Bushfire Protection Assessment

Subdivision

Caerleon Estate, Stage 14

Bathla Group

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A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

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Project Number	23SYD6169
Project Manager	Natalie South FPAA BPAD L3 Certified Practitioner No. BPAD41212-L2
Prepared by	Natalie South FPAA BPAD L3 Certified Practitioner No. BPAD41212-L2
Reviewed by	Nathan Kearnes FPAA BPAD L3 Certified Practitioner No. BPAD23575-L3
Approved by	Nathan Kearnes FPAA BPAD L3 Certified Practitioner No. BPAD23575-L3
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LIMITATIONS

The bushfire protection measures recommended in this report do not completely remove the risk to life and property, and they do not guarantee that a development will not be impacted by a bushfire event. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions.

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Bathla Group.

Template 2.1.3

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Abbreviations

Abbreviation	Description
AS 3959	Australian Standard AS 3959:2018 Construction of buildings in bushfire prone areas
APZ	Asset Protection Zone
BAL	Bushfire Attack Level
BFPL	Bush Fire Prone Land
BPM	Bushfire Protection Measures
BFSA	Bush Fire Safety Authority
CDC	Complying Development Certificate
DA	Development Application
DtS	Deemed-to-Satisfy
FDI	Fire Danger Index
IPA	Inner Protection Area
NCC	National Construction Code
PBP	'Planning for Bush Fire Protection 2019' and 'Planning for Bush Fire Protection Addendum November 2022'
RFS	NSW Rural Fire Service
SA	Standards Australia
SVTM	State Vegetation Type Map

1. Property and Proposal

Table 1 identifies the subject property and outlines the type of development proposed.

Table 1: Subject site and development proposal summary

Street address:	Hone Creek Drive, Caerleon
Postcode:	2850
Lot/DP no:	Lot 930 DP 1274170
Local Government Area:	Mid-Western Regional Council
Fire Danger Index (FDI)	80
Current land zoning:	R1: General Residential
Type of development proposed:	Residential subdivision

1.1 Description of Proposal

The proposal is for subdivision of 1 lot into 378 lots (Figure 1). The proposed development forms Stage 14 of the Caerleon Estate and consists of 370 residential lots, 2 non-residential use lots, 4 detention basins, 1 drainage channel, 1 open space lot, associated roads and infrastructure.

The subdivision is located on land identified as bush fire prone Land (BFPL) within the ePlanning Spatial Viewer[1].

1.2 Assessment Process

The proposal was assessed in accordance with Section 100B of the *Rural Fires Act 1997,* Clause 45 of the *Rural Fires Regulation 2022*, along with 'Planning for Bush Fire Protection 2019' (RFS 2019) and 'Planning for Bush Fire Protection Addendum November 2022' (RFS 2022a), herein collectively referred to as 'PBP'.

This assessment is based on the following information sources:

- Background documentation provided by Bathla group;
- Information contained within the site plan from Bathla (Project: Caerleon. Mudgee_Stage 14, Drawing No. SK-01, revision 3, dated 4 July 2023); and
- GIS analysis including online spatial resources (i.e. Google Earth, SIX Maps, Nearmap and the NSW Government Planning Portal).

Table 2 identifies the bushfire protection measures assessed and whether an acceptable or performance based solution is proposed.

[1] https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address

Table 2: Summary of bushfire protection measures assessed

Bushfire Protection Measure	Acceptable Solution	Performance Solution	Report Section
Asset Protection Zones	☑	☑	3.1
Landscaping	☑	☐	3.2
Construction standard	☑	☑	3.3
Access	☑	☑	3.4
Water supply	☑	☐	3.5
Electrical services	☑	☐	3.6
Gas services	☑	☐	3.7

1.3 Significant Environmental Features

An assessment of significant environmental features, threatened species, populations or ecological communities under the *Biodiversity Conservation Act 2016* that may potentially be affected by the proposed bushfire protection measures has not been undertaken in this report as it is covered by other parts of the Development Application (DA) process.

The impact footprint of the bushfire protection measures (e.g. Asset Protection Zone [APZ]) is identified within this report and therefore capable of being assessed by a suitably qualified person. Mid-Western Regional Council is the determining authority for this development; they will assess more thoroughly any potential environmental issues.

1.4 Aboriginal Cultural Heritage

An assessment of any Aboriginal cultural heritage objects (within the meaning of the *National Parks and Wildlife Act 1974*) that may potentially be affected by the proposed bushfire protection measures has not been undertaken in this report as it is covered by other parts of the Development Application (DA) process.

The impact footprint of the bushfire protection measures (e.g. APZ) is identified within this report and therefore capable of being assessed by a suitably qualified person. Mid-Western Regional Council is the determining authority for this development; they will assess more thoroughly any potential Aboriginal cultural heritage issues.

