



# Bushfire Hazard Assessment Report

## **Property**

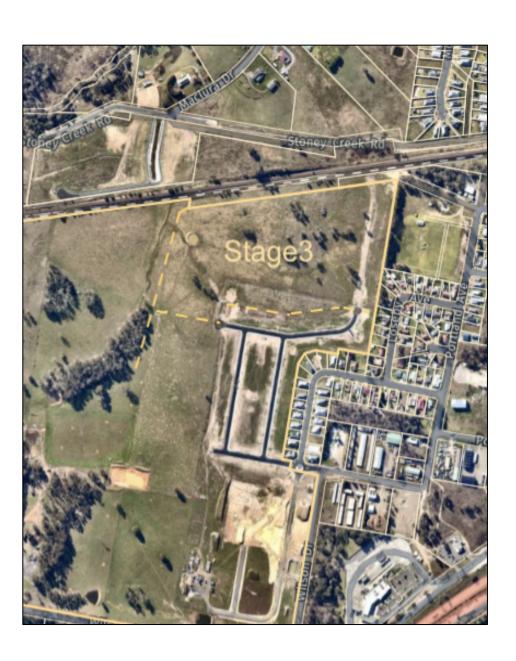
Wilson Drive, Marulan

## Proposal

Subdivision

## Client

Corio Projects Pty Ltd



**Date** 23 June 2023

Reference BAR 10010/23

**Prepared by** Matthew Sharrock

BPAD-Level 2 Certified Practitioner



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## 1 Property & Proposal Details

Client Corio Projects Pty Ltd

**Lot** 23 **DP** 1256090

**Address** Wilson Drive, Marulan

**Proposal** Subdivision

Land Zone R1 General Residential

Council Area Goulburn Mulwaree

Fire Danger Index 100

## 2 Introduction

This bushfire hazard assessment report has been prepared on behalf of *Corio Projects Pty Ltd* in respect of a proposed Subdivision over Wilson Drive, Marulan. This component of the Subdivision is referred to as Stage 3.

NSW Government Planning Portal identifies the property as being bushfire prone. This land has been recognized as land that can support or is subject to bushfire attack. The orange shaded area indicates Category Three bushfire vegetation and the canary yellow shaded area bushfire prone land (Figure 1).

The dominant bushfire vegetation across the assessment area is categorised as Grassland. A small area of Woodland is located southwest of the site and the Remnant Vegetation provisions will apply to the Railway corridor adjacent the northern boundary. The topography of the land across the assessment area was found to be slight sloping.



Figure 1 Bushfire Prone Land Map (NSW Gov 2023)

The above factors are important when determining the asset protection zone requirement and the bushfire attack level construction standard applicable to the proposed Subdivision.

Other bushfire protection and design measures outlined in the report include, access requirements and utility services covering; water, electricity and gas.

The bushfire protection measures in *Planning for Bushfire* Protection (PBP) 2019 and the recommendations made herein, aim to *protect human life and minimise the impacts to property from the threat of bushfire*. These recommendations will also ensure the objectives of PBP can be satisfied:

- Afford buildings and their occupants protection from exposure to a bush fire;
- Provide for a defendable space to be located around buildings;
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, minimises material ignition
- Ensure that appropriate operational access and egress for emergency service personnel and residents is available
- Provide for ongoing management and maintenance of bush fire protection measures (BFPM); and
- Ensure that utility services are adequate to meet the needs of firefighters.

In accordance with Section 4.46 of the *Environmental Planning & Assessment Act (1979)* the proposed Subdivision (Integrated Development) triggers the *Rural Fires Act (1997)*. Section 100B of the Rural Fires Act states that a Bushfire Safety Authority (Approval) is required from the Rural Fire Service.

Subsequently, this Report will accompany a Development Application. It has been prepared in accordance with the requirements of Clause 44 of the *Rural Fires Regulation (2022)* and *Planning for Bushfire Protection (2019.*)

## 3 Bushfire Hazard Assessment

## 3.1 Vegetation

Rural Fires Regulation (Clause 44 (b) requires a classification of vegetation on and surrounding the property, to a distance of 140m. This classification was undertaken in accordance with the system for vegetation classification in Planning for Bushfire Protection (Appendix One).

