Bushfire Protection Assessment

Subdivision

Lot 184 DP 1237400 Gurner Avenue, Austral (DA1)

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DOCUMENT TRACKING

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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 Landcom.

Template 2.8.1

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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
EP&A Act	*Environmental Planning and Assessment Act 1979*
FDI	Fire Danger Index
IPA	Inner Protection Area
NASH	National Association of Steel-framed Housing
NCC	National Construction Code
PBP	Planning for Bush fire Protection 2019
RFS	NSW Rural Fire Service

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:	Gurner Avenue, Austral (DA1)
Postcode:	2179
Lot/DP no:	Lot 184 DP 1237400 (DA1)
Local Government Area:	Liverpool City Council
Fire Danger Index (FDI)	100
Current land zoning:	R2 Low Density Residential, RU6 Transition, SP2 Local Drainage
Type of development proposed:	Residential subdivision

1.1 Description of Proposal

The proposal is for subdivision of part of 1 lot into 218 lots (Figure 1).

This proposal forms the first Development Application (DA1) of a three-stage subdivision and this stage will be constructed in two sub-stages (Figure 4):

- Stage 1: Creation of 60 residential lots, 8 superlots, 1 residue lot (Lot 72) and associated roads and infrastructure;
- Stage 2: Subdivision of residue Lot 72 to create 70 residential lots, 2 superlots, 2 residue lots (Lot 245 and 275) and associated roads and infrastructure.

The subdivision is located on land identified as bush fire prone land (BFPL) on the Bushfire Prone Land layer 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 44 of the *Rural Fires Regulation 2013* and *Planning for Bush fire Protection* (RFS 2019), herein referred to as PBP.

This assessment is based on the following information sources:

- Background documentation provided by Landcom;
- Site inspections and preliminary bushfire / ecological assessments undertaken by Eco Logical Australia (ELA);
- Information contained within the site plan from Landcom (Sketch No. SK_0085 Rev D 18 October 2021); and
- GIS analysis including online spatial resources (i.e. Google Earth, SIX Maps, Nearmap and the NSW Government Planning Portal).

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

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

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

The subject land is situated within the Sydney Growth Centres biodiversity certified areas. In August 2017, the *Biodiversity Conservation Act 2016* (BC Act) was gazetted and repealed the *Threatened Species Conservation Act 1995* (TSC Act), however under section 43 of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*, the repeal of the TSC Act does not affect the operation of part 7 or 8 of Schedule 7 to that Act. The effect is that the Biodiversity Certification of the Growth Centres continues to have effect under the new legislation. Biodiversity certification removes the need to conduct impact assessment on certified land for threatened species population and communities listed under the BC Act.

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. Liverpool City 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. Liverpool City Council is the determining authority for this development; they will assess more thoroughly any potential Aboriginal cultural heritage issues.

