

BUSHFIRE MANAGEMENT PLAN

248 Woolmer Road,
Woolmer



Client: Bird in Hand 3 Pty Ltd

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Date: 20/12/2021



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Document Version Register

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1. Executive summary

A Reconfiguring of a Lot (RaL) application for a residential subdivision is proposed to be lodged for 248 Woolmer Road, Woolmer, described as Lot 5 on SP265876 (hereafter referred to as 'the site'). The development comprises the subdivision of a Lot into approximately 201 residential lots with sizes between 503-1019m² over 7 stages, and a regulated vegetation area.

1.1 Bushfire

The site is identified by the Toowoomba Regional Council Planning Scheme (2012) as containing areas of Medium bushfire hazard. The Queensland Government State Planning Policy Interactive Mapping System Natural Hazards and Risk Resilience Mapping identifies that the site contains areas of Medium Potential Bushfire Intensity and Bushfire Potential Impact Buffer.

1.2 Mitigation measures

The implementation of the following measures will assist in addressing environmental and bushfire issues on the site.

1.3 Construction of buildings

Careful design of new buildings should be undertaken; taking into consideration site characteristics and relevant building standards including the Australian Standard for Construction of buildings in bushfire-prone areas (AS3959-2018) and the Building Code of Australia. Bushfire Attack Levels (BAL) vary across the site from BAL-Low for lots on the southern portion of the site to a maximum of BAL-19 for lots closest to bushland areas. However, BALs for houses built on lots closest to bushland areas will be in the order of BAL-12.5 to BAL-19

1.4 Access and egress

All lots within the site are provided with access to sealed roads of an all-weather standard that are suitable for use by emergency service vehicles such as urban fire brigade trucks. The Lot layout has been designed to ensure that lots are well-separated from areas of potentially hazardous vegetation. Access to the site from Browne Road is through an area of open grassy woodland. Bushfires in the area are likely to be fast moving grassfires. The safest option for residents is to remain indoors rather than evacuating through an area of bushfire hazard.

1.5 Fire trails

No fire trails are proposed due to the establishment of a perimeter road which separates areas of development from potentially hazardous vegetation. Where walking trails or other access provisions are provided in proximity to the bushland area, these may provide auxiliary access for fire/vegetation management purposes.

1.6 Vegetation management

The majority of lots in the development are located in areas that are well-separated from areas of potentially hazardous vegetation. As the development progresses, a low fuel load zone should be maintained between each stage and surrounding undeveloped lands of up to 50 metres width. In areas where a perimeter road is not present, fuel loads in grassland areas can be managed by slashing or grazing by livestock. Where vegetation management is identified by the ecological assessment to be appropriate, this may assist in maintaining or reducing site fuel loads.

1.7 Water supply

The Toowoomba Regional Council Planning Scheme (2012 Version 26) Bushfire hazard overlay code requires that the development is provided with a reliable water supply for fire-fighting purposes that is safely located and freely accessible. All lots will be provided with access to a reticulated water supply that can achieve suitable pressures and flow rates for fire-fighting purposes. Additionally, all potential dwellings will be located within 40 metres of a fire hydrant.

1.8 Maintenance of bushfire mitigation measures

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

2. Introduction

Range Environmental Consultants was engaged to undertake a bushfire assessment of the site and to prepare a Bushfire Management Report for the proposed development at Woolmer. The development comprises the subdivision of a Lot into approximately 201 residential lots and a regulated vegetation area.

2.1 General Site Details

Table 1 Summary of general site details

| | |
|---|---|
| Address | 248 Woolmer Road, Woolmer |
| Lot on Plan | Lot 5 SP265876 |
| Area | 90.3ha |
| Local Government Area | Toowoomba Regional Council |
| Planning Scheme / Local Plan | Toowoomba Regional Council Planning Scheme (2012 Version 26) |
| Overlay Codes | Environmental Significance, Bushfire Hazard, Airport Environs, Flood Hazard, Agricultural Land |
| VMA 1999 | Category B (Least concern Regional Ecosystem 11.8.8/11.8.2a, Of Concern RE 11.8.3), Category C (Least Concern RE 11.8.8/11.8.2a) and Category X |
| Area Classification / Zone | Low density residential/General Precinct |
| Regional Plan Land Use Designation | Urban Footprint |

The site is located in the locality of Woolmer on the north-western boundary of Highfields. Access to the site is via Browne Road to the north which then connects to Highfields Road. Rural lands are present to the west, Low Density Residential areas to the south and east, Low-Medium Density Residential areas to the east, and Community Facilities rural areas to the north.

Figure 1 provides an aerial view of the site and its context within the surrounding landscape, Figure 2 provides contours for the site with Figure 3 illustrating the proposed development superimposed on an aerial image.

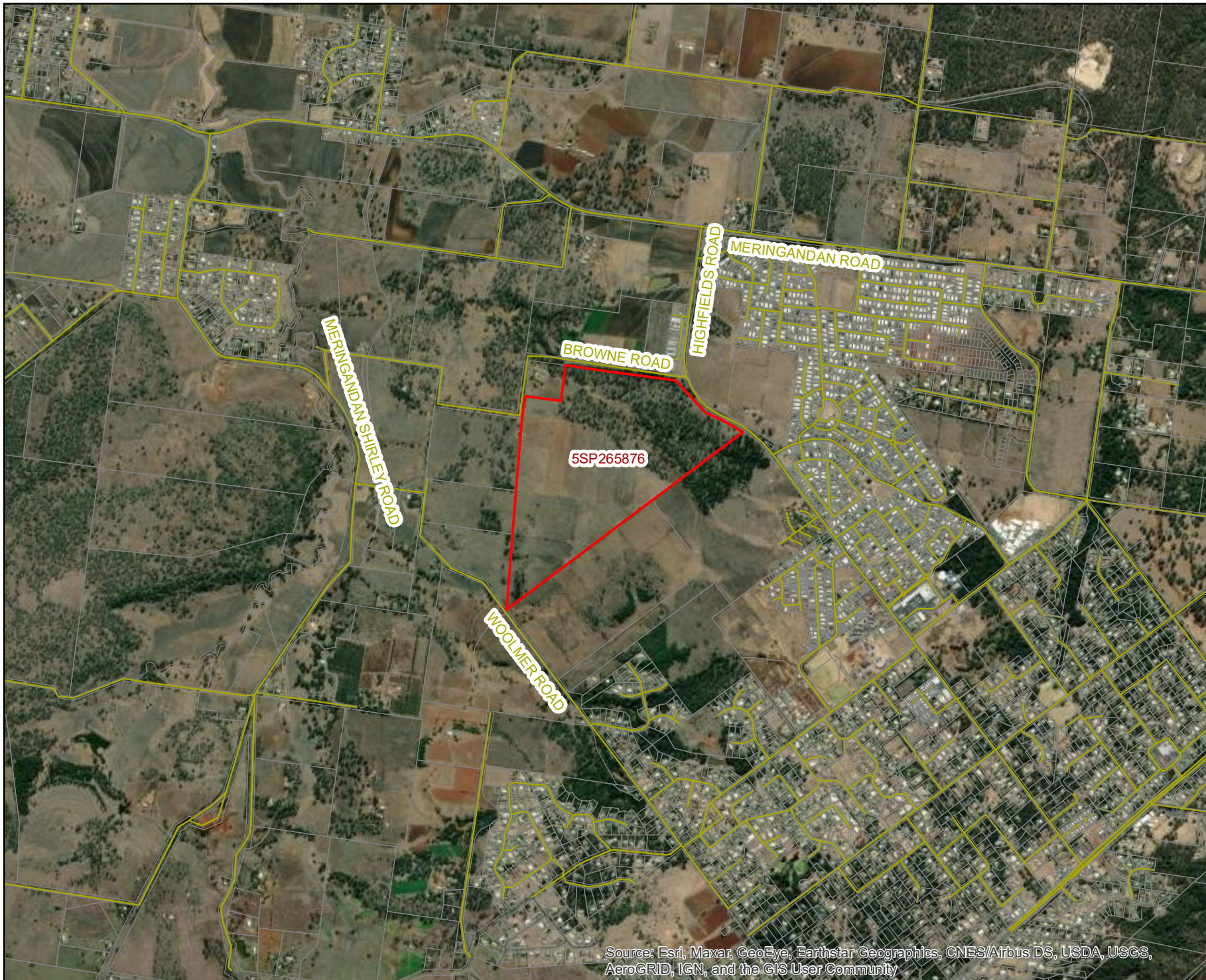


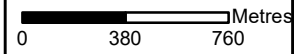
Figure 1 Site Locality

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Legend

- Site Boundary
- Cadastre
- Roads

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Source: Cadastral data sourced from DNRME (2021).



Figure 2 Topography of the Site

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0 110 220 Metres

Legend

-  Site Boundary
-  Cadastre
-  Roads
-  Contours (10m)

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N



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



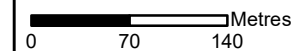
Figure 3 Proposed Development

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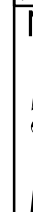


Legend

- Site Boundary
- Cadastre
- Roads
- Road Reserve
- Pedestrian Link
- Proposed Lot Layout
- Stage 1
- Stage 2
- Stage 3
- Stage 4
- Stage 5
- Stage 6
- Stage 7

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2.2 Site Description

Lands containing stages 1 to 7 of the project comprise open grassland areas that are currently grazed with the northern portion of the site containing scattered trees. A gully runs to the northwest through the northern portion of the site, within the vegetated extent of the site. The open grassed areas of the site fall to the northwest with underlying slopes in the order of 5% or 3°. The area between the gully and the proposed development falls to the north with underlying slopes in the order of 14% or 8°.

The following photographs provide a visual representation of the site and vegetation present.



Photograph 1 View to the west over the area proposed for residential lots



Photograph 2 View of the gully north of the development area



Photograph 3 View of vegetation located in the gully area north of the proposed development



Photograph 4 View to the northeast along the eastern boundary of the site

3. Vegetation

Saunders Havill Group (2021) assessed the site as:

"Of concern RE11.8.3 is mapped along the southern edge of the northern vegetation, however on-site observations of this vegetation considered this mapping to be inaccurate. The mapped area contained elements of a vine thicket community however it is observed to be highly modified and would not meet the thresholds of the regional ecosystem description. The remaining mapped vegetation within the north of the site consists of composite ecosystems of least concern remnant and regrowth RE 11.8.2 and RE 11.8.8."

REs 11.8.2 and 11.8.8 are described in Table 2. The extent of mapped vegetation in the area and its conservation status is shown in Figure 4.

Eucalyptus crebra was the dominant native tree species on the site, with limited numbers of *E. tereticornis* and *E. melliodora*. Mature trees are in the height range of 15 to 23 metres.

Table 2 Regional Ecosystem Vegetation Descriptions

| Regional ecosystem: | 11.8.8 | Conservation status: | Least Concern | Biodiversity status: | No concern at present |
|---------------------|---|----------------------|---------------|----------------------|-----------------------|
| Description: | Woodland usually dominated by either <i>Eucalyptus albens</i> (White Box) or <i>E. crebra</i> (Narrow-leaved Ironbark). <i>Eucalyptus tereticornis</i> (Forest Red Gum) is an associated species that becomes locally dominant on creek lines. Other tree species that may be present include <i>Callitris baileyi</i> (Cypress), <i>Angophora subvelutina</i> (Broadleaf Apple), <i>Brachychiton populneus</i> (Kurrajong), <i>E. melliodora</i> (Yellow Box), <i>E. orgadophila</i> (Mountain Coolibah), <i>Angophora floribunda</i> (Roughbark Apple), <i>E. moluccana</i> (Grey Box), <i>E. macrocarpa</i> (Grey Box), <i>E. biturbinata</i> (Grey Gum), <i>E. melanophloia</i> (Silver-leaved Ironbark) and <i>Corymbia clarksoniana</i> (Clarkson's Bloodwood). There is often a sparse low tree layer dominated by similar species to the canopy. The shrub layer is absent or sparse and consisting of species such as <i>Cassinia laevis</i> (Coughbush), <i>Olearia elliptica</i> (Sticky Daisy Bush), <i>Acacia implexa</i> (Lightwood), <i>Xanthorrhoea glauca</i> (Grass tree) or <i>Jacksonia scoparia</i> (Dogwood). The ground layer is usually dominated by grasses of variable composition. Common species include <i>Themeda triandra</i> (Kangaroo Grass), <i>Bothriochloa decipiens</i> (Pitted Bluegrass), <i>Dichanthium sericeum</i> (Queensland Bluegrass), <i>Cymbopogon refractus</i> (Barb Wire Grass), <i>Aristida</i> spp. (Wire Grass), Forbs or sedges such as <i>Gahnia aspera</i> (Saw Sedge), <i>Asperula conferta</i> (Common Woodruff) or <i>Desmodium varians</i> (Tick Trefoil) frequently occur. Occurs on hilltops and sides formed from Cainozoic basaltic rocks. | | | | |
| Regional Ecosystem: | 11.8.2 | Conservation Status: | Least Concern | Biodiversity Status: | No concern at present |
| Description: | <i>Eucalyptus tereticornis</i> predominates and together with other tree species forms a distinct but discontinuous canopy (14-23m high). <i>Eucalyptus melliodora</i> is usually present in the canopy and often is codominant. Scattered <i>E. longirostrata</i> , <i>E. saligna</i> or <i>E. grisea</i> may be present on wetter sites while <i>Angophora floribunda</i> and occasional <i>E. microcarpa</i> occur on the less, well-drained depressions and flat areas. Scattered tall and lower shrubs are usually present, but rarely form conspicuous layers. The ground layer is dense and dominated by perennial | | | | |

grasses. Occurs on steep slopes of hills and mountains (subregion 23) formed from basalt. The soils are generally shallow (< 60 cm deep), brown to grey-brown, gradational, clay-loams and clays. Basalt stones and boulders can occur on the surface. (BVG1M: 11a)