The site assessment undertaken on 22 June 2023 indicated that bushfire vegetation is located to the north, west and south of the Subdivision. Attachment Three provides an overall plan of the vegetation hazard assessment. Site photographs are also included in Attachment Four.

A small narrow area of vegetation is located adjacent the northeast portion of the Stage 3 along the eastern boundary of the property. This vegetation is associated with the Marulan Sporting Fields. The vegetation measures on average 11 meters in width and will be separated from adjacent Category Three bushfire vegetation to the north by a 20 meter wide road.

Due to the above factors the low threat vegetation exclusions of Section A1.10 (PBP) can apply. These vegetation exclusions are not considered a hazard for the purpose of the assessment.

Strips of vegetation less than 20 metres in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20m of the site or 2 each other.



Figure 2 Low Threat Vegetation Exclusion

or other areas of vegetation being Category 1, 2 or 3 vegetation.

The vegetation north of the Stage 3 is associated with a railway corridor. The vegetation is a mixture of Grasses, Shrubs and several Trees. Due to the presence of elevated fuels a vegetation classification of Grassland will not apply. As the vegetation measures less than 50 meters in width the *Remnant Vegetation* provisions of PBP will be applied. The application of a vegetation classification of Grasslands or Remnant Vegetation was discussed with Mr Jamie

Winte of the RFS Bateman's Bay Office on Friday 23 June 2023. Due to the rationale outlined above it was established that a vegetation classification of Remnant Vegetation was appropriate.

The vegetation adjacent the western and south boundaries of Stage Three is farming pasture. PBP considers farming pasture a hazard and applies a classification of *Grasslands*.

A small area of overstorey trees surrounding by farming pasture is located adjacent the southwest corner of Stage 3. NSW Government Vegetation Mapping classifies the vegetation community as Tableland Grassy Box-Gum Woodland. Consequently, when applying the methodology for vegetation classification the vegetation community is classified as **Woodland**.

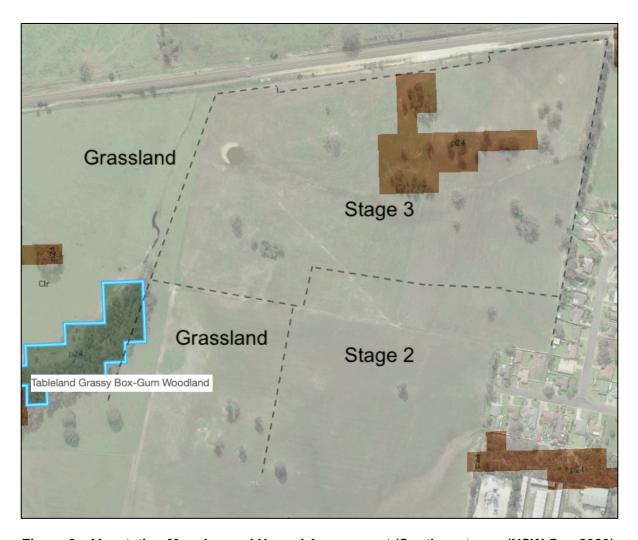


Figure 3 Vegetation Mapping and Hazard Assessment (Southwest area (NSW Gov 2023)



Figure 4 Hazard Assessment ( North & Northeast)

## 3.2 Effective Slope

Rural Fires Regulation 2022 (Clause 44 (c) requires an assessment of the slope of the land on and surrounding the property to a distance of 100m from the boundaries of the property. Planning for Bushfire Protection (Appendix One) also requires the gradient within the hazard, which most significantly influences fire behaviour to be determined.

The gradient of the land was determined with the benefit of the contour plan prepared by AT&L and site observation. The topography of the land across the assessment area was found to be slight sloping.

Therefore, in accordance with the slope classes detailed in Section A1.4, the effective slope of the land beneath the hazard which most significantly influences fire behaviour is shown in Figure 5.

