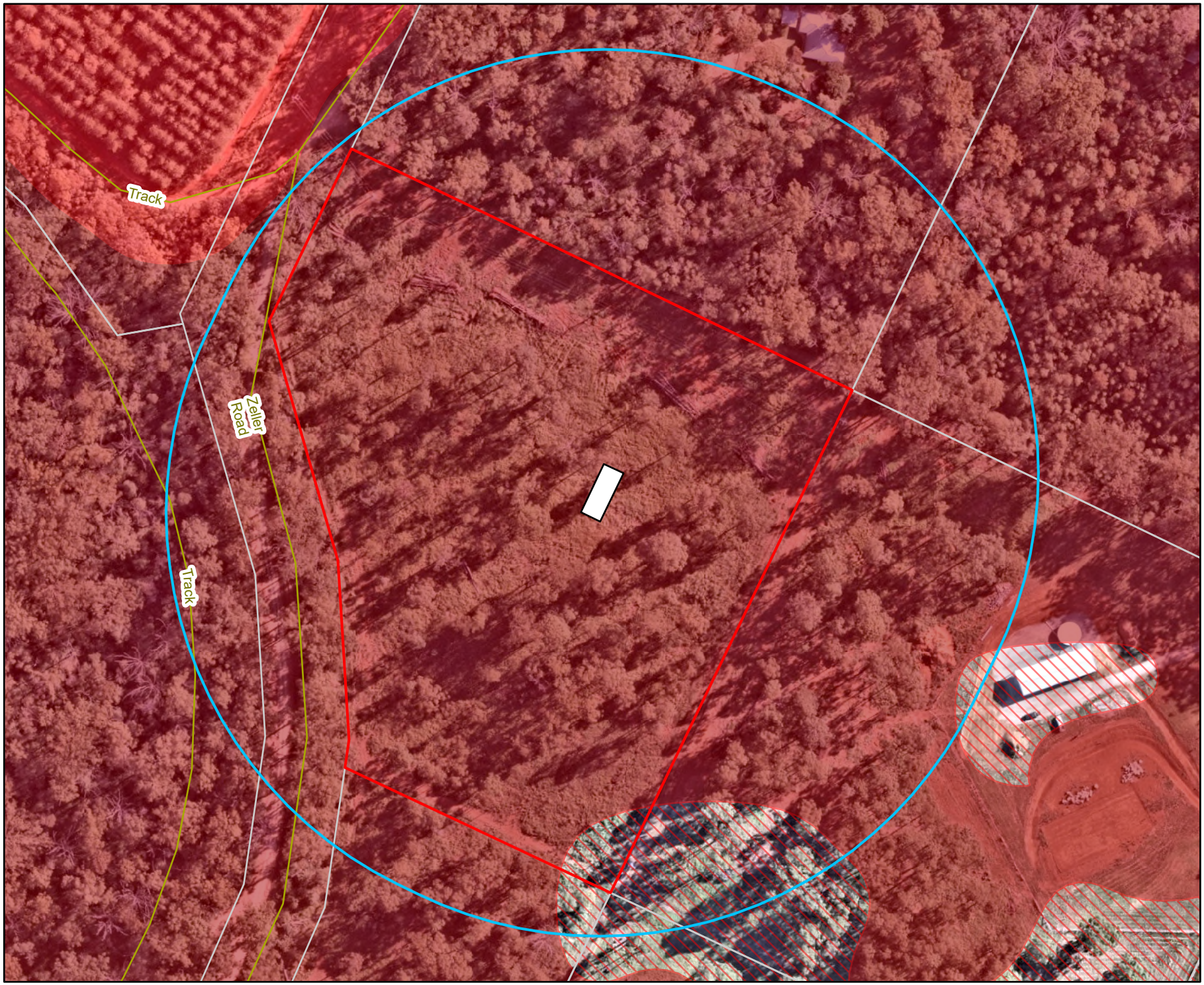

Figure 5
SPP Bushfire Hazard Map

Project:
Lot 1 Zeller Road,
Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 20 40

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling
- 150m buffer
- Very High Potential Bushfire Intensity
- High Potential Bushfire Intensity
- Medium Potential Bushfire Intensity
- Potential Impact Buffer

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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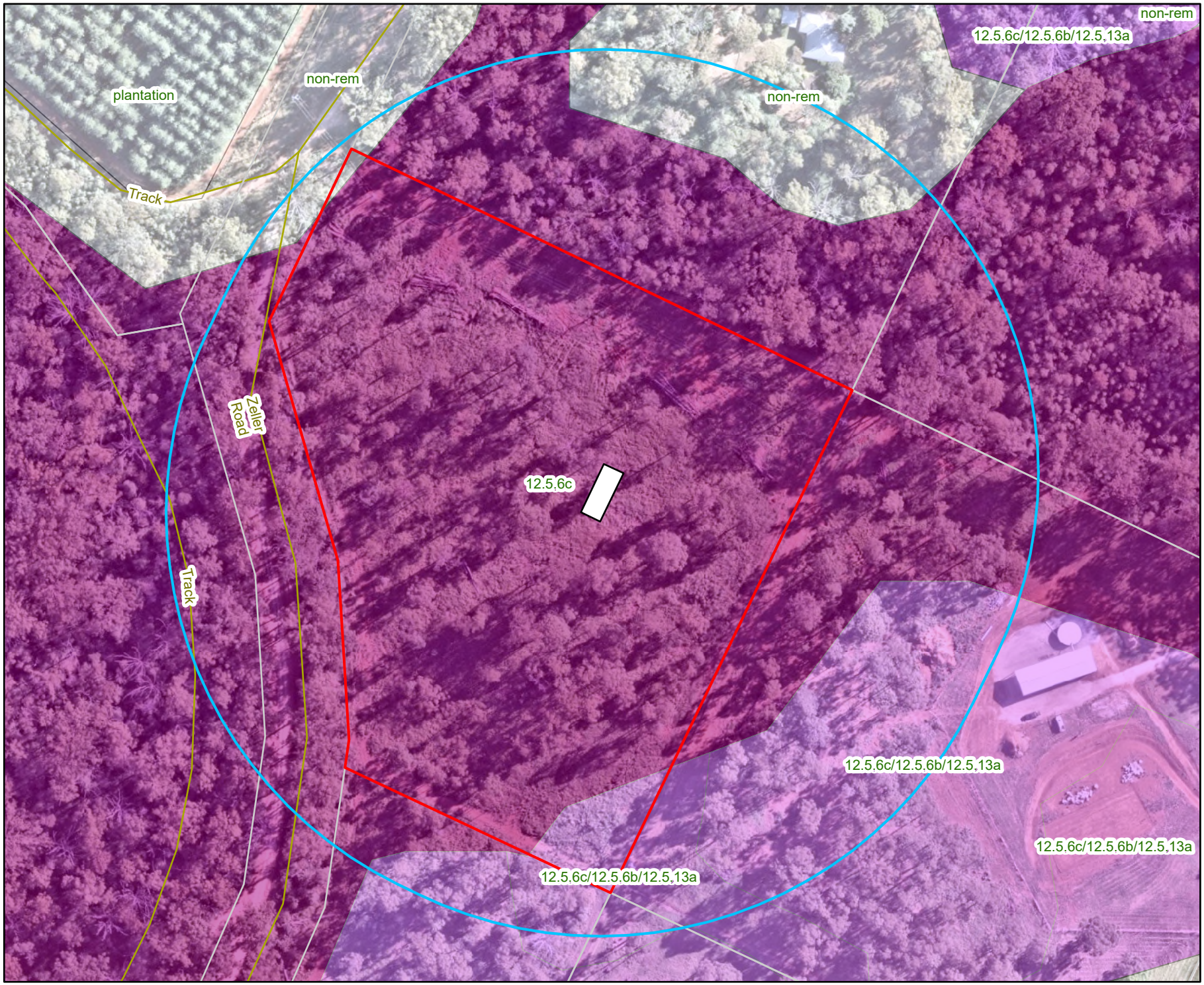

Figure 6
Regulated Vegetation and Regional Ecosystems

Project:
Lot 1 Zeller Road, Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 20 40

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling
- 150m buffer
- Category A or B containing endangered
- Category C or R containing endangered
- Non-remnant

The content of this document includes third party data. Range Environmental Consultants does not guarantee the accuracy of such data.