Vegetation communities in this regional ecosystem include:

11.8.2a: *Eucalyptus tereticornis* and *E. melliodora* woodland occurring on low hills. Occurs on low hills (subregion 31 and 32) formed from basalt. The soils are generally shallow (< 60 cm deep), brown to grey-brown, gradational, clay-loams and clays. Basalt stones and boulders can occur on the surface. Not a Wetland (BVG1M: 11a)

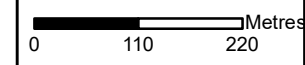
**Figure 4
Regulated Vegetation
and Regional
Ecosystems**

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Legend

- Cadastre
- Roads
- Site Boundary
- Category A or B containing of concern
- Category A or B that is of least concern
- Category C or R that is of least concern
- non-remnant

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Source: Cadastral data sourced from DNRME (2021).



4. Bushfire

4.1 Bushfire Hazard Mapping

The site has been identified by the Toowoomba Regional Planning Scheme (2012 Version 26) as containing areas of Medium Bushfire Risk. The bushfire hazard as identified by the Toowoomba Regional Planning Scheme (2012 Version 26) is shown in Figure 5.

The Queensland State-wide mapping methodology was also used to identify Bushfire Prone Areas on and surrounding the site. This methodology scales bushfire hazard based on the Potential Fire-line Intensity of a severe bushfire, and can be used to predict the radiation profile of areas adjacent to potentially hazardous vegetation. The bushfire hazard for the site and surrounds as identified by the Queensland Government SPP Interactive Mapping System is shown in Figure 6. The SPP mapping indicates the site contains areas of potential impact buffer and medium potential bushfire intensity.

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

A field assessment was conducted to confirm the vegetation hazard classes (VHCs) present within and surrounding the site.

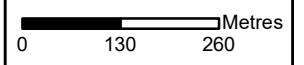
Figure 5
TRC Bushfire
Hazard Mapping

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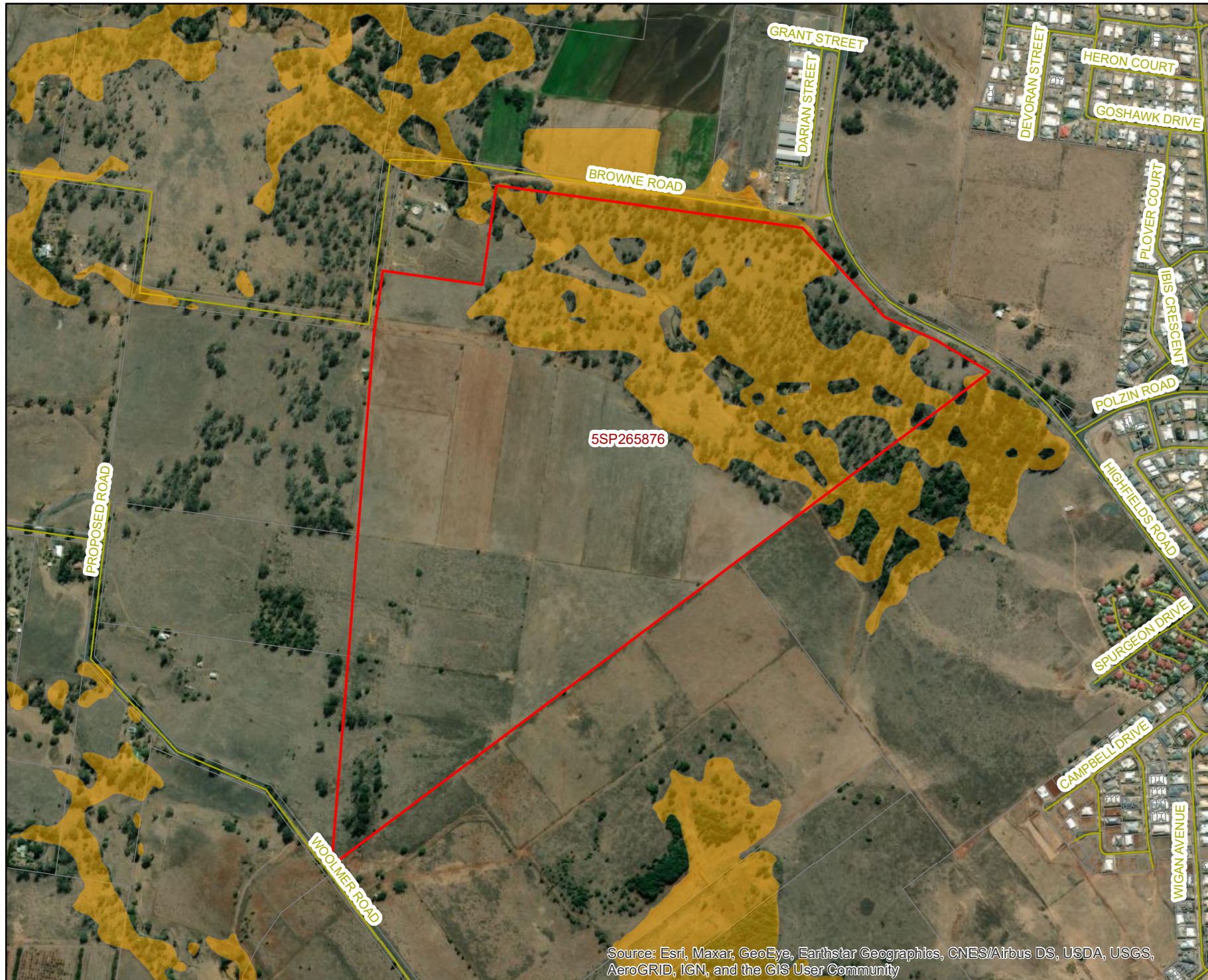
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Legend

- Cadastre
- Roads
- Site Boundary
- TRC Bushfire Hazard**
- High Fire Risk
- Medium Fire Risk

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 Source: Cadastral data sourced from DNRME (2021).



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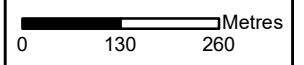
**Figure 6
SPP Bushfire
Hazard Mapping**

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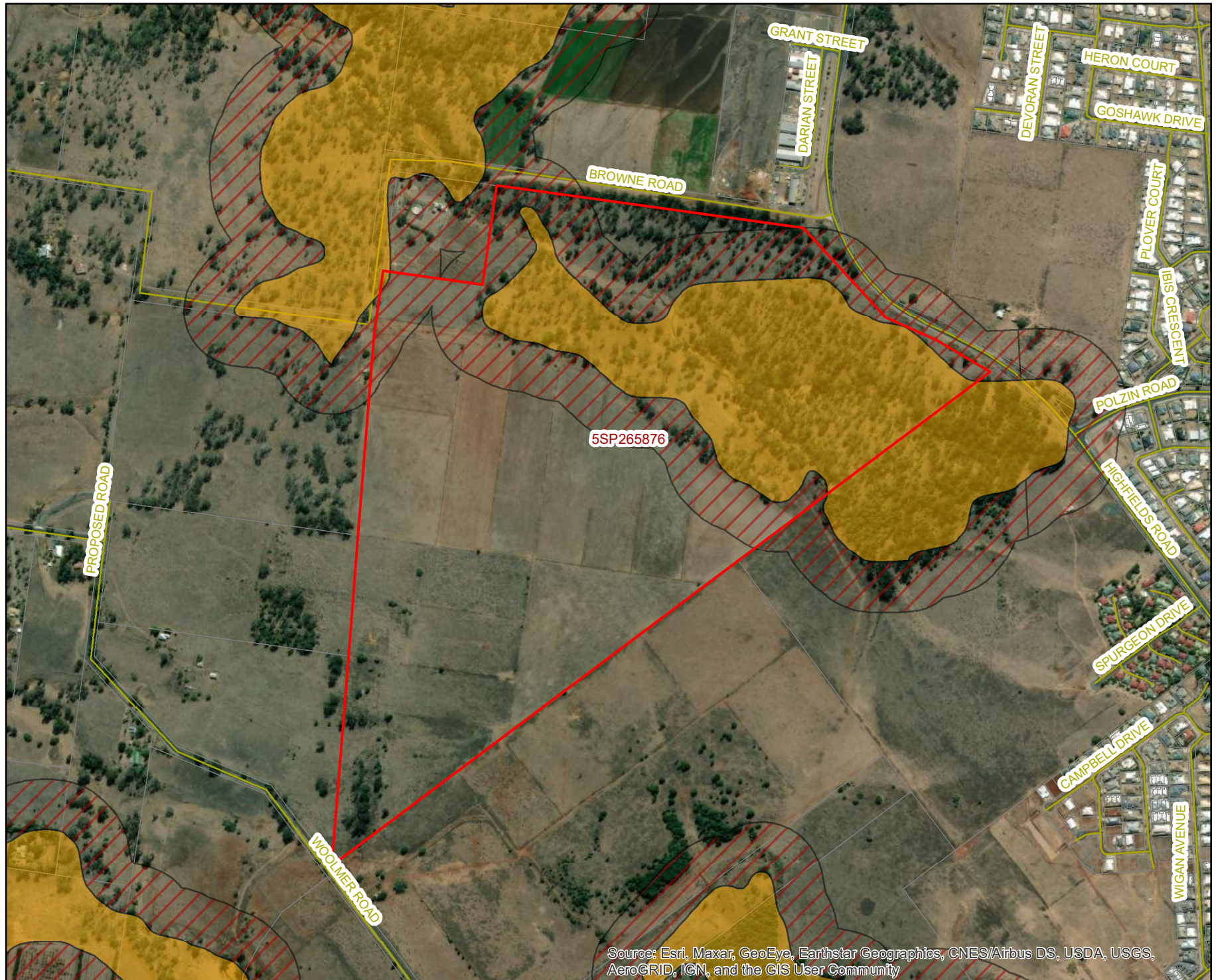
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Legend

- Cadastral
- Roads
- Site Boundary
- SPP Bushfire Hazard**
- Very High Potential Bushfire Intensity
- High Potential Bushfire Intensity
- Medium Potential Bushfire Intensity
- Potential Impact Buffer

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

4.2 Fire Brigade

The development site is contained within the Queensland Fire and Rescue Service Cabarlah Rural Fire Brigade district. The closest fire brigade equipped to fight structural fires is the Highfields Fire Station, located at 49 Obrien Road, Highfields approximately 2.3 kilometres by road to the east of the site (i.e. About 4 minutes away).

4.3 Fire Run

The length of fire run influences the area in which a fire has to develop and reach its potential maximum intensity for the conditions prevailing at the time. It is important to assess the length of fire run to determine the potential scale and intensity of fires that may occur in the area. Fire runs less than 1 kilometre in length are generally considered to pose a lesser risk than those with a longer run. Fire runs may be modified by natural features such as creeks, rock formation and vegetation types and be influenced by weather and fuel conditions.

Fire runs in the area are limited due to the historical clearing of woody vegetation on the site and surrounding lands to the west, Low and Low-Medium Density Residential areas to the north, south and east and maintenance of fuel loads at levels by ongoing grazing by domestic livestock. Fire runs are generally limited due to extent of vegetation remaining in the landscape and relatively narrow corridors of vegetation in gullies. Figure 7 shows the location of possible fire runs and the areas of the development that could potentially be impacted by bushfire and ember attack.