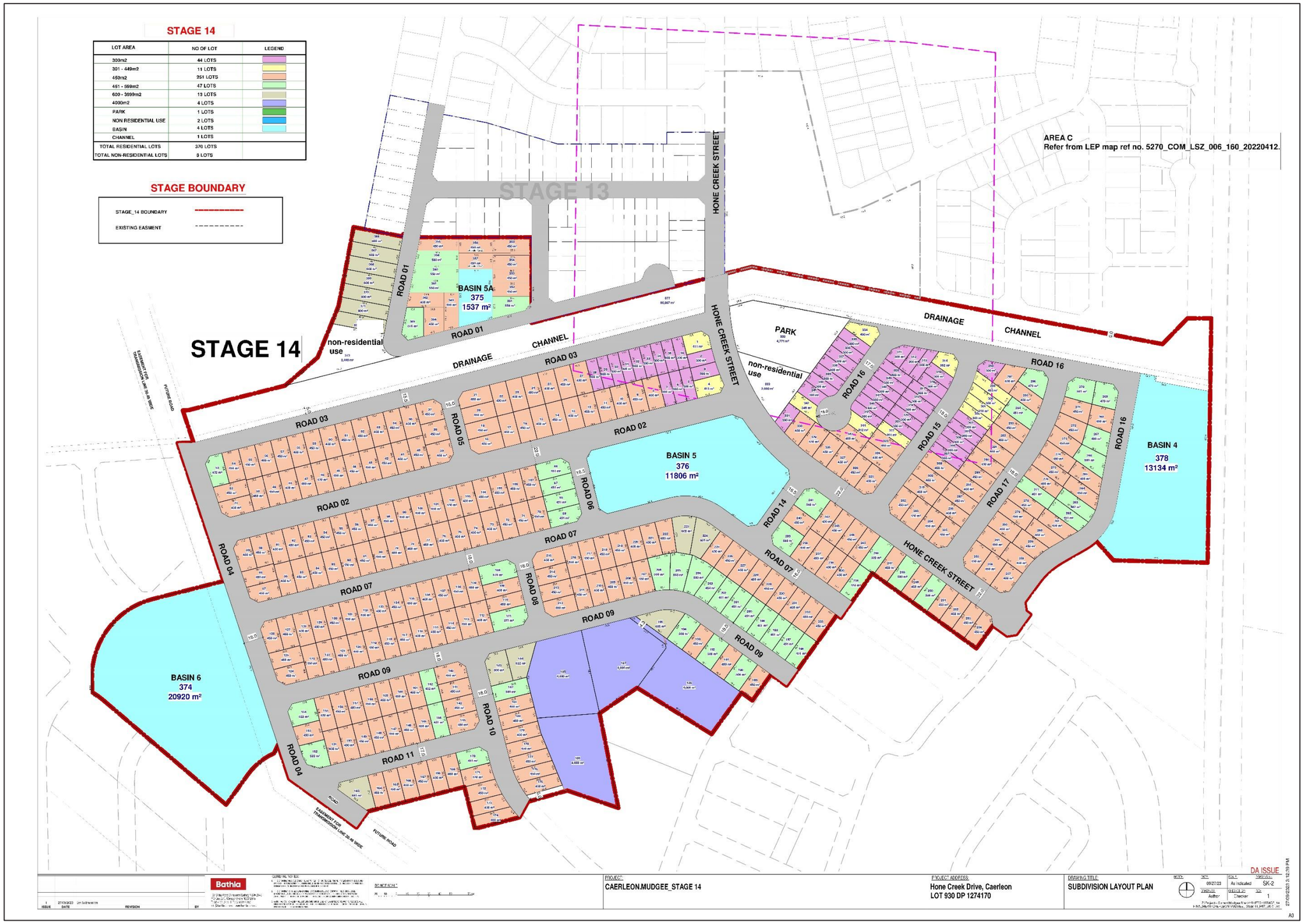

Figure 1: Subdivision Layout

2. Bushfire Hazard Assessment

2.1 Process

The site assessment methodology from Appendix 1 of PBP and Method 2 of AS 3959:2018 *Construction of buildings in bushfire-prone areas* (SA 2018) has been used in this assessment to determine Asset Protection Zones (APZ). The Method 2 assessment has utilised a maximum exposure of 29 kW/m^2 for APZ determination along the north-western boundary as detailed below and in Section 3.

The modelling output for the Method 2 assessment can be found in Appendix A.

Figure 2 and Table 3 show the effective slope and predominant vegetation representing the highest bushfire threat potentially posed to the subdivision from various directions.

2.2 Vegetation Assessment

In accordance with PBP, the predominant vegetation formation has been assessed for a distance of at least 140 m from the subject land in all directions.

The predominant vegetation has been determined from the NSW State Vegetation Type Map (SVTM; DPE 2022).

2.3 Slope Assessment

In accordance with PBP, the slope that would most significantly influence fire behaviour was determined over a distance of 100 m from the boundary of the proposed development under the classified vegetation.

The effective slope has been determined from 2 m contour data.

2.4 Summary of Assessment

The predominant vegetation has been determined in accordance with the methodology within PBP. As shown in Figure 2, the bushfire prone vegetation within 140 m of the site is located to the east, south, west and north-west and consists of grassland and woodland.

Grassland

The unmanaged grassland to the east, south and west is considered a 'grassland' hazard under PBP, as such is classified accordingly. The effective slope under this hazard ranges from 'all upslopes and flat', '>0-5 degrees downslope' and '>5-10 degrees downslope' as shown in Figure 2.

The grassland to the south and west will be removed in future development stages of the Caerleon Estate Masterplan (Appendix B) to be developed by Bathla (the proponent). Therefore, a 50 m temporary APZ will be implemented until future development occurs.

Woodland

The bushfire prone vegetation to the north-west is mapped as 'Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion' (DPE 2022)' which falls within the 'Western Slopes Grassy Woodlands' vegetation class in accord with Keith (2004) and is classified as 'Grassy Woodlands' under PBP. The fuel load for Grassy Woodlands is 10.5 t/ha (surface and elevated) and

20.2 t/ha (overall fuel load including bark and canopy) as per table 1.12.8 of PBP. The effective slope under this vegetation falls within the PBP slope categories of 'All upslopes and flat land'.

The riparian corridor to the south-east of the subject land will be rehabilitated with 'Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion' and 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' Plant Community Types (pers comm. Lachlan Webster of Biodiversity Australia, 5 September 2023) both of which also fall within the 'Western Slopes Grassy Woodlands' vegetation class (Keith 2004) and are classified as 'Grassy Woodlands' under PBP. The effective slope under this vegetation falls within the PBP slope categories of '>0-5 degrees downslope'.

Managed lands

The detention basins and drainage channel within the proposed development will be designed and managed to PBP Inner Protection Area (IPA) specifications (Appendix C) in perpetuity. As such, they are not considered a bushfire hazard.

In all other directions, there are managed lands in the form of land cleared for future residential development associated with the Caerleon Estate Masterplan.

Table 3: Bushfire hazard assessment, APZ requirements and BALs

Transect #	Slope	Vegetation Formation	PBP Residential APZ (BAL-29)	Method 2 APZ (≤29 kW/m^2)	Proposed APZ	Comments
1 and 3 (west)	All upslope and flat land (1° upslope)	Woodland	11 m	8 m	≥10 m	Proposed APZ dimension determined by Method 2 assessment achieving ≤29 kW/m^2 exposure and to be established within lots 337-344 (Figure 2). This approach is consistent with previous development that has been approved to the north along the western interface as part of previous Stages (5, 8 and 9) of Caerleon Estate.
2 (west)	All upslope and flat land (8° upslope)	Woodland	11 m	5 m	≥10 m	As above.
4 - 5 (west)	All upslope and flat land	Grassland	10 m	N/A	≥50 m	A temporary 50 m APZ will be provided between the hazard and the development until subsequent stages of Caerleon Estate are constructed.
6 - 7 (south)	>0° to 5° downslope	Grassland	11 m	N/A	≥50 m	As above.

Transect #	Slope	Vegetation Formation	PBP Residential APZ (BAL-29)	Method 2 APZ (≤29 kW/m²)	Proposed APZ	Comments
8 (south-east)	>0° to 5° downslope	Woodland	13 m	N/A	≥13 m	APZ accommodated within temporary APZ and proposed public road infrastructure.
9 (east)	>0° to 5° downslope	Grassland	11 m	N/A	≥11 m	APZ accommodated within detention basin in development site.
All other directions	Managed land					

