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# Travers

bushfire & ecology

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## Bushfire Protection Assessment

Proposed subdivision

Lot 3 DP 564631 & Lots 2 & 4 DP 634523  
Nos. 51, 134 & 146 Station Lane, Lochinvar

Under Section 100B of the Rural Fires Act (1997)

April 2020  
(Ref: 18BATH17)





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Lot 3 DP 564631 & Lots 2 & 4 DP 634523  
Nos. 51, 134 & 146 Station Lane, Lochinvar**

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The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features is to be confirmed by a registered surveyor.



## EXECUTIVE SUMMARY

A bushfire protection assessment has been undertaken for the proposed staged subdivision of Lot 3 DP 564631 & Lots 2 & 4 DP 524523, Nos. 51, 134 & 146 Station Lane, Lochinvar to create up to eight hundred and fifty-five (855) lots.

The development is categorised by the NSW Rural Fire Service (NSW RFS) as being a residential subdivision and this requires the NSW RFS to issue a bushfire safety authority (BSA) in accordance with *Planning for Bush Fire Protection (PBP)*.

The proposed residential subdivision must ensure that the extent of bushfire attack that can potentially impact a building envelope should not exceed a radiant heat flux of 29kW/m<sup>2</sup>. This rating assists in determining the size of the asset protection zone (APZ), which provides the necessary defendable space between hazardous vegetation and a building.

The assessment found that bushfire can potentially affect the proposed development from the surrounding unmanaged grassland vegetation, remnant forested wetland and freshwater wetland vegetation (associated with the riparian corridors and on-site stormwater detention basins) resulting in the future buildings being exposed to potential radiant heat and ember attack.

The land surrounding the proposed development forms part of the 'Lochinvar Structure Plan'. The areas to the east, west and south will be subject to future development which will remove the hazardous vegetation. This assessment has taken into consideration the 'Lochinvar Structure Plan' and provides temporary APZs to those aspects which will be developed in the future.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures:

- APZs in accordance with the minimum setbacks outlined within *PBP* (Table A1.12.2 FFDI 100) for most aspects.
- Use of an alternative solution to determine minimum APZ setbacks for the western aspect of Stage 6 based on the upslope topography and fuel loads associated with Sydney Sand Flats Dry Sclerophyll Forest.
- Amendment of the subdivision design (possibly at Stage 4 DA) to ensure that the minimum 12m APZ can be accommodated within Lot 94.
- Provision of access in accordance with the acceptable solutions outlined in *PBP*.
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *PBP*.
- Future dwelling construction in compliance with the appropriate construction sections of *AS3959-2018*, and *PBP*.

## GLOSSARY OF TERMS

<i>AEP</i>	<i>AEP Ecology Biobanking Offsets Bushfire</i>
AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
<i>AS1596</i>	<i>Australian Standard – The storage and handling of LP Gas</i>
<i>AS2419</i>	<i>Australian Standard – Fire hydrant installations</i>
<i>AS3745</i>	<i>Australian Standard – Planning for emergencies in facilities</i>
<i>AS3959</i>	<i>Australian Standard – Construction of buildings in bushfire-prone areas 2018</i>
BAL	bushfire attack level
<i>BCA</i>	<i>Building Code of Australia</i>
BSA	bushfire safety authority
DA	development application
<i>EP&amp;A Act</i>	<i>Environmental Planning &amp; Assessment Act 1979</i>
FFDI	forest fire danger index
IPA	inner protection area
LEP	Local Environmental Plan
m	metres
OPA	outer protection area
<i>PBP</i>	<i>Planning for Bush Fire Protection 2019</i>
POM	Plan of Management
<i>RF Act</i>	<i>Rural Fires Act 1997</i>
NSW RFS	NSW Rural Fire Service
SFPP	special fire protection purpose

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## REFERENCES

## SCHEDULE 1 – Bushfire Protection Measures

## APPENDIX 1 – Management of Asset Protection Zones





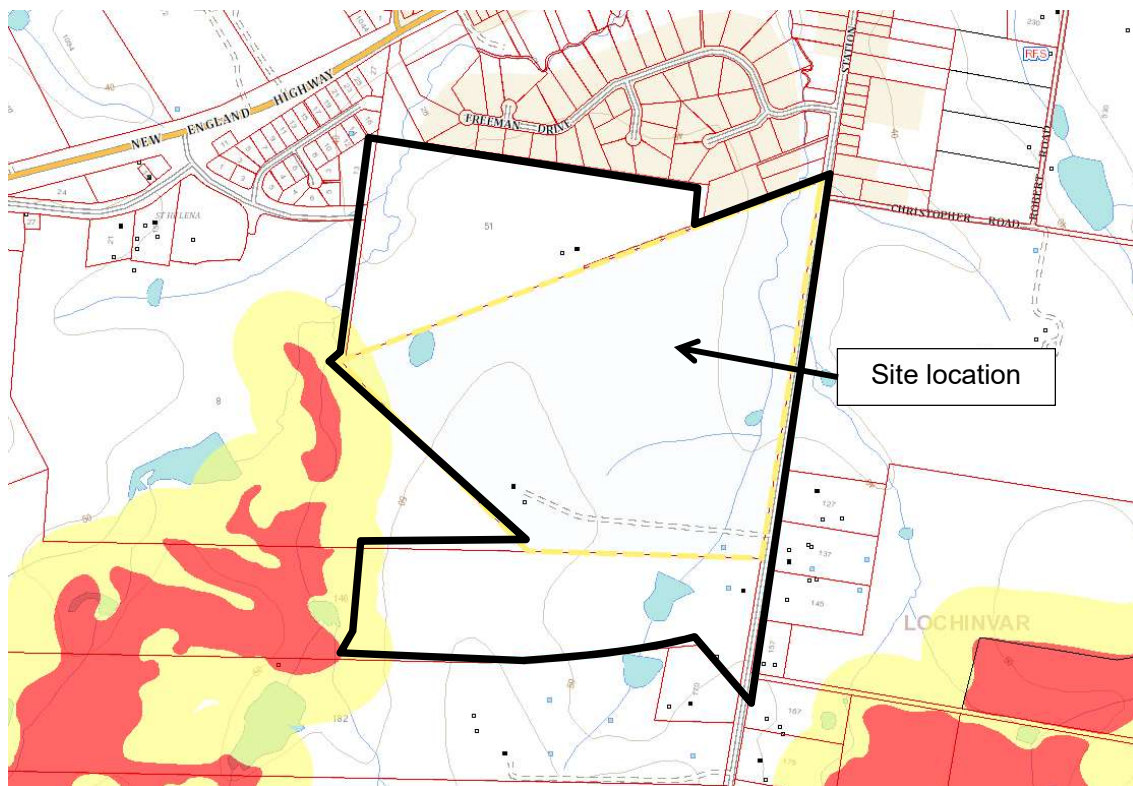


# Introduction

# 1

*Travers bushfire & ecology* has been engaged to undertake a bushfire protection assessment for the proposed staged subdivision development of Lot 3 DP 564631 & Lots 2 & 4 DP 524523, Nos. 51, 134 & 146 Station Lane, Lochinvar.