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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3 Determination of Bushfire Attack Level (BAL)

The following details summarise the steps that were carried out using information collected from the relevant site and apply this information to the conditions required and set out in Australian Standard '*Construction of Buildings in Bushfire-prone areas*' (AS 3959-2018) to identify the relevant BAL for the dwelling.

Table 2 Summary of attributes to determine BAL rating

Step	Procedure	Value north	Value east	Value south	Value west
	AS3959 2018 Method	Method 2	Method 2	Method 2	Method 2
1	Fire Danger Index (FDI)	70	70	70	70
2	Vegetation Hazard Class (VHC)	8.1	8.2	8.2	8.2
3	Overall fuel load (t/ha)	35.0	23.8	23.8	23.8
4	Distance of Classified vegetation from the dwelling	44m	35m	35m	35m
5	Location of hazardous vegetation	Upslope	Level with	Downslope	Level with
6	Effective slope of land under classified vegetation	1 degree	1 degree	2 degrees	1 degree
7	Radiant heat flux	18.43	16.92	18.89	16.92
8	Bushfire Attack Level (BAL)	BAL-19	BAL-19	BAL-19	BAL-19
9	Appropriate construction methods	BAL 19 construction method	BAL 19 construction method	BAL 19 construction method	BAL 19 construction method

*__Note:__ This fire report has been prepared on the basis that the identified minimum separation distance can be achieved and maintained between the dwelling and the edge of hazardous vegetation. Failure to maintain this separation distance will result in a higher Bushfire Attack Level (BAL) being applied to the dwelling.

Figure 7 provides an aerial view of the site, the location of the dwelling and presence of native vegetation. An explanation of Bushfire Attack Levels is provided in Appendix B of this report.

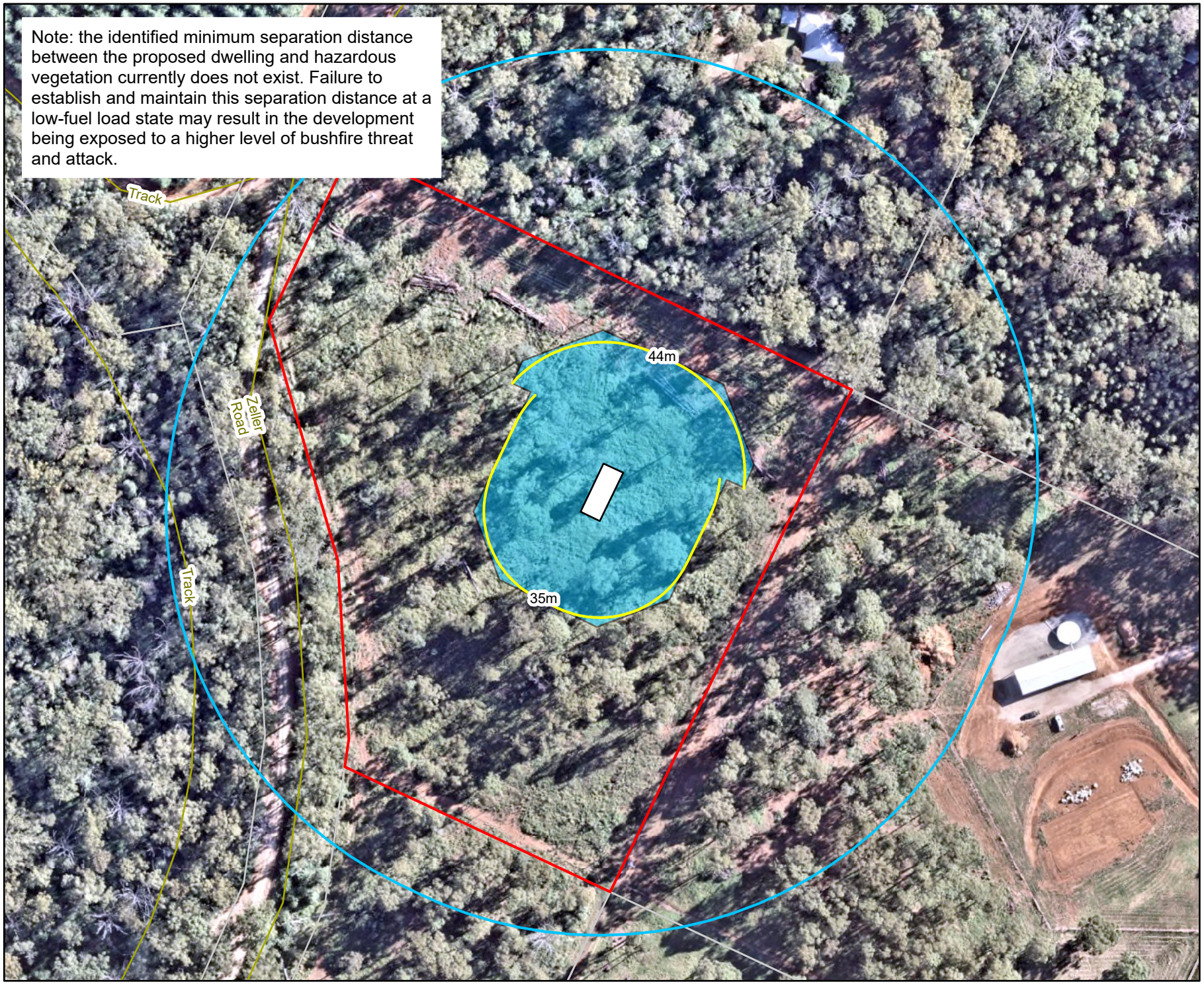

Figure 7 Minimum Separation Distance

Project:
Lot 1 Zeller Road, Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 20 40

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling
- Development envelope
- 150m buffer
- APZ required to achieve BAL-19

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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4 Planning requirements

4.1 Toowoomba Regional Planning Scheme

The Toowoomba Regional Council Planning Scheme (2012 Version 28) contains a Bushfire hazard overlay code, the purpose of which is to protect the safety of people and property in bushfire risk areas.

1. The purpose of this code is to protect the safety of people and property in bushfire risk areas.
2. The purpose of the code will be achieved through the following overall outcomes:
    a. development does not increase the exposure of people and property to an unacceptable bushfire hazard risk;
    b. development located in a bushfire risk area is designed to mitigate the bushfire risk through siting, design and management measures;
    c. development provides access and evacuation routes for both private and emergency service vehicles which are appropriate to the nature of the development and the level of bushfire risk;
    d. development for essential community infrastructure is able to function effectively during and immediately after a bushfire event;
    e. public health and safety and the environment are not put at risk by development involving the manufacture and/or storage of hazardous goods in a bushfire hazard area;
    f. the reconfiguration of land appropriately responds to bushfire hazard having regard to the appropriate siting of future development and access for evacuation; and
    g. development provides access to an adequate water supply for fire fighting purposes.