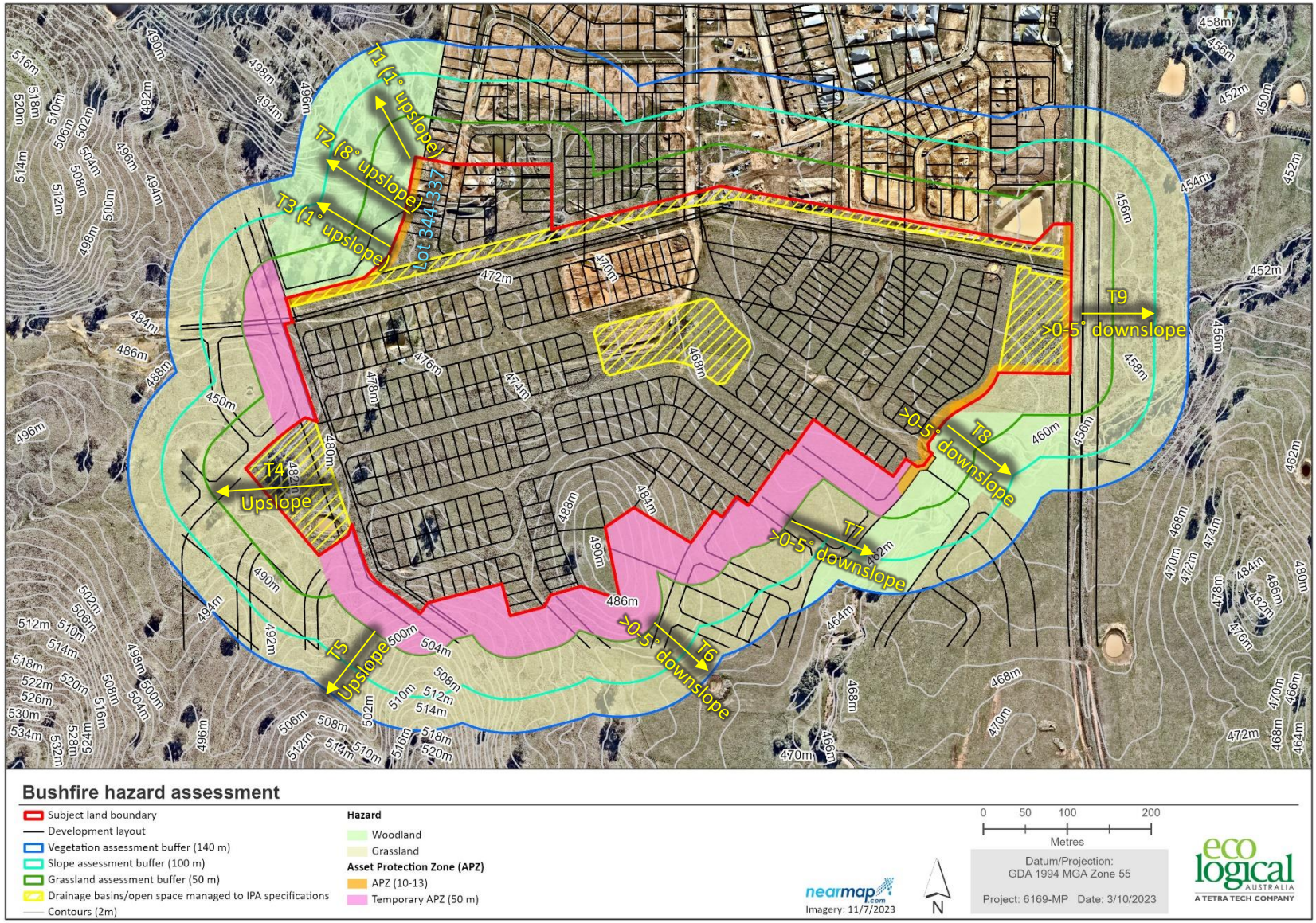

Figure 2: Bushfire Hazard Assessment

3. Bushfire Protection Measures

3.1 Asset Protection Zones

Table 3 shows the dimensions of the required APZ and where relevant, information on how the APZ is to be provided is included. The footprint of the APZ is also shown on Figure 2.

A temporary 50 m APZ will be provided to the southern and western boundary within future stages of Caerleon Estate, which is also owned by the Bathla Group (proponent). The temporary APZ will be created and managed by Bathla Group in perpetuity or until future development of that land occurs (Figure 2) and the hazard is removed. The temporary APZ will be secured via an 88b instrument and is recommended to form a condition of consent.

The APZ along the north-western boundary is 10 m which meets and/or exceeds the Method 2 modelled APZ requirement of 5-10 m. This additional distance is consistent with both the previously approved APZ dimension for the northern Stages (5, 8 and 9) and in recognition that a perimeter road has not been provided along this interface.

The compliance of the proposed APZ with Section 5.3.1 of PBP is documented in Table 4.

Table 4: APZ requirements and compliance (adapted from Table 5.3a of PBP)

Performance Criteria	Acceptable Solutions	Compliance Notes
The intent may be achieved where:		
Potential building footprints will not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	APZs are provided in accordance with tables A1.12.2 and A1.12.3 based on the FDI.	**Complies with acceptable solutions and performance criteria** APZ provided in accordance with Table A1.12.3 and Method 2 assessment under AS 3959-2018 (Appendix C)
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 of PBP.	**To comply** APZ to be managed in accordance with PBP. Fuel management specifications provided in Appendix C.
The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	**To comply** East, south-east and north-west APZ is provided wholly within the boundaries of the development site. West and south Temporary APZ located within future stages of Caerleon Estate but within overall development site. This land is being developed by Bathla Group (the proponent) and will be managed in perpetuity or until the bushfire hazard is removed.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees.	**Complies** APZ is not located on slopes greater than 18°.

3.2 Landscaping

The compliance of the proposed landscaping with Section 5.3.1 of PBP is documented in Table 5.

Table 5: Landscaping requirements and compliance (adopted from Table 5.3a of PBP)

Performance Criteria	Acceptable Solutions	Compliance Notes
The intent may be achieved where:		
Landscaping is 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 of PBP; and	**To comply** APZ / Landscaping is to be designed and managed in accordance with PBP. Landscaping specifications provided in Appendix C.
	Fencing is constructed in accordance with Section 7.6 of PBP.	**To comply** Fencing to be constructed in accordance with Section 7.6 of PBP (see Section 3.3.1 for further details).

3.3 Construction Standards

The Bushfire Attack Level (BAL) for future dwellings within the proposed subdivision will be determined during the individual dwelling Complying Development Certificate (CDC) or DA process however, a maximum of BAL-29 is provided by the subdivision design.

The NBC Bushfire Attack Assessor (BFAA) was used to determine the BAL construction requirements for Transects 1, 2 and 3. This approach is in accordance with Appendix B: Detailed Methodology for Determining the Bushfire Attack Level (BAL) – Method 2 of Australian Standard 3959: Construction of buildings in bushfire-prone areas' (SA 2018). The results of this assessment are shown in Appendix A.

NB: As outlined in CB3 of Appendix B of AS 3959-2018 a vegetation classification system specific to a relevant State or accepted as an alternate to the national system can be utilised. This assessment utilises the fuel loadings for grassy and semi-arid woodland in accordance with Section A1.2 of PBP.

BALs within the proposed development range from BAL-29 to BAL-LOW as identified in Figure 3.

It is recommended BALs for Lots 337-344 be conditioned and documented in any legal mechanisms (i.e. 88b instrument) to ensure a BAL consistent with the approved APZ is provided.

3.3.1 Fences and Gates

To comply with Section 7.6 of PBP, all fencing and gates are to be constructed of hardwood or non-combustible material, aside from those lots exposed to BAL-LOW. Where fencing is within 6 m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.