The proposed development is identified as bushfire prone on the *Maitland City Council* bushfire prone land map (refer Figure 1.1). This triggers a formal assessment by Council in respect of the NSW Rural Fire Service (NSW RFS) policy against the provisions of *Planning for Bush Fire Protection (PBP)*.



**Figure 1.1 – Bushfire Prone Land Map**  
(source: Planning Portal, 2019)

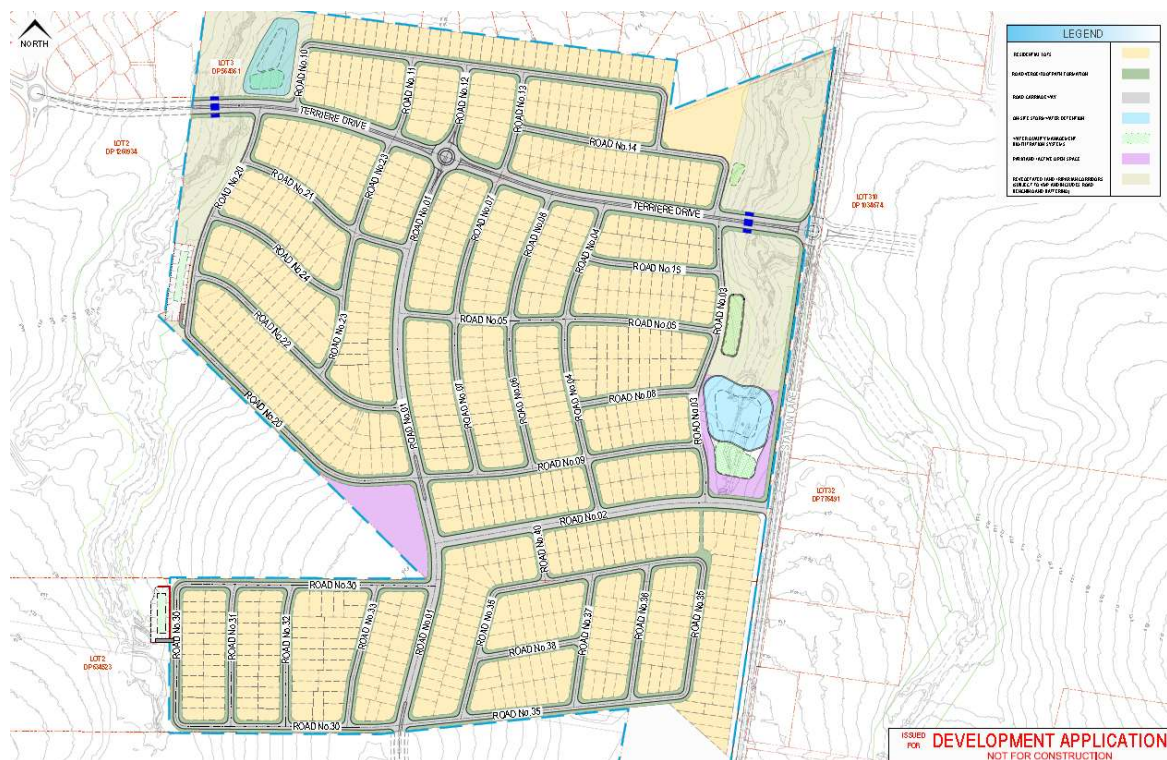
## 1.1 Project synopsis

The development proposal involves the subdivision of existing Lot 3 DP 564631 & Lots 2 & 4 DP 524523 to create:

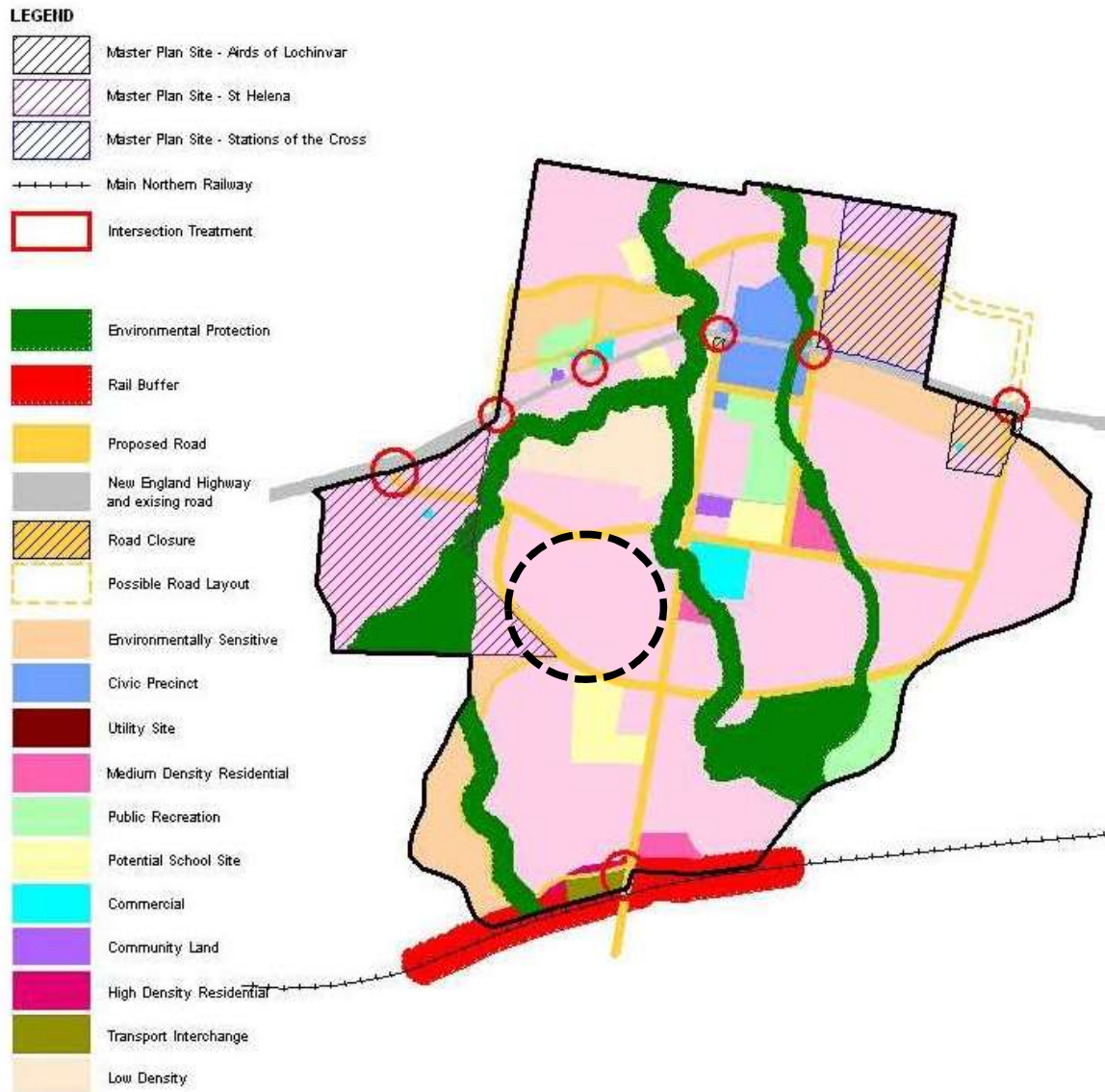
- Eight hundred and fifty-five (855) new residential allotments over six (6) stages;
- Two (2) parkland / open space areas;
- Two (2) on-site stormwater detention basins and associated riparian corridors;
- Bio-filtration systems; as well as
- Associated internal road network extending from Station Lane in the east with through road access to future development in the west and south (refer Figure 1.2).