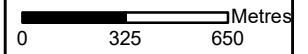
Figure 7 Potential Fire Runs

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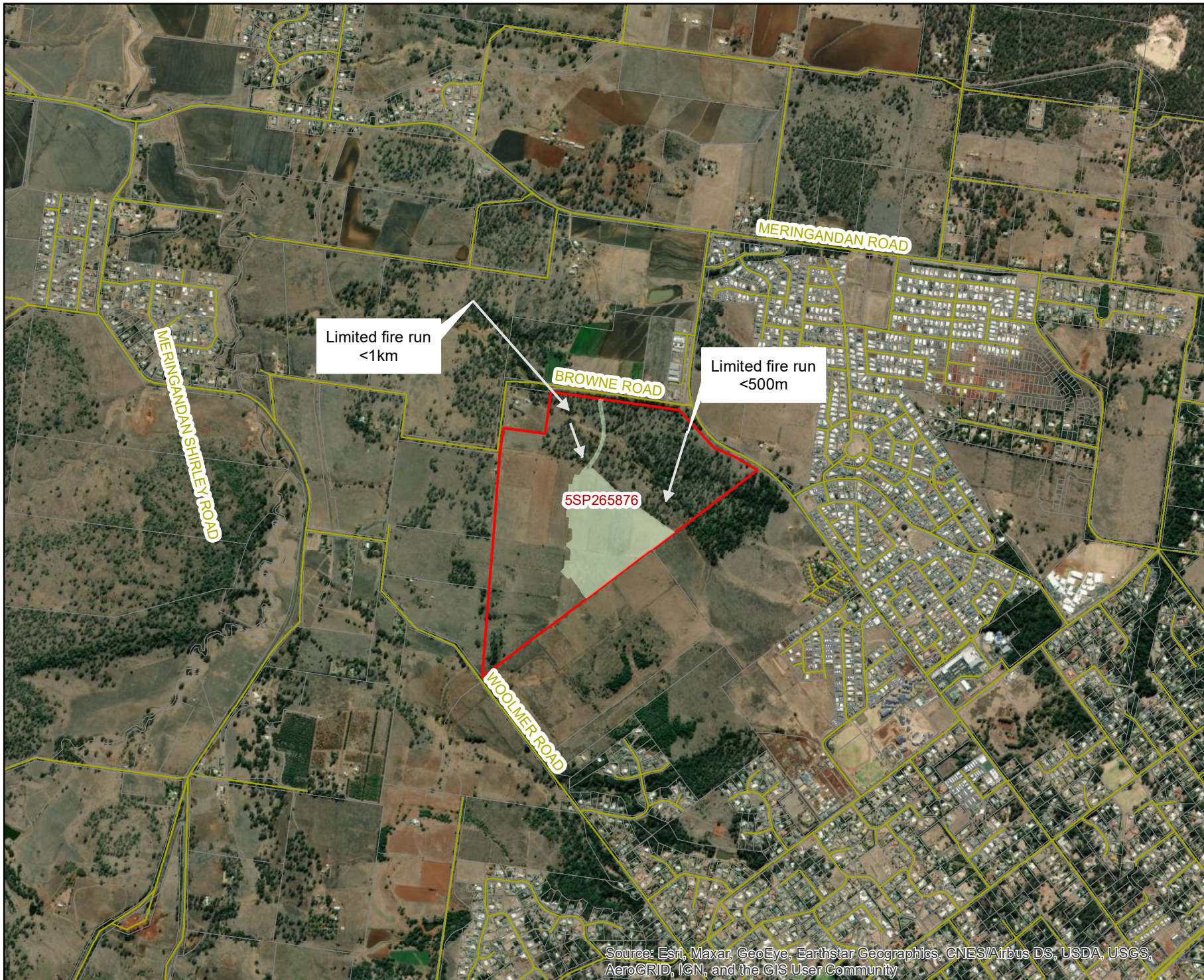


Legend

- Cadastre
- Roads
- Site Boundary
- Potential Fire Run
- Development Footprint

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

4.4 Fuel Loads

Three key factors that influence how a bushfire behaves are topography, fuel and weather. Fuel; its availability, arrangement, size, amount and moisture content contribute to the speed and intensity of a bushfire. The type of vegetation present determines the flammability of the fuel, with the finer and drier the fuel, the more easily it will burn. Fuel loads in general are related to the quantities of fine fuels available to burn. The primary components of fuel loads are the fine fuels; that is; flammable materials that are less than 6 mm in diameter such as leaves, twigs and bark principally on or near the ground.

The Queensland State Government has introduced a State-wide mapping methodology to identify Bushfire Prone Areas. This methodology was developed by the CSIRO Climate Adaptation Flagship and scales bushfire hazard based on the Potential Fire-line Intensity of a severe bushfire. It is used to predict the radiation profile of areas adjacent to potentially hazardous vegetation. A key component of the methodology is the allocation of Vegetation Hazard Classes (VHC) which are used to estimate Potential Fuel Loads. These fuel loads were derived from a combination of expert appraisals and field measurements using the upper range of fuel loads for each fuel element (i.e. surface, near surface, elevated and bark). A “long unburnt condition” of generally greater than 10 years without burning was used for estimating fuel loads.

The VHCs mapped for the site and immediate adjoining areas by the State-wide mapping methodology were 38.5 throughout the middle portion of the site, with VHC 40.4 mapped in the southern corner of the site. The northern portion of the site was mapped predominantly as VHC 11.2, with VHC 40.4 mapped across the northern boundary and a small patch of VHC 7.1 mapped adjacent to the proposed development. Figure 8 shows the mapped VHCs in and around the site. Table 3 provides a summary of the mapped VHCs and potential fuel loads.

Table 3 Mapped Vegetation Hazard Classes and Potential Fuel Loads

| Vegetation Hazard Class (VHC) | Surface and near surface Fuel Load (t/ha) | Total Fuel Load (t/ha) |
|--|---|------------------------|
| 11.2 Moist to dry eucalypt woodlands on basalt areas | 11.5 | 13 |
| 38.5 Discontinuous irrigated cropping and horticulture | 1.5 | 2 |
| 40.4 Continuous low grass or tree cover | 4.5 | 5 |
| 41.4 Discontinuous low grass or tree cover | 2.5 | 3 |
| 42.6 Nil to very low vegetation cover | 0 | 0 |



Appendix C: Calculation of Bushfire Hazard, contains additional information on fuel loads and the bushfire hazard present.

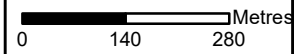
Figure 8 Mapped Vegetation Hazard Classes

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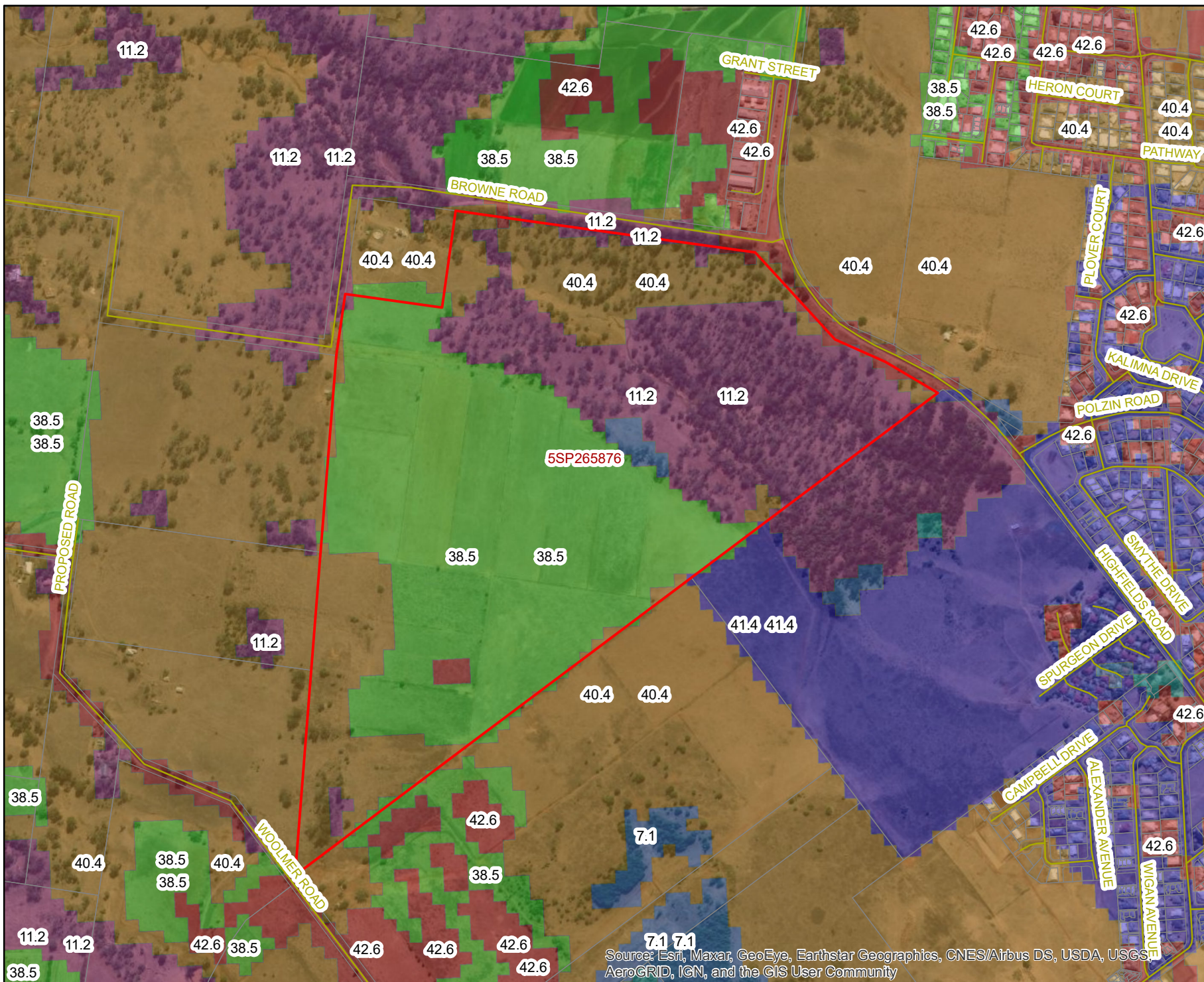


Legend

- Site Boundary
- Cadastre
- Roads
- 11.2 Moist to dry eucalypt woodlands on basalt areas
- 38.5 Cropping and horticulture
- 39.2 Low to moderate tree cover in built-up areas
- 40.4 Low grass or tree cover in rural areas
- 41.4 Low grass or tree cover in built-up areas
- 42.6 Nil to very low vegetation cover
- 7.1 Semi-evergreen to deciduous microphyll vine forest

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 (2021).



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

5. Mitigating Potential Bushfire Impact

A number of actions should be implemented to mitigate the potential impacts of bushfire on the development. This suite of bushfire mitigation measures, when implemented in an integrated manner can achieve a better outcome for the site than when used individually and in isolation from other measures. This suite of potential measures is illustrated in Figure 9.

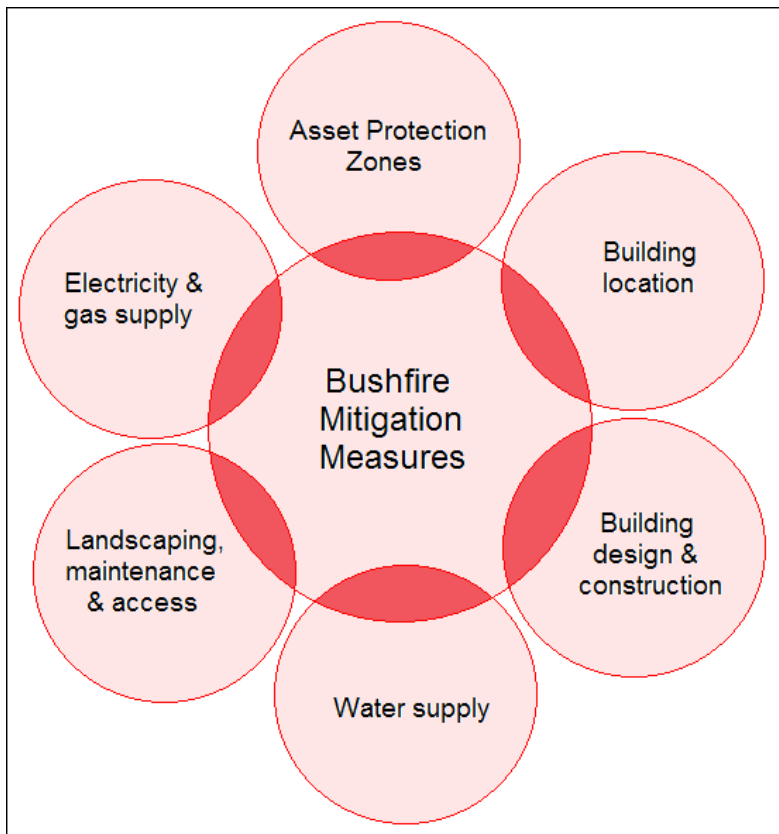


Figure 9 Bushfire mitigation measures in combination. (Redrawn from Guideline for Building in Bushfire Prone Areas; Emergency Management Victoria 2016)

5.1 Building Location and Separation

The location of buildings and their relationship with vegetation in the immediate surrounding area is critical for maximising their survival in the event of a bushfire. Building envelopes have not been identified for the site as adequate separation distances can be achieved between potentially hazardous vegetation and sites for dwellings on individual lots. Building issues can be adequately addressed during the design and construction phase with compliance to the National Construction Code and the Australian Standard for construction of buildings in bushfire-prone areas. Buildings on the site could potentially be exposed to a maximum Bushfire Attack Level of 19, given that buildings are set back from the front of lots.