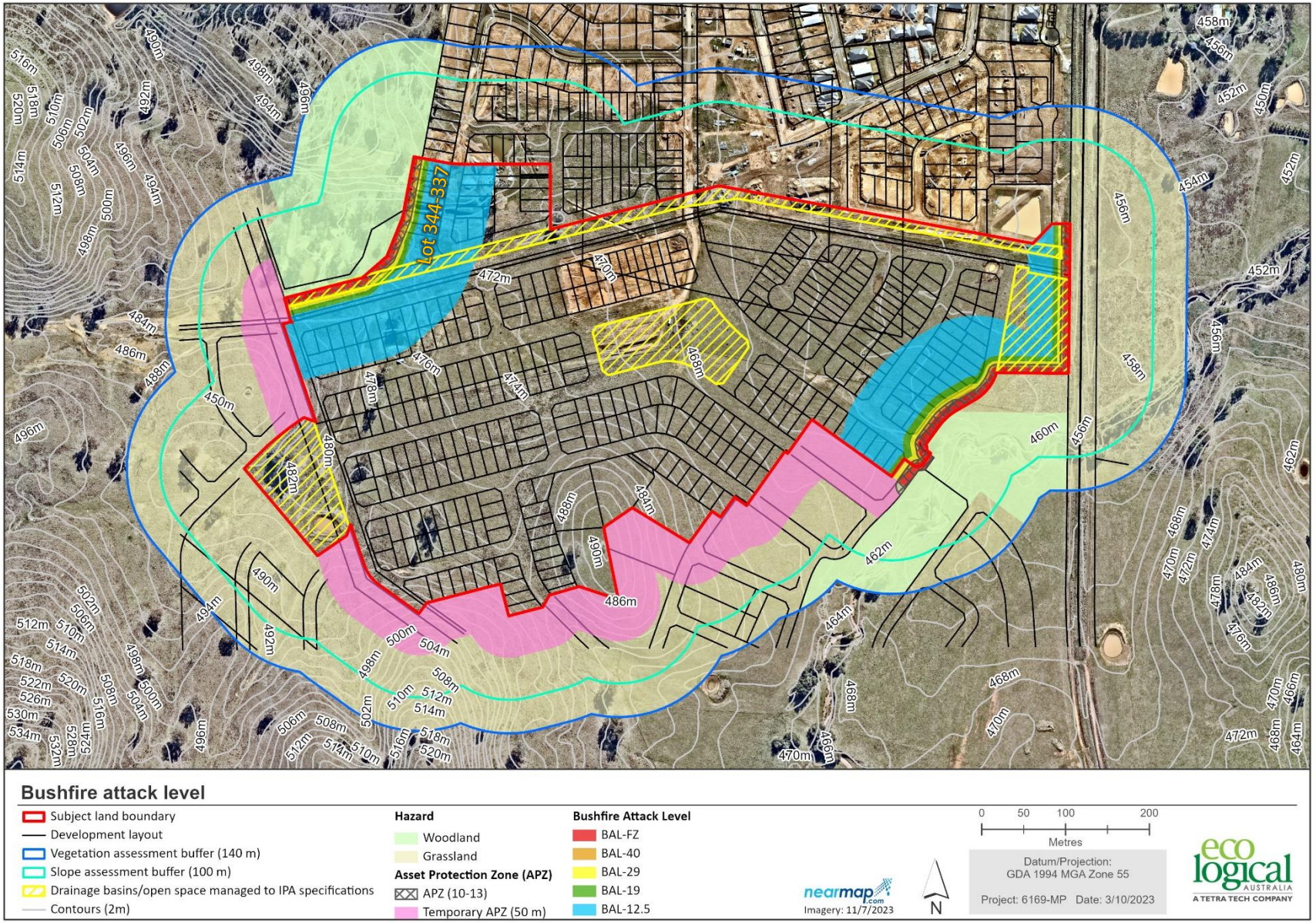

Figure 3: Bushfire Attack Levels

3.4 Access

Public road access to the subdivision is via Hone Creek Drive to the north as shown in Figure 4. Temporarily there will be a single access/egress point onto Hone Creek Drive until further stages are constructed to the south within the Caerleon Estate.

Figure 4 shows the internal and perimeter access within the subdivision. The performance criteria and acceptable solutions for each of these access types are shown in Table 13 Table 14 and Table 15 (Appendix D), along with comment on the subdivision design compliance or otherwise.

All roads within the subdivision are classified 'non-perimeter' aside from the western portion of Road 03, Road 04 (entirely) and Road 16 (eastern boundary) as shown in Figure 4.

A summary of the compliance assessment with PBP can be found in Table 6 below whilst all access performance solutions are detailed in Table 7.

The design of Stage 14 is consistent with the overall existing approved and constructed development within Caerleon Estate to the north (Stages 5, 8, 9 and 13).

Table 6: Access summary of compliance

Access type	Acceptable Solution	Performance Solution	Further details
General	☑	☑	Table 7 and Table 13
Perimeter road	☐	☑	Table 7 and Table 14
Non-perimeter road	☑	☑	Table 7 and Table 15
Property Access	☐	☐	N/A – no property access roads proposed.

Table 7: Access performance solution

Item #	Access Type	Description	Performance Criteria	Acceptable Solution	Comments
1	General	N/A	Firefighting vehicles are provided with safe, all-weather access to structures	Perimeter roads are provided for residential subdivisions of three or more allotments;	The subdivision does not provide a perimeter road between the bushfire hazard to the north-west and the proposed lots along the north-western boundary (Lots 337-344) as shown in Figure 2. The PBP performance criteria is met by: • The road (Road 18) forms an extension to the existing Caerleon Estate Road network with the design being consistent with the Caerleon Estate Development Control Plan (DCP) and previous approvals for Stage 13 (RFS 2022b) for which Road 18 extends; • Consistent with the preceding approved stages to the north includes Stage 13, 9, 8 and 5 that abut the western interface; • All lots are accessible via the proposed internal road network, which provides safe, all-weather access to structures; • Firefighters are provided access to the lots from proposed Road 18, which is within 70 m of the most distant part of any of the Lots 337-344 located on the western side of the road adjoining the hazard (Figure 1); The subdivision does not provide a perimeter road between the bushfire hazard to the south and the proposed lots along the southern boundary as shown in Figure 2. The PBP performance criteria is met by: • The grassland hazard to the south is temporary in nature and a ≥50 m APZ will be provided until future stages of Caerleon Estate are constructed and the hazard removed on a permanent basis; • All lots within the southern portion of the development are >50 m from the temporary grassland hazard therefore not bushfire prone.
2	General	Hone Creek Road	Firefighting vehicles are provided with safe, all-weather access to structures	Subdivisions of three or more allotments have more than one access in and out of the development;	Temporarily the subdivision will have one access/egress to the north via Hone Creek Drive. The PBP performance criteria is met by:

Item #	Access Type	Description	Performance Criteria	Acceptable Solution	Comments
					• This is only a temporary measure until future stages of Caerleon Estate are constructed to the south (Figure 4); • The road is a spine road which connects to the existing Hone Creek Drive and further internal road network of Stages 7, 8, 9 and 13; • The road is not bushfire prone and traverses managed land for >300 m therefore unlikely to be cut in event of fire; • The road travels north away from any potential bushfire hazards to the east, south and west; • This is a non-perimeter road and exceeds the PBP non-perimeter road design requirements providing a 7 m carriageway (2 x 3.5 m lanes) and 2.5 m parking outside of the carriageway.