This code identifies performance outcomes and acceptable outcomes. Where appropriate, this Code has been applied to the development and outcomes proposed to comply with the accepted development and assessment benchmarks. Table 3 and Table 4 provide responses to the Bushfire hazard overlay code.

Table 3 Toowoomba Regional Council- Bushfire Hazard Overlay Code Accepted Development

Performance outcomes	Acceptable Outcomes	Proposed Outcomes
PO1 Development is provided with an adequate water supply for fire-fighting purposes that is safely located and freely accessible.	**AO1.1** Development within a water supply area involving the creation of a new lot/s or involving proposed and existing buildings with a combined gross floor area greater than 50m^2, is connected to Council's reticulated water supply system It will be readily available at all time for fire fighting vehicles and a water supply outlet located within the road reserve is within 40m of the following: a. All of the land, or b. A building envelope designated on each lot; or c. The centre of each lot, excluding access handles (where no building envelope is designated); and d. All existing and proposed buildings And Fire hydrants are designed and installed in accordance with Queensland Fire and Emergency Services' Fire Hydrant and Vehicle Access Guidelines, Unless otherwise specified by the relevant water entity	**PO1.1** Development is the establishment of a removable dwelling on an existing lot. The dwelling is located outside a reticulated water supply area.
PO2 Development provides for the safety of people and people by avoiding areas of High or Medium bushfire risk.	**AO1.2** Development outside a water supply area involving proposed or existing buildings with a combined gross floor area greater than 50m^2, are provided with a dedicated on site water storage system that permanently holds a minimum of 10,000 litres (e.g. dam, swimming pool or water tank) for fire-fighting purposes.	**PO1.2** A dedicated on site water storage system that permanently holds a minimum of 10,000 litres is to be available at all times.
PO3 Development provides for the safety of people and property by mitigating the bushfire risk through the siting of buildings.	**AO1.3** A water tank is provided within 10m of each building (other than a class 10 building) which: a) Is either below ground level or of non-flammable construction;	**PO1.3** A dedicated fire-fighting water supply is to be provided, and it is to be in accordance with the requirements of AO1.3.

	b) Has a take-off connection at a level that allows the following dedicated, static water supply to be left available for access by fire fighters: i. 10,000 litres for residential buildings; ii. Includes shielding of tanks and pumps in accordance with AS2304-2011; iii. Includes a hardstand area allowing medium rigid vehicle (15 tonne fire appliance) access within 6m of the tank; iv. is provided with rural fire brigade tank fittings if serviced by a rural fire brigade (i.e. 50mm ball valve and male camlock coupling and, if underground, an access hole of 200mm (minimum) to accommodate suction lines); & v. Is clearly identified by directional signage at the street frontage.	
	AO2.1 Development is not located on land that is subject to High or Medium bushfire risk. **OR** **AO2.2** Where development is located in a High or Medium bushfire risk area (except for single dwellings on existing lots), it complies with a Bushfire Management Plan for the premises	**PO2.1** The location of the proposed house site is mapped by Council as being entirely contained within an area of Medium bushfire risk. Mapping by the Queensland Government identified the bushfire hazard as comprising Very high potential bushfire intensity. **PO2.2** Development is the establishment of a removable dwelling on an existing lot. A site-specific bushfire assessment was undertaken of the site that identified that the dwelling was subject to a BAL of 19. A Bushfire Management Plan has been prepared for the dwelling.
	AO3.1 Buildings and structures:	**PO3.1**

	a) are sited in locations of lowest hazard within the lot; and b) achieve setbacks from hazardous vegetation of 1.5 times the predominant mature canopy tree height or 10m, whichever is the greater; and **c)** are 10 m from any retained vegetation strips or small areas of vegetation; and **d)** are sited so that elements of the development least susceptible to fire are sited closest to the bushfire hazard.	Buildings and structures: a. are located to achieve adequate separation distances from potential hazardous vegetation for a BAL 19; and b. achieve a minimum setback of 44 metres north, and 35 metres east, south and west from potentially hazardous vegetation that enables the dwelling to achieve a BAL of 19. Trees in the area have a mature height of 30-35 metres. The Australian Standard AS3959-2018 allows for the construction of buildings closer to vegetation than this provided that they are built to a higher standard; and c. are greater than 10 metres from small or narrow strips of vegetation that could be considered to be a bushfire hazard; and d. elements that are least susceptible to fire such as lawns and maintained grounds are situated between the dwelling and areas of potential bushfire hazard.

Table 4 Toowoomba Regional Council-Bushfire Hazard Overlay Code Assessable Development

Performance Outcomes	Acceptable Outcomes	Proposed Solutions
For all Development		
PO1 Community infrastructure is only located in a bushfire medium and high risk area where the function and role of the infrastructure necessitates its location in the area and there are no suitable alternative sites in a low bushfire hazard area.	No acceptable outcome is nominated.	Not applicable.
PO2 Community infrastructure is able to function effectively during and immediately after bushfire events.	**AO2.1** The community infrastructure is located on land that is not subject to High or Medium bushfire risk; or **AO2.2** The community infrastructure will not involve any new building work other than a minor extension (<20 m^2 Gross Floor Area) to an existing building; or **AO2.3** The community infrastructure development is located within a bushfire hazard area (as identified in the Bushfire Hazard Overlay Maps) but is designed to function effectively during and immediately after bushfire events.	Not applicable.
Water Supply		
PO3 Development is provided with an adequate water supply for fire fighting purposes that is	**AO3.1** Development within a water supply area involving the creation of a new lot/s or involving proposed and existing buildings with a combined gross floor area greater than 50m^2, is connected to Council's reticulated water supply system It will be readily available	**PS3.1** The site is located outside a reticulated water supply area. A dedicated on site water storage system that permanently holds a minimum of 10,000 litres is to be available at all times.

safely located and freely accessible.	at all times for fire fighting vehicles and a water supply outlet located within the road reserve is within 40m^2 of the following: a. All of the land; or b. A building envelope designated on each lot; or c. The centre of each lot, excluding access handles (where no building envelope is designated); and d. All existing and proposed buildings And Fire hydrants are designed and installed in accordance with Queensland Fire and Emergency Services' Fire Hydrant and Vehicle Access Guidelines, Unless otherwise specified by the relevant water entity **AO3.2** Development outside a water supply area involving proposed or existing buildings with a combined gross floor area greater than 50m^2, are provided with a dedicated on site water storage system that permanently holds a minimum of 10,000 litres (e.g. dam, swimming pool or water tank) for fire fighting purposes. **AO3.3** A water tank is provided within 10m of each building (other than a class 10 building) which: a. Is either below ground level or of non-flammable construction; b. Has a take-off connection at a level that allows the following dedicated, static water supply to be left available for access by fire fighters: c. 10,00 litres for residential buildings; d. (For industrial, commercial; and other buildings, a volume specified in AS2304-2011	**PS3.2** A dedicated on-site water storage system that permanently holds a minimum of 10,000 litres for fire-fighting purposes is to be provided at the time of constructing the dwelling. **PS3.3** Where a water tank is provided for fire fighting purposes, then it is to comply with the requirements of AO3.3.