The proposed subdivision forms part of the greater 'Lochinvar Structure Plan' (refer Figure 1.3). Under this plan the land to the east, south and west is subject to future staged development, therefore removing the grassland hazard from these aspects and reducing the overall bushfire risk posed to the site.

Schedule 1 shows the proposed subdivision and bushfire protection measures, including APZs.



**Figure 1.2 –Concept Land Use Plan**  
(source: *The Bathla Group*, dated 20/04/2020)



**Figure 1.3 –Lochinvar Structure Plan**  
(source: *Maitland City Council*, dated September 2007)

## 1.2 Information collation

Information sources reviewed for the preparation of this report include the following:

- Master Plan Design Plans issued for Development Application prepared by *The Bathla Group*, Project No, 19-0042, Revision A
- Lochinvar Structure Plan produced by Maitland City Council, dated September 2007
- Preliminary Constraints Advice prepared by *AEP Ecology Biobanking Offsets Bushfire*, dated 6<sup>th</sup> February 2020
- Maitland Local Environmental Plan (LEP)
- *NearMap* aerial photography
- Topographical maps DLPI of NSW 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas (AS3959)*
- *Planning for Bush Fire Protection (PBP) 2019*

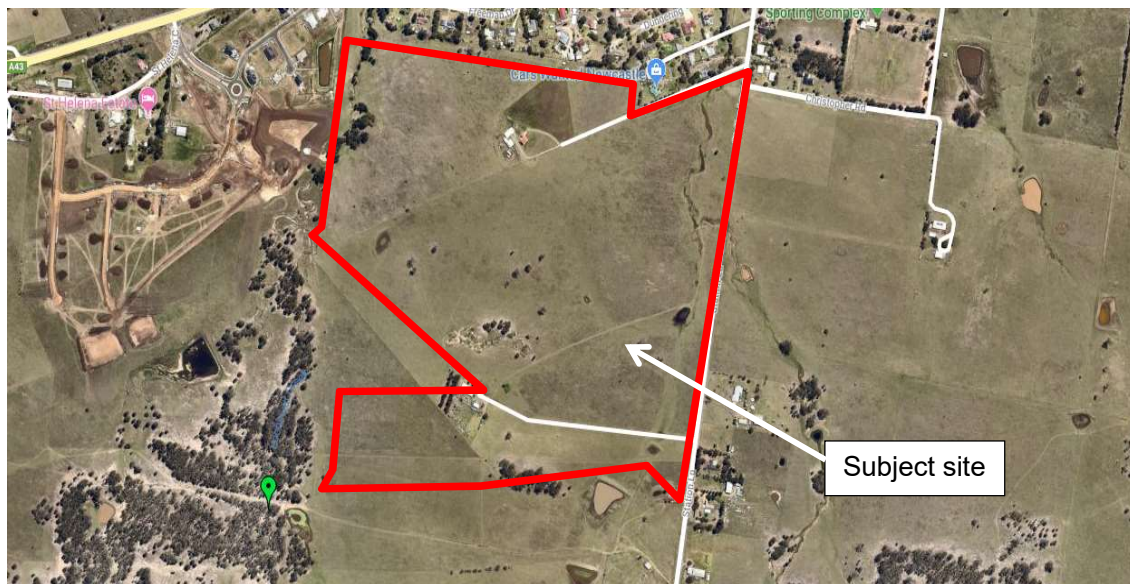


An inspection of the proposed development site and surrounds was undertaken in January 2020 to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bushfire measures and a visual appraisal of bushfire hazard and risk were also undertaken.

### 1.3 Site description

The proposed development is located to the west of Station Lane and south of Freeman Drive, Lochinvar within the local government area (LGA) of Maitland. The subdivision forms part of the greater 'Maitland – Urban Release Area' which involves future staged residential development to the east, south and west.

The site is currently grazed, supporting two (2) large lot rural dwellings and associated outhouses, and is bound by a mixture of managed and unmanaged grassland to the north, east and south. The site supports two (2) riparian corridors in the north-east and north-west. The land external to the site's south-western boundary supports disturbed forest vegetation associated with Lochinvar Creek.



**Figure 1.4 – Aerial appraisal**  
(source: NearMap, 2019)

### 1.4 Legislation and planning instruments

Is the site mapped as bushfire prone?	Yes
Proposed development type	Residential subdivision
Is the development considered integrated for the purposes of Section 100B of the <i>Rural Fires Act 1997</i> ?	Yes – referral and approval by the NSW RFS is required.
Is the proposal located in an Urban Release Area as defined under Clause 273 of the <i>EP&amp;A Regulations</i> ?	Yes – Maitland Urban Release Area
Zoning	R1 – General residential
Significant environmental features	No – The riparian areas will be restored and rehabilitated.
Details of any Aboriginal heritage	No known.
Does the proposal rely on an alternative solution	Yes – APZ to the west of Stage 6 determined using Method 2 AS3959.