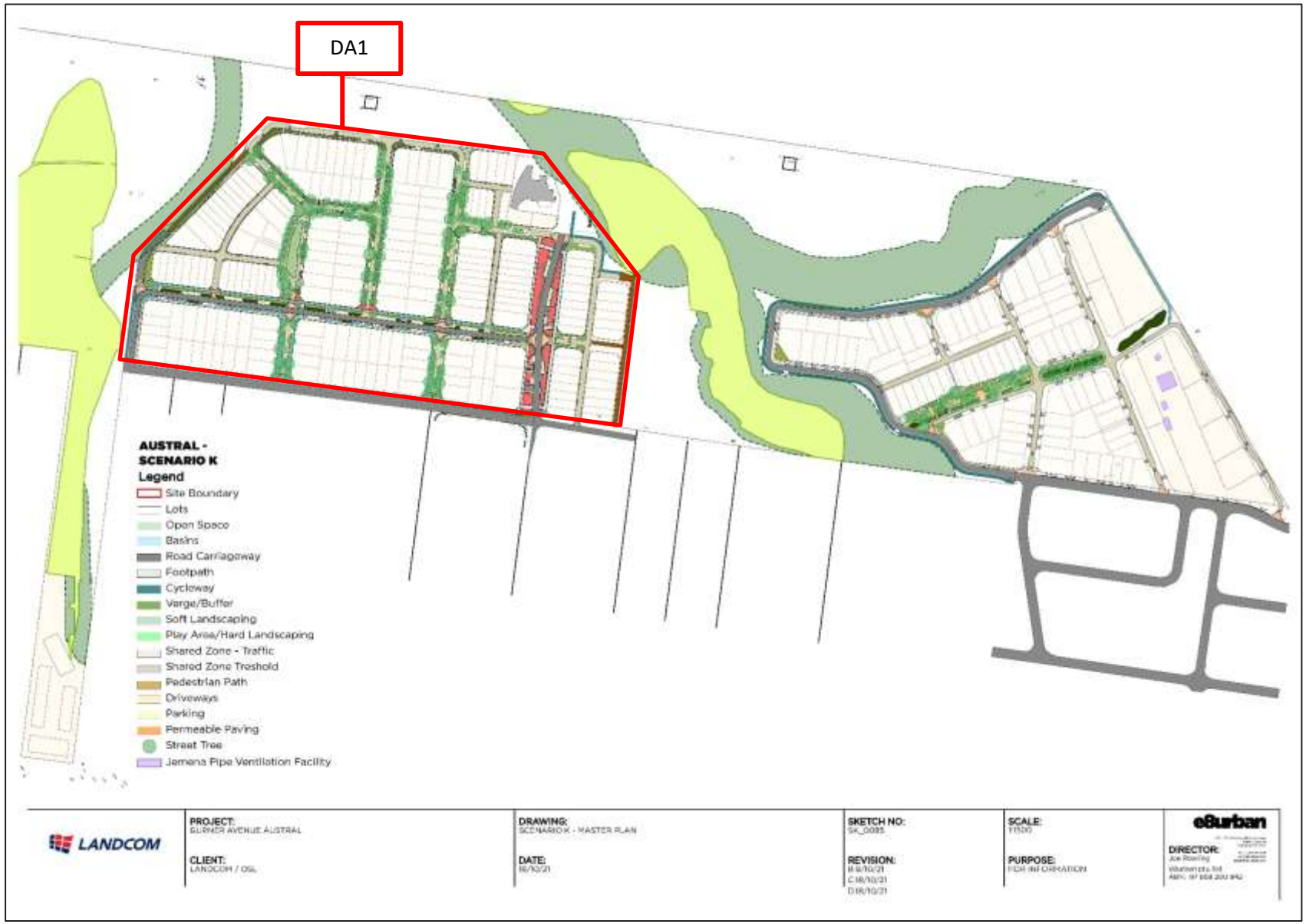

Figure 1: Subdivision Layout

2. Bushfire Hazard Assessment

2.1 Process

The site assessment methodology from Appendix 1 of PBP has been applied in this assessment to determine the required APZ requirements.

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 ELA validated vegetation mapping.

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

As shown in Figure 2, there is bushfire prone vegetation internal and external to the proposed development.

The bushfire hazard to the north, east and west is located within riparian corridors which extend in a north-south direction along the western urban interface and a north-west/south-east direction along the eastern urban interface and northern development boundary. The vegetation within the riparian corridors is identified as 'Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion' which falls within the 'Coastal Floodplain Wetlands' vegetation class (Keith 2004) and classified as 'forested wetland' in accordance with PBP. The effective slope under this bushfire hazard falls within the PBP slope category of '>0-5 degrees downslope'.

There is a patch of woodland vegetation less than 1 ha in area adjacent the southern boundary of the proposed development. This vegetation is greater than 100 m from any Category 1 or 2 vegetation and has been excluded under Section A1.10(1) of PBP. The predominant vegetation in this area consists of unmanaged grassland which is classified as 'grassland' in accordance with PBP, although it is considered temporary in nature and will be removed once development occurs in the future. The effective slope under this bushfire hazard falls within the PBP slope category of 'all upslopes and flat land'.

The transmission line easement within the north of the proposed development will be managed by the governing authority and is therefore not considered a bushfire hazard.