	e. Includes shielding of tanks and pumps in accordance with AS2304-2011 f. Includes a hardstand area allowing medium rigid vehicle (15 tonne fire appliance) access within 6m of the tank g. Is provided with rural fire brigade tank fittings if serviced by a rural fire brigade (i.e. 50mm ball valve and male camlock coupling and, if underground, an access hole of 200mm (minimum) to accommodate suction lines); and h. Is clearly identified by directional signage at the street frontage	
Hazardous Materials		
PO4 Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on the manufacture or storage of hazardous materials in bulk.	**AO4.1** Development complies with a Bushfire Management Plan for the premises. Note: 'Hazardous materials in bulk' is defined in Section 9, Glossary of the SPP Guideline. Where the assessment manager has not previously approved a Bushfire Management Plan (see Note 1.7 above), the development proponent will be expected to prepare such a plan to the satisfaction of the assessment manager. See Appendix 8 for more information on bushfire management plans.	**PS4.1** Development is to comply with this bushfire management plan. The proposed land use does not include the storage of bulk quantities of hazardous materials.
Reconfiguring a lot and Material Change of Use		
PO5 Lot design and the siting of buildings provide safe sites for habitable and non-habitable buildings.	**AO5.1** All development enables buildings and structures to achieve setbacks from hazardous vegetation that are: a. sited within the area of lowest hazard within the lot; and b. provide for adequate setbacks from hazardous vegetation; and c. 1.5 times the predominant mature canopy tree height or 10m, whichever is the greater; and d. 10m from any retained vegetation strips or small areas of vegetation; and	**PO5.1** The proposed MCU enables the proposed dwelling to be sited: a. In the central portion of the lot to enable separation distances to be achieved on the site to enable the dwelling to achieve a maximum BAL-19; b. To achieve adequate setbacks from potentially hazardous vegetation; c. Within an asset protection zone which achieves a minimum separation distance of 44 metres north, and 35 metres east, south and

	e. sited so that elements of the development least susceptible to fire are sited closest to the bushfire hazard.	west from potentially hazardous vegetation to achieve a maximum BAL of BAL-19 (Appendix B). The height of mature canopy trees on the site is in the order of 30-35 metres. The Australian Standard AS3959-2018 allows for the construction of buildings closer to vegetation than this provided that they are built to a higher standard; and d. The dwelling is setback by a distance greater than 10m from retained vegetation strips onsite; e. With less susceptible elements (e.g. swimming pools) sited closest to the bushfire hazard.
PO6 For development that will result in multiple buildings or lots, roads and access are designed to mitigate against bushfire hazard by ensuring adequate access for: a) fire fighting and other emergency vehicles; and b) the evacuation of people in the event of an emergency.	**AO6.1** The road design is capable of providing access for fire fighting and other emergency vehicles, in accordance with the standards identified in SC6.2 PSP No. 2 – Engineering Standards – Roads and Drainage Infrastructure. **AO6.2** The lot layout ensures that all roads are through roads. **AO6.3** The lot layout does not include long narrow lots, long access ways or rear lots. **AO6.4** The road has a maximum gradient of 1 in 8 (12.5%).	**PS6.1** The adjacent road which services the site (Zeller Road) is capable of providing access to firefighting and other emergency vehicles. Where a driveway is constructed, it is to be capable for providing access for fire fighting and other emergency vehicles. **PS6.2** Not applicable. No new lots are proposed for this development. **PS6.3** Not applicable. **PS6.4** The nature of the development includes establishment of a removable dwelling on an existing property with no new roads proposed. Constructed access to the site will be provided from Zeller Road. The site is located on lands with

		underlying slopes in the order of 3% or 2 degrees; it is expected that future driveways will have similar grades.
PO7 For development that will result in multiple buildings or lots, fire breaks are provided that: a. adequately and effectively separate the development site from surrounding vegetation to mitigate against bushfire hazard; b. have sufficient width to enable continuous access for fire fighting and other emergency vehicles, residents and equipment; and c. are in secure tenure and are maintained.	**AO7.1** The development incorporates a fire break provided by a perimeter road that: a. separates the boundary of the lots and the adjacent bushland; b. has a minimum cleared width of 20m; c. has a formed road width of 6m; and d. is constructed to an all weather standard. **AO7.2** The development includes fire breaks which are located as close as possible to the boundaries of the lot(s) and the adjoining bushfire hazard and the fire breaks have: a. a minimum cleared width of 6m; b. a minimum formed width of 4m; c. a maximum gradient of 1 in 8 (12.5%); d. are constructed and maintained to prevent erosion, provide adequate drainage and provide continuous access for fire fighting vehicles; e. provide passing bays and turning areas for fire-fighting appliances; and f. are either located on public land, or within an access easement that is granted in favour of the Toowoomba Regional Council and the Queensland Fire and Rescue Service. **AO7.3** Vehicular access is provided along and at each end of the fire break to existing fire maintenance trails or roads. **AO7.4**	**PS7.1-4** Due to the siting and nature of the development and the use of perimeter roads as firebreaks, fire management lines are not proposed. The existing Zeller Road reserve provides good access and egress for residents and emergency services. A minimum asset protection zone of 44 metres north, and 35 metres east, south and west is to be achieved and maintained between the dwelling and hazardous understory vegetation.

	The development includes sufficient cleared breaks of 6m minimum width in retained bushland within the development (e.g. creek corridors and retained vegetation) to allow burning of sections and access for bushfire response.	

4.2 State Planning Policy- Bushfire

The State Planning Policy (July 2017) provides a comprehensive set of principles which underpin Queensland's planning system to guide local government and the state government in land use planning and development assessment. The State's interest in relation to natural hazards is: "The risks associated with natural hazards are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards". The State Planning Policy (July 2017) development assessment requirements have been addressed in Table 7.

Table 7 State Planning Policy development assessment requirements (Natural hazards, risk and resilience - Bushfire)

Assessment Benchmark	Development assessment requirement	Proposed solution
Applicable development	A development application for a material change of use, reconfiguration of a lot or operational works on premises in any of the following: 1. bushfire prone areas 2. flood hazard areas 3. landslide hazard areas 4. storm tide inundation areas 5. erosion prone area.	Development is a Material Change of Use (MCU) that will result in the establishment of a dwelling at the site. Development is in an area identified as bushfire prone.
3	Bushfire, flood, landslide, storm tide inundation, and erosion prone areas outside the coastal management district: Development other than that assessed against (1) above, avoids natural hazard areas, or where it is not possible to avoid the natural hazard area, development mitigates the risks to people and property to an acceptable or tolerable level.	PS1. The house site is located in an area of mapped Very high potential bushfire intensity for the site by the Queensland Government Development Assessment Mapping System Nature Hazards Risk and Resilience mapping (Bushfire). The Toowoomba Regional Council Bushfire Hazard Overlay Code mapping identifies the house site is entirely located within an area of Medium bushfire risk mapped for the site. A site-specific hazard assessment was undertaken and a Bushfire Management Report prepared that identifies measures to mitigate the risks to people and property to an acceptable level. Included in the hazard assessment were identification and calculation of a Bushfire Attack Level. Mitigation measures identified include: i. Buildings to comply with relevant standards of building construction including the Building Code of Australia (BCA) and the Australian Standard Construction of buildings in bushfire-prone areas AS3959-2018. A 'worse case scenario' was adopted with an FDI of 70 used in BAL calculations. A BAL of 19 is identified for the proposed dwelling, dependent on the ability to achieve