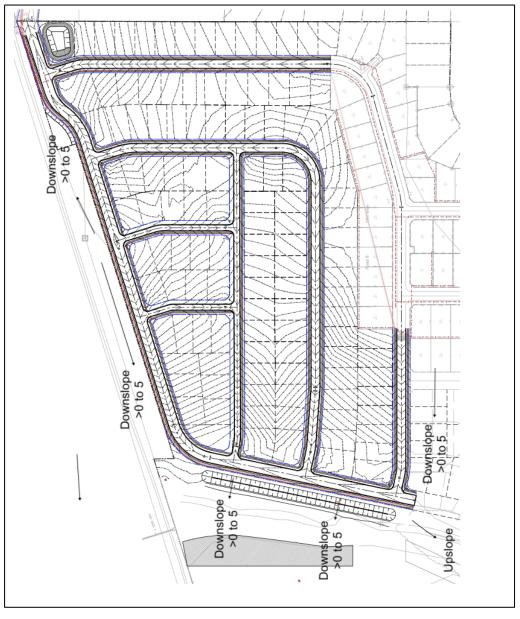


Figure 5 Effective Slope

## 4 Asset Protection Zone

An asset protection zone (APZ) is a buffer zone of minimal fuel loads located between a building and a bushfire hazard. The minimal fuel loads within the APZ will ensure any vegetation does not provide a path for the transfer of fire to buildings either from ground level or through the tree canopy. This will ensure the impact of direct flame contact, radiant heat and ember attack on the development are minimised. The APZ also provides a buffer zone between the development site and the bushfire hazard, allowing firefighters and homeowners to safely defend the property.

Asset protection zone requirements were assessed in accordance with the methodology detailed in Appendix One of PBP. When the findings outlined in Table 1 were applied to Table A1.12.2 (PBP), it was found that the proposed Subdivision complies with the minimum distance requirement for an APZ.

A 30 meter APZ will apply over the land adjacent the southern area of Stage 3. This APZ plus the 20 meter wide road will provide an overall buffer distance of 50 meters (Attachment 1, Plan 2).

Direction	Slope Class	Vegetation Type	Distance to Veg (m)	APZ Minimum Req'ment (m)	Complies
North	Downslope >0 to 5	Remnant Vegetation/ Rainforest	20	14	Yes
West	Downslope >0 to 5	Grassland	20	12	Yes
Southwest	Upslope	Woodland	20	12	Yes
South	Downslope >0 to 5	Grassland	20	12	Yes

Table 1 Assessment Findings

Performance Criteria	Acceptable solutions	Compliance/Comments
Potential building footprints will not be exposed to radiant heat levels exceeding 29 kW/m2 on each proposed lot.	APZ's are provided in accordance with tables A1.12.2 and A1.12.4 based on the FDI	Yes. APZ's comply with Table A1.12.2
APZ's are managed and maintained to prevent the spread of a fire towards the building.	APZ's are managed in accordance with the requirements with Appendix 4	Yes. APZ to be managed in accordance with requirements detailed below
The APZ is provided in perpetuity	APZ's are wholly within the boundaries of the property	Yes
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	The APZ is located on lands with slope less than 18 degrees.	Yes. The gradient of the land is slight sloping

Table 2 APZ Requirements

## 5 Bushfire Construction Considerations

#### 5.1 Bushfire Attack Level Construction Standard

Bushfire attack level (BAL) construction standards are principally concerned with *improving* the ability of a building to better withstand bushfire attack from the effects of wind, smoke, embers, radiant heat and flame contact. The construction standard will provide a level of protection to the buildings occupants (until the fire front passes) as well as to the building itself.

When the findings outlined in Table 1 were applied to Table A1.12.5 (PBP), BAL construction standards of BAL 29 or lower will apply to each Lot.

BAL ratings relative to the distance from the vegetation to future buildings are outlined in Table 3. Attachment Two also provides a coloured shaded BAL Subdivision Plan.

Vegetation	Slope	BAL 29	BAL 19	BAL 12.5	No Requirement
Rainforest	Downslope >0 to 5	14m to 21m	21m to <29m	29m to <100m	>100m
Grassland	Downslope >0 to 5	12m to <17m	17m to <25m	25m to <15m	>50m
Woodland	Upslope	12m to <18m	18m to <26m	26m to <100m	>100m

Table 3 BAL Ratings

## 6 Environmental & Aboriginal Considerations

At the time of this assessment there were no threatened species, population or ecological community identified under the *Biodiversity Conservation Act 2016* or any aboriginal object within the meaning of the *National Parks and Wildlife Act 1974*, that were known to the applicant to exist or be situated on the property.