3	General	Hone Creek Drive, Road 04, 07, 09, 10 and 16.	Firefighting vehicles are provided with safe, all-weather access to structures	All roads are through roads;	One (1) permanent dead end road and four (4) temporary dead ends are proposed until subsequent stages of Caerleon Estate are constructed. The PBP performance criteria is met by:
					<u>Hone Creek Drive</u>
					• Temporary dead-end road <200 m in length and will provide a T intersection compliant with 'Type B' of Figure A3.3 of PBP;
					• Road provides a 7 m carriageway (2 x 3.5 m lanes) with 2.5 m parking outside of carriageway (non-perimeter standards);
					• Only 7 lots are serviced from the dead end portion of the road;
					• Temporary dead-end will be resolved upon development of subsequent stages of Caerleon Estate.
					<u>Road 04, 07 and 10</u>
					• Temporary dead-end roads <200 m in length and will provide temporary 12 m outer radius turning area;
					• Dead end portion of roads only service a small number of lots:
					  ○ Road 04: 1 lot
					  ○ Road 10: 9 lots

Item #	Access Type	Description	Performance Criteria	Acceptable Solution	Comments
					○ Road 07: 11 lots. • The land adjoining the road to the south will be developed in the future as subsequent stages of Caerleon Estate (Figure 4). This will remove the bushfire hazard, meaning the proposed roads (Road 04, 07 and 10) will no longer be bushfire prone and therefore there will be no need for the road to meet the PBP performance criteria i.e. no need for evacuation and firefighting vehicle response. <u>Road 09</u> • Addressed in assessment item 4 (below). <u>Road 16 (western portion)</u> • Permanent dead-end road <200 m in length and will provide a turning area with inner radius of 16 m; • The road is >200 from any bushfire hazard, is not bushfire prone and does not provide an emergency vehicle route to any potential bushfire hazard, therefore there will be no need for the road to meet the PBP performance criteria i.e. no need for evacuation and firefighting vehicle response.
4	General	Road 09	Firefighting vehicles are provided with safe, all-weather access to structures	Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	Road 09 is a 225 m long dead-end road. The PBP performance criteria is met by: • The land adjoining the road to the south will be developed in the future as subsequent stages of Caerleon Estate (Figure 4). This will remove the bushfire hazard, as such the proposed road (Road 09) will no longer be bushfire prone and therefore there will be no need for the road to meet the PBP performance criteria i.e. no need for evacuation and firefighting vehicle response. • Furthermore, the 225 m long cul-de-sac will provide a temporary 12 m outer radius turning area.

Item #	Access Type	Description	Performance Criteria	Acceptable Solution	Comments
5	General	All roads	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.	15t capacity is proposed, the PBP performance criteria is achieved based on the following: Capacity is suitable for a Cat 1 tanker, the site is unlikely to be serviced by anything larger than a Cat 1 tanker given these are the largest most used in rural and urban/interface scenarios, therefore 15t is considered sufficient.

6	Perimeter road	Roads 04 and 16	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.	Parking provided outside of the carriageway width;	Perimeter Roads 03 (western portion), 04 and 16 provide 9 m carriageways (2 x 4.5 m lanes) with parking within carriageway. The PBP performance criteria is achieved based on:
					<u>Road 03 (western portion)</u>
					• The road design provides a 9 m carriageway (kerb to kerb) with no parking on the hazard side.
					  ○ An allowance for 2.5 m parking (exceeds minimum standard vehicle size) provides a 6.5 m clear carriageway which allows safe passing for 2 x 2.4 m wide firefighting tankers to pass and evacuating residents simultaneously;
					• The road is <200 m in length and only services 13 lots beyond its intersection with Road 05;
					• If there was a bushfire in the north-western hazard, other residents in the estate would evacuate via other roads in the network (i.e. Road 02, Road 07) to Hone Creek Road away from the bushfire hazard.
					<u>Road 04</u>
					• The road design provides a 9 m carriageway (kerb to kerb) with no parking on the hazard side.
					  ○ An allowance for 2.5 m parking (exceeds minimum standard vehicle size) provides a 6.5 m clear carriageway which allows safe passing for 2 x 2.4 m wide firefighting tankers to pass and evacuating residents simultaneously;
					• The land adjoining the road to the west will be developed in the future as subsequent stages of Caerleon Estate

Item #	Access Type	Description	Performance Criteria	Acceptable Solution	Comments
					(Figure 4). This will remove the bushfire hazard, as such the proposed road (Road 04) will no longer be bushfire prone and therefore there will be no need for the road to meet the PBP performance criteria i.e. no need for evacuation and firefighting vehicle response. • The grassland hazard is considered low risk and a temporary 50 m APZ will be provided until future development occurs removing the grassland hazard. <u>Road 16</u> • The road design provides a 9 m carriageway (kerb to kerb) with no parking on the hazard side. o An allowance for 2.5 m parking (exceeds minimum standard vehicle size) provides a 6.5 m clear carriageway which allows safe passing for 2 x 2.4 m wide firefighting tankers to pass and evacuating residents simultaneously; • The road is <200 m in length and only services 12 lots and does not have any other roads intersecting, therefore no additional residents would use this road for evacuation.
7	Perimeter and Non-perimeter road	Hone Creek Drive, Road 04, 07, 09, 10 and 16	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	There are through roads, and these are linked to the internal road system at an internal of no greater than 500m;	All roads are connected to the internal road network within Caerleon Estate at intervals of less than 500 m. <u>Non-perimeter roads</u> Road 16 (western portion) is a permanent dead end road; Hone Creek Road and Roads 07, 09 and 10 are temporary dead-end roads. The performance solution for non-compliance with through roads (assessment items 3 and 4) addresses the performance criteria. <u>Perimeter roads</u> Road 04 is a temporary dead-end road. The performance solution for non-compliance with through roads (assessment items 3 and 4) addresses the performance criteria.
8	Non-perimeter roads	Road 03, 05-11 and 14-16	As above.	Parking provided outside of the carriageway width;	Road designs range between:

Item #	Access Type	Description	Performance Criteria	Acceptable Solution	Comments
					• 8 m carriageway kerb to kerb (2 x 4 m lanes) and parking within carriageway width to one side; • 9 m carriageway kerb to kerb (2 x 4.5 m lanes) and parking within carriageway width to one side. The PBP performance criteria is achieved based on: • An allowance for 2.5 m parking (exceeds minimum standard vehicle size) provides a minimum 5.5 m clear carriageway which meets the PBP acceptable solution.