		and maintain a minimum separation distance of 44 metres north, and 35 metres east, south and west; ii. Provision of an adequate water supply that can be readily accessed for fire-fighting purposes; and iii. Adequate ingress and egress to the site. Provided the measures identified in the Bushfire Management Report are implemented and maintained, the bushfire risk to people, property and infrastructure can be kept to an acceptable level.
4	All natural hazard areas: Development supports and does not hinder disaster management response or recovery capacity and of capabilities.	PS2. Development, comprising a Material Change of Use for the establishment of a dwelling is proposed to occur at the site on the site in an area mapped by Queensland Government Development Assessment Mapping System as comprising Very High Potential Bushfire Intensity. The development actively assists and supports disaster management capacity and capabilities by: i. Providing ready access to a water supply suitable for fire-fighting purposes. This can be achieved by provision of a dedicated on-site water storage system that permanently holds a minimum of 10,000 litres for fire fighting purposes; and ii. Managing potentially hazardous fuel loads on the site.
5	All natural hazard areas: Development directly, indirectly and cumulatively avoids an increase in the severity of the natural hazard and the potential for damage on the site or to other properties	**PS3**. The development takes into consideration topography, location of existing vegetation and potential natural hazards. Mitigation measures identified include: i. Maintenance of vegetation (including understorey) on the site to prevent the accumulation of hazardous fuel loads; ii. Ongoing management of woody environmental and highly flammable weeds such as Lantana in the vicinity of dwelling; iii. Establishment of a minimum separation distance of 44 metres north, and 35 metres east, south and west from areas of potentially

		hazardous vegetation on lands under the management of the landholder; iv. Landscaping near buildings to consist of plants that have low flammability.
6	All natural hazard areas: Risks to public safety and the environment from the location of hazardous materials and the release of these materials as a result of a natural hazard are avoided.	**PS4**. The development comprises a Material Change of Use for establishment of a dwelling. The nature of this development is such that it will not involve the location or use of hazardous materials on the site. In this situation there is low potential for the release of these materials as a result of a natural hazard event.
7	All natural hazard areas: The natural processes and the protective function of landforms and the vegetation that can mitigate risks associated with the natural hazard are maintained or enhanced.	**PS5**. The development seeks to maintain and enhance the protective function of landforms and vegetation present on the site by: i. Ongoing and effective management of environmental weeds on the site; ii. Maintaining an area of low fuel load between the dwelling and retained vegetation areas; iii. Retaining the natural landform by minimising the extent of major earthworks required, and iv. Ensuring that any landscape plantings are compatible with the natural environment and do not contribute to an elevated bushfire hazard. Incorporation of these measures in the development will enable natural processes and functions to continue and aid in the mitigation of risks associated with potential natural hazards.

5 Mitigating the bushfire risk

5.1 Vegetation management

Maintenance of vegetation near the dwelling will assist in managing fuel loads and associated bushfire risks. The identified asset protection zone should be maintained in a 'low fuel load' state. **Contrary to common belief, the area around the building does not need to be totally devoid of vegetation, and in fact some trees in this area can serve a valuable role in trapping embers before they impact on the asset.** It is important however that:

- There are substantial gaps (of at least 2 - 5m) between the canopies of any trees in this area.
- There are no continuous fuels linked horizontally or vertically. (Smooth barked trees provide a lesser fuel ladder to the canopy than rough barked or ribbon barked species).
- Tree canopies do not overhang the roof.
- Surface and near surface fuels are kept to a minimum. This includes lawns to be kept short (less than 10 cm in height) and removal of accumulated leaf and bark litter.
- Avoidance of flammable mulches on garden beds such as woodchip or straw within 10 metres of the dwelling.
- Use of non-flammable mulches such as river pebbles or stones on garden beds near dwellings and buildings.

If these steps are followed it should be possible for fuel loads to be maintained at 5 tonnes per hectare or less. Failure to maintain the asset protection zone in a low fuel load state could significantly elevate the intensity of a bushfire should one occur. Appendix C contains additional details on creating and maintaining an Asset Protection Zone and guidelines for landscaping in fire prone areas are provided in Appendix D.

It is worth noting that findings from the major bushfires in southern states identified that one of the most important factors in building survival was effective vegetation management (e.g. maintenance of low fuel loads and shrubby understorey) for a minimum radius of 40 metres around the house site.

5.2 Water supply

An adequate water supply suitable for firefighting purposes should be available at all times. The TRPS (2012 Version 28) Bushfire Hazard Overlay Code requires that the dwelling be provided with a reliable water supply for fire-fighting purposes that is safely located and freely accessible. This can be achieved by provision of a dedicated on site water storage system that permanently holds a minimum of 10,000 litres for fire fighting purposes that:

- is of non-combustible construction;
- is provided with rural fire brigade tank fittings of a 50mm ball valve and male camlock coupling; and
- allows access to a fire appliance within 6m of the tank.

5.3 Site access

Access to the site is via a constructed gravel road of all-weather access (Zeller Road) which is located on the western boundary of the site. Adequate access is to be constructed and maintained to enable efficient, practical access to buildings and water supply for emergency services appliances.

5.4 Adjacent structures

Where any garage, carport, or similar structure is not attached to the dwelling covered by this report, the entire garage, carport, or similar roofed structure on the subject allotment shall comply with the construction requirements of this report, alternatively the building shall be at least 6m from the dwelling covered in this report or it shall be separated by a fire wall with an FRL -/60/60.

5.5 Location of dwelling

The house site is located in the central portion of the site to optimise separation distances from potentially hazardous vegetation in all directions surrounding the site. This has enabled a separation distance of greater than 44 metres north, and 35 metres east, south and west from potentially hazardous vegetation to be achieved with the dwelling being exposed to a BAL of 19.

5.6 Prepare, Act, Survive

The site is located within an identified bushfire hazard area. It is critically important that residents are well prepared during times of high fire danger and have well made plans that can be readily enacted in a time of bushfire emergency.

5.7 Maintenance of bushfire mitigation measures

It is the landholders' responsibility to ensure that the bushfire mitigation measures identified in this report are implemented and maintained into the future. Failure to maintain these measures may contribute to the dwelling being exposed to a higher level of bushfire threat and attack should one occur in the area.

6 Minimisation of risk - building

A number of construction measures are required to minimise the risk of bushfire impact on the dwelling, including construction of a dwelling in compliance with the National Construction Code and the Australian Standard for construction of buildings in bushfire-prone areas (AS3959-2018).

Some key areas of construction to be considered dependant on the identified BAL rating include:

- Sarking of roofs, or
- Installation of foil-backed insulation blankets (anticon) over battens under roof sheeting,
- Screening of vents and weepholes in external walls and eve linings,
- Use of bushfire resisting material for cladding,
- Screening of the openable parts of windows to be screened with corrosion resistant steel mesh with a maximum aperture of 2mm,
- Maximum permissible gaps for garage doors (roller and panel lift), and
- Use of bushfire-resistant timber or a non-combustible material for decking.

Specific construction requirements are to be confirmed by the builder. Construction of the dwelling is to comply with the National Construction Code and the Australian Standard for construction of buildings in bushfire-prone areas (AS3959-2018).

7 Safety of people

Any residential property located in a Bushfire prone area should have its own smoke alarms and basic fire-fighting equipment, and a fire fighting, and evacuation procedure should be in place and well-rehearsed.

8 Conclusions

The dwelling has been identified as being exposed to a Bushfire Attack Level (BAL) of BAL-19. This fire report has been prepared on the basis that a minimum separation distance of greater than to be achieved with the dwelling being exposed to a BAL of 19 can be achieved and maintained between the dwelling and hazardous understorey vegetation. Failure to maintain these separation distances will result in a higher Bushfire Attack Level (BAL) being applied to the dwelling.

