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BUSHFIRE THREAT ASSESSMENT REPORT

FOR

Michael Cole

Wybong Road

Muswellbrook

NSW 2333

Disclaimer

The report is prepared in accordance with current accepted practice as described in Australian Standard AS 3959 - 2018 and amendments thereto "Construction of Buildings in Bushfire Prone Areas" and N.S.W. Rural Fire Services guide "Planning for Bushfire Protection 2019" and amendments thereto and other relevant regulations.

I certify the proposed development can conform to the specifications and requirements of Planning for Bushfire Protection 2019 in accordance with Section 4.14(1)(b) of the Environmental Planning and Assessment Act 1979.

Due to the unpredictable nature of bushfires and of weather conditions at the time of a bushfire this report cannot be taken as a guarantee that the recommended bushfire mitigation measures will protect the property and life from damage in every possible bushfire condition or circumstance. Ultimately the responsibility is on the owner to accept the risks associated with development in or near a bushfire prone area.

This report is for the use only of Hyndes Bailey & Co for whom it was prepared and their financial or business associates with whom they may share the report in its entirety and for no other purpose.

No responsibility is accepted for any third party who may use or rely on the whole or any part of the content of this report.

Neither the whole nor any part of this report nor any reference thereto maybe included in part or full in any way without my written approval for the form and context in which it may appear.



Barry Cleary AFSM 13/6/2023

BPAD 19741

Post Grad Dip. Design for Bushfire Prone Areas. UWS

Certificate IV Public Safety - Firefighting Supervision

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LIST OF ABBREVIATIONS

MSC	MUSWELLBROOK SHIRE COUNCIL
APZ	ASSET PROTECTION ZONE
AS 3959-2018	CONSTRUCTION OF BUILDINGS IN BUSHFIRE PRONE AREAS
BAL	BUSHFIRE ATTACK LEVEL (MEASURED AS kW/m ²)
BCA	BUILDING CODE OF AUSTRALIA
BFRMP	BUSHFIRE RISK MANAGEMENT PLAN
BFSA	BUSHFIRE SAFETY AUTHORITY
DA	DEVELOPMENT APPLICATION
DCP	DEVELOPMENT CONTROL PLAN
GFDI	GRASSLAND FIRE DANGER INDEX
EP&A ACT	ENVIRONMENTAL PLANNING & ASSESSMENT ACT
ESD	ECOLOGICALLY SUSTAINABLE DEVELOPMENT
FFDI	FOREST FIRE DANGER INDEX (ALSO FDI)
FRL	FIRE RESISTANCE LEVEL
IPA	INNER PROTECTION AREA
kW/m ²	KILOWATTS PER SQR. METRE (being a measure of radiant heat)
LEP	LOCAL ENVIRONMENT PLAN
NASH	NATIONAL ASSOCIATION OF STEEL HOUSING
NCC	NATIONAL CONSTRUCTION CODE
OPA	OUTER PROTECTION AREA
PBP 2019	PLANNING FOR BUSHFIRE PROTECTION 2019
POM	PLAN OF MANAGEMENT
RFS	RURAL FIRE SERVICE
F+RNSW	FIRE & RESCUE NEW SOUTH WALES
RHF	RADIANT HEAT FLUX
ROS	RATE OF SPREAD
SEPP	STATE ENVIRONMENTAL PLANNING POLICY
SWS	STATIC WATER SUPPLY
=	EQUAL TO
<	LESS THAN
>	GREATER THAN
≤	LESS THAN OR EQUAL TO
≥	GREATER THAN OR EQUAL TO

EXECUTIVE SUMMARY

In New South Wales local councils are bound by the the Environmental Planning and Assessment Act Sect 4.14 to ensure that all habitable developments in bushfire prone areas conform to 'Planning for Bushfire Protection' (NSW RFS, 2019). This Bushfire Threat Assessment report has been prepared on behalf of Hyndes Bailey & Co by Mr. Barry Cleary AFSM, BPAD 19741. The report has been prepared in accordance with Planning for Bushfire Protection 2019 (PBP) and AS 3959-2018 Construction of buildings in bushfire prone areas.

The proposal is to apply for the subdivision of Lot 641 in DP554159, Lot 123 & 124 in DP700578, Lot 7 & 8 DP117997 and Lot 505 in DP117997. As such it is proposed to apply for subdivision of each lot separately within the one development application, to create 2 lots from each existing lot being, a new “railway land lot” and a residue “farm land lot”.

The purpose of this subdivision is to create seperate lots over the existing rail line by subdividing the land currently owned by Bengalla upon which the Mach Energy Rail line passes across, such that the ownership may be transferred to Mach Energy.

The newly created railway land lots will not have a dwelling entitlement. There is an existing dwelling on Lot 505 DP711996. This dwelling has well maintained grounds and suitable access provisions. However access onto the property was not available at the time of the site visit. Water supplies and the bushfire safety standard of the existing structure could not be confirmed.

Being Integrated Development, this will require Council to refer the proposal to the RFS for the issue of a Bush Fire Safety Authority (BFSA).

This report has considered the potential bushfire hazard posed by the adjoining bushfire prone vegetation. The report demonstrates that the proposal can meet the deemed to satisfy solutions for the subdivision of land (PBP Chapter 5).

“Although this Standard is designed to improve the performance of buildings when subjected to bushfire attack in designated bushfire-prone areas there can be no guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions”.

Extract from AS 3959 2018 Construction of buildings in bushfire-prone areas P.6

1.1.0 INTRODUCTION

Table 1.1 Synopsis

SUBJECT LOTS	
Lot and DP (Current)	Lot 7 DP1170997 – 43.61 ha
	Lot 8 DP1170997 - 25.01 ha
	Lot 505 DP711996 - 15.38 ha
	Lot 123 DP700578 - 15.97 ha
	Lot 124 DP700578 - 24.06 ha
	Lot 641 DP554159 - 10.12 ha

Table 1.1.2 Site Cadastre

SITE CADASTRE	
Water supply	Static Water Supply
Electricity supply	N/A
FFDI	100 @ 1:50 year event
Address (general Locality)	Wybong Road, Muswellbrook NSW 2333
LGA	Muswellbrook City Council (MCC)
Zoning	RU1 Primary Production
LEP & Mapping	NSW Planning Portal
BPL Mapping	NSW Planning Portal
Vegetation North	Mining development
Vegetation South	Railway infrastructure and farmland
Vegetation East	Farmland generally consisting of grassland
Vegetation West	Revegetated mining land - combination of some woodland and grasslands
Canopy Height	10 - 15 metres
Elevation	200 m AHD
Sited Visited	24/5/2023

“In NSW all development on Bushfire Prone land must satisfy the aims and objectives of PBP 2019. The aim of PBP 2019 is to provide for the protection of human life and minimise the impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment.” (PBP 2019 P.10)

Being mindful of the above statement, the following report has been drafted for the creation of separate lots over the existing rail line by subdividing the land currently owned by Bengalla upon which the Mach Energy Rail line passes across, such that the ownership may be transferred to Mach Energy.

The proposed development is classed as Integrated development which requires referral to the RFS under the EP&A Act 1979 s4.46. This enables the proposal to be assessed by the RFS under the Rural Fires Act 1997 s100B for the issue of a BFSA for the proposal.

1.2.0 DESCRIPTION



Fig. 1.2.1 Over-view of the existing site (see Appendix 1)

1.2.1 General Description

The above diagram illustrates the current lot layout. It is an area of approximately 134.15 ha. The site is situated 3.5 km West of the Muswellbrook CBD. Generally the area is used for a combination of both mining and agricultural activities. The existing rail line which runs across Wybong Road to the North, extends South through each of the Lots to be subdivided before turning East towards Muswellbrook. The rail corridor is accessed by Overton Road which runs from Wybong Road to the South and parallel to the rail line on the West side. A separate access road runs parallel to the rail line to the East. This road provides access to the dwelling on Lot 505 DP711996 known as 79 Overton Road, Muswellbrook.

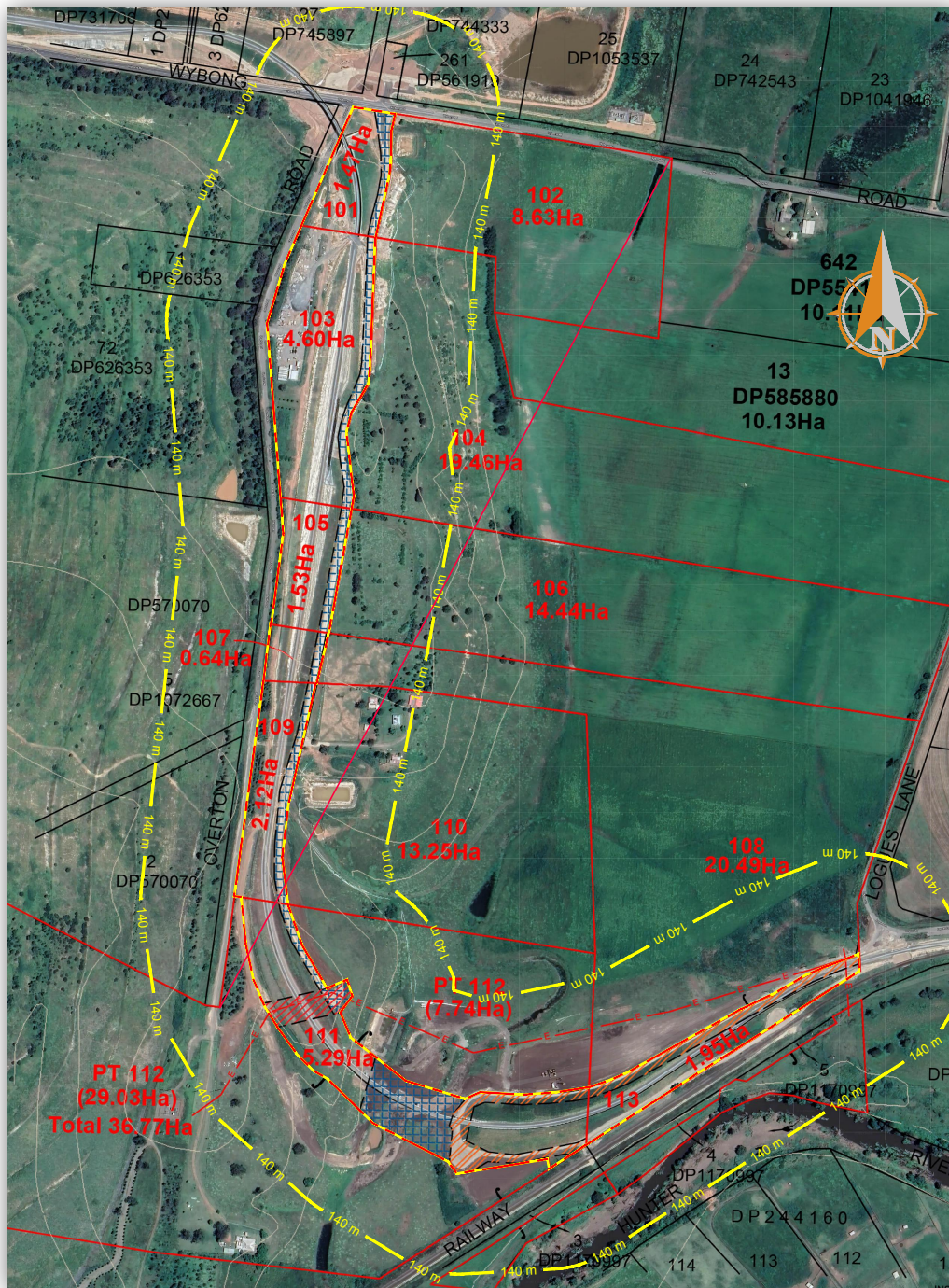


Fig. 1.2.2 Over-view of the proposed subdivision (see Appendix 1)

1.2.3 Description of the proposal

Figure 1.2.2 above, demonstrates the subdivision of each lot, to create 2 lots from each existing lot being, a new “railway land lot” and a residue “farm land lot”.