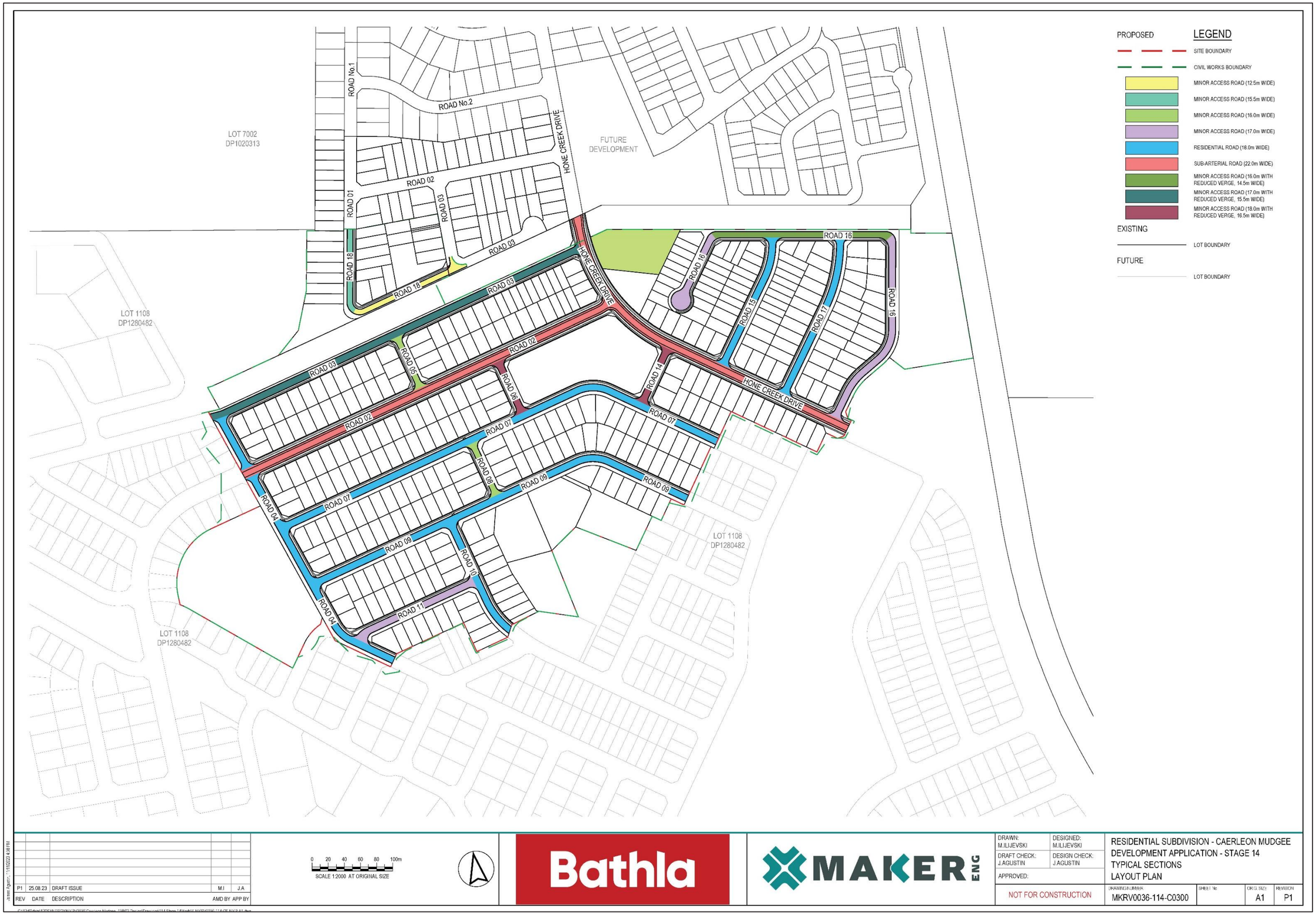

Figure 4: Subdivision Access

3.5 Water Supplies

The compliance assessment of the proposed water supply with Section 5.3.3 of PBP is documented in Table 8.

Table 8: Assessment of requirements for the supply of water services (adapted from Table 5.3c of PBP)

Performance Criteria	Acceptable Solution	Compliance Notes
Adequate water supplies is provided for firefighting purposes.	Reticulated water is to be provided to the development where available; A static water supply and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and Static water supplies shall comply with Table 5.3d of PBP.	**Complies** Proposal to be serviced by a reticulated water supply
Water supplies are located at regular intervals; and 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 2419.1:2021 (SA 2021); Hydrants are not located within any road carriageway; and Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	**To comply** The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and Table 5.3c and Table 5.3d of PBP.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2021 (SA 2021).	
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.	**To comply** **Not applicable**

3.6 Electricity Services

The compliance assessment of the proposed supply of electricity services with Section 5.3.4 of PBP is documented in Table 9.

Table 9: Assessment of requirements for the supply of electricity services (adapted from Table 5.3c of PBP)

Performance Criteria	Acceptable Solution	Compliance Notes
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 (30 m), 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 Guide for the Management of Vegetation in the Vicinity of Electricity Assets (ISSC3 2016).	**Complies** Electricity services to the subject site are located underground

3.7 Gas Services

The compliance assessment of the proposed supply of gas services (reticulated or bottle gas) with Section 5.3.4 of PBP is documented in Table 10.

Table 10: Assessment of requirements for the supply of gas services (adapted from Table 5.3c of PBP)

Performance Criteria	Acceptable Solution	Compliance Notes
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 – The Storage and handling of LP gas, the requirements of relevant authorities, and metal piping is used; • All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 m and shielded on the hazard side; • Connections to and from gas cylinders are metal; • Polymer-sheathed flexible gas supply lines are not used; and • Above-ground gas service pipes are metal, including and up to any outlets.	**To comply (if installed)** The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and Table 5.3c of PBP.

3.8 Staged Development

The proposed development forms part of a well-established multi-staged development known as 'Caerleon Estate' (as shown in Appendix B).

The proposed development (Stage 14) will be constructed in a staged manner as shown in Figure 5 and it is the responsibility of the proponent to implement the identified bushfire protection measures to each stage as identified in this assessment. Implementation of these measures may be temporary in nature (i.e. APZ, fire trails, turning areas) until future stages are developed.