The drainage basins adjoining the eastern boundary and the temporary drainage basin within residue Lot 245 will be designed and managed to Inner Protection Area (IPA) standards in accordance with Appendix 4 of PBP.

Table 3: Bushfire hazard assessment, APZ requirements and BALs

Transect #	Slope	Vegetation Formation	Required APZ	Proposed APZ	Comments
1 (north)	>0° to 5° downslope	Forested Wetland	12 m	≥12 m	APZ provided wholly within development site.
2 (east)	>0° to 5° downslope	Forested Wetland	12 m	≥12 m	As above.
3 (south)	All upslope and flat land	Grassland	10 m	≥10 m	Temporary APZ provided wholly within development site.
4 (west)	>0° to 5° downslope	Forested Wetland	12 m	≥12 m	APZ provided wholly within development site.
All other directions			Managed land		

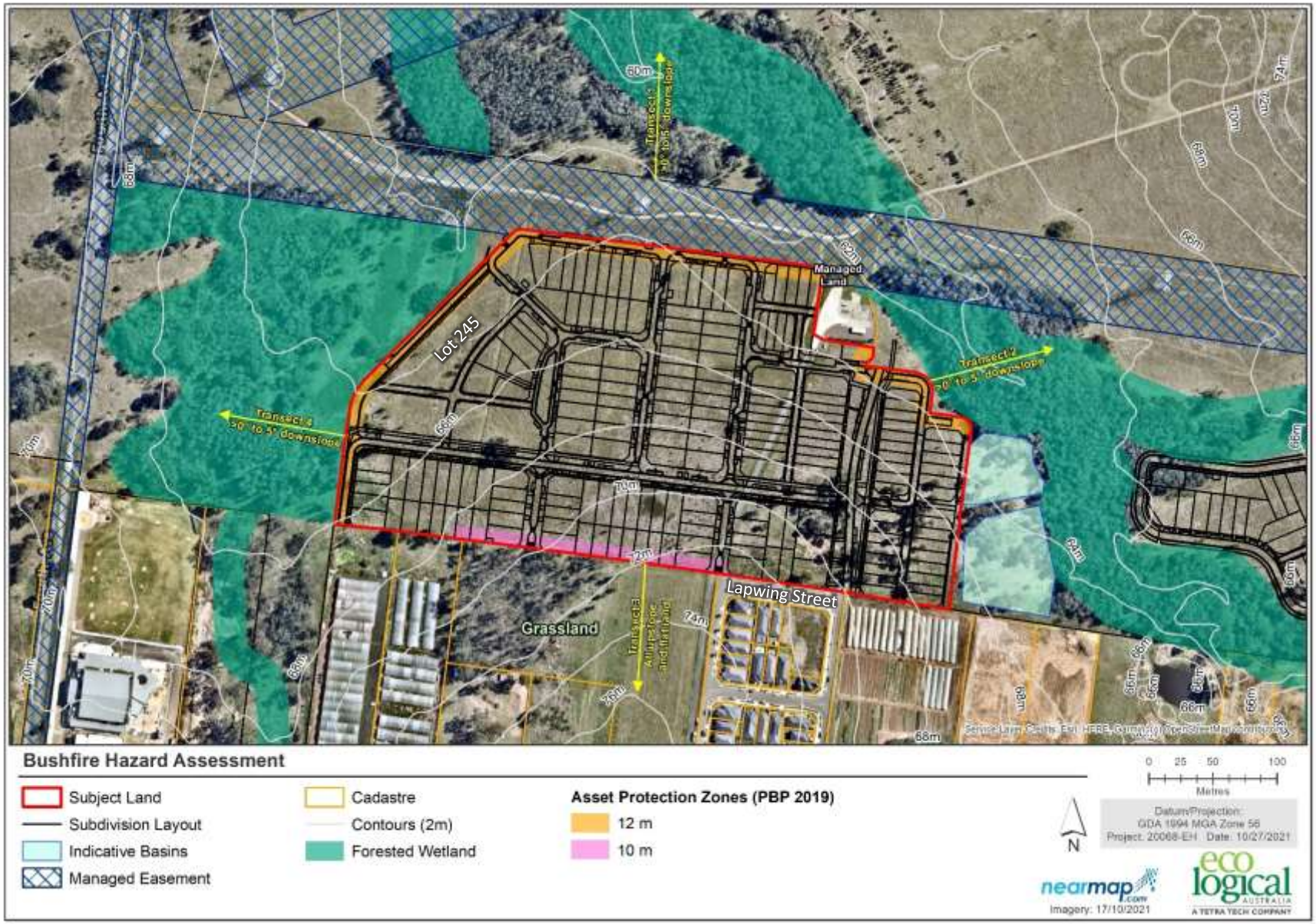

Figure 2: Bushfire Hazard Assessment

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.

There are some lots within the south of the development that are largely impacted by the temporary APZ associated with the grassland hazard. These lots will temporarily be undevelopable until development occurs in adjoining land removing the bushfire hazard and extinguishing the APZ.

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** APZ provided in accordance with Table A1.12.2 as shown in Table 3 and Figure 2.
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 A.
The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	**Complies** APZ located wholly within development site.
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 Fencing is constructed in accordance with Section 7.6 of PBP.	**To comply** Landscaping within all residential lots to comply with Appendix 4 of PBP. Streetscaping and open space areas to adhere to design principles and guidance from current RFS guidelines (*Standards for Asset Protection Zones*). **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.

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. 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.

3.3.2 Class 10a Buildings (sheds etc.)

To comply with section 8.3.2 of PBP, future Class 10a structures within 6 m of any proposed dwelling must be constructed in accordance with the NCC. Where the structure is greater than 6 m, no bushfire requirements apply.

3.4 Access

Public road access to the subdivision is via two proposed entry points off Lapwing Avenue.