The purpose of this subdivision is to create separate lots over the existing rail line by subdividing the land currently owned by Bengalla across which, the Mach Energy Rail line passes, and that the ownership may be transferred to Mach Energy.

1.2.2 Topographic Description (locality)

Undulating low hills, ranging in elevation from 140 – 220 m. Slopes are 3 – 10%, with slope lengths averaging 1,200 m. Local relief is 40 – 60 m. Drainage lines occur at 700 – 1,000 m intervals. (Kovak & Lawrie 1991).

1.2.3 Vegetation Description (locality)

Much of the area has been cleared out of woodland for grazing on unimproved pastures. Remnants of forest red gum and forest oak occur. Broad-leaved red ironbark, narrow-leaved red ironbark, bull oak, grey box and swamp oak may also be found in some areas. (Kovak & Lawrie 1991).

1.2.4 Climate & Fire History

The site is situated in the Muswellbrook LGA which has a Fire Danger Index (FDI) rating of 100. Extreme bushfire weather can be expected with long periods of drought, high temperatures, low humidity and strong northwesterly winds.

1.2.5 Legislative Considerations

This Bushfire Threat Assessment has been prepared in accordance with the current legislative requirements which are:-

EP&A Act 1979 s4.14

EP&A Act 1979 s4.46

Rural Fires Act 1997 s100B

Rural Fires Regulation 2022 Clause 45

Planning for Bushfire Protection 2019

AS 3959:2018 Construction of buildings in bushfire prone areas

1.2.6 Significant Environmental Features

There are no significant environmental features on or near the subject block.

1.2.7 Threatened Species Population

There are no known threatened flora and fauna species on the subject block.

1.2.8 Aboriginal Heritage

There are no known aboriginal artefacts on the site.

1.3.0 BUSHFIRE PRONE LAND MAP

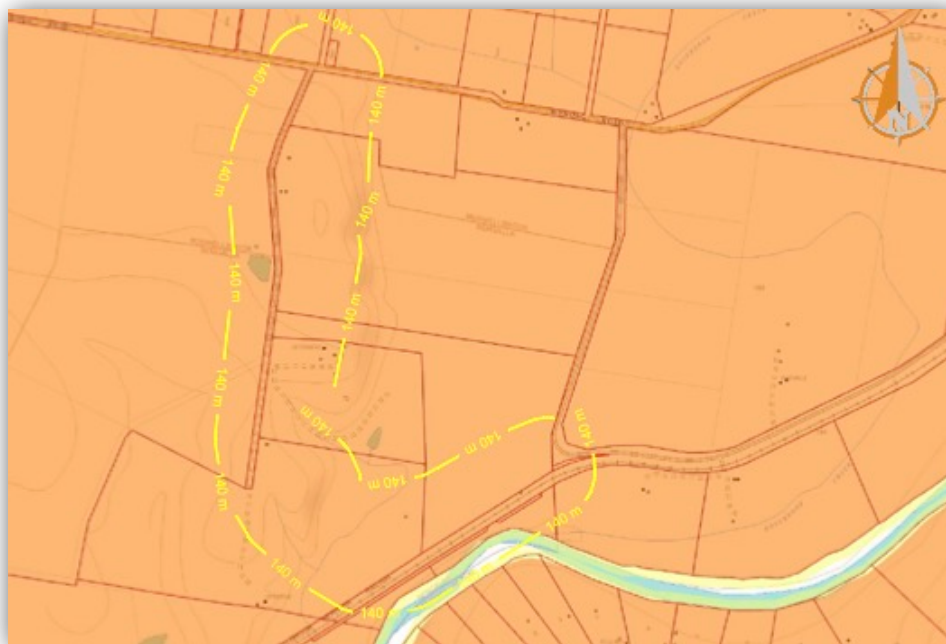
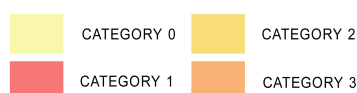


Fig. 1.3.1 Extract of MSC's Bushfire Prone Land Map
Note: the highlighted area denotes the approximate block location.



1.3.1 Category 0

Category 0 vegetation appears as the yellow layer on the map and the buffer zone which extends out away from the vegetation. Buffer distances vary in width according to the vegetation category.

1.3.2 Category 1

Category 1 vegetation appears as red on the map and represents forests, woodlands, heathlands, pine plantations and wetlands. Land within 100 metres of this category (indicated by the yellow layer on the map) is also captured by the Bushfire Prone Land Map due to the likelihood of bushfire attack.

1.3.3 Category 2

Category 2 vegetation appears as light orange on the map and represents rainforests and lower risk parcels of bushfire prone vegetation. Land within 30 metres of this category (indicated by the yellow layer on the map) is also captured by the Bushfire Prone Land Map due to the likelihood of bushfire attack.

1.3.4 Category 3

Category 3 vegetation appears as orange on the map and represents medium risk vegetation such as grasslands, freshwater wetlands and arid shrublands. Land within 30 metres of this category (indicated by the yellow layer on the map) is also captured by the Bushfire Prone Land Map due to the likelihood of bushfire attack.

1.3.5 Context of the map

The map is in general accordance with the structure of the vegetation communities found at this location.