Appendix C: Calculation of Bushfire Hazard contains additional information on the methodologies used to calculate the potential bushfire hazard that the site is exposed to.

5.2 Asset Protection Zones

The establishment of an Asset Protection Zone (APZ) is an effective mechanism for reducing bushfire hazards that a building may be exposed to. An APZ is a fuel-reduced area surrounding a built asset or structure. Potential bushfire fuels should be minimised within an APZ, so that the vegetation within it 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, implemented 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.

The APZ is located between the asset and the bushfire hazard and consists of an Inner Protection Area (IPA) and an Outer Protection Area (OPA). The IPA is the area closest to the asset and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and be a defensible 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. The OPA is located between the IPA and the unmanaged vegetation. Vegetation within the OPA can be managed to a more moderate level with the reduction of fuel in this area substantially decreasing the intensity of an approaching fire. It also assists restricting the pathways to crown fuels; reducing the level of direct flame, radiant heat and ember attack on the IPA and built assets. Figure 10 provides a visual representation of a building, separation from areas of potentially hazardous vegetation and the creation of an APZ.

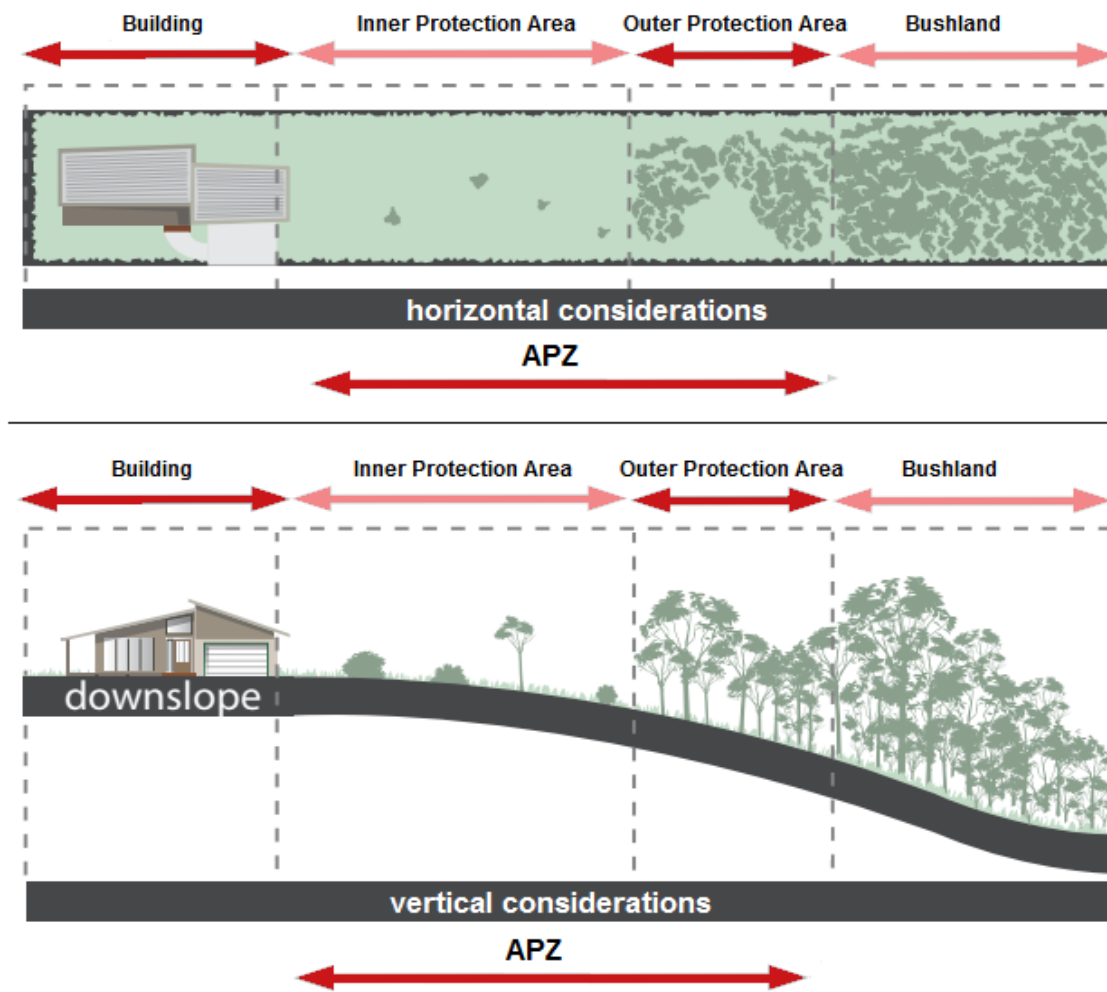


Figure 10 Building envelopes and their relationship to potentially hazardous vegetation. (Planning for Bushfire Protection 2017)

The majority of Lots are located outside of identified bushfire hazard areas and will not require the establishment of APZs at the time of constructing a dwelling on them. Additional details on creating and managing an APZ are provided in Appendix E: Living in a Bushfire Prone Area.

5.3 Building design and construction

Careful design of new buildings in areas of mapped bushfire hazard needs to be undertaken; which includes consideration of site characteristics. Buildings should be constructed to meet the requirements of the relevant building standards and Council bylaws prevailing at the time to enable a building to be designed and constructed according to the site conditions. This includes the Building Code of Australia (BCA 2019) and the Australian Standard for “Construction of buildings in bushfire-prone areas (AS3959 – 2018).

Bushfire Attack Levels (BAL) of Low for the majority of buildings to be established on the site, whilst those within 100 metres of areas of vegetation will potentially be exposed to a BAL of between 12.5 and 19, depending on their location within proposed lots.

Appendix B: contains information on the potential Bushfire Attack Levels that could be experienced on the site and Appendix D: has an explanation of BAL's.

5.4 Access and Egress

Unhindered access and egress is required to the site to enable ready access by emergency services in a time of need. All lots are to be provided with access to constructed and sealed roadways that will provide all-weather access. The use of Cul-de-sacs has been minimised in areas where potentially hazardous vegetation is present to ensure that potential entrapment is minimised. A new road is to be constructed from Browne Road through an area of open grassy woodland to service the development. The road is to be located within a 19 metre wide reserve and comprise a 2 lane road that is 8 metres wide with vegetation managed for 5.5 metres on either side. These measures provide adequate separation from areas of potentially hazardous vegetation and will enable emergency service vehicles to safely operate in an emergency event. Due to the relatively low level of risk, alternative vehicular access to the site is not mandated. These measures will provide unhindered ingress and egress to the site.

5.5 Vegetation Management

The majority of lots in the development are located in areas that are well-separated from areas of potentially hazardous vegetation. Ongoing management of woody environmental weeds in bushland areas in the northern extent of the site will assist in maintaining bushfire hazards to an acceptable level. As the development progresses, a low fuel load zone should be maintained between each stage and surrounding undeveloped lands of up to 50 metres width. In areas where a perimeter road is not present, fuel loads in grassland areas can be managed by slashing or grazing by livestock. Where vegetation management is identified by the ecological assessment to be appropriate, this may assist in maintaining or reducing site fuel loads.

5.6 Fire Trails

No fire trails are proposed due to the nature of the development (sub-dividing 1 lot into 201 residential lots and a regulated vegetation area). The establishment of a perimeter road which separates areas of development from potentially hazardous vegetation negates the need for a fire trail in this situation. Where walking trails or other access provisions are provided in proximity to the bushland area, these may provide auxiliary access for fire/vegetation management purposes.

5.7 Water Supply

The Toowoomba Regional Council Planning Scheme Bushfire Hazard Overlay Code (2012 Version 26) requires that an adequate water supply is provided for fire-fighting purposes. This can be achieved by:

- Connection to Council's reticulated water supply system;
- Being readily available at all time for fire fighting vehicles; and
- A water supply outlet is located within the road reserve that is within 40m² of the following:
 - All of the land; or
 - A building envelope designated on each lot; or
 - The centre of each lot, excluding access handles (where no building envelope is designated); and
- Fire hydrants are designed and installed in accordance with Queensland Fire and Emergency Services' Fire Hydrant and Vehicle Access Guidelines

5.8 Landscaping

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. 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 dwellings; and

- Use of non-flammable mulches such as river pebbles or stones on garden beds near dwellings and buildings.

Guidelines for landscaping in fire prone areas are provided in Appendix F:.

5.9 Prepare, Act, Survive

It is 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. This includes having plans in place to guide actions on days of extreme and catastrophic, identifying safe refuge areas and planning to either 'stay' or 'go'. The key message being; Prepare, Act and Survive. The Queensland Fire and Emergency Services have information readily available to assist people living in bushfire prone areas to develop their own plans. Details can be downloaded from:

www.ruralfire.qld.gov.au/BushFire_Safety/Pages/default.aspx

It is noted that all lots achieve adequate separation distances from areas of potentially hazardous vegetation. Bushfires in the area are likely to take the form of fast-moving grassfires. The safest option for residents in this situation is to remain indoors with doors and windows closed until the bushfire passes.

5.10 Maintenance of Bushfire Mitigation Measures

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

6. Planning Requirements

The Queensland Government's State Planning Policy (SPP) for Natural Hazards (Bushfire) contains development assessment requirements that developments in bushfire prone areas are required to address. Likewise, the Toowoomba Regional Council's Bushfire hazard overlay code contains provisions to protect the safety of people and property in bushfire risk areas. The Code proposes Performance outcomes and Acceptable outcomes which have been addressed through Proposed Solutions. A summary of compliance with SPP and TRC Bushfire hazard overlay code is presented in Table 4.

Table 4 Summary of compliance to the Queensland SPP and TRC Bushfire hazard overlay code

| Development Action | Compliance | | Reference to proposed solution | | |
|--------------------------------|------------|----------------------------------|---|--------------|-------------|
| | SPP | TRC Bushfire Hazard Overlay Code | QLD SPP Table 5 | TRC Table 6 | TRC Table 7 |
| Risk mitigation | ✓ | ✓ | PS1 | PS2.1, PS2.2 | |
| Water access | ✓ | ✓ | PS1 (iii), PS2 (i) | PS1 | PS3.1-3 |
| Access and Egress | ✓ | ✓ | PS1 (v), PS2 (ii) | | PS6.1-4 |
| Vegetation management | ✓ | ✓ | PS1 (i), PS2 (ii), PS3 (i), (iii), (iv) | | PS5 |
| Asset Protection Zones | ✓ | ✓ | PS1 (i), PS3 (ii) | PS3 | |
| Location of buildings | ✓ | ✓ | PS1 (i) | PS3.1 | PS5.1 |
| Building design & construction | ✓ | ✓ | PS1 (ii) | PS2.2, PS3.1 | |
| Hazardous materials | ✓ | ✓ | PS4 | | PS4.1 |
| Community infrastructure | N/A | N/A | | | |

6.1 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 5.