## 7 Access

Access roads must enable safe access and egress for residents attempting to leave an area while emergency service personnel are arriving to undertake firefighting operations. The purpose of the road system is to:

- Provide firefighters with access to structures, allowing more efficient use of firefighting resources;
- Provide evacuation routes for firefighters and the public; and
- Provide access to areas of bush fire hazard for firefighting and hazard mitigation purposes.

The two key issues for the overall Subdivision Road design are the provision of a perimeter road and internal roads. The Subdivision design includes a Perimeter Road with two access points from the Subdivision to the existing road network. The internal road network links at intervals not exceeding 500 meters. The proposed road design compiles with the requirements of Table 5.3b (Access) of PBP, outlined below.

Performance Criteria	Acceptable solutions	Compliance/Comments
General Requirements	Property access roads are two-wheel drive, all-weather roads;	Yes
Firefighting vehicles are provided with safe, all-weather	Perimeter roads are provided for residential subdivisions of three or more allotments;	Yes
access to structures and hazard vegetation	Subdivisions of three or more allotments have more than one access in and out of the development;	Yes. Two points of access are available to and from the Subdivision
	Traffic management devices are constructed to not prohibit access by emergency services vehicles;	See Recommendation
	Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient;	Yes. Gradient is slight sloping
	All roads are through roads;	Yes

Table 4 General Access Requirements

Performance Criteria	Acceptable solutions	Compliance/Comments
General Requirements  Firefighting vehicles are provided with safe, all-weather access to	Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	N/A. No dead-end roads
structures and hazard vegetation	Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	Yes. See Recommendation
	Where access/egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system, and	N/A
	One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for re suppression.	N/A
The capacity of access roads is adequate for firefighting vehicles	The capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.	Yes. See Recommendation
There is appropriate access to water supply	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	Yes. See Recommendation
	Hydrants are provided in accordance with AS 2419.1:2005.	Yes. See Water Section

Table 4 General Access Requirements

Performance Criteria	Acceptable solutions	Compliance/Comments
Perimeter Roads	Roads are two-way sealed roads	Yes
Access roads are designed to	Minimum 8m carriageway width kerb to kerb;	Yes
allow safe access and egress for firefighting vehicles while residents are	Parking is provided outside of the carriageway width;	N/A. Parking area's not proposed
evacuating as well as providing a safe operational	Hydrants are located clear of parking areas;	N/A. No parking area's
environment for emergency service personnel during firefighting and emergency management on the	Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	Yes Multiple internal roads ensure distance does not exceed 500m
interface	Curves of roads have a minimum inner radius of 6m;	Yes
	Maximum grade is 15 degrees and an average grade of not more than 10 degrees;	Yes. Gradient is slight sloping
	The road crossfall does not exceed 3 degrees; and	Yes
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	N/A No trees
Internal Road  Access roads are designed	Minimum 5.5m carriageway width kerb to kerb; parking is provided outside of the carriageway width;	Yes
to allow safe access and egress for fire fighting	Hydrants are located clear of parking areas;	N/A. Parking area's not proposed
vehicles while residents are evacuating.	Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	Yes. All roads link with road system at interval's of no greater than 500m
	Curves of roads have a minimum inner radius of 6m;	Yes
	The road crossfall does not exceed 3 degrees; and	Yes
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	N/A No Trees

Table 5 Perimeter & Internal Road Requirements

Performance Criteria	Acceptable solutions	Compliance/Comments
Property Access  Firefighting vehicles can access the dwelling and exit safely	There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency fire fighting vehicles.	Yes. Standard driveway access for each Lot. No property access roads proposed
	Minimum carriageway width of 4m;	N/A. See above
	In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay;	N/A.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;	N/A
	Provide a suitable turning area in accordance with Appendix 3;	N/A
	Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	N/A
	The minimum distance between inner and outer curves is 6m;	N/A
	The crossfall is not more than 10°;	N/A
	Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads;	N/A
	A development comprising more than three dwellings has formalised access by dedication of a road and not by right of way.	N/A

**Table 6 Property Access Requirements** 

## 8 Services

## 8.1 Water

Water supply and services are critical for both firefighting operations and in the protection of buildings, during and after the passage of a bushfire.

Water supply to the property is provided from Sydney Water's reticulated water system. Water infrastructure can comply with the requirements of Table 5.3c (Water Supplies), outlined below.