1.4.0 PHOTOGRAPHIC REVIEW OF THE LOCALITY

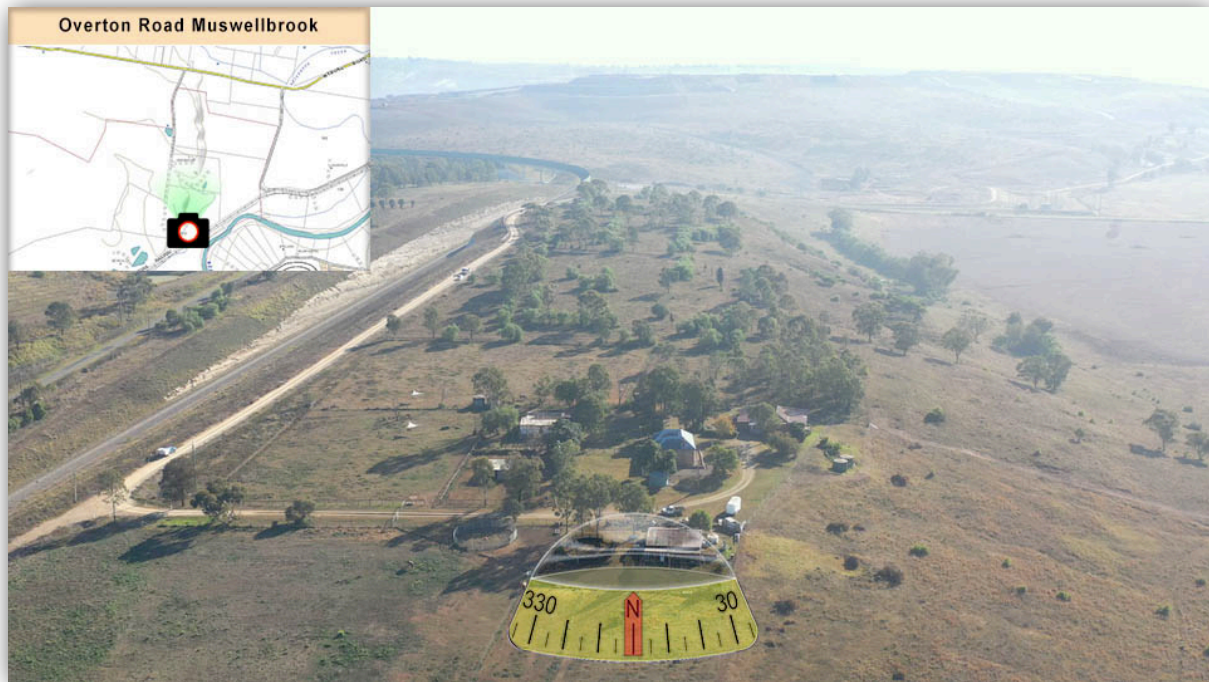


Fig. 1.4.1 View to the North

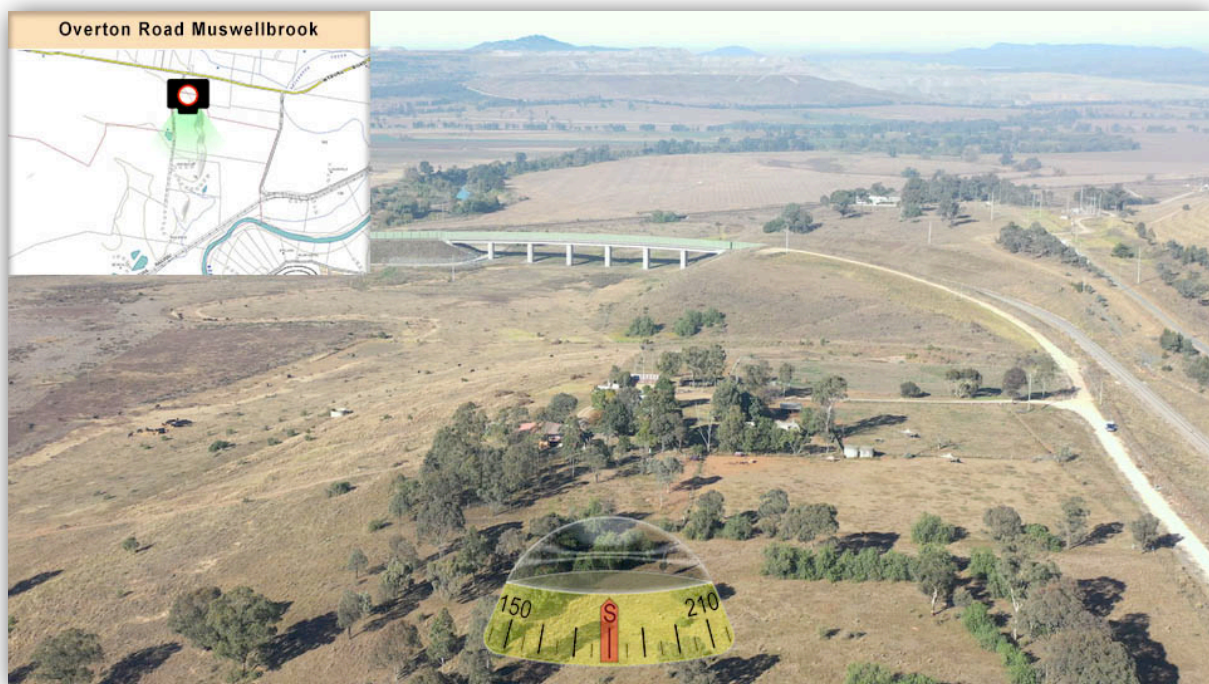


Fig. 1.4.2 View to the South

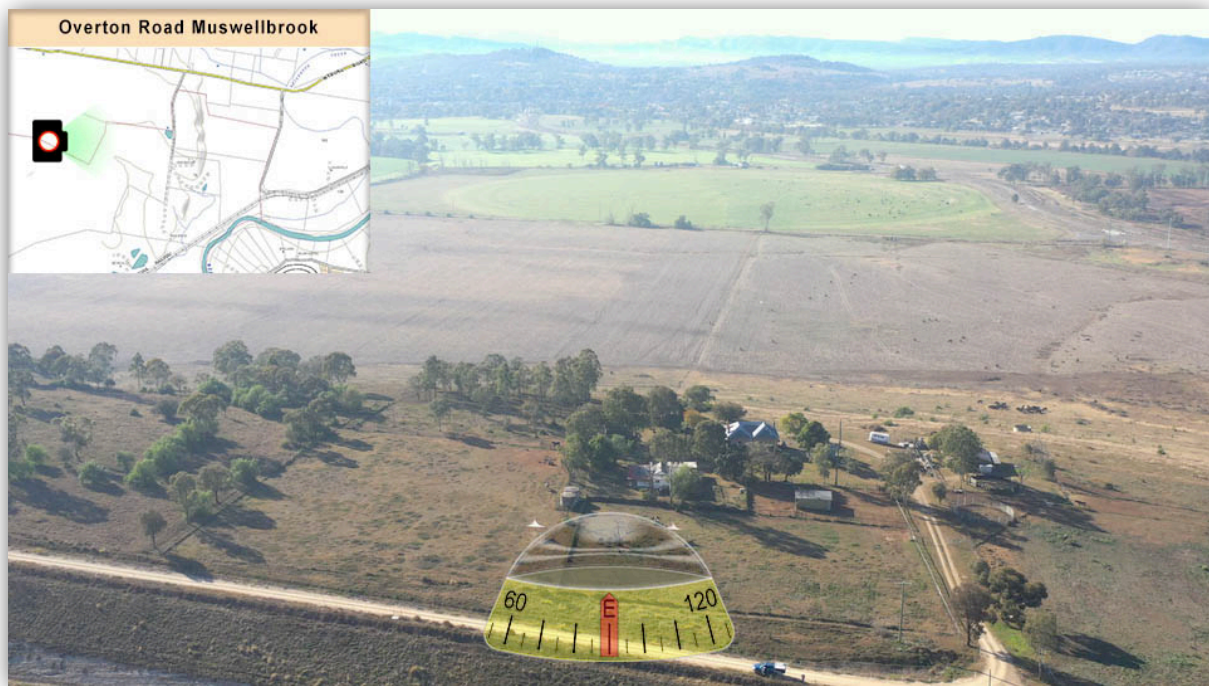


Fig. 1.4.3 View to the East

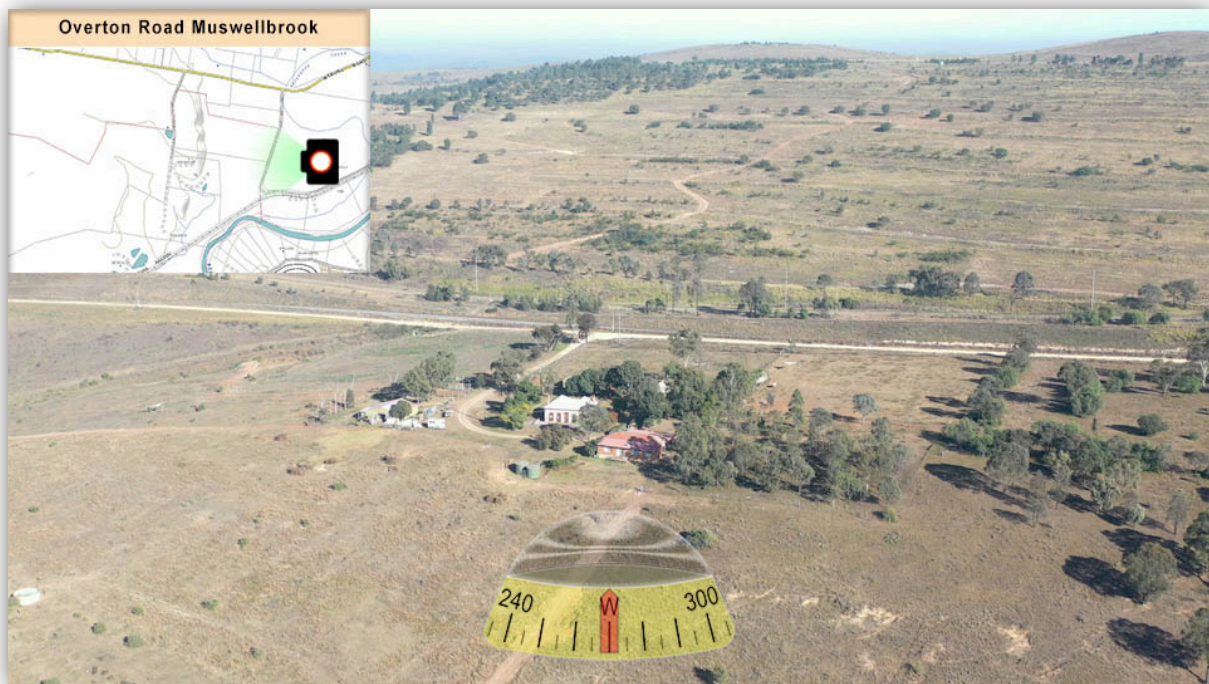


Fig. 1.4.4 View to the West.

1.5.0 BUSHFIRE ASSESSMENT AND METHODOLOGY

Determination of Bushfire Attack Level (BAL) is in accordance with the Site Assessment Methodology found in PBP 2019 Appendix 1 which sets out the following:

1. Determine all vegetation formations within 140m of the development
2. Determine the effective slope from the building to a distance of 100 m
3. Determine the FFDI for the local council area
4. Determine the separation distance from the building to the vegetation
5. Match the relevant FFDI, vegetation group, separation distance and the effective slope using the relevant tables found in PBP 2019 Appendix 1.

1.5.1 Vegetation and Slope Assessment Overview

The vegetation assessment and mapping was undertaken by both site inspection and Aerial Photogrammetry Interpretation.

The slope assessments and mapping was undertaken by both Aerial Photogrammetry Interpretation with a 10 metre contour overlay, as well as a site inspection using a Nikon Forestry Pro Range finding Hypsometer.

The predominant bushfire threat is a combination of grassland and woodland which is located West of the proposed subdivision. This vegetation is currently unmanaged and is unlikely to be managed into the future.

Table1.5.1 Overview of Threat Assessment

Predominant Bushfire Prone Vegetation Assessment		
Direction	Vegetation	Determined Slope(s)
North	Mining infrastructure and operations	N/A
East	Predominantly managed as agricultural land	10° to 15° downslope
South	Predominantly managed as agricultural land	10° to 15° downslope
West	Rehabilitated mining land now a combination of both woodland and grassland	0° to upslope

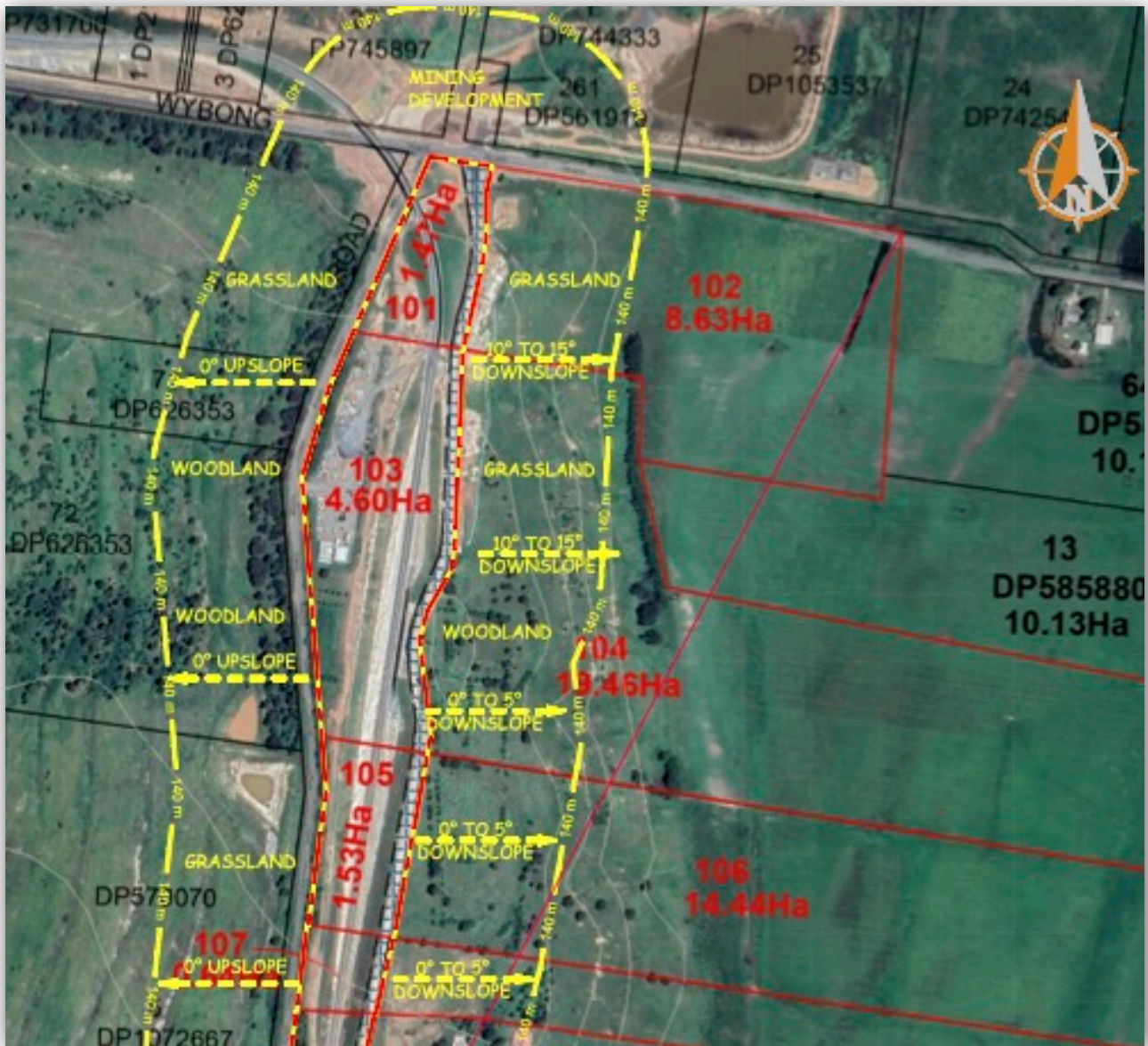


Fig. 1.5.1 Vegetation assessment North (see Appendix 1)

The bushfire prone vegetation to the West is generally a combination of unmanaged woodland and grassland. The land East of the proposal is a combination of woodland and grassland however all the land to the East is used for grazing and other agricultural purposes.