Table 5 State Planning Policy development assessment requirements (Natural hazards, risk and resilience - Bushfire)

| Assessment Benchmark | Development assessment requirement | Proposed solution |
|------------------------|---|---|
| Applicable development | <p>A development application for a material change of use, reconfiguration of a lot or operational works on premises in any of the following:</p> <ol style="list-style-type: none"> 1. bushfire prone areas 2. flood hazard areas 3. landslide hazard areas 4. storm tide inundation areas 5. erosion prone area. | <p>Development comprises Reconfiguring a Lot (subdivision) into 201 Residential lots with an additional area identified for a regulated vegetation area. A portion of the site containing residential lots is identified as being located within a mapped bushfire hazard area.</p> |
| 3 | <p>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.</p> | <p>PS1. The site is identified by the Queensland Government Development Assessment Mapping System Natural Hazards Risk and Resilience mapping (Bushfire) as containing areas of Medium bushfire potential intensity and Potential Impact buffer. The majority of the proposed residential lots are located within areas of Low bushfire hazard or within a Potential impact buffer. The Toowoomba Regional Council Bushfire Hazard Overlay Code mapping identifies similar areas of bushfire hazard for the site. A site-specific hazard assessment was undertaken and a Bushfire Management Plan prepared that identifies measures to mitigate the risks to people and property to an acceptable level. Included in the hazard assessment were; identification of vegetation hazard class (VHC) present and the calculation of Bushfire Attack Levels. Mitigation measures identified include:</p> <ol style="list-style-type: none"> 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. Indicative BAL's range from 'Low' for the majority of the site and from 12.5 to 19 for lots adjacent to bushland areas to the north. BAL's were calculated using a 'worst case scenario' with an FDI of 70; |

| Assessment Benchmark | Development assessment requirement | Proposed solution |
|----------------------|---|---|
| | | <ul style="list-style-type: none"> ii) Provision of a reticulated water supply that can be readily accessed for fire-fighting purposes; and iii) Constructed ingress and egress to all lots on the site. <p>Provided the measures identified in the bushfire management plan are implemented and maintained, the bushfire risk to people, property and infrastructure can be kept to an acceptable level.</p> |
| 4 | <p>All natural hazard areas: Development supports and does not hinder disaster management response or recovery capacity and of capabilities.</p> | <p>PS2. Development comprises Reconfiguring a Lot (subdivision) into 201 Residential lots with an additional area identified for a regulated vegetation area. The majority of the proposed residential lots are located in an areas of Low bushfire hazard or Potential impact buffer as identified by the Queensland Government Development Assessment Mapping System Natural Hazards Risk and Resilience mapping.</p> <p>The development actively assists and supports disaster management capacity and capabilities by:</p> <ul style="list-style-type: none"> i) Providing ready access to a reticulated water supply suitable for fire-fighting purposes; ii) Provision of all-weather constructed access to all lots; iii) Establishment of a perimeter road between proposed residential lots and bushland areas; and iv) Entrance road to service the development in conjunction with management of vegetation on road verges will enable ready and safe access by emergency services and residents |
| 5 | <p>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</p> | <p>PS3. The development takes into consideration topography, location of existing vegetation and potential natural hazards. Residential lots are to be established in open grassland areas with open grassy woodland areas to the north</p> |

| Assessment Benchmark | Development assessment requirement | Proposed solution |
|----------------------|---|---|
| | | <p>retained as an environmental area. Mitigation measures identified include:</p> <ul style="list-style-type: none"> i) Establishment and maintenance of a 'low fuel load zone' containing a perimeter road between residential lots and bushland areas; ii) Lot layout that ensures that potential building sites are not exposed to a Bushfire Attack Level of greater than 19; and iii) Landscaping near buildings to consist of plants that have low flammability. <p>Where parkland embellishments are proposed to be provided, structures are to be designed and constructed to minimise potential impacts from bushfire. Measures utilised may include appropriate siting of built infrastructure which takes into consideration potentially hazardous understorey vegetation, weed management (where required), use of bushfire resisting materials.</p> |
| 6 | <p>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.</p> | <p>PS4. comprises Reconfiguring a Lot (subdivision) into 201 Residential lots with an additional area identified for a regulated vegetation area. 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.</p> |
| 7 | <p>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.</p> | <p>PS5. The development seeks to maintain and enhance the protective function of landforms and vegetation present on the site by:</p> <ul style="list-style-type: none"> i) Retaining bushland areas largely intact by locating residential areas in sites clear of potentially hazardous vegetation; ii) Maintaining an area of low fuel load between the development and bushland areas; iii) Retaining the natural landform by minimising the extent of major earthworks required, and |

| Assessment Benchmark | Development assessment requirement | Proposed solution |
|----------------------|------------------------------------|--|
| | | <p>iv) Ensuring that any landscape plantings are compatible with the natural environment and do not contribute to an elevated bushfire hazard.</p> <p>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.</p> |

6.2 Toowoomba Regional Planning Scheme - Bushfire

The Toowoomba Regional Council Planning Scheme (2012 Version 23) contains a Bushfire hazard overlay code.

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 6 and Table 7 provide responses to the Bushfire hazard overlay code.

Table 6 Bushfire Hazard Overlay Code – requirements for accepted development and assessment benchmarks for assessable development

| Performance outcomes | Acceptable Outcomes | Proposed solutions |
|--|---|---|
| <p>PO1 Development is provided with an adequate water supply for fire-fighting purposes that is safely located and freely accessible.</p> | <p>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 50m², is connected to Council’s reticulated water supply system It will be readily available at all times for fire fighting vehicles and a water supply outlet located within the road reserve is within 40m of the following:</p> <ul style="list-style-type: none"> 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 <p>And</p> <p>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</p> <p>AO1.2 Development outside a water supply area involving proposed or existing buildings with a combined gross floor area greater than 50m², 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.</p> <p>AO1.3 A water tank is provided within 10m of each building (other than a class 10 building) which:</p> | <p>PS1.1 All new lots are to be provided with ready access to Council’s reticulated water supply so as to provide a reliable fire-fighting water source in compliance with AO 1.1.</p> <p>PS01.2 Not applicable.</p> <p>PS01.3 Not applicable.</p> |

| Performance outcomes | Acceptable Outcomes | Proposed solutions |
|---|---|---|
| | <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> i) 10,000 litres for residential buildings; ii) For industrial, commercial and other buildings: a volume specified in AS2304- 2011; c. Includes shielding of tanks and pumps in accordance with AS2304-2011; d. Includes a hardstand area allowing medium rigid vehicle (15 tonne fire appliance) access within 6m of the tank; e. 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 f. Is clearly identified by directional signage at the street frontage | |
| <p>PO2 Development provides for the safety of people and people by avoiding areas of High or Medium bushfire risk.</p> | <p>AO2.1 Development is located on land that is not subject to High or Medium bushfire hazard.</p> <p>OR</p> <p>AO2.2</p> | <p>PS2.1 The majority of residential Lots are located in an area mapped by Council as containing no bushfire hazard with the bushland portions of the site comprising Medium fire risk. Mapping by the Queensland Government identifies the bushfire hazard for the area of residential lots</p> |

| Performance outcomes | Acceptable Outcomes | Proposed solutions |
|---|--|---|
| | <p>Where development is located in a High or Medium bushfire hazard area (except for single dwellings on existing lots), it complies with a Bushfire Management Plan for the premises.</p> | <p>as being 'Potential impact buffer' or Low bushfire hazard.</p> <p>PS2.2 A bushfire Management Plan has been prepared for the site which identifies standard of building required, emergency fire-fighting water supplies and ingress and egress requirements.</p> <p>New buildings are to be constructed to comply with current relevant building standards. This includes the Building Code of Australia (Parts 1 and 2) and the Australian Standard for Building in bushfire-prone areas (AS3959-2018).</p> |
| <p>PO3 Development provides for the safety of people and property by mitigating the bushfire risk through the siting of buildings.</p> | <p>AO3.1 Buildings and structures:</p> <ul style="list-style-type: none"> 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 10 metres, whichever is the greater; and c. are 10 metres 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. | <p>PS3.1</p> <ul style="list-style-type: none"> a. The Lot layout for the site has been designed to ensure that the majority of lots are located outside of areas of Council identified medium bushfire hazard. Buildings on lots closest to areas of hazardous vegetation can achieve a minimum separation distance of 23 metres from potentially hazardous bushland areas to achieve a maximum BAL of 19; and b. The majority of lots achieve separation distances of greater than 1.5 times the predominant height of potentially hazardous vegetation (trees have a mature height in the order of 15 to 23 metres). A limited number of lots will be within 1.5 times the predominant mature canopy tree height, however the |



| Performance outcomes | Acceptable Outcomes | Proposed solutions |
|----------------------|---------------------|--|
| | | <p>Australian Standard AS3959-2018 however allows for the construction of buildings closer to vegetation than this provided that they are built to a higher standard; and</p> <ul style="list-style-type: none"> c. A minimum separation distance of 23 metres exists between potential buildings on residential lots and bushland areas. A perimeter road is to be established within this area; and d. Elements least susceptible to fire such as roads, maintained parkland areas, tennis courts and swimming pools should be located closest to the bushfire hazard. <p>Appendix C: provides additional information on the level of bushfire hazard posed to buildings and the methodology used to calculate it. A site specific bushfire report should be prepared to guide the construction of new dwellings taking into account location of buildings and prevailing building requirements.</p> |

Table 7 Bushfire Hazard Overlay Code - assessment benchmarks for assessable development

| Performance Outcomes | Acceptable Outcomes | Proposed Solutions |
|---|---|-----------------------|
| For all Development | | |
| <p>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.</p> | <p>No acceptable outcome is nominated.</p> | <p>Not applicable</p> |
| <p>PO2 Community infrastructure is able to function effectively during and immediately after bushfire events.</p> | <p>AO2.1 The community infrastructure is located on land that is not subject to High or Medium bushfire risk; or</p> <p>Note for AO2.1: A site-specific bushfire hazard assessment is necessary to demonstrate that although the proposed development site is within bushfire hazard area, the bushfire hazard is low on that site.</p> <p>AO2.2 The community infrastructure will not involve any new building work other than a minor extension (<20 m² Gross Floor Area) to an existing building; or</p> <p>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.</p> <p>Note for AO2.3: The development application must include and comply with a comprehensive Bushfire Management Plan.</p> | <p>Not applicable</p> |

| Performance Outcomes | Acceptable Outcomes | Proposed Solutions |
|--|---|---|
| Water Supply | | |
| <p>PO3 Development is provided with an adequate water supply for fire fighting purposes that is safely located and freely accessible.</p> | <p>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 50m², is connected to Council’s reticulated water supply system It will be readily available at all times for fire fighting vehicles and a water supply outlet located within the road reserve is within 40m² of the following:</p> <ul style="list-style-type: none"> 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 <p>All existing and proposed buildings</p> <p>And</p> <p>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</p> <p>AO3.2 Development outside a water supply area involving proposed or existing buildings with a combined gross floor area greater than 50m², 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.</p> <p>AO3.3 A water tank is provided within 10m of each building (other than a class 10 building) which:</p> | <p>PS3.1 All new lots are to be provided with ready access to Council’s reticulated water supply so as to provide a reliable fire-fighting water source (for both structural and bush fires) in compliance with AO 3.1; or</p> <p>PS3.2 Not applicable.</p> <p>PS3.3 Not applicable.</p> |

| Performance Outcomes | Acceptable Outcomes | Proposed Solutions |
|---|--|---|
| | <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> i) 10,00 litres for residential buildings; ii) (For industrial, commercial; and other buildings, a volume specified in AS2304-2011 c. Includes shielding of tanks and pumps in accordance with AS2304-2011 d. Includes a hardstand area allowing medium rigid vehicle (15 tonne fire appliance) access within 6m of the tank e. 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 f. Is clearly identified by directional signage at the street frontage | |
| Hazardous Materials | | |
| <p>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.</p> | <p>AO4.1 Development complies with a Bushfire Management Plan for the premises.</p> <p><small>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.</small></p> | <p>PS4.1 The project is a residential development. The manufacture or storage of hazardous materials in bulk is not appropriate for a development of this nature and will not be undertaken.</p> |
| Reconfiguring a lot and Material Change of Use | | |
| PO5 | AO5.1 | PS5.1 |

| Performance Outcomes | Acceptable Outcomes | Proposed Solutions |
|---|---|---|
| <p>Lot design and the siting of buildings provide safe sites for habitable and non-habitable buildings.</p> | <p>All development enables buildings and structures to achieve setbacks from hazardous vegetation that are:</p> <ol style="list-style-type: none"> sited within the area of lowest hazard within the lot; and provide for adequate setbacks from hazardous vegetation; and 1.5 times the predominant mature canopy tree height or 10m, whichever is the greater; and 10m from any retained vegetation strips or small areas of vegetation; and sited so that elements of the development least susceptible to fire are sited closest to the bushfire hazard. | <p>The lot layout enables buildings and structures to achieve adequate setbacks from potentially hazardous vegetation:</p> <ol style="list-style-type: none"> The Lot layout for the site has been designed to ensure that the majority of residential lots are located outside of areas of Council identified bushfire hazard. Buildings on all lots can achieve adequate separation distances from downslope and potentially hazardous bushland areas to achieve a maximum BAL of 19. The majority of lots are located in areas of identified Low bushfire hazard; and The lot layout enables adequate setbacks for buildings to be achieved from areas of potentially hazardous vegetation to ensure that they are not exposed to a BAL of greater than 19; and The majority of lots achieve separation distances of greater than 1.5 times the predominant height of potentially hazardous vegetation (trees have a mature height in the order of 15 to 23 metres). A limited number of lots will be within 1.5 times the predominant mature canopy tree height, however the Australian Standard AS3959-2018 however allows for the construction of buildings closer to vegetation than this provided that they are built to a higher standard. In this situation, indicative BALs will not exceed 19; and |