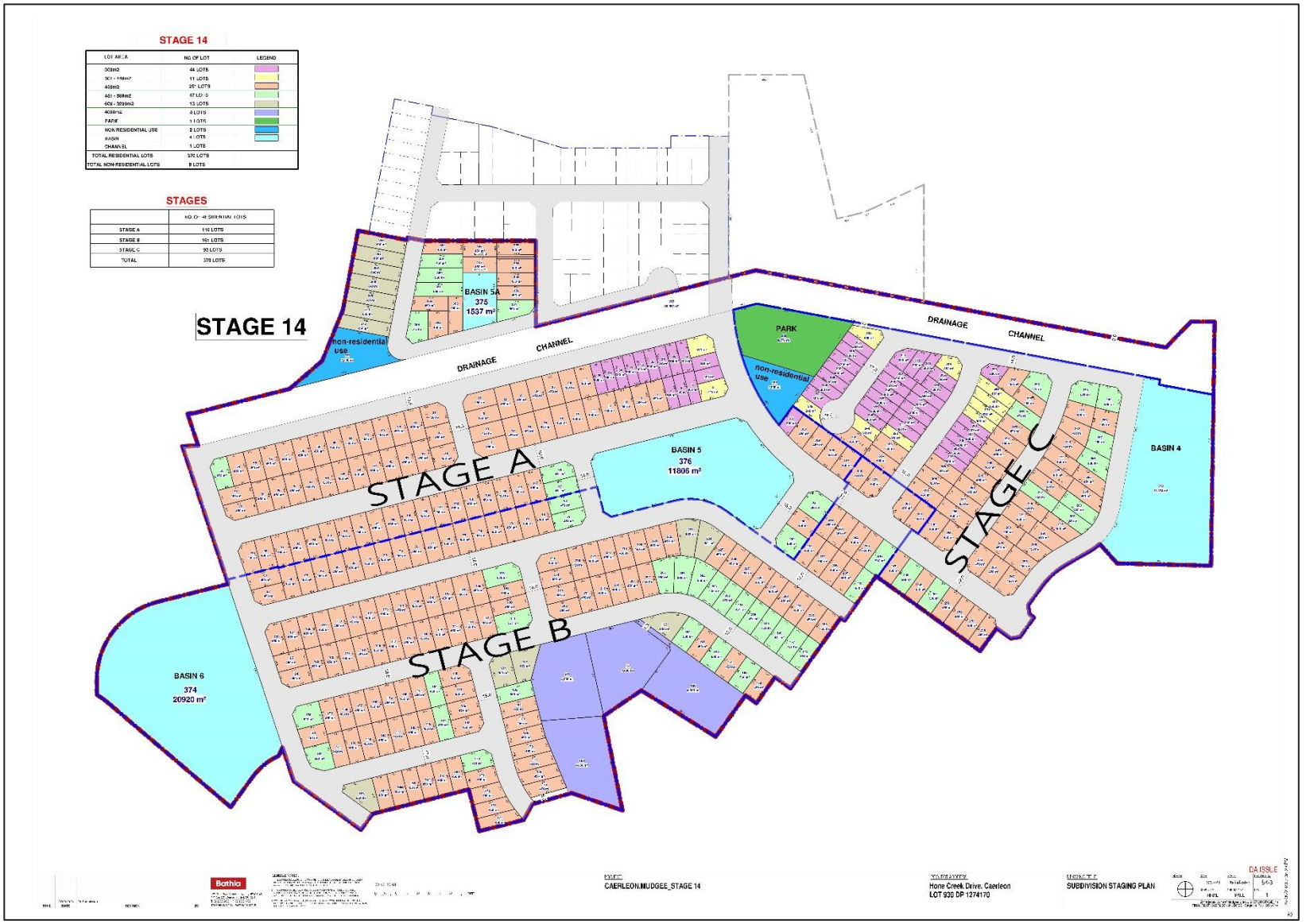

Figure 5: Subdivision Staging

4. Conclusion

The proposed subdivision has been assessed against the specifications and requirements of 'Planning for Bush Fire Protection 2019' and 'Planning for Bush Fire Protection Addendum November 2022', as outlined in Table 11.

Table 11: Development Bushfire protection measures and associated recommendations

Bushfire Protection Measures	Recommendations	Acceptable Solution	Performance Solution	Report Section
Asset Protection Zones	APZ dimensions are detailed in Table 3 and shown in Figure 2. Identified 10 m APZ to north-west to be maintained in perpetuity to the specifications detailed in Appendix C. A 50 m temporary APZ to the west and south is to implemented within future stages of 'Caerleon Estate' which will be developed by Bathla (the proponent) until bulk earthworks occur. This shall be registered under an 88b instrument.	☑	☑	3.1
Landscaping	Any future landscaping meets the requirements of PBP listed in Appendix C.	☑	☐	3.2
Construction standard	BAL for dwellings to be determined at individual CDC/DA stage however, a maximum of BAL-29 is achievable. It is recommended BALs for Lots 337-344 be conditioned and documented in any legal mechanisms (i.e. 88b instrument) to ensure a BAL consistent with the approved APZ is provided.	☑	☑	3.3
Access	Access to meet the civil drawings prepared by Maker Eng (Figure 4), Reference MKRV0036-114-DA Revision 1 dated 5 September 2023. Performance solutions detailed in Table 7 addresses the requirement for general access, perimeter and non-perimeter roads.	☑	☑	3.4
Water supply	Reticulated water supply to meet PBP specifications for a subdivision.	☑	☐	3.5
Electricity service	Electricity supply located underground.	☑	☐	3.6
Gas service	Gas services (if installed) are to be installed and maintained in accordance with AS/NZS 1596:2014.	☑	☐	3.7

5. Recommendations

It is recommended that the subdivision be issued a Bush Fire Safety Authority based on the findings in Table 11

Natalie South
Bushfire Consultant
FPAA BPAD Certified Practitioner No. BPAD41212-L2

Nathan Kearnes
Principal Bushfire Consultant
FPAA BPAD Certified Practitioner No. BPAD23575-L3

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Appendix A – Bushfire Attack Assessor Model

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 11/09/2023 **Assessment Date:** 11/09/2023

Site Street Address: Caerleon Estate Stage 14, Mudgee

Assessor: Bruce Horkings; Eco Logical Australia (ELA)

Local Government Area: Mid-western Regional **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: T1 and 3

Vegetation Information

Vegetation Type:	Grassy and Semi-Arid Woodland (including Mallee)		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	1 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	10.5	**Overall Fuel Load(t/ha):**	20.2
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	0 Degrees	**Site Slope Type:**	Level
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	10

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Level of Construction:	BAL 29	**Peak Elevation of Receiver(m):**	3.87
Radiant Heat(kW/m2):	28.21	**Flame Angle (degrees):**	65
Flame Length(m):	8.54	**Maximum View Factor:**	0.426
Rate Of Spread (km/h):	0.94	**Inner Protection Area(m):**	10
Transmissivity:	0.871	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	9819		

BAL Thresholds

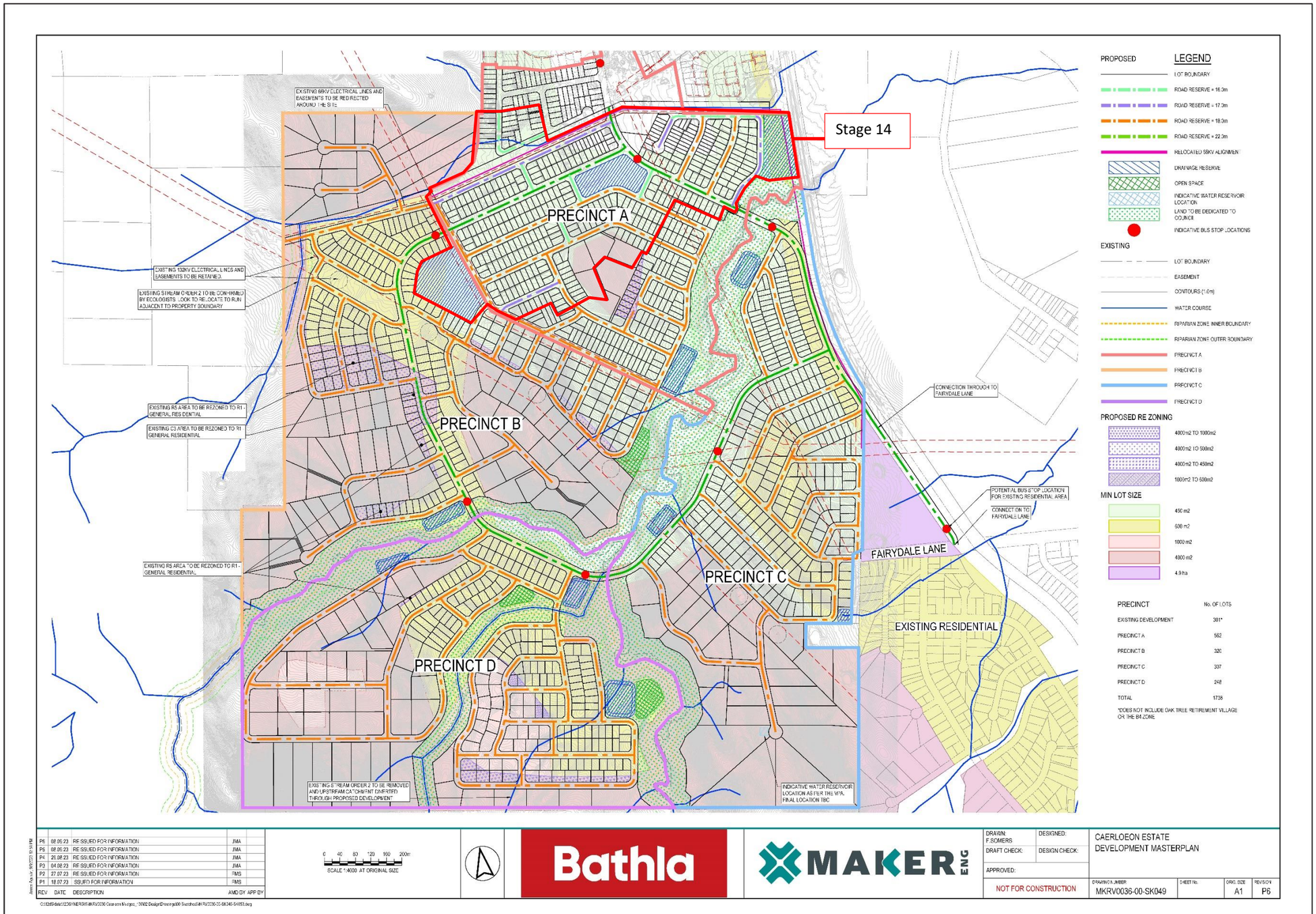
	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	7	10	15	21	36	6