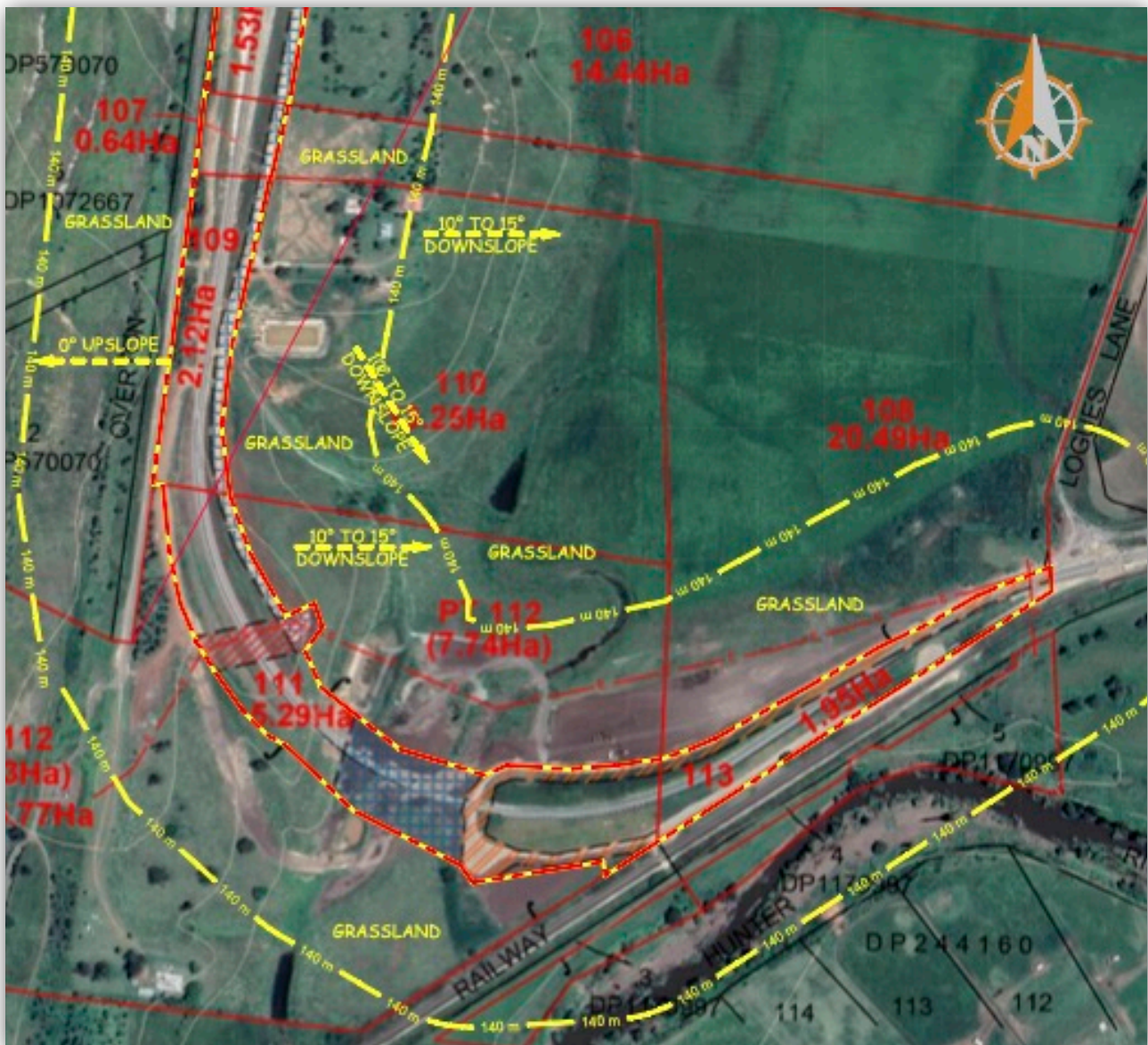


Fig. 1.5.2 Vegetation assessment South (see Appendix 1)

The bushfire prone vegetation to the West and South is generally a combination of both managed and unmanaged grassland. The land East and North of the proposal is grassland which is used for grazing and other agricultural purposes.

In general the distance from the rail line to the nearest bushfire threat to the West is ≥ 40 metres.

1.5.2 Threat Assessment West (Woodland)

Table 1.5.1 Summary of Threat Assessment West

Summary Threat Assessment Data West		
1	Determine all vegetation formations within 140m of the development	Woodland - Dominated by an open to sparse layer of eucalypts with the crowns rarely touching. Typically 15-35m high (may be shorter at sub-alpine altitudes). Diverse ground cover of grasses and herbs. Shrubs are sparsely distributed. Usually found on flat or undulating ground. (PBP 2019)
2	Determine the effective slope from the building to a distance of 100 m	Typically 0° - upslope
3	Determine the FFDI for the local council area	FFDI = 100 (PBP 2019)
4	Determine the separation distance from the building to the vegetation	≥40 metres
5	Match the relevant FDI, vegetation group, separation distance and the effective slope using the relevant tables found in PBP 2019 A1	BAL-12.5

Table 1.5.2 Extract from PBP 2019 Table A1.12.5

Determination of Bushfire attack level (BAL) -FDI 100 (1090K)					
PBP 2019 Table A1.12.5					
Vegetation Formation (Keith)	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
	Distance (m) of asset to the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
Rainforest	<8	8 -<11	11 -<16	16 -<23	23 -<100
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine plantations and Sub-Alpine Woodland	<18	18 -<24	24 -<33	33 -<45	45 -<100
Grassy and Semi-Arid Woodland including Mallee	<9	9 -<12	12 -<18	18 -<26	26 -<100
Forested Wetland (excluding Coastal Swamp Forest)	<7	7 -<10	10 -<14	14 -<21	21 -<100
Tall Heath	<12	12 -<16	16 -<23	23 -<32	32 -<100
Short Heath	<7	7 -<9	9 -<14	14 -<20	20 -<100
Arid-Shrublands (Acacia and chenopod)	<5	5 -<6	6 -<9	9 -<14	14 -<100
Freshwater wetlands	<4	4 -<5	5 -<7	7 -<11	11 -<100
Grassland	<8	8 -<10	10 -<15	15 -<22	22 -<50

1.5.3 Threat Assessment West (Grassland)

Table 1.5.3 Summary of Threat Assessment West

Summary Threat Assessment Data West		
1	Determine all vegetation formations within 140m of the development	Grassland - General Maritime Grasslands, Temperate Montane Grasslands, Western Slopes Grassland, Riverine Plain Grassland and Semi-arid Floodplain Grassland. Dominated by perennial grasses and the presence of broad leaved herbs on flat topography. lack of woody plants. Plants include grasses, daisies, legumes, geraniums, saltbushes and copperburrs. (PBP 2019 A1.2)
2	Determine the effective slope from the building to a distance of 100 m	Typically 0° - upslope
3	Determine the FFDI for the local council area	FFDI = 100 (PBP 2019)
4	Determine the separation distance from the building to the vegetation	≥40 metres
5	Match the relevant FDI, vegetation group, separation distance and the effective slope using the relevant tables found in PBP 2019 A1	BAL-12.5




Table 1.5.4 Extract from PBP 2019 Table A1.12.5

Determination of Bushfire attack level (BAL) -FDI 100 (1090K)					
PBP 2019 Table A1.12.5					
Vegetation Formation (Keith)	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
	Distance (m) of asset to the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
Rainforest	<8	8 -<11	11 -<16	16 -<23	23 -<100
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine plantations and Sub-Alpine Woodland	<18	18 -<24	24 -<33	33 -<45	45 -<100
Grassy and Semi-Arid Woodland including Mallee	<9	9 -<12	12 -<18	18 -<26	26 -<100
Forested Wetland (excluding Coastal Swamp Forest)	<7	7 -<10	10 -<14	14 -<21	21 -<100
Tall Heath	<12	12 -<16	16 -<23	23 -<32	32 -<100
Short Heath	<7	7 -<9	9 -<14	14 -<20	20 -<100
Arid-Shrublands (Acacia and chenopod)	<5	5 -<6	6 -<9	9 -<14	14 -<100
Freshwater wetlands	<4	4 -<5	5 -<7	7 -<11	11 -<100
Grassland	<8	8 -<10	10 -<15	15 -<22	22 -<50

1.6.0 BUSHFIRE PROTECTION MEASURES & RECOMMENDATIONS

The overall intention of bushfire protection measures is to improve property protection and community resilience to bushfire attack (*PBP 2019 P.10*).

For all residential developments there are five bushfire protection measures that can be used to reduce the attack mechanisms of a bushfire. They are:

-  Asset Protection Zones and Landscaping
-  Access.
-  Services - Water and Electricity and Gas.

Each of these mechanisms work in combination to achieve a resilient development. The following section describes how the proposal will address each of these measures.

1.6.1 Asset Protection Zones (APZ) and Landscaping

“Often referred to as a fire protection zone. Its aim is to protect human life, property and highly valued public assets and values. It is an area surrounding a development, managed to reduce the bushfire hazard to an acceptable level. The width of the APZ will vary with slope, vegetation and construction level. The APZ, consists of an area maintained to achieve minimal fuel loads and for subdivision, comprising a combination of perimeter road, fire trail, rear yard or a reserve, so that a fire path is not created between the hazard and the building.” (PBP 2006)

The existing rail infrastructure benefits from the roads which run parallel to and on both sides of the rail line. The separation distance of ≥ 40 m will provide a radiant heat flux exposure of ≤ 12.5 kW/m².

The existing dwelling at 79 Overton Road, Muswellbrook has well managed grounds which surround the development. It is a reasonable expectation this management shall continue into the future. The existing APZ is situated wholly within the boundaries of the proposed lot. All the structures have separation distances ≥ 6 meters from each other.

The existing APZ's shall be managed in accordance with PBP Appendix 4 for the life of the development.

1.6.2 Access Requirements

It is the aim of this requirement to provide safe operational access for emergency services personnel in suppressing a bushfire, while residents are accessing or egressing an area.

The proposed subdivision has been assessed against the performance criteria and acceptable solutions for property access of PBP table 5.3b which is detailed below.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
The intent may be achieved where:		
Firefighting vehicles are provided with safe, all-weather access to structures.	Property access roads are two-wheel drive, all-weather roads;	Complies
	Perimeter roads are provided for residential subdivisions of three or more allotments;	N/A
	Subdivisions of three or more allotments have more than one access in and out of the development;	N/A
	Traffic management devices are constructed to not prohibit access by emergency services vehicles;	Can comply
	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;	N/A
	All roads are through roads;	N/A
	Dead end roads are not recommended, but if unavoidable, 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;	Can comply

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
The intent may be achieved where:		
Firefighting vehicles are provided with safe, all-weather access to structures (continued).	where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	Not applicable
	where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and	Not applicable
	one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	Not applicable
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.	Complies
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;	N/A
	hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - <i>Fire hydrant installations System design, installation and commissioning</i> ; and	N/A

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
The intent may be achieved where:		
There is appropriate access to water supply.	there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	This provision shall apply to 79 Overton Road, Muswellbrook
Non-perimeter roads Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	minimum 5.5m carriageway width kerb to kerb;	N/A
	parking is provided outside of the carriageway width;	N/A
	hydrants are located clear of parking areas;	N/A
	roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	N/A
	curves of roads have a minimum inner radius of 6m;	Complies
	the road crossfall does not exceed 3 degrees; and	Complies
	a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Complies

It is noted both Overton Road and the access road East of the Rail line are not through roads. Both these roads shall provide a suitable turning solution in accordance with PBP 2019 Appendix 3.3 (attached to this report as Appendix 4)

The dwelling at 79 Overton Road shall provide suitable access for a Category 1 fire appliance to within 4m of the static water supply. This requirement shall also be inclusive of a suitable turning solution in accordance with PBP 2019 Appendix 3.3 (attached to this report as Appendix 4)

1.6.3 Services - Water, Electricity and Gas

It is the aim of this measure to provide adequate water services for the protection of buildings during and after the passage of a bushfire, to locate gas and electricity so as not to contribute to the risk of fire to buildings.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
The intent may be achieved where:		
Adequate water supplies are provided for firefighting purposes.	reticulated water is to be provided to the development where available	N/A
	a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed	Can comply
	static water supplies shall comply with Table 5.3d.	Can comply
The integrity of the water supply is maintained	all above-ground water service pipes are metal, including and up to any taps; and above-ground water storage tanks shall be of concrete or metal.	Can comply
location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	where practicable, electrical transmission lines are underground; where overhead, electrical transmission lines are proposed as follows: lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in ISSC3 <i>Guideline for Managing Vegetation Near Power Lines</i> .	Can Comply

The dwelling at 79 Overton Road shall provide a 20,000 litre static water supply in accordance with PBP 2019 Table 5.3d. This supply can be part of the domestic system for the purposes of water quality but the above stated capacity must be available for firefighting purposes at all times.