| Performance Outcomes | Acceptable Outcomes | Proposed Solutions |
|--|---|--|
| | | <p>d. Separation distances of greater than 23 metres are achieved between northern boundaries of lots closest to areas of potentially hazardous vegetation; and</p> <p>e. Elements least susceptible to fire such as roads, parkland areas, tennis courts and swimming pools should be located between buildings and potential bushfire hazards.</p> <p>Appendix C: provides additional information on the level of bushfire hazard posed to buildings and the methodology used to calculate it. A site specific bushfire report should be prepared to guide the construction of new dwellings located within areas of mapped bushfire hazard, taking into account location of buildings and prevailing building requirements.</p> |
| <p>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:</p> <ul style="list-style-type: none"> a. fire fighting and other emergency vehicles; and b. the evacuation of people in the event of an emergency. | <p>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.</p> <p>AO6.2 The lot layout ensures that all roads are through roads.</p> <p>AO6.3 The lot layout does not include long narrow lots, long access ways or rear lots.</p> <p>AO6.4 The road has a maximum gradient of 1 in 8 (12.5%).</p> | <p>PS6.1 All roads are to be constructed to accordance with the required Engineering standards and will provide all-weather access to all lots. This will enable ready access by fire-fighting and other emergency vehicles.</p> <p>PS6.2 Lot layout ensures that all roads are through roads, that are located in areas of Council identified Low bushfire hazard and avoids the potential for entrapment.</p> <p>PS6.3</p> |

| Performance Outcomes | Acceptable Outcomes | Proposed Solutions |
|--|--|--|
| | | <p>No long narrow lots, long access ways or rear lots will be created in the development.</p> <p>PS6.4 New roads servicing the development are to be constructed in recognised standards that will enable ready access by fire-fighting and other emergency vehicles. Maximum gradients of roads will not exceed 12.5%.</p> |
| <p>PO7 For development that will result in multiple buildings or lots, fire breaks are provided that:</p> <ol style="list-style-type: none"> adequately and effectively separate the development site from surrounding vegetation to mitigate against bushfire hazard; have sufficient width to enable continuous access for fire fighting and other emergency vehicles, residents and equipment; and are in secure tenure and are maintained. | <p>AO7.1 The development incorporates a fire break provided by a perimeter road that:</p> <ol style="list-style-type: none"> separates the boundary of the lots and the adjacent bushland; has a minimum cleared width of 20m; has a formed road width of 6m; and is constructed to an all weather standard. <p>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:</p> <ol style="list-style-type: none"> a minimum cleared width of 6m; a minimum formed width of 4m; a maximum gradient of 1 in 8 (12.5%); are constructed and maintained to prevent erosion, provide adequate drainage and provide continuous access for fire fighting vehicles; provide passing bays and turning areas for fire-fighting appliances; and are either located on public land, or within an access easement that is granted in favour of the Toowoomba | <p>PS7.1 The following measures are identified that will achieve adequate separation from bushland areas:</p> <ol style="list-style-type: none"> establishment of a perimeter road that will separate the residential component of the development from areas of bushland; the road will be located within a cleared area that has a minimum width of 17 metres; and have a minimum width of 6 metres; and will be of sealed all-weather construction. <p>PS7.2 No fire breaks are identified for the development. A perimeter road is to be established between residential and bushland areas that effectively fulfills the purpose of a firebreak.</p> <p>PS7.3 The site is not proposed to contain fire breaks.</p> <p>PS7.4</p> |



| Performance Outcomes | Acceptable Outcomes | Proposed Solutions |
|----------------------|---|--|
| | <p>Regional Council and the Queensland Fire and Rescue Service.</p> <p>AO7.3 Vehicular access is provided along and at each end of the fire break to existing fire maintenance trails or roads.</p> <p>AO7.4 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.</p> | <p>Retained bushland comprises open grassy woodland. The establishment of walking trails or vehicular service tracks in this area as the environmental reserve is developed will enable for fuel reduction activities and ecological burns to be undertaken.</p> |

7. Conclusion

The bushfire assessment of the site identified that in general hazards are in the low to medium category with Bushfire Attack Levels (BAL) ranging from Low to a maximum of 19 for potential buildings on the site. The bushfire risk to built assets can be effectively managed at the design and construction phase through the application of the National Construction Code and the Australian Standard Construction of buildings in bushfire-prone areas (AS3959-2018) and ongoing vegetation management.

7.1 Recommendations

The following recommendations are made for the proposed development with reference to the ecological values and bushfire management requirements of the site:

- That buildings are designed and constructed to meet the requirements of the relevant building standards prevailing at the time. This includes the Building Code of Australia (BCAC), the Australian Standard for Construction of buildings in bushfire-prone areas (AS3959 – 2018) and relevant Council bylaws and building regulations.
- That a reticulated water supply be provided that is capable of supplying for fire-fighting purposes.
- That bushfire mitigation measures identified in this bushfire management report are implemented and maintained.

8. References

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Appendix A: Site Plans

PROPOSAL PLAN

NOT TO BE USED FOR ENGINEERING DESIGN OR CONSTRUCTION

NOTES

This plan was prepared as a conceptual layout only. The information on this plan is not suitable for any other purpose.

Property dimensions, areas, numbers of lots and contours and other physical features shown have been compiled from existing information and may not have been verified by field survey. These may need verification if the development application is approved and development proceeds, and may change when a full survey is undertaken or in order to comply with development approval conditions.

No reliance should be placed on the information on this plan for detailed subdivision design or for any financial dealings involving the land.

Pavements and centrelines shown are indicative only and are subject to Engineering Design.

Saunders Havill Group therefore disclaims any liability for any loss or damage whatsoever or howsoever incurred, arising from any party using or relying upon this plan for any purpose other than as a document prepared for the sole purpose of accompanying a development application and which may be subject to alteration beyond the control of the Saunders Havill Group. Unless a development approval states otherwise, this is not an approved plan.

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PROJECTION - GDA94 MGA56

LEGEND

- Site Boundary
- Major Contour (1.0m interval)
- Stage Boundary
- Priority Infrastructure Area - Council Overlay
- Flood Hazard Area - Council Overlay
- Waterways and Wetlands - Council Overlay
- Koala Habitat Area - Core - State Overlay
- Ecological Significance - Council Overlay
- Fisheries Stream - Pass 1 - State Overlay
- Regulated Vegetation Mapping - State Overlay
- 400m Park Catchment
- 10m Wide Landscape Buffer
- Stage Boundary
- 1 Stage No.

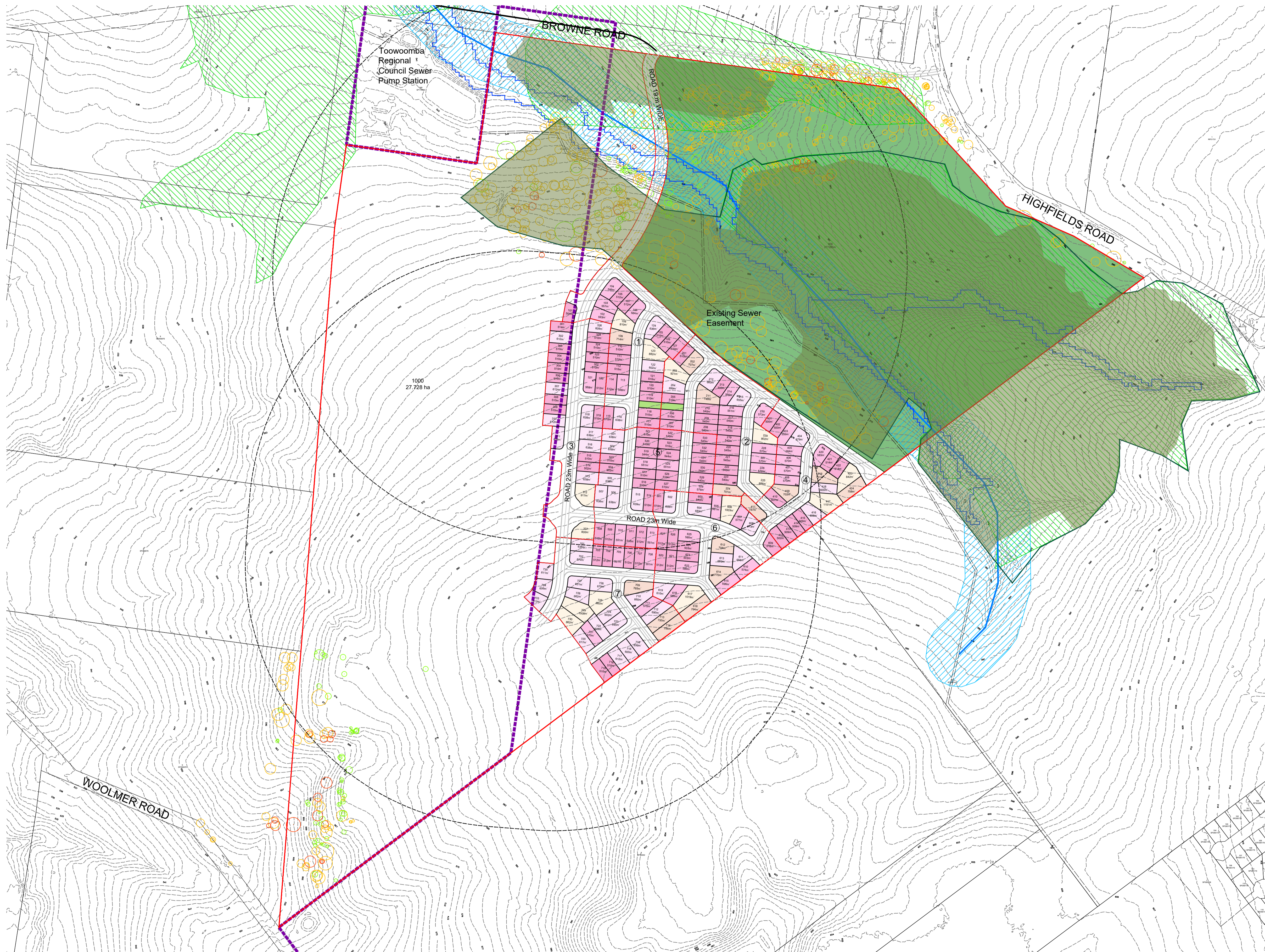
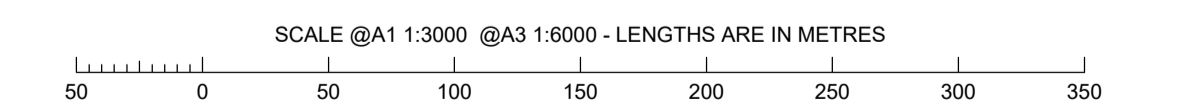
Tree Survey

- Non-juvenile Koala Habitat Tree
- Native Tree
- Dead / Stag Tree

DEVELOPMENT STATISTICS

| | | |
|---|--------------------|-------------|
| 500m ² - <550m ² | 92 | 45.8% |
| 550m ² - <600m ² | 34 | 16.9% |
| 600m ² - <700m ² | 47 | 23.4% |
| 700m ² - <800m ² | 14 | 7.0% |
| >800m ² | 14 | 7.0% |
| Total | 201 | 100% |
| Site Area | 90.13 ha | |
| Net Developable Area (Lots only) | 12.011 ha | |
| (Average Lot Size - 598m ²) | | |
| Density dw/ha | 12.8 dw/ha | |
| Balance Lot (Lot 1000) | 43.616 ha | |
| Area New Road (Collector) | 3.067 ha | |
| Area New Road (Local) | 3.639 ha | |
| Length New Road | 3275 m | |
| Pedestrian Link | 680 m ² | |
| Green Space | 27.729 ha | |

RP DESCRIPTION: Lot 5 on SP265876





Appendix B: Bushfire Attack Levels

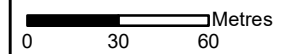
Appendix B Bushfire Attack Levels

Project: BMR
Woolmer

Client: Bird in
Hand 3 Pty Ltd

Project No.: J000698

Compiled by: GL Date: 20/12/2021
Approved by: WG Date: 20/12/2021



Legend

- Cadastre
- Roads
- Site Boundary
- Pedestrian Link
- Road Reserve
- Proposed Lot Layout
- Flame Zone
- BAL-40
- BAL-12.5
- BAL-29
- BAL-19

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 (2021).



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix C: Calculation of Bushfire Hazard

A number of methodologies were utilised to calculate the level of bushfire hazard that the site could potentially be exposed to.