Performance Criteria	Acceptable solutions	Compliance/Comments
A water supply is provide for firefighting	Reticulated water is provided to the development	Yes
Water supplies are located at regular intervals	Fire hydrant spacing, design and sizing comply with AS 2419.1 – 2005	Yes. See Recommendation
Water supply is accessible and reliable	Hydrants are not located within any road carriageway	Yes. See Recommendation
for firefighting operations	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads	Yes
Flows and water pressure are appropriate	Fire hydrant flows and pressures comply with AS 2419.1 – 2005	
The integrity of the water supply is maintained	All above ground water pipes external to the building are metal, including and up to any taps.	See recommendation

**Table 7 Water Requirements** 

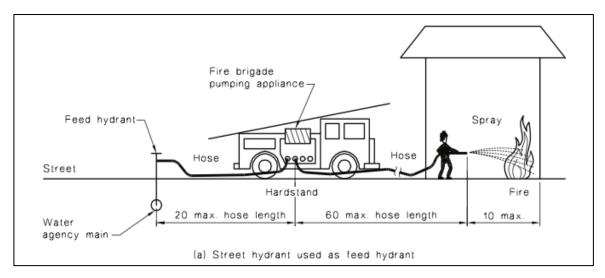


Figure 6 Australian Standard 2419.1-2021

## 8.2 Electrical & Gas

It is important that the location of electricity and gas services limits the possibility of ignition of surrounding bushland or the fabric of buildings.

The proposed underground electricity infrastructure will ensure compliance with the requirements of Table 5.3c (Electricity Service) of PBP.

If gas cylinders are installed adjacent the buildings, the release valves must be directed away from the building and at least 2 metres away from any combustible material. Gas meters located adjacent to buildings shall not use polymer sheathed flexible pipe.

## 9 Recommendations

The proposed Subdivision was assessed in accordance with the requirements of Clause 44 of the *Rural Fires Regulation 2022 and Planning for Bushfire Protection (PBP) 2019.* It was determined that the proposal conforms to the requirements of both Clause 44 and PBP. Specific recommendations detailing how the proposal can comply with PBP are detailed below.

### **Asset Protection Zone**

- 1. Each Lot shall be maintained in perpetuity as an inner protection area in accordance with the requirements detailed in Section 4.
- A 30m APZ adjacent the southern boundary shall be maintained in a low hazard state with grassland not to exceed 100mm in height. This requirement will be extinguished when Stage 4 of the Subdivision is completed.

#### Bushfire Attack Level Construction Standard & Upgrade of Existing Buildings

1. Construction requirements for each Lot must comply with AS3959-2018, and Section 7.5 of PBP.

#### <u>Access</u>

- 1. Traffic management devices are constructed to not prohibit access by emergency services vehicles
- 2. Roll top kerbing should be used to the hazard side of the road.
- The capacity of road surfaces must be sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes).
- 4. Hydrants must be located outside of road carriageways.

#### Water

- 1. Fire hydrant spacing, design and sizing comply with AS 2419.1 2021.
- 2. Hydrants are not located within any road carriageway.
- 3. All above ground water pipes external to the building are metal, including and up to any taps.

#### Gas

- 1. Bottled gas is installed and maintained in accordance with AS1596 and the requirements of relevant authorities. Metal piping is to be used.
- 2. All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation.
- 3. If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal.
- 4. Gas meters located adjacent to buildings shall not use polymer sheathed flexible pipe

#### 10 Conclusion

In conclusion, it has been demonstrated that the proposed Subdivision satisfies the performance criteria and acceptable solution requirements of Planning for Bushfire Protection 2019. This ensures the specific objectives, relevant to this proposal have been addressed because:

- Perimeter of Subdivision is not exposed to bushfire hazard;
- No vegetated corridors exist that permit the passage of bushfire towards buildings;
- Buffer distance and areas of managed land located between the adjacent bushland and property will restrict the passage of bushfire to the property;
- Buffer distance between the vegetation and future buildings will ensure radiant heat levels do not exceed 29kW/m2;
- Asset protection zone to be maintained in perpetuity;
- Clear, ready and safe access from all properties to the public road system is available for residents and emergency services;
- Access is available to adjacent vegetation to facilitate bushfire mitigation works and property protection;
- Adequate supply of water and services is available to facilitate effective firefighting.