This supply shall have a 65 mm Storz adapter and stop cock. All above ground plumbing fittings and pipes shall be metal.

1.6.4 Design and Construction

The intent of measures is that buildings are designed and constructed to withstand the potential impacts of bush fire attack. To achieve this, the following conditions should apply:

It is recommended the existing dwelling at 79 Overton Road be upgraded to improve ember protection. This is to be achieved by enclosing all openings (excluding roof tile spaces) or covering openings with a non-corrosive metal screen mesh with a maximum aperture of 2mm. Where applicable, this includes any sub floor areas, openable windows, vents, weep-holes and eaves. External doors should be fitted with draft excluders.

1.6.5 Recommendations

Table 1.6.1 Recommendations

Recommendations
Ensure verges of access roads are mowed and managed on a regular basis to a height of ≤ 200 mm
Ensure the dwelling at 79 Overton Road has a 20,000 litre fire fighting water supply with 65 mm storz fitting with stop cock.
All above ground plumbing fitting to be metal
Provide a turning solution in accordance with PBP A3.3
Install an SWS marker in a prominent position near the front gate.
Stop up all gaps > 2 mm (excluding any roof tiles)
Ensure all openable portion of windows are screened with non-corroding metal screens
Fit draught excluders to all external doors

1.7.0 CONCLUSION

The proposed development is for the creation of separate lots over the existing rail line by subdividing the land currently owned by Bengalla upon which the Mach Energy Rail line passes across, so that the ownership may be transferred to Mach Energy..

The proposal is compliant with PBP 2019 Chapter 5 in all aspects.

Certain recommendations for the dwelling at 79 Overton Road Muswellbrook have been made to increase the bushfire safety outcome for this dwelling.

The recommendations of this report should enhance the chances of occupant and building survival as well as outcomes for adjacent neighbours. It does not increase the fire management and maintenance responsibility of its neighbours.

It is the aim of this report to provide for the protection of human life (including firefighters) and to minimise impacts on the proposal from the threat of bushfire, while having due regard to development potential, on-site amenity and protection of the environment. (*PBP 2019 P.1*)

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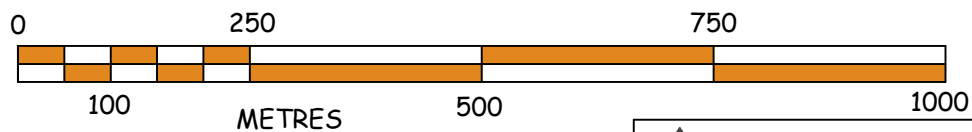
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<https://six.nsw.gov.au/wps/portal/>

Slope assessments and mapping has been undertaken by both Aerial Photogrammetry Interpretation with a 2 metre contour overlay, as well as a site inspection using a Nikon Forestry Pro Range finding Hypsometer.



SITE OVERVIEW 140m

SOURCE:- SIX MAPS 1/6/2023

Note; This drawing is indicative only. It does not purport to be a surveyed work nor does it constitute a surveyed work. Bushfire Consultant Pty Ltd assumes no responsibility for any reliance on this as a surveyed work.



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NSW 2333



Site Overview to 140 m

Date:
12-06-2023

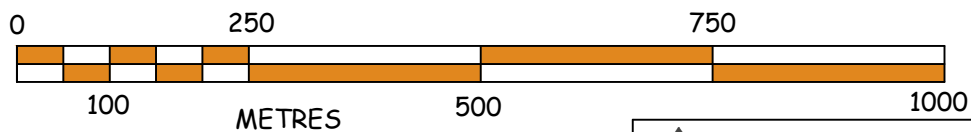
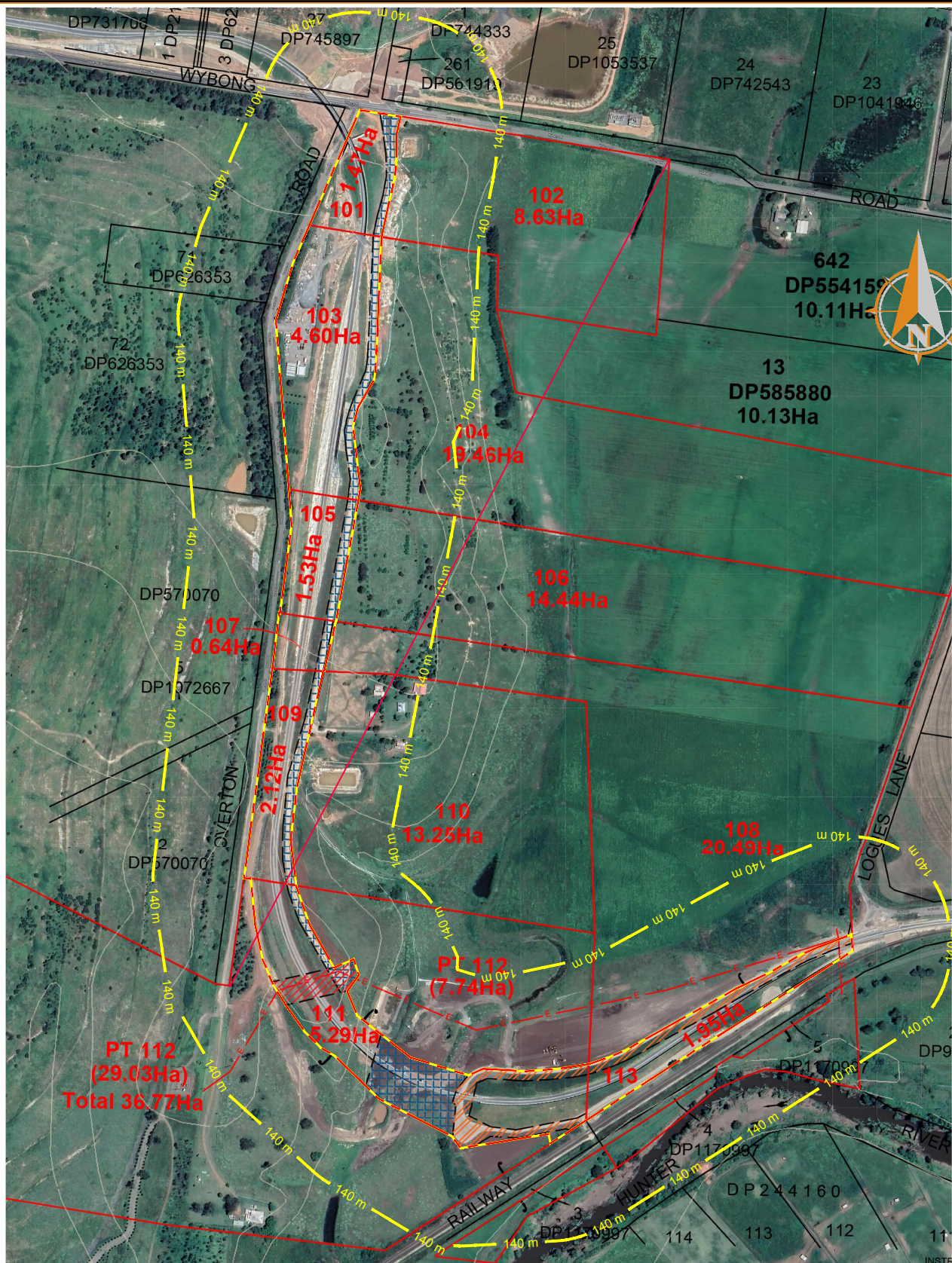
Version
V-1.0

Sheet
1

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BJC

Checked by
JC

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SITE OVERVIEW 140m

SOURCE:- SIX MAPS 1/6/2023

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Version
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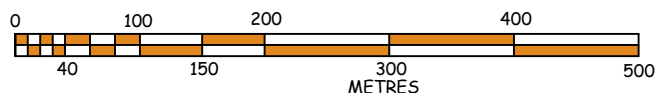
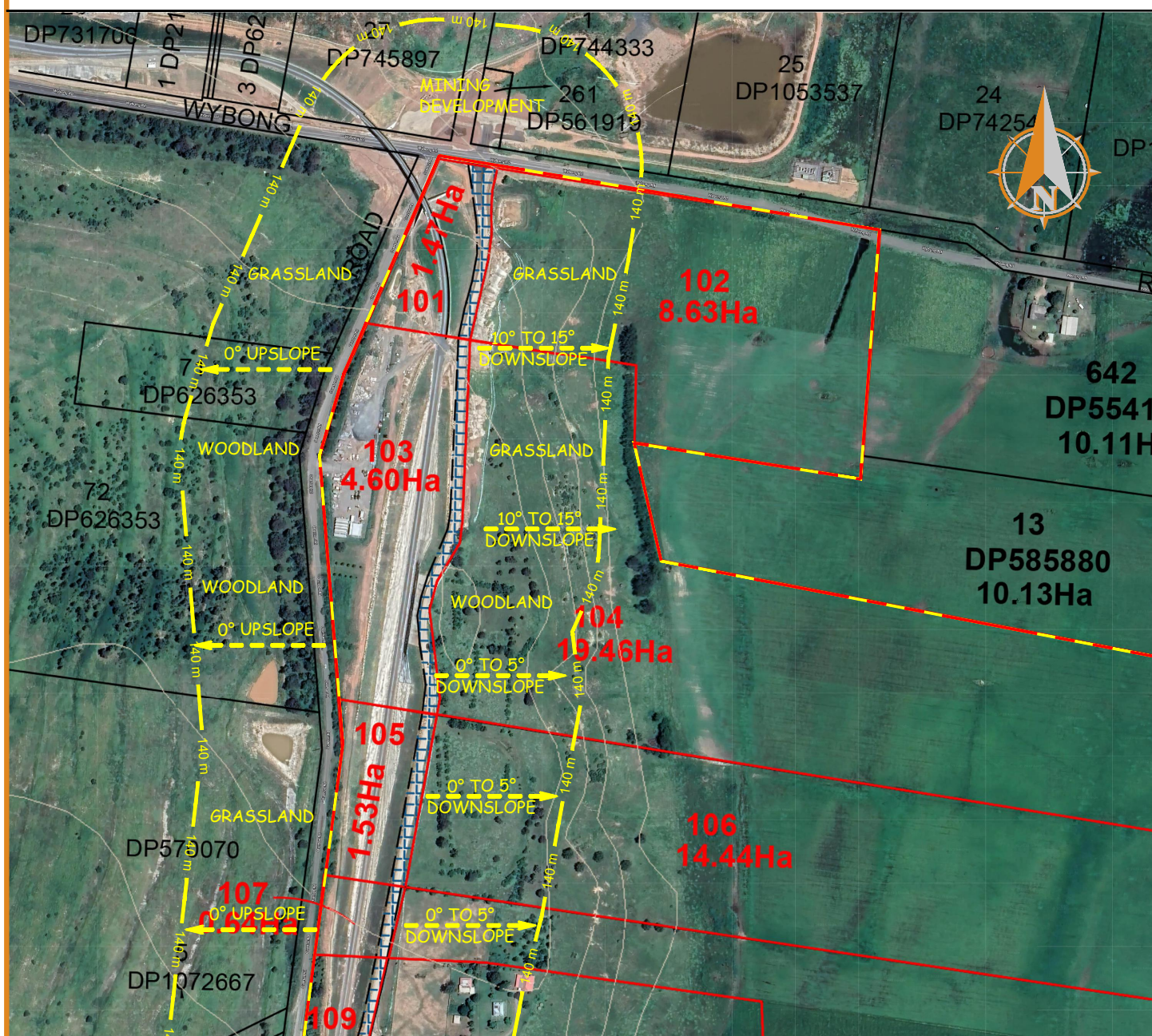
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APPENDIX 1