Overall Fuel Hazard Assessment

An overall fuel hazard assessment was undertaken in representative areas of the site in accordance with the 'Overall Fuel hazard Assessment Guide' (Victorian State Government 2010) to assess the hazard posed by the various fuel components present. Attributes measured were bark fuel, elevated fuel, near-surface fuel, and surface fuel as illustrated in Figure 11. The location of the individual overall fuel hazard assessment sites is shown in Figure 12.

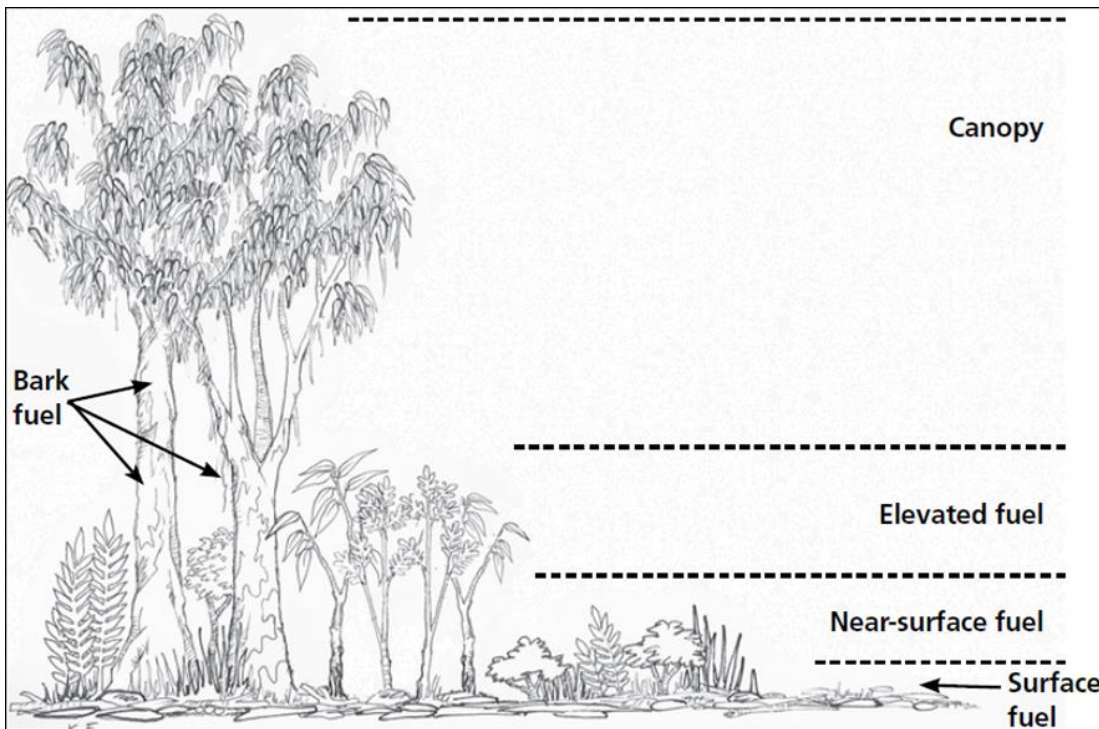


Figure 11 Fuel hazard layers used to determine the overall fuel hazard for a site. (Image from Overall fuel hazard assessment guide 2010).

Overall fuel hazard attributes and values recorded for the individual sites are presented in Table 8 with Table 9 providing a summary of fuel loads for individual attributes.

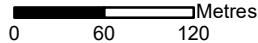
Figure 12 Fuel Hazard Assessment Sites

Project: BMR
Woolmer

Client: Bird in
Hand 3 Pty Ltd

Project No.: J000698

Compiled by: GL Date: 20/12/2021
Approved by: WG Date: 20/12/2021



Legend

- Fuel Hazard Assessment Site
- Cadastre
- Roads
- Site Boundary
- Pedestrian Link
- Road Reserve
- Proposed Lot Layout

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 (2021).



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Table 8 Overall fuel assessment summary

| Date assessed: 7 December 2021 | | Assessor: Rick Galbraith | | | | |
|---|-------|--------------------------|-------|-------|-----|--|
| Sampling Location: Browne Road, Highfields | | Veg Type: Woodland | | | | |
| Plot Information | | | | | | |
| Plot No. | 1 | 2 | 3 | 4 | 5 | |
| GPS Waypoint: | 001 | 002 | 003 | 004 | 006 | |
| Canopy Height - assessed over a 20m radius | | | | | | |
| Ave Hgt to Top of Canopy: | 15m | 18m | 23m | 20m | 0m | |
| Ave Hgt to Base of Canopy: | 4m | 10m | 12m | 12m | 0m | |
| Bark fuel - over a 20m radius. | | | | | | |
| Bark type: | Other | Other | Other | Other | N/A | |
| Bark Fuel Hazard: | M | M | M | M | L | |
| Elevated fuel layer – assessed over 10m radius | | | | | | |
| Elevated % Cover: | <10 | <10 | <10 | <10 | 0 | |
| Elevated % Dead | 10 | 10 | 15 | 20 | 0 | |
| Elevated Fuel Ave Height (m) | 1 | 1.2 | 1.5 | 1.5 | 0 | |
| Elevated Fuel Hazard: | L | L | L | L | L | |
| Near-surface fuel layer - assessed over a 10m radius | | | | | | |
| Near-surface % Cover: | 90 | 95 | 90 | 95 | 95 | |
| Near-surface % Dead | 20 | 10 | 20 | 20 | 25 | |
| NS Average Height (cm): | 50 | 50 | 50 | 40 | 50 | |
| NS Fuel Hazard: | VH | VH | VH | VH | VH | |
| Surface fuel layer - assessed over a 10m radius | | | | | | |
| Surface Litter % Cover: | 20 | 20 | 20 | 20 | 20 | |
| Average Litter Depth (mm): | 10 | 10 | 15 | 10 | 10 | |
| Surface Fuel Hazard | L | L | L | L | L | |
| Combined Surface and Near-surface Fine Fuel Hazard calculation | | | | | | |
| Combined Hazard | H | H | H | H | H | |
| Overall Fuel Hazard calculation | | | | | | |
| Overall Fuel Hazard | M | M | M | M | M | |

Table 9 Summary of fuel loads for each site assessed

| Site / Fuel t/ha | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 |
|-----------------------------------|--------|--------|--------|--------|--------|
| Bark | 1 | 1 | 1 | 1 | 0 |
| Elevated | 0.5 | 0.5 | 1 | 1 | 0 |
| Near Surface | 5 | 6 | 5 | 6 | 6 |
| Surface | 2 | 2 | 2 | 2 | 2 |
| Combined near surface and surface | 7 | 8 | 7 | 8 | 8 |
| Total | 8.5 | 9.5 | 9 | 10 | 8 |

The following photographs illustrate the nature of vegetation present at the various sites that were sampled using the methodology identified in the Overall fuel hazard assessment guide (2010).



Photograph 5 View to the north from fuel assessment Site 2 - vegetation present north of the gully



Photograph 6 Fuel assessment Site 4 – dense near surface fuel layer with little to no surface fuel loads



Photograph 7 View to the east from fuel assessment Site 5 – the elevated and near surface fuel layers were absent



Photograph 8 View to the south from fuel assessment Site 1 – few canopy trees and low level of elevated fuel layer

Determination of Bushfire Attack Level – AS3959-2018

The bushfire hazard that buildings could potentially be exposed to was calculated using the Australian Standard Construction of buildings in bushfire-prone areas (AS3959-2018) Method 2 and site specific data. AS 3959-2018 identifies the level of construction required for the purpose of ensuring that a building is constructed to withstand a potential bushfire attack. This Standard is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand attack from bushfire, thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself. AS3959-2018 requires that vegetation be assessed within 100 metres of a building when determining the Bushfire Attack Level.

Determination of FDI

Adopting a worst case scenario, an FDI of 70 was used for the site when calculating Bushfire Attack Levels (BAL) for 'the site'. Figure 13 provides a Fire Danger Index (FDI) map of Southeast Queensland and identifies the location of the site.

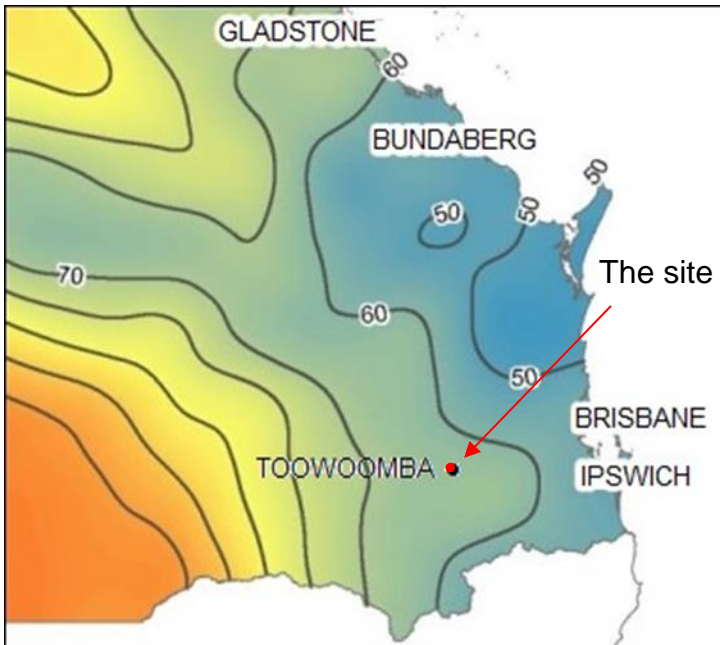


Figure 13 FDI map for Southeast Queensland. Leonard. J. A New Methodology for State-wide Mapping of Bushfire Prone Areas in Queensland. 2014

The online AS 3959-2018 Method 2 Flamesol calculator was used to calculate the Bushfire Attack Level (BAL) that lots could potentially be exposed to using potential fuels loads associated with the mapped VHC 11.2 to give a conservative assessment (Figure 14), as fuels loads present during the site visit were lower than those that are mapped



Calculated December 9, 2021, 11:23 am (MDc v.4.9)

BMR Woolmer

| Minimum Distance Calculator - AS3959-2018 (Method 2) | | | |
|--|--------------|--|--|
| Inputs | | Outputs | |
| Fire Danger Index | 70 | Rate of spread | 1.67 km/h |
| Vegetation classification | Woodland | Flame length | 12.46 m |
| Understorey fuel load | 11.5 t/ha | Flame angle | 53 °, 63 °, 71 °, 76 °, 78 ° & 83 ° |
| Total fuel load | 13 t/ha | Elevation of receiver | 4.97 m, 5.55 m, 5.89 m, 6.04 m, 6.09 m & 6.18 m |
| Vegetation height | n/a | Fire intensity | 11,268 kW/m |
| Effective slope | 8 ° | Transmissivity | 0.876, 0.859, 0.835, 0.8100000000000001, 0.797 & 0.732 |
| Site slope | 0 ° | Viewfactor | 0.5985, 0.4429, 0.2981, 0.2028, 0.1648 & 0.0447 |
| Flame width | 100 m | Minimum distance to < 40 kW/m ² | 10.3 m |
| Windspeed | n/a | Minimum distance to < 29 kW/m ² | 13.9 m |
| Heat of combustion | 18,600 kJ/kg | Minimum distance to < 19 kW/m ² | 20.5 m |
| Flame temperature | 1,090 K | Minimum distance to < 12.5 kW/m ² | 29.1 m |
| | | Minimum distance to < 10 kW/m ² | 34.7 m |

Rate of Spread - McArthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Figure 14 Method 2 Flamesol minimum distance calculation (VHC 11.2)

The potential radiant heat flux was calculated using the Australian Standard Construction of buildings in bushfire-prone areas (AS3959-2018) Method 2 for representative areas to the north of proposed lots. Figure 15 shows the reduction in radiant heat flux with increasing distance from areas of hazardous vegetation.