The proposed Subdivision complies with the standards necessary to protect persons and property from danger that may arise from a bushfire, as prescribed by *Planning for Bushfire Protection 2019*. Therefore, the Commissioner is in a position to issue a Bushfire Safety Authority.

Matthew Sharrock

Principal Consultant



## 11 References

NSW Rural Fire Service (2018) *Planning for Bushfire Protection, A guide for Councils, Planners, Fire Authorities and Developers,* NSW Rural Fire Service

New South Wales Government 2023, 26 June 2023, www.legislation.nsw.gov.au

Australian Standard 3959-20018 Construction of Building in Bushfire Prone Areas, Standards Australia, Sydney NSW

NSW Government 2023, 26 June 2023, https://maps.six.nsw.gov.au

Keith. D 2004, Ocean Shores to Desert Dunes, The Native Vegetation of NSW and the ACT, DIPNR and NSW NPWS

Costermans. L 2006, *Native Trees and Shrubs of South-Eastern Australia*, Reed New Holland, (Sydney) Australia

Standards Australia 2005, Australian Standard 2419.1-2021 *Fire Hydrant Installations*, Part 1: System design, installation and commissioning, Standards Australia Sydney

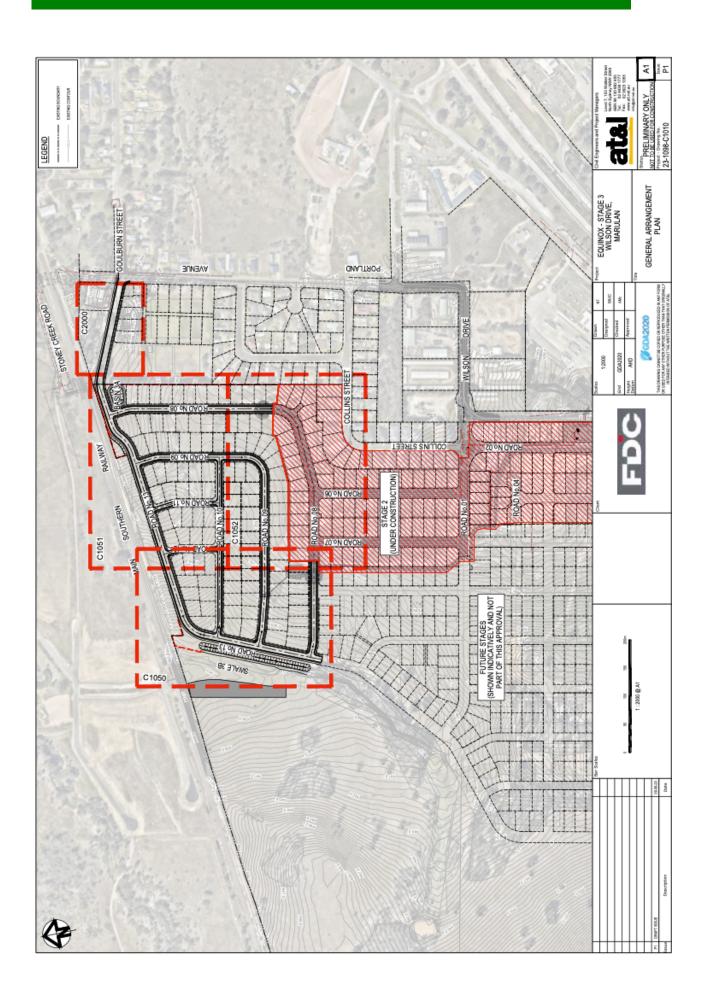
## Notes & Disclaimer

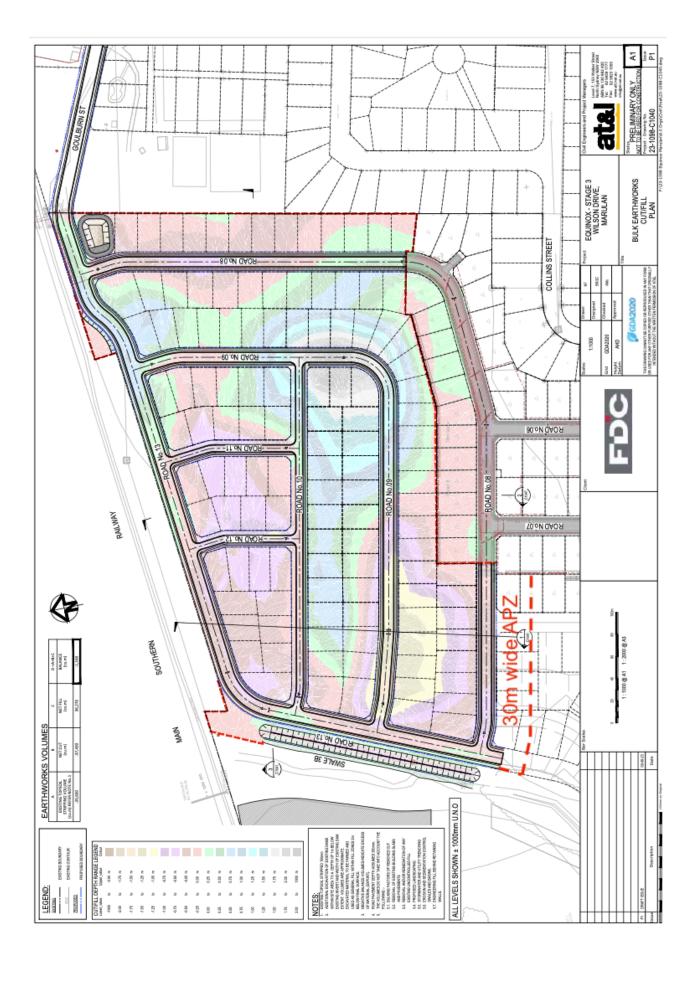
Any recommendation, opinion or interpretation in this Report is made in good faith based on the legislative requirements of the New South Wales (NSW) Planning System for bushfire prone land.

The bushfire protection and design measures recommended in this report, aim to help protect human life and minimise the impacts on property from bushfire. However, these measures cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable behaviour and nature of fire and the difficulties associated with extreme weather and fire weather conditions.

Bushfire Building Solutions takes no responsibility for the implementation and ongoing maintenance of the bushfire protection measures outlined in the Report.

Due to the above rationale the author is not liable to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above.











Low Threat Vegetation Exclusion



Remnant Vegetation adjacent north boundary



Remnant Vegetation adjacent northern boundary



Grassland adjacent western boundary



Woodland adjacent southwest corner of Subdivision



Grassland adjacent southern boundary of Subdivision