VEGETATION & SLOPE ANALYSIS (NORTH) TO 140m

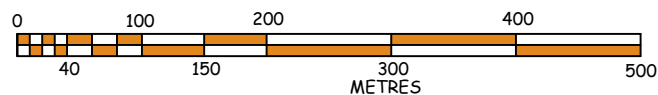
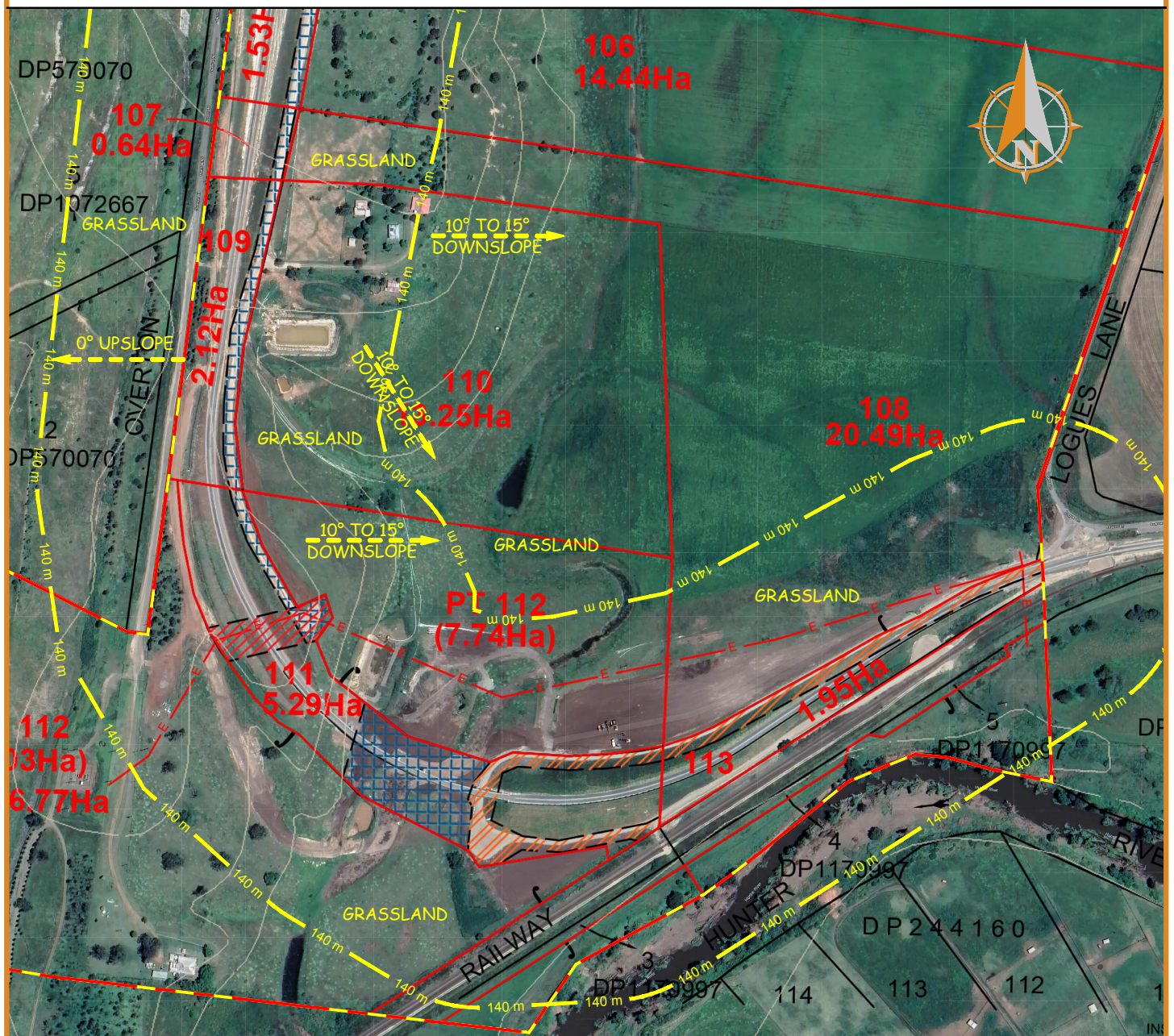
NOT TO SCALE CONTOURS = 10 METRES
VEGETATION ASSESSED USING AS 3959-2019
VEGETATION ASSESSED WITHIN 140M OF THE SITE.
ALL SLOPES RELATIONAL TO THE SUBJECT SITE.
PREDOMINANT VEGETATION ASSESSED AS
WOODLAND
CANOPY = 10 - 15 m HIGH

DOMINANT SPECIES = EUCALYPTS
UNDERSTOREY = ACACIA AND OTHER SPECIES
GROUND COVER = MIXTURE OF NATIVE SPECIES AND GRASSES

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	Vegetation & Topographical Analysis			
Date; 12-06-2023		Version V-1.0		Sheet 3
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APPENDIX 1



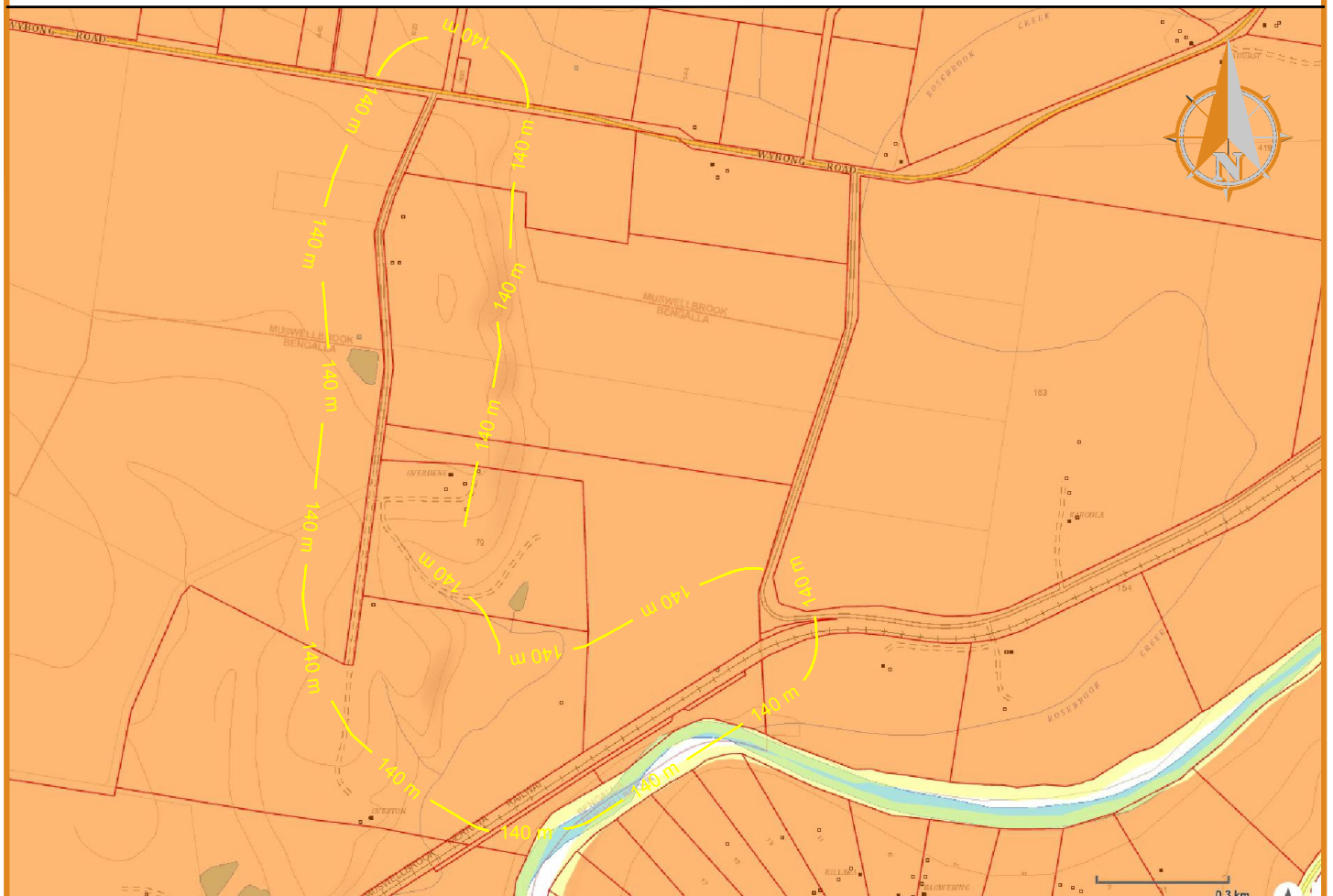
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 ALL SLOPES RELATIONAL TO THE SUBJECT SITE.
 PREDOMINANT VEGETATION ASSESSED AS
 GRASSLAND
 GROUND COVER = MIXTURE OF NATIVE
 SPECIES AND GRASSES

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	Date; 12-06-2023	Version V-1.0	
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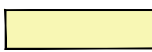



APPENDIX 1



BUSH FIRE PRONE LAND MAPPING


NOT TO SCALE

Source: ePlanning Spatial Viewer; <https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address>

-  **Category 0** vegetation appears as the yellow layer on the map and the buffer zone which extends out away from the vegetation. Buffer distances vary in width according to the vegetation category
-  **Category 1** vegetation appears as red on the map and represents forests, woodlands, heathlands, pine plantations and wetlands. Land within 100 metres of this category (indicated by the yellow layer on the map) is also captured by the Bushfire Prone Land Map due to the likelihood of bushfire attack.
-  **Category 2** vegetation appears as light orange on the map and represents rainforests and lower risk parcels of bushfire prone vegetation. Land within 30 metres of this category (indicated by the yellow layer on the map) is also captured by the Bushfire Prone Land Map due to the likelihood of bushfire attack.
-  **Category 3** vegetation appears as orange on the map and represents medium risk vegetation such as grasslands, freshwater wetlands and arid shrublands. Land within 30 metres of this category (indicated by the yellow layer on the map) is also captured by the Bushfire Prone Land Map due to the likelihood of bushfire attack.

EP&A ACT 1979 SECTIONS 4.14 & 10.3

EP&A Act Sect. 10.3: Councils prepare maps which record the bushfire prone vegetation within their LGA. These maps are certified by the RFS Commissioner.

-  EP&A Act Sect. 4.14: (Implicit) If a proposed structure, its access roads, APZ's or water supplies are captured by this mapping, then it must provide evidence that the proposal conforms to the specifications and requirements of Planning for Bush Fire Protection 2019.

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	Bushfire Prone Land Mapping		
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Drawn by BJC	Checked by JC	File name X:\BFC\Clients\#1033_HyndesBailey\DWG\WybongRoadMuswellbrook2333.dwg	

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for asset protection zones

protection

Collection



STANDARDS FOR ASSET PROTECTION ZONES

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INTRODUCTION

For thousands of years bush fires have been a natural part of the Australian landscape. They are inevitable and essential, as many Australian plants and animals have adapted to fire as part of their life cycle.

In recent years developments in bushland areas have increased the risk of bush fires harming people and their homes and property. But landowners can significantly reduce the impact of bush fires on their property by identifying and minimising bush fire hazards. There are a number of ways to reduce the level of hazard to your property, but one of the most important is the creation and maintenance of an Asset Protection Zone (APZ).

A well located and maintained APZ should be used in conjunction with other preparations such as good property maintenance, appropriate building materials and developing a family action plan.

WHAT IS AN ASSET PROTECTION ZONE?