The contents of this report should be implemented, and the attached appendices heeded in order to ensure that the highest level of protection can be achieved for the residents and their property.

Appendices

Appendix A Calculation of Bushfire Attack Level

AS3959-2018 Method 2 was used to determine the Bushfire Attack Levels that the house site is exposed to. The State Planning Policy Asset Protection Zone Width Calculator was used to determine the potential Bushfire Attack Level (BAL).

Vegetation Hazard Class

The new methodology for State-wide mapping of bushfire prone areas in Queensland identifies Potential Fuel Loads that are assigned to vegetation categories (Vegetation Hazard Classes) formed by amalgamating land use and vegetation types with a moderately consistent fuel load and structure. The Potential Fuel Load assigned to each Vegetation Hazard Class (VHC) is generally representative of the higher fuel load expected for the typical vegetation types, landscape and site conditions within each Vegetation Hazard Class. This Potential Fuel Load of each Vegetation Hazard Class would approximate the 80th percentile fuel load of the "long unburnt condition" for the class (generally greater than 10 years without burning). The Vegetation Hazard Classes (VHC) mapped for the site and surrounds (within 150m radius) were identified to be VHC 8.1 Wet eucalypt tall open forests and VHC 40.4 Continuous low grass or tree cover (Figure 8).

Range Environmental completed a detailed site assessment to facilitate preparation of a representative vegetation hazard class map in relation to the site. Based on detailed field assessment, a site-based vegetation hazard class map has been produced to accurately determine potential bushfire hazards and resulting building requirements for the site (Figure 9). The VHCs applicable for the site were identified to be VHC 8.1, VHC 8.2 Wet eucalypt tall woodland and VHC 40.4. Table 5 provides a brief description of VHCs and their potential fuel load characteristics.

Table 5 Vegetation hazard class description and 80th percentile potential fuel load

Vegetation Hazard Class (VHC)	Surface (t/ha)	Near surface (t/ha)	Elevated	Bark	Total
8.1 Wet eucalypt tall open forest	28.0	3.0	2.0	2.0	35.0
8.2 Wet eucalypt tall woodlands	18.0	3.1	1.7	1.0	23.8
40.4 Continuous low grass or tree cover	0.5	4.0	0.5	0.0	5.0

Fuel load data sources from Bushfire Resilient Communities Technical Reference Guide October 2019

It is noted that VHC 40.4 is considered a non-hazardous VHC under Bushfire Resilient Communities (2019) and BAL calculations using the SPP APZ calculator involving this VHC results in a radiant heat flux of 0kW/m^2 (BAL-Low). VHC 40.4, while listed as a grass fire prone VHC with a continuous fuel load under Bushfire Resilient Communities (2019), is considered a non-hazardous VHC due to low fuels loads of 5t/ha or less and calculations using the SPP APZ calculator involving this VHC results in a radiant heat flux of 0kW/m^2 (BAL-Low).

Figure 8 Vegetation Hazard Class Mapping

Project:
Lot 1 Zeller Road, Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 20 40

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling
- 150m buffer
- 8.1 Wet eucalypt tall open forest
- 36.1 Exotic & hardwood plantation
- 40.4 Continuous low grass or tree cover
- 42.6 Nil to very low vegetation cover

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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range environmental consultants

Figure 9
Ground Truthed VHCs

Project:
Lot 1 Zeller Road, Mount Luke

Client:
Aaron Stalling

Project No.: J002898

Compiled by: GabiLevay Date: 22/05/2026
Approved by: Will Gibson Date: 22/05/2026

Metres
0 20 40

Legend

- Cadastre
- Roads
- Site boundary
- Proposed dwelling
- 150m buffer
- 8.1 Wet eucalypt tall open forest
- 8.2 Wet eucalypt tall woodland
- 40.4 Continuous low grass or tree cover

Source: Cadastral data sourced from DNRME (2026). Aerial imagery sourced from NearMap (2026).

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range environmental consultants

Table 6 State Planning Policy Asset Protection Zone Width Calculator (VHC 8.1 – upslope north).

SPP Bushfire Asset Protection Zone Width Calculator			
VARIABLE DESCRIPTION	**VARIABLE**	**UNITS**	**VALUE**
Input Values			
FIRE WEATHER SEVERITY	**FDI**		70.00
VEGETATION HAZARD CLASS	**VHC**	-	8.1 Wet eucalyptus tall open forest
REMNANT STATUS	**-**	-	Remnant
SLOPE TYPE (UPSLOPE OR DOWNSLOPE)	**ST**	-	Upslope
EFFECTIVE SLOPE UNDER THE HAZARDOUS VEGETATION	**eSlope**	degrees	1.00
SLOPE BETWEEN SITE AND HAZARDOUS VEGETATION	**θ**	degrees	1.00
DISTANCE OF THE SITE FROM HAZARDOUS VEGETATION	**d**	m	44.00
Output Values			
SURFACE FUEL LOAD	**-**	t/ha	28.00
NEAR SURFACE FUEL LOAD	**-**	t/ha	3.00
BARK FUEL LOAD	**-**	t/ha	2.00
ELEVATED FUEL LOAD	**-**	t/ha	2.00
TOTAL OVERALL FUEL LOAD	**W**	t/ha	35.00
TOTAL SURFACE FUEL LOAD	**w**	t/ha	31.00
POTENTIAL FIRE LINE INTENSITY	**I**	kW/m	47089
RADIANT HEAT FLUX	**q**	kW/m^2	18.43
BUSHFIRE ATTACK LEVEL (AS 3959-2018)	**BAL**	-	BAL 19
DISCLAIMER: Fire-line intensity and radiant heat calculations where effective slope exceeds 20 degrees (downslope) or 15 degrees (upslope) may be unreliable. In these locations, specialist assessment is warranted.			

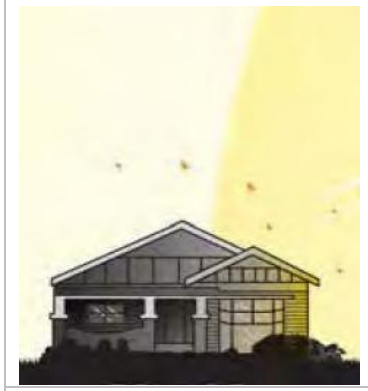
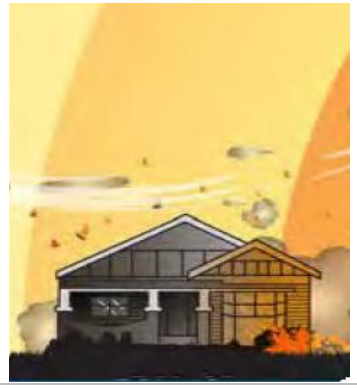
Table 7 State Planning Policy Asset Protection Zone Width Calculator (VHC 8.2 – level with east and west).