There are some lots within the south of the development that are reliant on access via roads that will be constructed in the future by other developers as per the DCP (Figure 2). These lots will temporarily be inaccessible until those roads are constructed.

Figure 3 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 B), along with comment on the subdivision design compliance or otherwise.

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.

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	☐	☐	Not applicable – No property access roads proposed.

Table 7: Access performance solution

Access Type	Description	Performance Criteria	Acceptable Solution	Comments
General	Southern boundary Perimeter road by others / temporary bushfire hazard	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 proposed lots and the temporary grassland bushfire hazard to the south as shown in Figure 2 however, the performance criteria is met by: • Safe, all-weather access to structures provided by 5.5 m wide internal non-perimeter road network; and • Temporary turning heads compliant with 'Type B' of Figure A3.3 of PBP are provided. Furthermore; • The bushfire hazard is small and isolated from the broader bushfire hazards in the area; • Is temporary in nature and will be removed once development occurs to the south as part of the DCP; and • Most of the lots along this boundary are either largely impacted by APZ or inaccessible until future roads are developed therefore will not be developed until hazard is removed.
General	Road E, Street C1, D, G and K	Firefighting vehicles are provided with safe, all-weather access to structures	All roads are through roads; 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;	Street K is an 'emergency access only' road with two (2) dead ends and accessed in the middle via Street C1 and there are five (5) temporary dead-end roads proposed. All are less than 200 m in length and provide 12 m outer radius turning areas. The temporary dead ends will become 'through roads' once further development occurs as part of the DCP.
General	C3	Firefighting vehicles are provided with safe, all-weather access to structures	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.	Street C3 is designed as two one-way lanes separated by a landscaped verge, the lanes connect with each other in the north and south (Figure 3). The western lane travels in a northerly direction and provides a 3.5 m wide shared carriageway which is 'no parking' and complies with acceptable solutions.