# Bushfire Threat Assessment

## 2

To assess the bushfire threat and to determine the required width of an APZ for a development, an assessment of the potential hazardous vegetation and the effective slope within the vegetation is required.

### 2.1 Hazardous fuels

*PBP* guidelines require the identification of the predominant vegetation formation in accordance with David Keith (2004) if using the simplified acceptable solutions in *PBP* or, alternatively, the vegetation class if adopting the comprehensive vegetation fuel loads (as allowable when undertaking an assessment under Method 2 of AS3959). The hazardous vegetation is calculated for a distance of at least 140m from a proposed building envelope.

Vegetation survey of the development site has been undertaken by *AEP* via their preliminary constraint advice (dated February 2020). In addition, the vegetation outside of the site has been confirmed via Greater Hunter Vegetation Mapping.

The results of this assessment are detailed in Figure 2.1 with the vegetation conversions identified in the following Table 2.1.

The vegetation identified as being retained with the development site, and posing a bushfire threat to the proposed development, includes:

**Table 2.1 – Vegetation**

Aspect	Vegetation community / source	Vegetation formation	Vegetation class	Comprehensive fuel loads (t/ha)	Acceptable solution fuel loads (t/ha) ( <i>PBP</i> 2019)
North-west (riparian corridor)	Swamp Oak – Weeping Grass grassy riparian forest of the Hunter Valley (PCT 1731) / <i>AEP</i>	Forest (see note below)	Coastal Swamp Forest	10/13.2 (see note 1)	10/13.2 (see note 1)
<b>Note 1:</b> This vegetation has been downgraded to a 'remnant' forest. <i>PBP</i> describes remnant vegetation as a parcel of vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 50m. The existing vegetation within this corridor exhibits these qualities (less than 1ha and fire run <50m) and therefore the threat posed is considered low and APZ setbacks for this aspect are the same as for the rainforest category outlined in <i>PBP</i> .					
West (Stage 6)	Parramatta Red Gum / Narrow-leaved Apple / Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area / Greater Hunter Vegetation Mapping	Forest	Sydney Sand Flats Dry Sclerophyll Forest	20.5/30.9	22/36.1

Aspect	Vegetation community / source	Vegetation formation	Vegetation class	Comprehensive fuel loads (t/ha)	Acceptable solution fuel loads (t/ha) (PBP 2019)
South & west	Grassland / site inspection	Grassland	Grassland	6/6	6/6
North-east (riparian corridor)	Grassland	Grassland	Grassland	10/13.2 (see note 1)	10/13.2 (see note 1)
		<b>Note 1:</b> Whilst the vegetation to the north-east is currently grassland, it is likely that the riparian corridors will be rehabilitated. This assessment assumes revegetation of the core riparian corridor only (i.e. a total width of vegetated corridor will be less than 50m with a total revegetation area of less than 1ha) as a result the threat posed is the same as for the rainforest category outlined in <i>PBP</i> .			
Detention basins & bio-filtration systems	Freshwater wetland	Freshwater wetland	Freshwater wetland	15/15	15/15

The following assessment has adopted *PBP* (column 6) fuel loads identified above for the majority of aspects in order to comply with the acceptable solutions. As detailed in Table 2.2, an alternative solution (adopting comprehensive fuel load (Column 5 above) has been used for allotments (western aspect of Stages 6).



**Photo 1:** Forest vegetation located to the west of Stage 6

## 2.2 Effective slope

The effective slope is determined by reviewing the slopes within 100m of the development boundary. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined.

The effective slope within the hazardous areas is detailed in Table 2.2.

### 2.3 Bushfire attack assessment

The following assessment has determined the APZ and bushfire attack levels (BAL) levels via the following approach:

- Table A1.12.2 & A1.12.5 of *PBP*; and
- Appendix B Method 2 (alternative solution) of *AS3959 Construction of buildings in bushfire prone areas* (2018);

A forest fire danger index (FFDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Hunter region. Table 2.2 provides a summary of the bushfire attack assessment based on residential development and the methodologies identified above.

**Table 2.2 – Bushfire attack assessment**

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 PBP)	Building construction standards Alternative solution
<b>STAGE 1</b>							
North	31-80	Managed (existing residential land)	N/A	N/A	>100m	N/A	N/A
South and west	126-132, 261-272	Grassland (future Stage 2)	0-5°D	Deemed to satisfy (PBP 2019)	50m (refer Note 1)	N/A	N/A
East	1,2,198-199 & 175-178	Remnant forest (refer Note 2)	0-5°D	Deemed to satisfy (PBP)	14m	BAL 29 (14 -<21m) BAL 19 (21-<29m) BAL 12.5 (29-<100m)	N/A
<b>STAGE 2</b>							
North	58,59,84,85,108,109,152-163	Managed / developed (Stage 1)	N/A	N/A	>100m	N/A	N/A
South	1-9,19-31	Grassland (future Stage 3)	0-5°D	Deemed to satisfy (PBP)	50m (refer Note 1)	N/A	N/A
West	31-34	Managed parkland (proposed Lot 178) (refer Note 3)	N/A	N/A	>100m	N/A	N/A
	47-58	Grassland (future Stage 5 & 6)	0-5°D	Deemed to satisfy (PBP)	50m (refer Note 1)	N/A	N/A
East	149-152	Remnant forest (refer Note 2)	0-5°D	Deemed to satisfy (PBP)	14m	BAL 29 (14 -<21m) BAL 19 (21-<29m) BAL 12.5 (29-<100m)	N/A



Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 PBP)	Building construction standards Alternative solution
	9,10,129,130	Freshwater wetland (on-site stormwater detention basins)	0-5°D	Deemed to satisfy (PBP)	13m (Includes road corridor)	BAL 12.5 (12-<100m)	N/A
<b>STAGE 3</b>							
North	111-117, 242-255	Managed / developed (Stage 2)	N/A	N/A	>100m	N/A	N/A
	256-260	Freshwater wetland (on-site stormwater detention basins)	0-5°D	Deemed to satisfy (PBP)	25m (Includes road corridor)	BAL 12.5 (12-<100m)	N/A
East	260-279	Managed (existing residential land)	N/A	N/A	>100m	N/A	N/A
South	198-201,211,278,279						
	97,134-142,176-179	Grassland	0-5°D	Deemed to satisfy (PBP)	17m (Includes road corridor)	BAL 19 (17-<25m) BAL 12.5 (25-<50m)	N/A
West	97-111	Grassland (future Stage 6)	0-5°D	Deemed to satisfy (PBP)	50m (refer Note 1)	N/A	N/A
<b>STAGE 4</b>							
North	80-94	Managed (existing residential land)	N/A	N/A	>100m	N/A	N/A
East	80,120-125,1-7	Managed / developed (Stage 1)	N/A	N/A	>100m	N/A	N/A
South	27-38,7,8	Grassland (future Stage 5)	0-5°D	Deemed to satisfy (PBP)	50m (refer Note 1)	N/A	N/A
West	94,25-27 (refer Note 5)	Freshwater wetland (on-site stormwater detention basins)	0-5°D	Deemed to satisfy (PBP)	25m (Includes road corridor)	BAL 12.5 (12-<100m)	N/A

Aspect	Proposed lots	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	APZ provided (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 PBP)	Building construction standards Alternative solution
	95,112,113	Freshwater wetland (on-site stormwater detention basins)	0-5 <sup>oD</sup>	Deemed to satisfy (PBP)	14m (Includes road corridor)	BAL 12.5 (12-<100m)	N/A
<b>STAGE 5</b>							
North & east	39-49,89,103-117,163	Managed / developed (Stage 4, 1 & 2))	N/A	N/A	>100m	N/A	N/A
South	141-157	Grassland	0-5 <sup>oD</sup>	Deemed to satisfy (PBP)	17m (Includes road corridor)	BAL 19 (17-<25m) BAL 12.5 (25-<50m)	N/A
	158-163	Managed parkland (proposed Lot 178) (refer Note 3)	N/A	N/A	>100m	N/A	N/A
West	39,40,60,61,62	Remnant forest (refer Note 2)	0-5 <sup>oD</sup>	Deemed to satisfy (PBP)	14m	BAL 29 (14 -<21m) BAL 19 (21-<29m) BAL 12.5 (29-<100m)	N/A
	87,88,139-141	Freshwater wetland (on-site stormwater detention basins)	0-5 <sup>oD</sup>	Deemed to satisfy (PBP)	14m (Includes road corridor)	BAL 12.5 (12-<100m)	N/A
<b>STAGE 6</b>							
North & south	1,24,25,48,49,50,71,73,74,96,12,13,36,37,59-61,84-86	Grassland	0-5 <sup>oD</sup>	Deemed to satisfy (PBP)	17m (Includes road corridor)	BAL 19 (17-<25m) BAL 12.5 (25-<50m)	N/A
East	86-96	Managed / developed (Stage 3)	N/A	N/A	>100m	N/A	N/A
West	1-12	Sydney Sand Flats Dry Sclerophyll Forest	2 <sup>oU</sup>	Alternative solution Method 2 AS3959	19.2 (refer Note 4)	N/A	BAL 29 (19.2 -<27.5m) BAL 19 (27.5-<38.1m) BAL 12.5 (38.1-<100m)

Notes: \* Slope is either 'U' meaning up slope or 'C' meaning cross slope or 'D' meaning down slope

**Note 1** - Future stages are to be managed as a temporary inner protection area (IPA) by *The Bathla Group* until such time as each development stage commences. This will ensure that the bushfire risk is managed in the interim. Temporary APZs will be 50m measured from the boundary of the stage under development.

**Note 2** – The proposed ‘revegetated land / riparian corridor’ (depicted in dark green in Schedule 1) will be subject to a future vegetation management plan. Whilst these areas are currently grassland / minimal vegetation, this assessment assumes revegetation of the core riparian corridor only (i.e. 50m in width with an overall area of <1ha) and therefore a ‘remnant’ vegetation classification has been applied.

**Note 3** - The proposed parkland / open spaces (depicted in yellow in Schedule 1) are to be constructed / implemented and managed by the landholder as an IPA with final ownership transferred to Council. The parkland will be subject to a landscape plan with ongoing maintenance / mowing in accordance with a Plan of Management (POM).

**Note 4** - A performance-based assessment using Appendix B of AS3959 was undertaken to determine the required APZ and BAL levels based on the comprehensive fuel loads associated with Sydney Sand Flats Dry Sclerophyll Forest on an upslope of 2 degrees. The results of the assessment is provided below and was prepared using the bushfire attack level calculator developed by *Flamesol*.



Calculated April 24, 2020, 10:13 am (MDC v.4.8)

West (Stage 6)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	100	Rate of spread	2.14 km/h
Vegetation classification	Forest	Flame length	17.46 m
Surface fuel load	20.5 t/ha	Flame angle	52 °, 62 °, 69 °, 74 °, 75 ° & 82 °
Overall fuel load	29.5 t/ha	Elevation of receiver	6.88 m, 7.71 m, 8.15 m, 8.390000000000001 m, 8.43 m & 8.640000000000001 m
Vegetation height	n/a	Fire intensity	32,661 kW/m
Effective slope	-2 °	Transmissivity	0.867, 0.846, 0.8179999999999999, 0.792, 0.779 & 0.721
Site slope	0 °	Viewfactor	0.6047, 0.4495, 0.3047, 0.2071, 0.1685 & 0.0455
Flame width	100 m	Minimum distance to < 40 kW/m <sup>2</sup>	14.3 m
Windspeed	n/a	Minimum distance to < 29 kW/m <sup>2</sup>	19.2 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m <sup>2</sup>	27.5 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m <sup>2</sup>	38.1 m
		Minimum distance to < 10 kW/m <sup>2</sup>	44.7 m

**Note 5** – Lot 94 will require an amendment to the subdivision design to enable the 12m APZ to be accommodated within the allotment and to provide for a dwelling footprint. This will occur at Stage 4 DA once final plans have been designed for the corridor and detention basin to ascertain the final APZ width .



# Specific Protection Issues

## 3

### 3.1 Asset protection zones

Table 3.1 outlines the proposal's compliance with the performance criteria for APZs.

**Table 3.1 – Performance criteria for asset protection zones (*PBP* guidelines pg. 43)**

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Potential building footprints will not be exposed to radiant heat levels exceeding 29kW/m <sup>2</sup> on each proposed lot.	APZs are provided in accordance with Tables A1.12.2 and A1.12.4 based on the FFDI	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Refer Table 2.2 and Schedule 1 attached. A performance based assessment was undertaken for the western aspect of Stage 6 in compliance with the performance criteria.  Lot 94 (Stage 4) will require redesign to accommodate the required minimum APZ.
APZs are managed and maintained to prevent the spread of a fire towards the building.	APZs are managed in accordance with the requirements of Appendix 4.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The APZ consists of landscaped areas, roads and turfed areas.
The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	The APZ is located on lands with a slope of less than 18°	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies. All slopes are less than 18 degrees.
Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Landscaping is in accordance with Appendix 4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent
	Fencing is constructed in accordance with Section 7.3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent

### 3.2 Building protection

Building construction standards for the proposed future dwellings located within 100m of bushfire prone land are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)* and *PBP*.