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

An APZ provides:

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

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

WHAT WILL THE APZ DO?

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

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

WHERE SHOULD I PUT AN APZ?

An APZ is located between an asset and a bush fire hazard.

The APZ should be located wholly within your land. You cannot undertake any clearing of vegetation on a neighbour's property, including National Park estate, Crown land or land under the management of your local council, unless you have written approval.

If you believe that the land adjacent to your property is a bush fire hazard and should be part of an APZ, you can have the matter investigated by contacting the NSW Rural Fire Service (RFS).

There are six steps to creating and maintaining an APZ. These are:

1. Determine if an APZ is required;
2. Determine what approvals are required for constructing your APZ;
3. Determine the APZ width required;
4. Determine what hazard reduction method is required to reduce bush fire fuel in your APZ;
5. Take measures to prevent soil erosion in your APZ; and
6. Landscape and regularly monitor in your APZ for fuel regrowth.

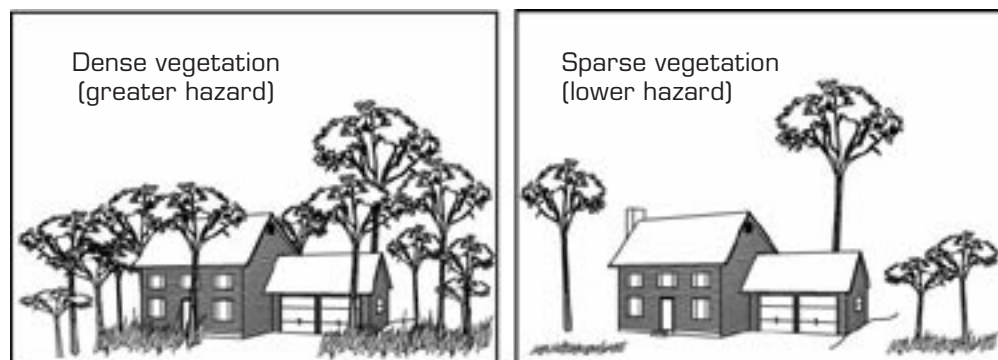
STEP 1. DETERMINE IF AN APZ IS REQUIRED

Recognising that a bush fire hazard exists is the first step in developing an APZ for your property.

If you have vegetation close to your asset and you live in a bush fire prone or high risk area, you should consider creating and maintaining an APZ.

Generally, the more flammable and dense the vegetation, the greater the hazard will be. However, the hazard potential is also influenced by factors such as slope.

- A large area of continuous vegetation on sloping land may increase the potential bush fire hazard.
- The amount of vegetation around a house will influence the intensity and severity of a bush fire.
- The higher the available fuel the more intense a fire will be.



Isolated areas of vegetation are generally not a bush fire hazard, as they are not large enough to produce fire of an intensity that will threaten dwellings.

This includes:

- bushland areas of less than one hectare that are isolated from large bushland areas; and
- narrow strips of vegetation along road and river corridors.

If you are not sure if there is a bush fire hazard in or around your property, contact your local NSW Rural Fire Service Fire Control Centre or your local council for advice.

STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ

If you intend to undertake bush fire hazard reduction works to create or maintain an APZ you must gain the written consent of the landowner.

Subdivided land or construction of a new dwelling

If you are constructing an APZ for a new dwelling you will need to comply with the requirements in *Planning for Bushfire Protection*. Any approvals required will have to be obtained as part of the Development Application process.

Existing asset

If you wish to create or maintain an APZ for an existing structure you may need to obtain an environmental approval. The RFS offers a free environmental assessment and certificate issuing service for essential hazard reduction works. For more information see the RFS document *Application Instructions for a Bush Fire Hazard Reduction Certificate* or contact your local RFS Fire Control Centre to determine if you can use this approval process.

Bear in mind that all work undertaken must be consistent with any existing land management agreements (e.g. a conservation agreement, or property vegetation plan) entered into by the property owner.

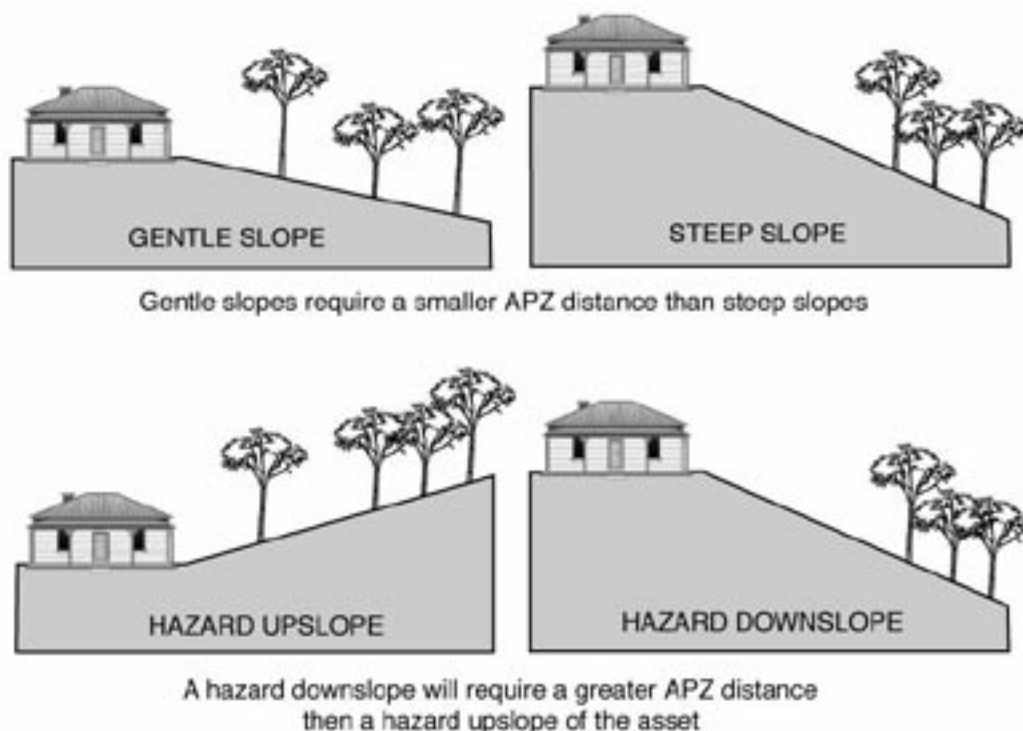
If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

STEP 3. DETERMINE THE APZ WIDTH

The size of the APZ required around your asset depends on the nature of the asset, the slope of the area, the type and structure of nearby vegetation and whether the vegetation is managed.

Fires burn faster uphill than downhill, so the APZ will need to be larger if the hazard is downslope of the asset.



Different types of vegetation (for example, forests, rainforests, woodlands, grasslands) behave differently during a bush fire. For example, a forest with shrubby understorey is likely to result in a higher intensity fire than a woodland with a grassy understorey and would therefore require a greater APZ width.

A key benefit of an APZ is that it reduces radiant heat and the potential for direct flame contact on homes and other buildings. Residential dwellings require a wider APZ than sheds or stockyards because the dwelling is more likely to be used as a refuge during bush fire.

Subdivided land or construction of a new dwelling

If you are constructing a new asset, the principles of *Planning for Bushfire Protection* should be applied. Your Development Application approval will detail the exact APZ distance required.

Existing asset

If you wish to create an APZ around an existing asset and you require environmental approval, the Bush Fire Environmental Assessment Code provides a streamlined assessment process. Your Bush Fire Hazard Reduction Certificate (or alternate environmental approval) will specify the maximum APZ width allowed.

For further information on APZ widths see *Planning for Bushfire Protection* or the *Bush Fire Environmental Assessment Code* (available on the RFS website), or contact your local RFS Fire Control Centre.

STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ

The intensity of bush fires can be greatly reduced where there is little to no available fuel for burning. In order to control bush fire fuels you can reduce, remove or change the state of the fuel through several means.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide you with some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

Fuels can be controlled by:

1. raking or manual removal of fine fuels

Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire.

Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

2. mowing or grazing of grass

Grass needs to be kept short and, where possible, green.

3. removal or pruning of trees, shrubs and understorey

The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation.

Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.

Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

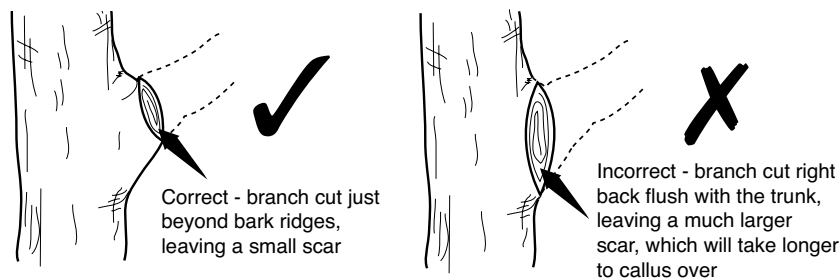
When choosing plants for removal, the following basic rules should be followed:

1. Remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at www.agric.nsw.gov.au/noxweed/;
2. Remove more flammable species such as those with rough, flaky or stringy bark; and
3. Remove or thin understorey plants, trees and shrubs less than three metres in height

The removal of significant native species should be avoided.

Prune in accordance with the following standards:

- Use sharp tools. These will enable clean cuts and will minimise damage to the tree.
- Decide which branches are to be removed before commencing work. Ensure that you maintain a balanced, natural distribution of foliage and branches.
- Remove only what is necessary.
- Cut branches just beyond bark ridges, leaving a small scar.
- Remove smaller branches and deadwood first.



There are three primary methods of pruning trees in APZs:

1. Crown lifting (skirting)

Remove the lowest branches (up to two metres from the ground). Crown lifting may inhibit the transfer of fire between the ground fuel and the tree canopy.

2. Thinning

Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning may minimise the intensity of a fire.

3. Selective pruning

Remove branches that are specifically identified as creating a bush fire hazard (such as those overhanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

Your Bush Fire Hazard Reduction Certificate or local council may restrict the amount or method of pruning allowed in your APZ.

See the *Australian Standard 4373 (Pruning of Amenity Trees)* for more information on tree pruning.

4. Slashing and trittering

Slashing and trittering are economical methods of fuel reduction for large APZs that have good access. However, these methods may leave large amounts of slashed fuels (grass clippings etc) which, when dry, may become a fire hazard. For slashing or trittering to be effective, the cut material must be removed or allowed to decompose well before summer starts.

If clippings are removed, dispose of them in a green waste bin if available or compost on site (dumping clippings in the bush is illegal and it increases the bush fire hazard on your or your neighbour's property).

Although slashing and trittering are effective in inhibiting the growth of weeds, it is preferable that weeds are completely removed.

Care must be taken not to leave sharp stakes and stumps that may be a safety hazard.

5. Ploughing and grading

Ploughing and grading can produce effective firebreaks. However, in areas where this method is applied, frequent maintenance may be required to minimise the potential for erosion. Loose soil from ploughed or graded ground may erode in steep areas, particularly where there is high rainfall and strong winds.

6. Burning (hazard reduction burning)

Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

Any hazard reduction burning, including pile burns, must be planned carefully and carried out with extreme caution under correct weather conditions. Otherwise there is a real danger that the fire will become out of control. More bush fires result from escaped burning off work than from any other single cause.

It is YOUR responsibility to contain any fire lit on your property. If the fire escapes your property boundaries you may be liable for the damage it causes.

Hazard reduction burns must therefore be carefully planned to ensure that they are safe, controlled, effective and environmentally sound. There are many factors that need to be considered in a burn plan. These include smoke control, scorch height, frequency of burning and cut off points (or control lines) for the fire. For further information see the RFS document *Standards for Low Intensity Bush Fire Hazard Reduction Burning*, or contact your local RFS for advice.