Access Type	Description	Performance Criteria	Acceptable Solution	Comments
				The eastern lane travels in a southerly direction and provides a 3.4 m wide shared carriageway with designated parking outside of the carriageway. The performance criteria is met by: • Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; • The 100 mm less width than PBP acceptable solution does not compromise firefighting vehicle safety.; and • The separation distance between this lane and the closest north-west hazard is 90 m and an unlikely pathway for emergency services to reach the interface given there are more direct routes available.
Perimeter Roads	Road E, Street D and C2	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; and Minimum 8m carriageway width kerb to kerb;	Roads considered perimeter roads are Road E, Streets C2 and D (Figure 3), these roads do not fully meet the acceptable solution. **Street K** These perimeter roads are 'emergency access only' and provide a 4 m wide paved carriageway. The western road is approximately 100 m long and connects with the internal road network in the north and south. The eastern road is 135 m long, connects with the internal road network at the central point of the road. The road consists of two dead ends and provides turning heads compliant with 'Type B' of Figure A3.3 of PBP. The performance criteria is met by: • Road is not accessible by the public and will only be used by emergency services for operational activities in event of a bushfire. There are no residential driveways accessing these roads with road frontage and access provide via 'Street G'. • Safe access and egress is available for firefighters on the road while occupants evacuate east/southward on other internal roads; • Lot 245 in the north-west is a residue superlot (Figure 3) and will be subject to further subdivision under a separate future DA

Access Type	Description	Performance Criteria	Acceptable Solution	Comments
				along with a detention basin within Lot 275 which will create an increased separation between the hazard interface and the perimeter road providing a safe place for operations. • The detention basins in the south-east will be managed to IPA standards creating an increased separation between the hazard interface and the perimeter road providing a safe place for operations. **Street D** These perimeter roads abut the riparian corridor to the north-east and west (Figure 3) and provide a 5.5 m shared carriageway. The performance criteria is met by: • Access roads are designed to allow safe access/egress for firefighting vehicles while residents evacuate by; o Road will not be used for evacuation as it is a permanent dead end road and does not provide any property access; however, should residents be on the road :- o The 5.5 m carriageway allows safe passing for 2.4 m wide Category 1 firefighting vehicle and residents evacuating simultaneously; o Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; and o Designated parking bays are provided on the 'non-hazard' side of the road ensuring no obstructions during evacuation. • Access roads are designed to allow safe operational environment for emergency service personnel during firefighting and emergency management on the interface; o The 5.5 m carriageway allows safe passing for firefighting vehicles simultaneously based on Category 1 tanker width of 2.4 m; and

Access Type	Description	Performance Criteria	Acceptable Solution	Comments
				○ Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; and ○ Designated parking bays are provided on the 'non-hazard' side of the road ensuring no obstructions operational activities. **<u>Street E</u>** These perimeter roads abut the riparian corridor to the north-east and west (Figure 3) and provide a 5.5 m shared carriageway. The performance criteria is met by: • Access roads are designed to allow safe access/egress for firefighting vehicles while residents evacuate by; ○ The road will only services 4 lots which can quickly evacuate the area with residents likely to have left prior to arrival of emergency services; ○ The future connection to the south will provide further egress options; however, should residents be on the road:- ○ The 5.5 m carriageway allows safe passing for 2.4 m wide Category 1 firefighting vehicle and residents evacuating simultaneously; ○ Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; and ○ Designated parking bays are provided on the 'non-hazard' side of the road ensuring no obstructions during evacuation, <u>'no parking' will be permissible to the 'hazard' side of the road.</u> • Access roads are designed to allow safe operational environment for emergency service personnel during firefighting and emergency management on the interface;

Access Type	Description	Performance Criteria	Acceptable Solution	Comments
				○ The 5.5 m carriageway allows safe passing for firefighting vehicles simultaneously based on Category 1 tanker width of 2.4 m; and ○ Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; and ○ Designated parking bays are provided on the 'non-hazard' side of the road ensuring no obstructions operational activities, 'no parking' will be permissible to the 'hazard' side of the road. **Street C2** The 'perimeter road' only applies to only a small section of this road where it adjoins the bushfire hazard to the north-west as the remainder adjoins the managed transmission line easement (Figure 3). The 'perimeter' section of the road provides a 5.5 m shared carriageway with only 1 pinch point (kerb extension) that reduces the width of carriageway to 3.7 m for 3 m. The performance criteria is met by: • Access roads are designed to allow safe access/egress for firefighting vehicles while residents evacuate by; ○ The road will only service 1 lot, the resident likely to have left prior to arrival of emergency services; ○ Two (2) evacuations routes away from the hazard are available via the internal road network; however, should residents be on the road:- ○ The 5.5 m carriageway allows safe passing for 2.4 m wide Category 1 firefighting vehicle and residents evacuating simultaneously; ○ Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; and