The APZs depicted in Schedule 1 are based on a BAL 29 construction standard for those allotments fronting the bushfire hazard. Building construction standards have been outlined within Table 2.1.

### 3.3 Hazard management

APZs are required to be managed and maintained as an inner protection area (IPA) in accordance with NSW RFS guidelines *Standards for Asset Protection Zones* (RFS, 2005), with landscaping design to comply with Appendix 5 of *PBP*.

In terms of implementing and / or maintaining APZs, there is no physical reason that would constrain hazard management from being successfully carried out by normal means (e.g. mowing).

The APZs identified in Schedule 1 are located within road reserve widths and future residential allotments.

The open space / parkland (depicted in yellow) will be implemented by the landholder with final ownership transferred to Council. The park will be subject to a Landscape Plan / Plan of Management and will be managed as an APZ in perpetuity.

#### ***Subdivision staging***

To ensure protection against bushfire attack, the development will require the creation of APZs that need to be maintained sequentially until the final phase of development is completed to afford each stage of the development the appropriate level of bushfire protection (*PBP*).

As a result, APZs will be provided during all stages of development and the responsibility for the maintenance of APZs at each stage will be clearly defined by an easement or covenant to the extent as follows:

- A 50m APZ will apply from the boundary surrounding each stage.

This will ensure ongoing maintenance is undertaken until such time as land is developed. The easement or covenant for the purpose of an APZ can be extinguished when the bushfire hazard is permanently removed (i.e. when development occurs).

### 3.4 Access for fire-fighting operations

Primary access to the development will be via Station Lane to the east, with emergency access towards the existing township of Lochinvar and to Rutherford (via the Pacific Highway).

The development forms part of the Government Road Precinct within the greater Cessnock – Government Road Growth Centres, with the adjoining land to the south and west subject to future development and future additional road linkages.

As depicted below, the proposed road network offers a series of perimeter roads and internal road linkages. All roads have a carriageway width of 8-12m, with dedicated parking provided outside of this minimum width.



The proposal's compliance with the acceptable solutions outlined in *PBP* is detailed within Table 3.2 below.

**Table 3.2 – Performance criteria for access within residential subdivisions (PBP) guidelines pg. 44)**

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all weather access to structures and hazard vegetation.	Perimeter roads are provided for residential subdivisions of three or more allotments.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies.
		Subdivisions of three or more allotments have more than one access in and out of the development.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Once the adjoining stages are complete, the development will be accessed via: <ul style="list-style-type: none"> <li>• two (2) points via Station Lane (east)</li> <li>• one (1) point via Road No. 1 (south)</li> <li>• one (1) point via Terriere Drive (west) connecting with the approved St Helena residential development.</li> </ul>
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent
		Maximum grades for sealed roads do not exceed 15 degrees and an average grade of no more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies. All roads will be sealed
		All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200m in length, incorporate a minimum 12m outer radius turning circle, and are clearly sign posted as a dead end.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies – All roads are through roads.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		Where kerb and guttering are provided, perimeter roll top kerbing should be used to the hazard side of the road.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies
	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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent
	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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent
		Hydrants are provided in accordance with AS 2419.1:2005.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent
		There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A



Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
PERIMETER ROADS	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	Are two-way sealed roads.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies.
		Minimum 8m carriageway width kerb to kerb.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies. All roads are a minimum of 8m carriageway.
		Parking is provided outside of the carriageway width.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		Hydrants are located clear of parking areas.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies.
		Curves of roads have a minimum inner radius of 6m.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		The maximum grade road is 15° and average grade is 10°.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		The road crossfall does not exceed 3°.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
NON-PERIMETER ROADS	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating.	Minimum 5.5m width kerb to kerb.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies – All roads have a minimum of 8m wide carriageway.
		Parking is provided outside of the carriageway width.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies - Parking is provided outside of the carriageway width.
		Hydrants are located clear of parking areas.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complies.
		Curves of roads have a minimum inner radius of 6m.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		The road crossfall does not exceed 3°.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be a condition of consent.

### 3.5 Water supplies

The intent of measures is to provide adequate service of water for the protection of buildings during and after the passage of bushfire. Table 3.3 outlines the proposal's compliance with the acceptable solutions for reticulated water supply.

**Table 3.3 – Performance criteria for reticulated water supplies (*PBP* guidelines pg. 47)**

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Adequate water supplies are provided for firefighting purposes.	Reticulated water is to be provided to the development, where available.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Reticulated water is available to the development.
Water supplies are located at regular intervals.  The water supply is accessible and reliable for firefighting operations.	Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent.
	Hydrants are not located within any road carriageway.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent.
	Reticulated water supply to urban subdivisions uses a ring main system for areas for areas with perimeter roads.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent.
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent.
	Above ground water storage tank shall be of concrete or metal	N/A	<input type="checkbox"/>	

### 3.6 Gas

The intent of measures is to locate gas so as not to contribute to the risk of fire to a building. Table 3.4 outlines the required acceptable solutions for gas supply.

**Table 3.4– Performance criteria for gas supplies (*PBP* guidelines pg. 47)**

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Location of gas services will not lead to the ignition of surrounding bushland land or the fabric of buildings.	Reticulated or bottled gas bottles are to be installed and maintained in accordance with <i>AS1596 (2014)</i> and the requirements of relevant authorities. Metal piping is to be used.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent
	All fixed gas cylinders are to be kept clear of flammable materials to a distance of 10m and shielded on the hazard side.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent
	Connections to and from gas cylinders are metal.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent
	Polymer sheathed flexible gas supply lines are not used.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent
	Above ground gas service pipes are metal, including and up to any outlets.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be made a condition of consent

### 3.7 Electricity

The intent of measures is to locate electricity so as not to contribute to the risk of fire to a building. Table 3.6 outlines the required acceptable solutions for the subdivision's electricity supply.