SPP Bushfire Asset Protection Zone Width Calculator			
VARIABLE DESCRIPTION	**VARIABLE**	**UNITS**	**VALUE**
Input Values			
FIRE WEATHER SEVERITY	**FDI**		70.00
VEGETATION HAZARD CLASS	**VHC**	-	8.2 Wet eucalyptus tall woodland
REMNANT STATUS	**-**	-	Remnant
SLOPE TYPE (UPSLOPE OR DOWNSLOPE)	**ST**	-	Upslope
EFFECTIVE SLOPE UNDER THE HAZARDOUS VEGETATION	**eSlope**	degrees	1.00
SLOPE BETWEEN SITE AND HAZARDOUS VEGETATION	**θ**	degrees	1.00
DISTANCE OF THE SITE FROM HAZARDOUS VEGETATION	**d**	m	35.00
Output Values			
SURFACE FUEL LOAD	**-**	t/ha	18.00
NEAR SURFACE FUEL LOAD	**-**	t/ha	3.10
BARK FUEL LOAD	**-**	t/ha	1.70
ELEVATED FUEL LOAD	**-**	t/ha	1.00
TOTAL OVERALL FUEL LOAD	**W**	t/ha	23.80
TOTAL SURFACE FUEL LOAD	**w**	t/ha	21.10
POTENTIAL FIRE LINE INTENSITY	**I**	kW/m	21795
RADIANT HEAT FLUX	**q**	kW/m^2	16.92
BUSHFIRE ATTACK LEVEL (AS 3959-2018)	**BAL**	-	BAL 19
DISCLAIMER: Fire-line intensity and radiant heat calculations where effective slope exceeds 20 degrees (downslope) or 15 degrees (upslope) may be unreliable. In these locations, specialist assessment is warranted.			

Table 8 State Planning Policy Asset Protection Zone Width Calculator (VHC 8.2 – downslope south).

SPP Bushfire Asset Protection Zone Width Calculator			
VARIABLE DESCRIPTION	**VARIABLE**	**UNITS**	**VALUE**
Input Values			
FIRE WEATHER SEVERITY	**FDI**		70.00
VEGETATION HAZARD CLASS	**VHC**	-	8.2 Wet eucalyptus tall open woodland
REMNANT STATUS	**-**	-	Remnant
SLOPE TYPE (UPSLOPE OR DOWNSLOPE)	**ST**	-	Downslope
EFFECTIVE SLOPE UNDER THE HAZARDOUS VEGETATION	**eSlope**	degrees	2.00
SLOPE BETWEEN SITE AND HAZARDOUS VEGETATION	**θ**	degrees	2.00
DISTANCE OF THE SITE FROM HAZARDOUS VEGETATION	**d**	m	35.00
Output Values			
SURFACE FUEL LOAD	**-**	t/ha	18.00
NEAR SURFACE FUEL LOAD	**-**	t/ha	3.10
BARK FUEL LOAD	**-**	t/ha	1.70
ELEVATED FUEL LOAD	**-**	t/ha	1.00
TOTAL OVERALL FUEL LOAD	**W**	t/ha	23.80
TOTAL SURFACE FUEL LOAD	**w**	t/ha	21.10
POTENTIAL FIRE LINE INTENSITY	**I**	kW/m	25020
RADIANT HEAT FLUX	**q**	kW/m^2	18.89
BUSHFIRE ATTACK LEVEL (AS 3959-2018)	**BAL**	-	BAL 19
DISCLAIMER: Fire-line intensity and radiant heat calculations where effective slope exceeds 20 degrees (downslope) or 15 degrees (upslope) may be unreliable. In these locations, specialist assessment is warranted.			

Appendix B Bushfire Attack Levels explained

				
BAL-12.5	BAL-19	BAL-29	BAL-40	BAL-FZ
The risk is considered to be **LOW**	The risk is considered to be **MODERATE**	The risk is considered to be **HIGH**.	The risk is considered to be **VERY HIGH**.	The risk is considered to be **EXTREME.**
There is a risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m^2.	There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2.	There is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m^2.	There is a much increased risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m^2.	There is an extremely high risk of ember attack and burning debris ignited by windborne embers, and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2.

Images sourced from Planning Practice Note 65 September 2014 Victoria State Government

Appendix C Living in a Bushfire Prone area

A bushfire can ignite fuel and spread in three ways:

- Embers and burning debris carried by wind,
- Heat radiation from fire, and
- Direct flame contact

	Ignition of buildings by burning embers carried by the wind
	Ignition of buildings by heat radiation from the fire
	Ignition of buildings by direct flame contact

Figure 10 The three main elements of bushfire, which threaten life and property. (Ramsay & Rudolf 2003)

Overall, the intention of bush fire protection measures should be to prevent flame contact to a structure, reduce radiant heat to below the ignition thresholds for various elements of a building, to minimise the potential for wind driven embers to cause ignition and reduce the effects of smoke on residents and fire-fighters.

Whilst research shows that ember attack ultimately claims more vacant houses than radiant heat or flames, if a house is occupied, ember attack can be relatively easily dealt with. The consequence of leaving a house unattended is that there will probably be nobody there to prevent the small fires which initially start, from gradually taking hold of various parts of the structure. This process can occur over a significant period of time, usually simply with embers which fly about and settle, and start smouldering. The hot windy conditions associated with the fire help fan the smouldering clumps of fuel, and bring many small fires to life. These are

usually easy fires to extinguish if there is someone there with the equipment and water to put them out. In their absence, often some time, even hours after the initial fire front, the house succumbs to small fires which have grown to larger ones.

Over 90% of houses burnt down in bushfires are attributable to ember attack, and the vast majority of these are unattended at the time. In the 1984 study of the Ash Wednesday Fires around Mt Macedon, the survival rate amongst the 450 houses was 82% where they were occupied and 90% where the occupants were active, able bodied defenders, while only 30% of houses survived without someone to patrol them (Wilson & Ferguson, 1984).

Asset Protection Zones

The most immediate form of defense for an asset is a well-designed Asset Protection Zone (APZ). An APZ is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, or commercial buildings.

Various amenities can contribute to the Asset Protection Zone, provided they are not combustible or otherwise they will add to radiant heat levels. Such amenities include driveways, tennis courts, swimming pools or fire trails, each adding to the distance from the hazard.

Radiant heat barriers such as non-combustible walls or water tanks can help shield assets from radiant heat, thereby complementing the APZ, and in some cases reducing the requirement for distance from the hazard to a degree.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property

Potential 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.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset;
- damage to the built asset from intense radiant heat; and
- ember attack on the asset.

The APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

Inner Protection Area (IPA)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the area around the building, consisting of a mown lawn and well-maintained gardens. When establishing and maintaining an IPA the following requirements apply:

Trees

- Tree canopy cover should be less than 15% at maturity;

- trees at maturity should not touch or overhang the building (preferably, there should be no trees within 10 metres of a dwelling);
- lower limbs should be removed up to a height of 2m above the ground; and
- tree canopies should be separated by 2 to 5m.

Shrubs

- Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

Outer Protection Area (OPA)

An OPA is located between the IPA and unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

When establishing and maintaining an OPA the following requirements apply:

Trees

- Tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5metres

Shrubs

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

Grass

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

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bushfires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

The required distances for Asset Protection Zones are dependent on the vegetation type (hazard), the slope of the site and whether the hazard is upslope or downslope from the asset. In this situation, it is recommended that an APZ be established as illustrated in Figure 11.