Access Type	Description	Performance Criteria	Acceptable Solution	Comments
				○ Designated parking bays are provided on the 'non-hazard' side of the road ensuring no obstructions during evacuation. • Access roads are designed to allow safe operational environment for emergency service personnel during firefighting and emergency management on the interface; ○ The 5.5 m carriageway allows safe passing for firefighting vehicles simultaneously based on Category 1 tanker width of 2.4 m; and ○ Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; and ○ Designated parking bays are provided on the 'non-hazard' side of the road ensuring no obstructions operational activities.
Non-perimeter roads	Street C1	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	Minimum 5.5m width kerb to kerb;	All non-perimeter road carriageway widths range between 5.5-6.4 m aside from Street C1 however only 6 of these streets are within 100 m of a hazard and are identified in Figure 3: **Street C1** These roads have a shared carriageway of 5.5 m for the most part however there is one pinch point (kerb extension) in each street that reduces the width of carriageway to 3.7 m for 3 m (Figure 3). The performance criteria is met by: • The 5.5 m carriageway allows safe passing for 2.4 m wide Category 1 firefighting vehicle and residents evacuating simultaneously; • Roll top kerbing is provided to both sides of the road enabling easy kerb mounting if additional space is required for passing; • Designated parking bays are provided outside of the carriageway ensuring no obstructions; • Pinch points (kerb extensions and other traffic management devices) are to provide mountable kerbs with no parking either side so not prohibit access by emergency services.

Access Type	Description	Performance Criteria	Acceptable Solution	Comments
Perimeter/Non-perimeter	Road E, Street C2, D, G and K	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; 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;	Street K is an 'emergency access only' road with two (2) dead ends and accessed in the middle via Street C1 and there are five (5) temporary dead-end roads proposed. All connect with the internal road network at intervals no greater than 500 m and provide a 12 m outer radius turning area. The temporary dead ends will become 'through roads' once further development occurs as part of the DCP.