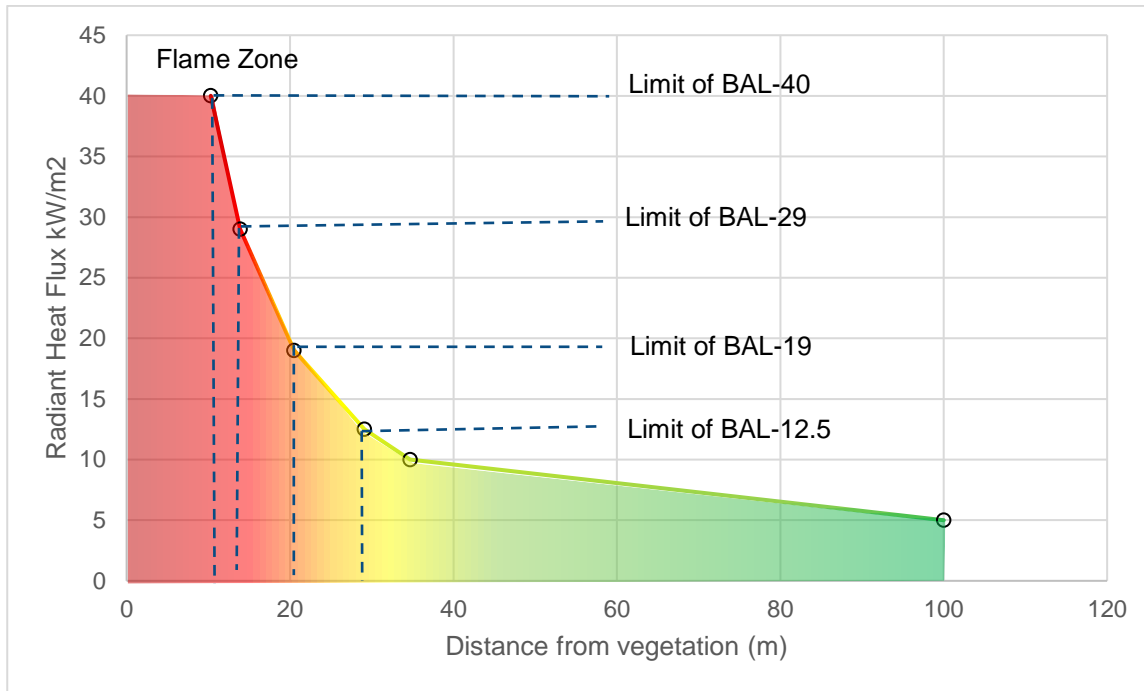


Figure 15 Potential radiant heat flux versus distance from vegetation assuming an overall fuel load of 13 tonnes per hectare (VHC 11.2)

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)

Using AS 3959 – 2018, Table 2.3 Classification of Vegetation, the vegetation is classified as Open Woodland (Grassland) B-06 which is shown in Figure 16. It is described as: “All forms (except tussock moorlands), including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland.”.

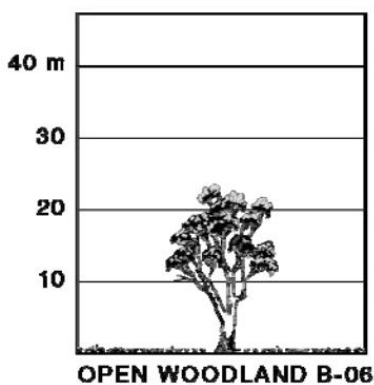







Figure 16 Vegetation Class B-06 Open Woodland (AS3959-2018)

Appendix D: Explanation of Bushfire Attack Levels

| | | | | |
|--|--|---|---|---|
|  |  |  |  |  |
| 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. |
| <p>There is a risk of ember attack.</p> <p>The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m².</p> | <p>There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat.</p> <p>The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m²</p> | <p>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.</p> <p>The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m².</p> | <p>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.</p> <p>The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m².</p> | <p>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.</p> <p>The construction elements are expected to be exposed to a heat flux greater than 40 kW/m².</p> |

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

BAL Descriptions - Australian Standard - Construction of Buildings in Bushfire-prone Areas (AS 3959-2018)

Appendix E: 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.

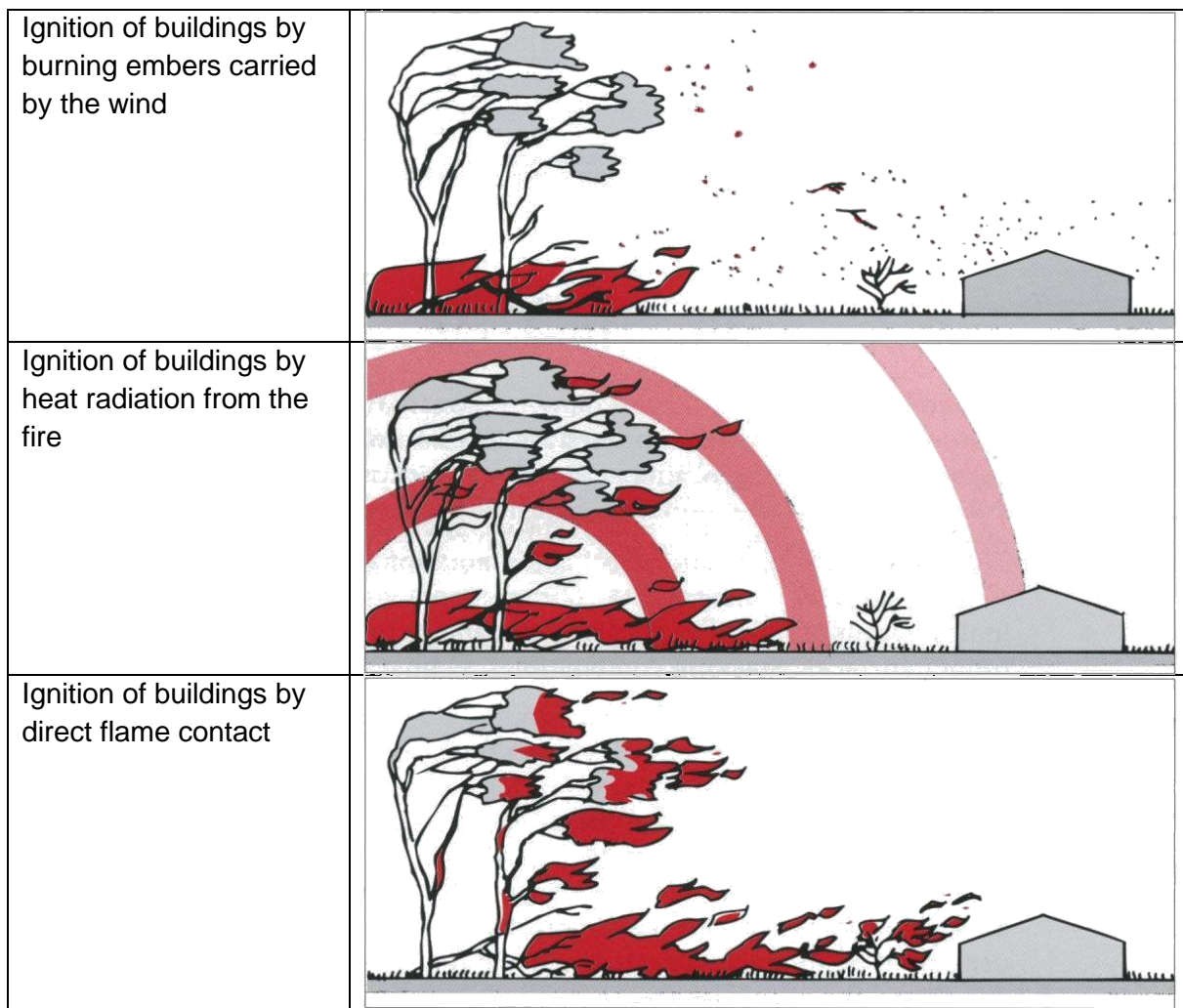


Figure 17 : The three main elements of bushfire which threaten life and property. (Ramsay & Rudolf 2003)

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 firefighters.

Asset Protection Zones

The most immediate form of defence for an asset is a well-designed Asset Protection Zone (APZ). This zone serves to protect the asset from flames and radiant heat. It improves the chances of the asset surviving the passing of the fire front, providing a safe refuge for occupants during this period and providing a relatively "defendable space" for firefighting activity.

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 act as a buffer zone between a building and the hazard. The primary purpose of an Asset Protection Zone is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures.

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

An APZ is made up of an Inner Protection Area (IPA) and Outer Protection Area (OPA) as illustrated in Figure 18.

Inner Protection Area (IPA) is the area closest to the asset and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and be a defensible 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. The IPA is typically the open area around dwelling, consisting of a mown lawn and well maintained gardens and grounds. Contrary to common belief, this area does not need to be 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:

- Canopy cover should be less than 15% with substantial gaps (or at least 2 - 5m) between the canopies of any trees in this area;
- Tree canopies do not overhang the roof;
- 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;
- Lower limbs should be removed to a minimum height of 2 metres above the ground;
- Surface and near surface fuels are kept to a minimum. This includes lawns (to be kept short) leaf litter and garden mulches; and
- Plants with a higher tolerance to fire should be utilised closest to the house and are maintained in a healthy moisture state throughout the fire season.

Outer Protection Area (OPA) is located between the IPA and the unmanaged vegetation. Vegetation within the OPA can be managed to a more moderate level with the reduction of fuel in this area substantially decreasing the intensity of an approaching fire. It also assists restricting the pathways to crown fuels; reducing the level of direct flame, radiant heat and ember attack on the IPA and built assets. The removal of mid layer fuels can help to prevent flames from transferring from ground fuels to the canopy where destructive potential is greatest.

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.

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. An example of an Asset Protection Zone in relation to a dwelling is presented in Figure 18.

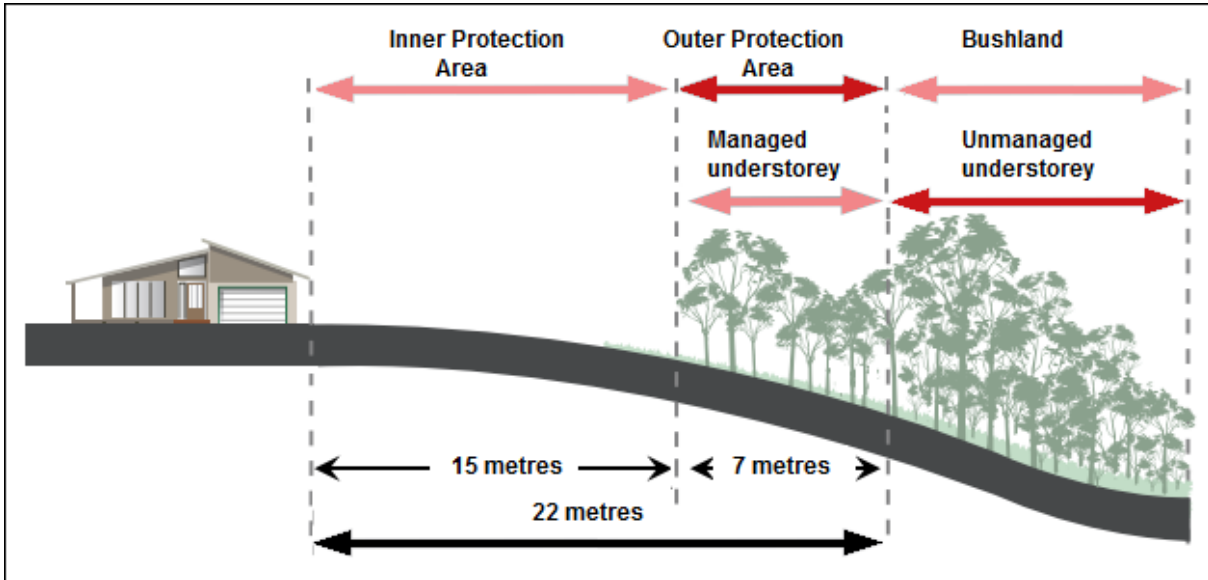


Figure 18 APZ elements with example radius (Adapted from Planning for Bushfire Protection 2018)

Appendix F: 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. Table 10 identifies the attributes of plants that may influence fire behaviour.

Table 10 Attributes of plants that may influence bushfire attack

| Growing plant attributes Composition of leaves | Growing plant attributes Structure | Ground fuel attributes |
|---|--|--|
| Moisture content Volatile oil content Mineral content | Leaf fineness Density of foliage Continuity of plant form Height of lowest foliage above ground Size of plant in terms of its volume and spread Dead foliage on plant Bark texture / characteristics | Quantity of ground fuel available in fire season Fineness of ground fuel Compacting ability of ground fuel Mineral content of ground fuel |

When landscaping in bushfire prone areas, it is important to use or retain plants of low flammability that have the following characteristics:

- Leaves with high moisture content,
- Low volatile oil content in leaves,
- Leaves that have a high mineral content,
- Limited retention of leaves and twigs in canopy and mid branches, and
- Smooth or tight bark.

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.

- Plants to avoid using in bushfire prone areas are ones that:
- Accumulate or create lots of dry dead debris during the fire season,

- Have a high volatile oil content in their leaves,
- Have loose flaky bark, and
- Have masses of very fine leaves, especially if they are continuous to the ground.

Garden maintenance 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 dwellings and buildings, and
- Avoidance of flammable mulches on garden beds such as woodchip or straw.