**Table 3.5 – Performance criteria for electricity services (PBP guidelines pg. 47)**

Performance criteria	Acceptable Solutions	Acceptable solution	Performance solution	Comment
Location of electricity services limit the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lines are underground
Regular inspection of lines in undertaken to ensure they are not fouled by branches.	Where overhead electrical transmission lines are proposed: <ul style="list-style-type: none"> <li>• Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas: and</li> <li>• No part of a tree is closer to a power line than the distance set out in accordance with the specification in <i>Vegetation Safety Clearances</i> issued by <i>Energy Australia</i> (NS179, April 2002).</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A



# Conclusion & Recommendations

## 4

### 4.1 Conclusion

A bushfire protection assessment has been undertaken for the proposed staged subdivision of Lot 3 DP 564631 & Lots 2 & 4 DP 524523, Nos. 51, 134 & 146 Station Lane, Lochinvar to create up to eight hundred and fifty-five (855) lots.

The assessment found that bushfire can potentially affect the proposed development from the surrounding unmanaged grassland vegetation, remnant forested wetland vegetation (associated with the riparian corridors and on-site stormwater detention basins) resulting in the future buildings being exposed to potential radiant heat and ember attack.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures:

- APZs in accordance with the minimum setbacks outlined within *PBP* (Table A1.12.2 FFDI 100) for most aspects.
- Use of an alternative solution to determine minimum APZ setbacks for the western aspect of Stage 6 based on the upslope topography and fuel loads associated with Sydney Sand Flats Dry Sclerophyll Forest.
- Amendment of the subdivision design (possibly at Stage 4 DA) to ensure that the minimum 12m APZ can be accommodated within Lot 94.
- Provision of access in accordance with the acceptable solutions outlined in *PBP*.
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *PBP*.
- Future dwelling construction in compliance with the appropriate construction sections of *AS3959-2018*, and *PBP*.

The following recommendations are provided to ensure that the development is in accordance with, or greater than, the requirements of *PBP*.

### 4.2 Recommendations

**Recommendation 1** - The development is as generally indicated on the attached Schedule 1 – Plan of Bushfire Protection Measures.

**Recommendation 2** - APZs are to be provided to the proposed development as outlined in Table 2.2 and as generally depicted within Schedule 1. The APZs are to be maintained as an IPA through regular maintenance of the landscaped areas, mowing of lawns in accordance with the guidelines provided in Appendix 1, and / or as generally advised by the NSW RFS in their publications.

**Recommendation 3** – The Stage 4 subdivision design is to be amended to accommodate for the minimum 12m APZ required for Lot 94.

**Recommendation 4** - At the issue of subdivision certificate, and in conjunction with the construction of each stage, a suitably worded instrument shall be created pursuant to Section 88 of the *Conveyancing Act 1919* which ensures:

- A temporary 50m APZ is applied from the boundary and surrounding each development stage.

This will ensure ongoing maintenance is undertaken until such time as land is developed. The easement or covenant for the purpose of an APZ can be extinguished when the bushfire hazard is permanently removed (i.e. when development occurs).

**Recommendation 5** - Access is to comply with the acceptable solutions outlined in Section 5.3 of *PBP*.

**Recommendation 6** - Building construction standards for the proposed future dwellings within 100m of bushfire prone land are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)* with additional construction requirements as listed within Section A3.7 of Addendum Appendix 3 *PBP*.

**Recommendation 7** - Water, electricity and gas supply is to comply with the acceptable solutions outlined in Section 5.3 of *PBP*.

## REFERENCES

- Australian Building Codes Board (2010) – *Building Code of Australia*, Class 1 and Class 10 Buildings Housing Provisions Volume 2.
- Chan, K.W. (2001) – *The suitability of the use of various treated timbers for building constructions in bushfire prone areas*. Warrington Fire Research.
- Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bush fire-prone areas*.
- Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change.
- Rural Fire Service (2006) - *Planning for bushfire protection – a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service.
- Rural Fire Service (2006) - Bushfire Attack Software on RFS Web site.
- Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack*. RFS Development Control Service.