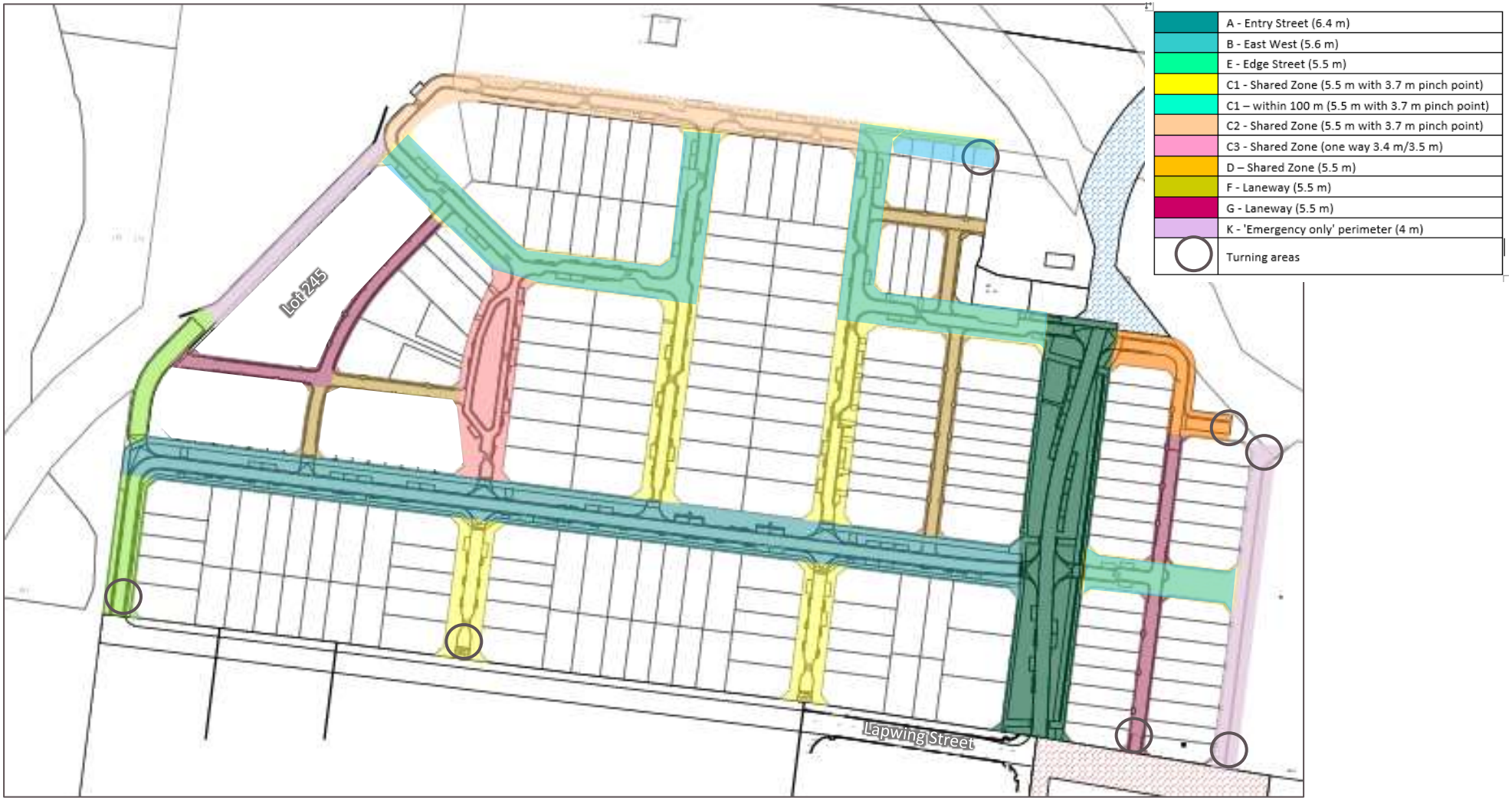

Figure 3: Access within proposed subdivision

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 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 (SA 2005); 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 (SA 2005).	
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.	

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. **Not applicable**

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** 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 will be constructed in two (2) stages as detailed in Section 1.1 and shown in Figure 4 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, perimeter road, turning areas) until future stages are developed.