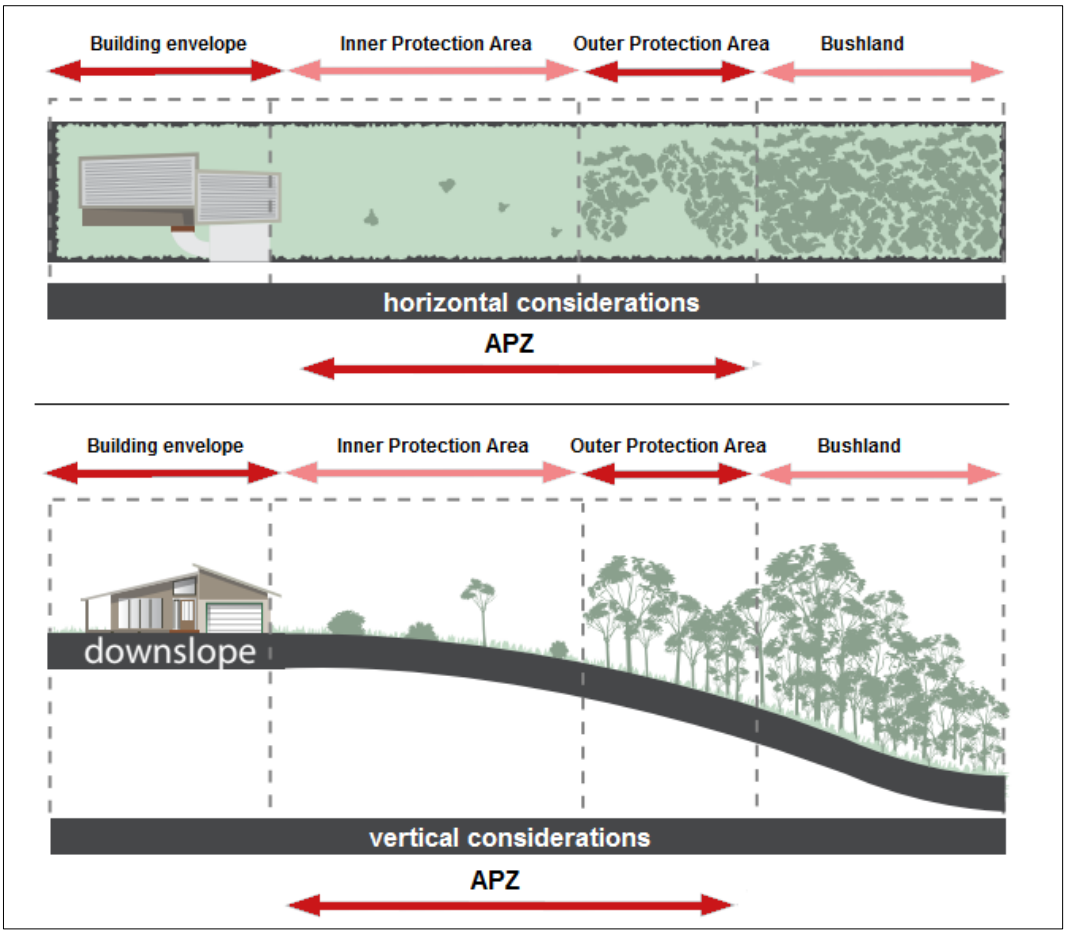


Figure 11 Building envelopes and their relationship to potentially hazardous vegetation. (Planning for Bushfire Protection 2017)

Information presented in this Appendix was drawn from Planning for Bushfire Protection, A guide for councils, planners, fire authorities and developers (NSW Rural Fire Service November 2019) and Standards for Asset Protection Zones (NSW Rural Fire Service undated).

Appendix D Landscaping in Fire Prone Areas

The design, management and maintenance of the landscape in the immediate vicinity of buildings are fundamental to the chances of survival of both people and buildings in a bushfire event. Vegetation provides the major fuel element in a bushfire. All vegetation, regardless of how succulent or green it is will eventually burn, provided the fire has sufficient intensity. When landscaping in bushfire prone areas, it is important to use or retain plants of low flammability that have the relevant characteristics as identified in Table 9.

Table 9 Characteristics of low flammability species and effect on performance in bushfire situations

Plant attribute	Effect	Design measure
Foliage moisture content	Leaves with higher moisture content retard ignition and slow the rate of combustion	Select species with high leaf moisture content (e.g. rainforest species, succulents and semi-succulents)
Foliage volatile oil content	Foliage with higher volatile oil content ignite more readily and enhance ignition of surrounding vegetation, even though volatile oils themselves do not contribute significantly to total radiant heat	Select species with lower volatile oil content
Foliage mineral content	Foliage with higher mineral content tend to be less flammable (e.g. Amyema spp mistletoes)	Species selection should favour species with higher leaf mineral content
Leaf fineness	The ratio of area-to-volume of leaves is one of the main factors affecting ease of ignition and intensity of burning. Finer leaves (greater area to volume ratio) tend to ignite and burn more easily than broader leaves	Species selection should favour broad-leafed species
Density of foliage and continuity of plant form	Species with continuous, denser foliage can act as a barrier to wind-borne embers and radiant heat; however, increased density can increase flammability. Species with open branching and low foliage density are less effective as a barrier, though can be less flammable	Select species on a case-by-case basis
Height of lowest foliage	Shrub and tree species with persistent low height foliage are more likely to be ignited by surface fires, allowing the spread of fires into the canopy above	Species selection should favour species which can be maintained or pruned to reduce persistent, near-ground foliage
Size of plant (volume and spread)	The effect of plant size varies according to volume or spread. Species with a greater spread tend to be more effective as a barrier to the diffusion of radiant heat than narrower trees with the same volume. Species with a greater volume can result in increased ember attack, radiation and flame if ignited. For example, narrow columnar trees are	Species selection should ensure plant size (volume and spread) does not increase ignition likelihood

Plant attribute	Effect	Design measure
	less effective as a barrier than wider trees with the same overall volume	
Dead foliage on plant	Persistent dead leaves and woody twigs increase flammability	Species selection should favour species which have a low volume of persistent dead leaves and woody material or can be maintained or pruned to reduce persistent, dead leaves and woody material
Bark texture	Loose, flaky, stringy, papery or ribbon-like bark contribute to ladder fuels which: • can contribute to destructive crown fires • act as a potential source of flame, radiant heat and ember attack	Avoid species with persistent loose, flaky, stringy, papery or ribbon-like bark. Species selection should favour smoothbarked and tightly-held bark species
Potential available surface fuel	The availability of surface fuel is a function of volume (quantity) and fineness. The fireline intensity increases in proportion to available fine fuel quantity. Fine fuel includes dead fallen material such as leaves, bark, twigs and branches up to 6mm in diameter (forest) and grass greater than 5cm in height (grasslands). Coarse fuel ignites less readily but may burn for longer	Species selection should favour species which do not contribute significantly to persistent, fine ground fuel

The characteristics of low flammability species and effect on performance in bushfire situations was sourced from the publication *Bushfire Resilient Communities, Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'*.

To assist building survival in a bushfire event, it is important that a fuel-reduced zone is maintained around it. This can be achieved by keeping all vegetation away from the building or by using low flammability plantings to help shield the building from radiant heat. Trees and shrubs that drop litter should not be planted or retained close to buildings where they can contribute to the accumulation of flammable material.

Ongoing maintenance of vegetation should be undertaken in the area surrounding the site to prevent hazardous fuel loads from occurring. These actions include:

- Pruning lower branches of trees to provide a minimum vertical 2 metre high fire break;
- Removal of loose bark, dead twigs, leaves;
- Regular mowing of lawns;
- Keeping other grassed areas to less than 100mm in height;
- Use of non-flammable mulches such as river pebbles or stones on garden beds near buildings; and
- Avoidance of flammable mulches on garden beds such as woodchip or straw.

www.rangeenviro.com.au

BRISBANE
Unit 1/7 Birubi Street
Coorparoo Qld 4151

TOOWOOMBA
Office A, 189 Hume St
Toowoomba QLD 4350

T 07 4588 6711
E admin@rangeenviro.com.au