- Trees and shrubs may be planted in the IPA provided:
  - Shrubs are planted in small clumps and short narrow rows
  - Shrubs are planted in clumps rather than in continuous rows
  - Trees should have lower limbs removed up to a height of 2 metres above the ground
  - No part of the tree overhangs within 2m of the dwelling
  - Vegetation is well spread out and does not form a continuous canopy
  - Trees are smooth barked and do not retain dead materials or deposit excessive quantities of ground fuel
  - That vegetation does not provide a continuous path to the building
  - Clumps of shrubs should be separated from exposed windows and doors by a distance
    of at least twice the height of the vegetation so that plants will not ignite the asset by
    direct flame contact or radiant heat emission
- Strategic landscaping to the above requirements can help mitigate the impacts of radiant heat.
- The use of local native plants that have fire retardant qualities is to be encouraged on the site. This includes plants that have low volatile oil content, high moisture content and high levels of salt
- Most Proteaceae species (e.g. *Banksia, Grevillea, Persoonia*) have qualities that are consistent with the recommended characteristics for bushfire prone locations
- Avoid plants with high levels of volatile oils in leaves. Eucalypts, Callistemon and Melaleucas burst into flames on heating and increase fire intensity. In Eucalypts, the amount of volatile oil on foliage can be over 4% whereas Callistemon and Melaleucas up to 1%. Generally the figure is less than 1% for Acacias, Grevilleas and Hakeas
- Use of non-combustible ground surfaces such as pebbles, gravel and paved areas etc must be used directly adjacent the building
- Lawn areas shall be cut low and clear of leaf litter. Short green grass will slow the fire and reduce fire intensity
- All fences in bush shall be made of either hardwood or non-combustible material
- Areas under fences, fence posts, gates and trees shall be raked and kept clear of fire fuel.
   Avoid brush fencing and planting "pencil pine" type trees next to buildings, as these are highly flammable
- Detached structures, including garden sheds shall be kept free of leaves and other debris
  and must be sealed to prevent entry of burning embers.