Run Description:	T2		
Vegetation Information			
Vegetation Type:	Grassy and Semi-Arid Woodland (including Mallee)		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	8 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	10.5	**Overall Fuel Load(t/ha):**	20.2
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	0 Degrees	**Site Slope Type:**	Level
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	10
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80
Program Outputs			
Level of Construction:	BAL 29	**Peak Elevation of Receiver(m):**	2.95
Radiant Heat(kW/m2):	20.38	**Flame Angle (degrees):**	72
Flame Length(m):	6.2	**Maximum View Factor:**	0.309
Rate Of Spread (km/h):	0.58	**Inner Protection Area(m):**	10
Transmissivity:	0.868	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	6057		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	4	5	10	15	27	6

Appendix B – Caerleon Estate Masterplan



Appendix C - Asset Protection Zone and Landscaping Standards

The following APZ management specifications apply to the APZs specified in Table 3 and shown in Figure 2. The identified APZs are to be maintained in perpetuity and management undertaken on an annual basis (as a minimum) and prior to the commencement of the bushfire season.

These APZ management specifications should be considered for any future landscaping and maintenance.

Further details on APZ implementation and management can be found on the NSW RFS website (https://www.rfs.nsw.gov.au/resources/publications).

Table 12: APZ management specifications

Vegetation Strata	Inner Protection Area (IPA)
Trees	• Tree canopy cover should be less than 15% at maturity; • Trees (at maturity) should not touch or overhang the building; • Lower limbs should be removed up to a height of 2 m above ground; • Canopies should be separated by 2 to 5 m; and • Preference should be given to smooth barked and evergreen trees.
Shrubs	• Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided; • Shrubs should not be located under trees; • Shrubs should not form more than 10% ground cover; and • Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
Grass	• Should be kept mown (as a guide grass should be kept to no more than 100 mm in height); and • Leaves and vegetation debris should be removed.

Appendix D - Access Standards

Table 13: General access requirements (adapted from Table 5.3b of PBP)

Performance Criteria	Acceptable Solutions	Compliance notes
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;	**Not applicable** No property access roads proposed, all roads are public.
	Perimeter roads are provided for residential subdivisions of three or more allotments;	**Satisfies performance criteria** Performance solution detailed in Table 7.
	Subdivisions of three or more allotments have more than one access in and out of the development;	**Satisfies performance criteria** Performance solution detailed in Table 7.
	Traffic management devices are constructed to not prohibit access by emergency services vehicles;	**To comply** Detail not provided at this stage.
	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;	**To comply** Detail not provided at this stage.
	All roads are through roads;	**Satisfies performance criteria** Performance solution detailed in Table 7.
	Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	**Satisfies performance criteria** Performance solution detailed in Table 7.
	Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	**Complies** All roads in the subdivision provide roll top kerbing.
	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;	**Not applicable** Proposed roads do not pass through forest, woodland or heath.
	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** No one-way roads proposed.

Performance Criteria	Acceptable Solutions	Compliance notes
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.	**Satisfies performance criteria** Performance solution detailed in Table 7.
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;	**To comply**
	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2021 – Fire hydrant installations system design, installation and commissioning; and	**To comply**
	There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	**Not applicable**

Table 14: Perimeter road requirements (adapted from Table 5.3b of PBP)

Performance Criteria	Acceptable Solutions	Compliance Notes
The intent may be achieved where:		
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;	**Complies** All roads will be two-way and sealed.
	Minimum 8m carriageway width kerb to kerb;	**Complies** Roads 03 (western portion), 04 and 16 provide 9 m carriageways (2 x 4.5 m lanes).
	Parking provided outside of the carriageway width;	**Satisfies performance criteria** Performance solution detailed in Table 7.
	Hydrants are located clear of parking areas;	**To comply** Detail not provided at this stage.
	There are through roads, and these are linked to the internal road system at an internal of no greater than 500m;	**Satisfies performance criteria** Performance solution detailed in Table 7.
	Curves of roads have a minimum inner radius of 6m;	**To comply** The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and Table 5.3b of PBP.
	The maximum grade road is 15 degrees and average grade is 10 degrees;	
	The road crossfall does not exceed 3 degrees;	
	A minimum vertical cleared of 4m to any overhanging obstructions, including tree branches, is provided.	

Table 15: Non-perimeter road requirements (adapted from Table 5.3b of PBP)

Performance Criteria	Acceptable Solutions	Compliance notes
The intent may be achieved where:		
Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	Minimum 5.5m width kerb to kerb;	**Complies** Non-perimeter roads are a minimum 7 m kerb to kerb.
	Parking is provided outside of the carriageway width;	Hone Creek Road and Road 02 **Complies** 7 m carriageway (2 x 3.5 m lanes) and 2.5 m parking outside of carriageway. Road 18 **Complies** 7 m carriageway (2 x 3.5 m lanes) and 7.5 m (2 x 3.75 m lanes) carriageway. Parking is prohibited on both sides of the road. Roads 03, 05-11, 14-17 **Satisfies performance criteria** Performance solution detailed in Table 7.
	Hydrants are located clear of parking areas;	**To comply** Detail not provided at this stage.
	Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	**Satisfies performance criteria** Performance solution detailed in Table 7.
	Curves of roads have a minimum inner radius of 6m	**To comply** The advice of a relevant authority or suitably qualified professional should be sought, for certification of design and installation in accordance with relevant legislation, Australian Standards and Table 5.3b of PBP.
	The road crossfall does not exceed 3 degrees;	
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	

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