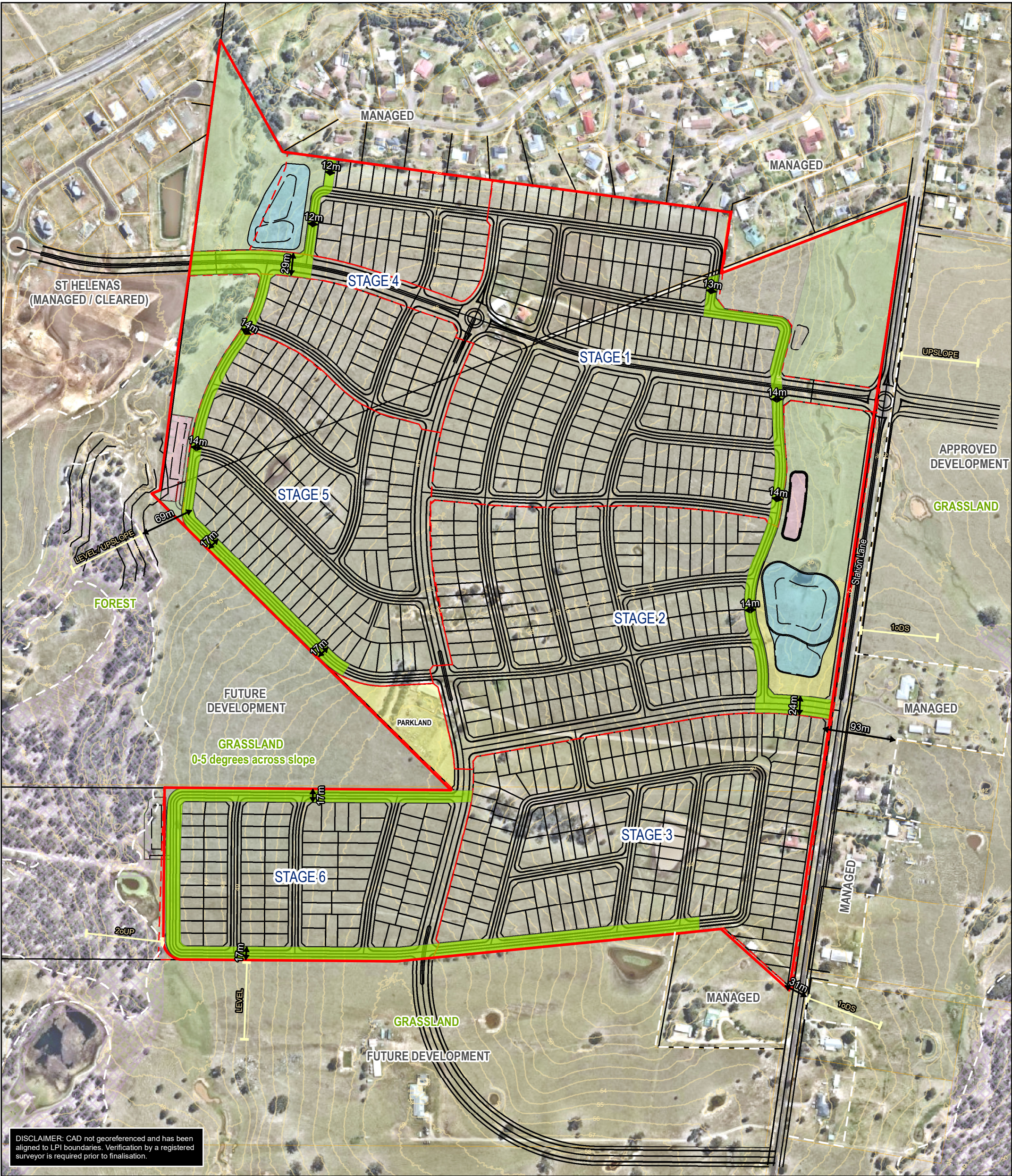




# Plan of Bushfire Protection Measures

S1





DISCLAIMER: CAD not georeferenced and has been aligned to LPI boundaries. Verification by a registered surveyor is required prior to finalisation.

Legend

- Proposed subdivision boundary (source: CAD)
- Lot boundaries (source: LPI)
- Contours 1m (source: LIDAR)
- Drainage (source: LPI)
- Parkland / Open space (managed land)
- On-site stormwater detention basin (Freshwater Wetland)
- Bio-filtration system (Freshwater Wetland)
- Revegetated land/ Riparian corridors (subject to VMP)

Greater Hunter Native Vegetation Mapping (VISID\_3855, 2012)

Vegetation Class

- Sydney Sand Flats Dry Sclerophyll Forests (Dry Sclerophyll Forest)
- Asset Protection Zone (APZ)

Aerial source: Nearmap



PROJECT & MXD REFERENCE  
Station Lane, Lochinvar  
18BATH17\_BF001

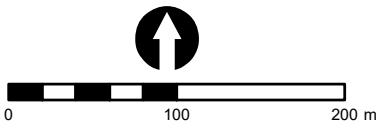
DATE & ISSUE NUMBER  
30/04/2020  
Issue 1

AW/BT

SCALE & COORDINATE SYSTEM  
1:4,500 @ A3  
GDA 1994 MGA Zone 56

TITLE  
**Schedule 1 - Bushfire Protection Measures**

Document Path: N:\GIS STORAGE\N Drive\18BATH17 StationLane Lochinvar\MXD\18BATH17\_BF001.mxd



Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.



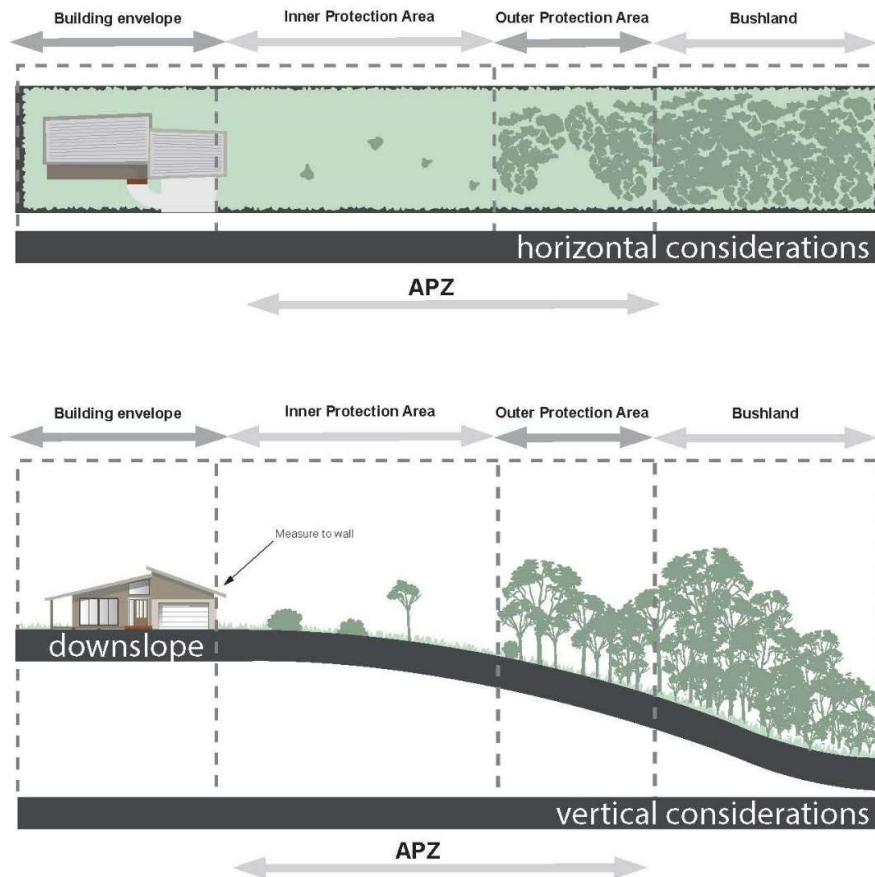


# Management of Asset Protection Zones

# A1

The NSW RFS provides basic advice in respect of managing APZs through documents such as *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 5 of *PBP*.

The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. The property is to be managed to IPA standards only. A typical APZ is graphically represented below:



APZs and progressive reduction in fuel loads  
(Source: *PBP*, 2019)

**Note:** Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought regarding vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the NSW RFS performance criteria.

The following provides maintenance advice for vegetation within the IPA and OPA. The APZ is to be maintained in perpetuity and should be undertaken regularly, particularly in advance of the bushfire season.

### Inner protection area (IPA)

Fuel loads within the IPA are to be maintained so it does not exceed 4t/ha.

Trees are to be maintained to ensure;

- canopy cover does not exceed 15% at maturity;
- trees (at maturity) do not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above ground;
- tree canopies should be separated by 2-5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

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

Grass is to be maintained to ensure:

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed (litter fuel within the IPA should be kept below 1cm).

General advice for landscaping is provided below:

- suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways;
- restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come into contact with the building; and
- when considering landscape species consideration needs to be given to estimated size of the plant at maturity.