7. Burning (pile burning)

In some cases, where fuel removal is impractical due to the terrain, or where material cannot be disposed of by the normal garbage collection or composted on site, you may use pile burning to dispose of material that has been removed in creating or maintaining an APZ.

For further information on pile burning, see the RFS document *Standards for Pile Burning*.

In areas where smoke regulations control burning in the open, you will need to obtain a Bush Fire Hazard Reduction Certificate or written approval from Council for burning. During the bush fire danger period a Fire Permit will also be required. See the RFS document *Before You Light that Fire* for further details.

STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

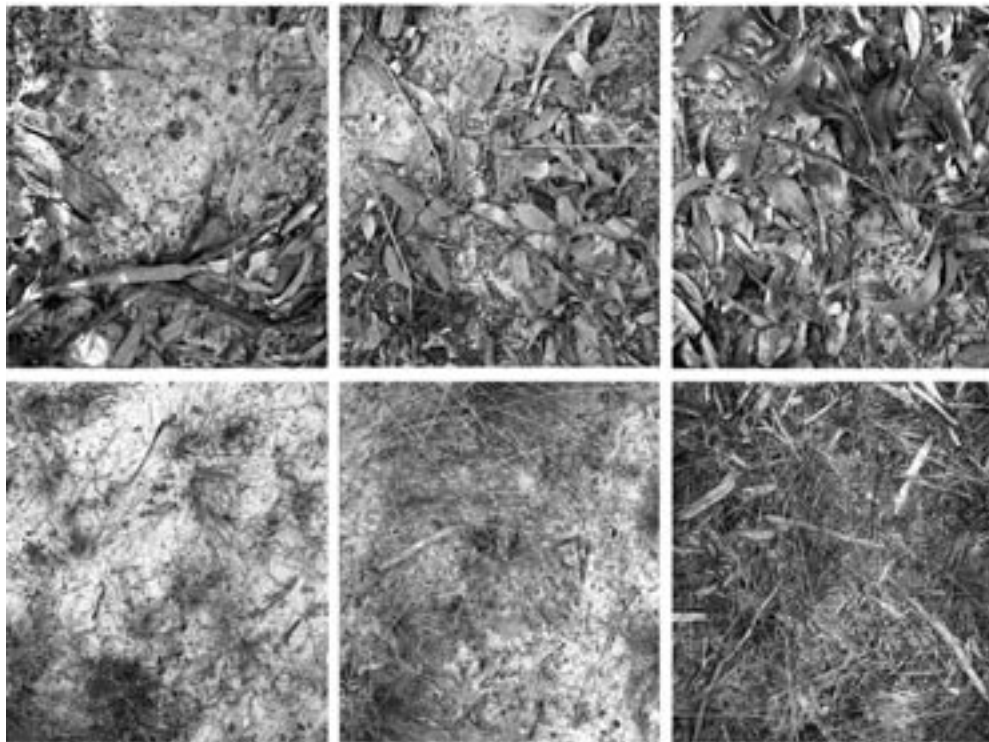
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

Soil erosion can greatly reduce the quality of your land through:

- loss of top soil, nutrients, vegetation and seeds
- reduced soil structure, stability and quality
- blocking and polluting water courses and drainage lines

A small amount of ground cover can greatly improve soil stability and does not constitute a significant bush fire hazard. Ground cover includes any material which directly covers the soil surface such as vegetation, twigs, leaf litter, clippings or rocks. A permanent ground cover should be established (for example, short grass). This will provide an area that is easy to maintain and prevent soil erosion.

When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



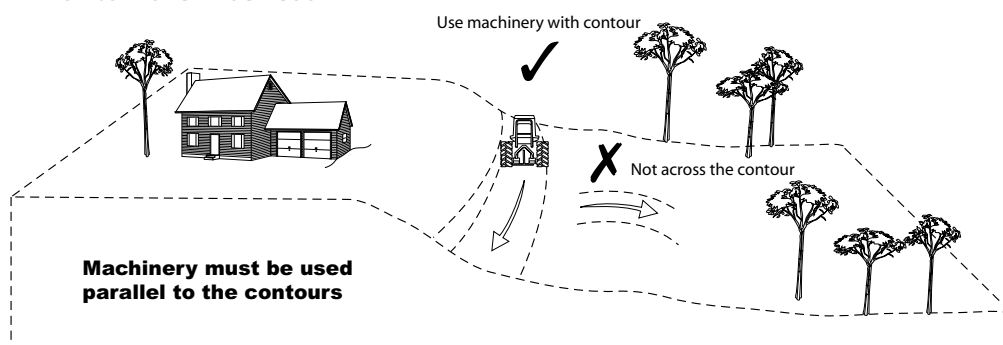
50%

75%

100%

Ground Cover

To reduce the incidence of soil erosion caused by the use of heavy machinery such as ploughs, dozers and graders, machinery must be used parallel to the contours. Vegetation should be allowed to regenerate, but be managed to maintain a low fuel load.



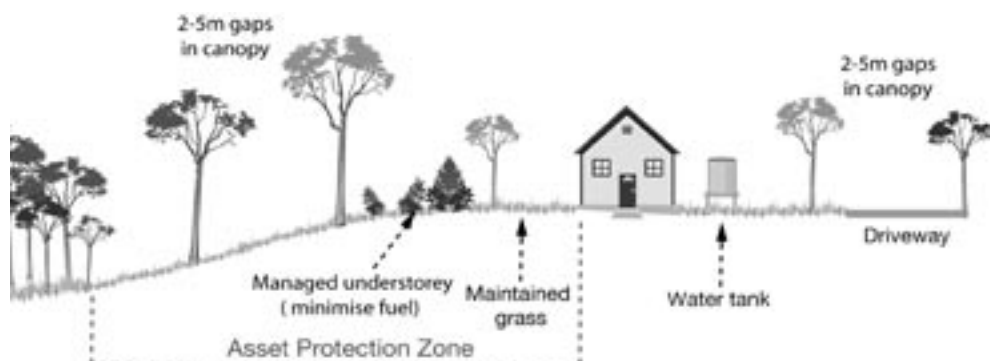
STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

Your home and garden can blend with the natural environment and be landscaped to minimise the impact of fire at the same time. To provide an effective APZ, you need to plan the layout of your garden to include features such as fire resistant plants, radiant heat barriers and windbreaks.

Layout of gardens in an APZ

When creating and maintaining a garden that is part of an APZ you should:

- ensure that vegetation does not provide a continuous path to the house;
- remove all noxious and environmental weeds;
- plant or clear vegetation into clumps rather than continuous rows;
- prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
- locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the dwelling;
- ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and
- avoid erecting brush type fencing and planting “pencil pine” type trees next to buildings, as these are highly flammable.



Removal of other materials

Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

Other protective features

You can also take advantage of existing or proposed protective features such as fire trails, gravel paths, rows of trees, dams, creeks, swimming pools, tennis courts and vegetable gardens as part of the property's APZ.

PLANTS FOR BUSH FIRE PRONE GARDENS

When designing your garden it is important to consider the type of plant species and their flammability as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage the ground fire to spread up to, and then through, the crown of the trees.

Plants that are less flammable, have the following features:

- high moisture content
- high levels of salt
- low volatile oil content of leaves
- smooth barks without “ribbons” hanging from branches or trunks; and
- dense crown and elevated branches.

When choosing less flammable plants, be sure not to introduce noxious or environmental weed species into your garden that can cause greater long-term environmental damage.

For further information on appropriate plant species for your locality, contact your local council, plant nurseries or plant society.

If you require information on how to care for fire damaged trees, refer to the Firewise brochure *Trees and Fire Resistance; Regeneration and care of fire damaged trees*.

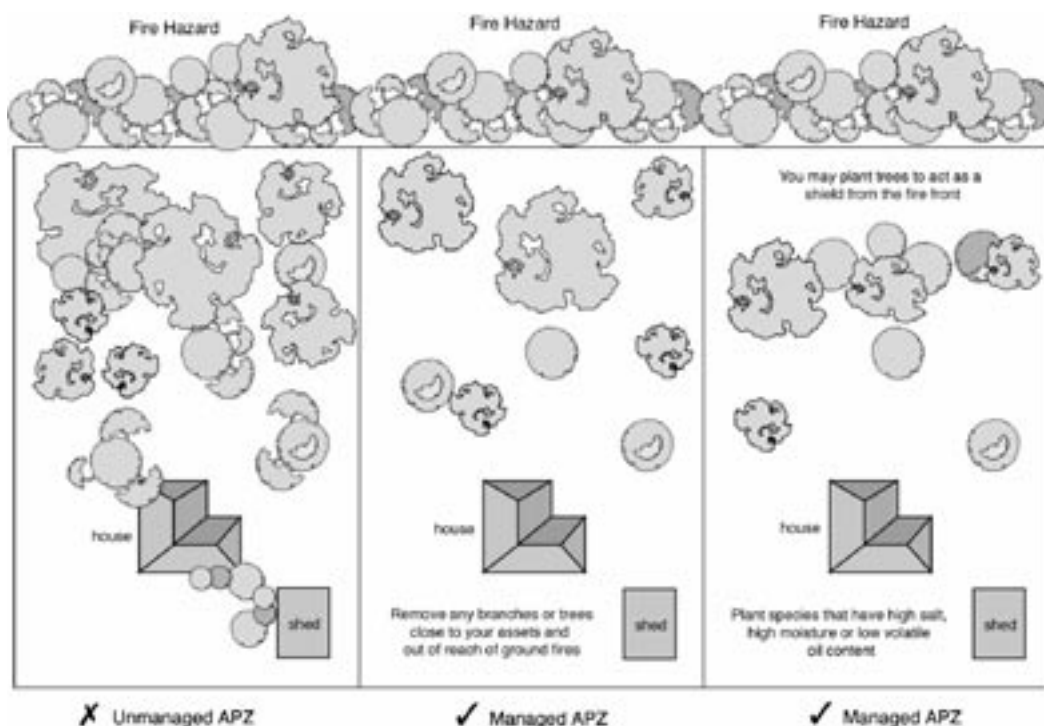
WIND BREAKS

Rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset.

You need to be aware of local wind conditions associated with bush fires and position the wind break accordingly. Your local RFS Fire Control Centre can provide you with further advice.

When choosing trees and shrubs, make sure you seek advice as to their maximum height. Their height may vary depending on location of planting and local conditions. As a general rule, plant trees at the same distance away from the asset as their maximum height.

When creating a wind break, remember that the object is to slow the wind and to catch embers rather than trying to block the wind. In trying to block the wind, turbulence is created on both sides of the wind break making fire behaviour erratic.



HOW CAN I FIND OUT MORE?

The following documents are available from your local Fire Control Centre and from the NSW RFS website at **www.rfs.nsw.gov.au**.

- Before You Light That Fire
- Standards for Low Intensity Bush Fire Hazard Reduction Burning
- Standards for Pile Burning
- Application Instructions for a Bush Fire Hazard Reduction Certificate

If you require any further information please contact:

- your local NSW Rural Fire Service Fire Control Centre.
Location details are available on the RFS website or
- call the NSW RFS Enquiry Line 1800 679 737
(Monday to Friday, 9am to 5pm), or
- the NSW RFS website at **www.rfs.nsw.gov.au**.

**Produced by the NSW Rural Fire Service, Locked Mail Bag 17,
GRANVILLE, NSW 2142. Ph. 1800 679 737**

www.rfs.nsw.gov.au

Acceptable Turning Solutions

A3.3 Vehicle turning head requirements

Dead ends that are longer than 200m must be provided with a turning head area that avoids multipoint turns. "No parking" signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.