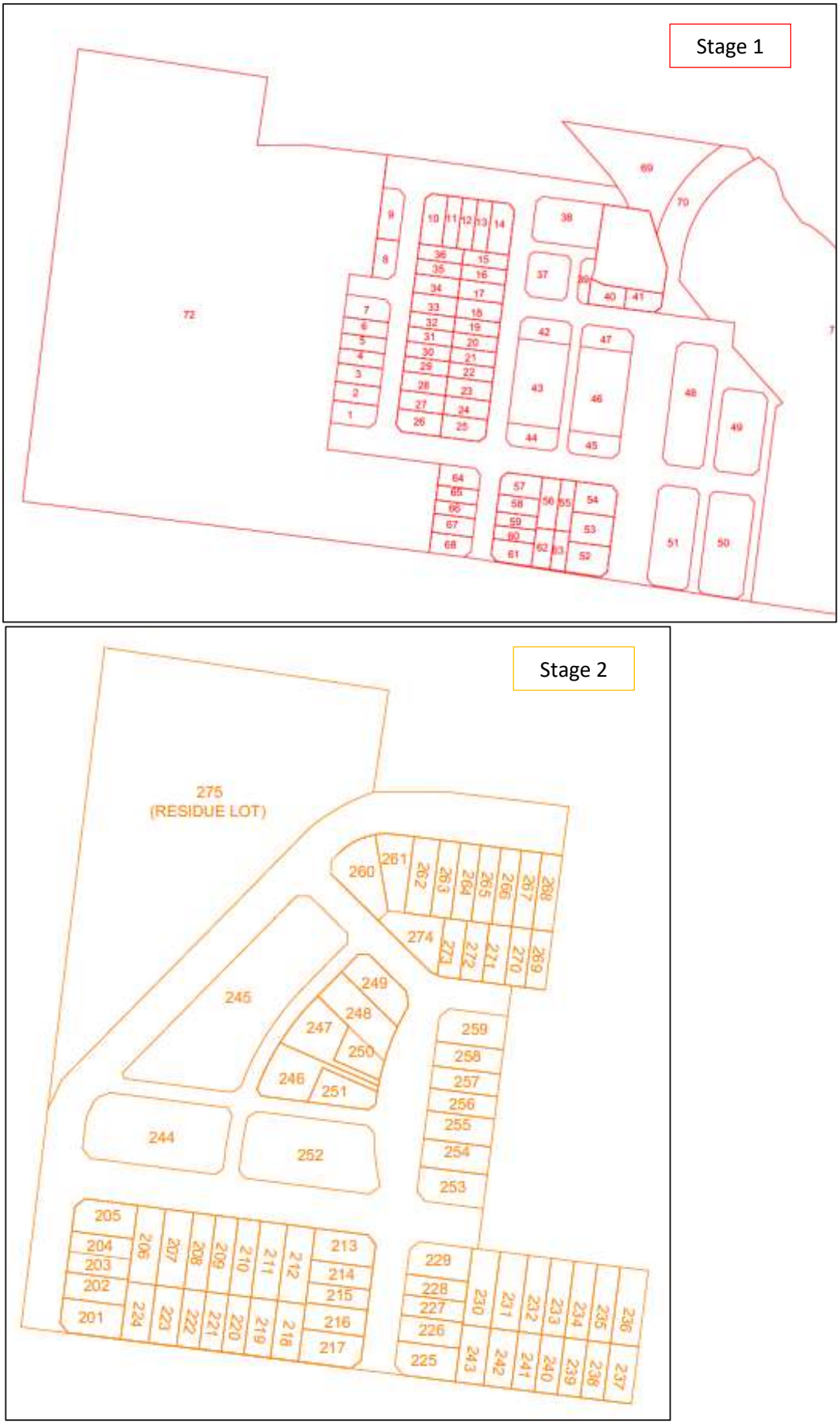

Figure 4: Staged construction

4. Conclusion

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

Table 11: Development Bushfire Protection Solutions and 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 APZ to be maintained in perpetuity to the specifications detailed in Appendix A.	☑	☐	3.1
Landscaping	Landscaping within all residential lots to comply with Appendix 4 of PBP. Streetscaping and open space areas to adhere to design principles and guidance from current RFS guidelines (*Standards for Asset Protection Zones*).	☑	☐	3.2
Construction standard	BAL for dwellings to be determined at individual CDC/DA stage however, a maximum of BAL-29 is achievable.	☑	☐	3.3
Access	Access to meet standards summarised in Table 6. Performance solution(s) detailed in Table 7 addresses the requirement for a perimeter road; perimeter, non-perimeter one way road widths; dead end roads.	☑	☑	3.4
Water supply	Reticulated water supply to meet PBP acceptable solution specifications for a subdivision.	☑	☐	3.5
Electricity service	Electricity supply located underground.	☑	☐	3.6
Gas service	Gas services 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.

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6. References

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Appendix A - 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 B - 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;	**Complies** All roads will be sealed, two-wheel drive.
	Perimeter roads are provided for residential subdivisions of three or more allotments;	**Complies with 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;	**Complies** Two (2) access points off Lapwing Street (Figure 2).
	Traffic management devices are constructed to not prohibit access by emergency services vehicles;	**To comply** Pinch points (kerb extensions and other traffic management devices) are to provide mountable kerbs with no parking either side so not prohibit access by emergency services.
	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** Details not provided at this stage.
	All roads are through roads;	**Complies with 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;	**Complies with 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;	**To comply** Details not provided at this stage.
	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** Access traverses managed land or grassland.
	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.	**Complies with performance criteria** Performance solution detailed in Table 7.

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.	**To comply** Details not provided at this stage.
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** Details not provided at this stage.
	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2017 – Fire hydrant installations system design, installation and commissioning; and	**To comply** Details not provided at this stage.
	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** Reticulated water supply proposed.

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 with performance criteria** Performance solution detailed in Table 7.
	Minimum 8m carriageway width kerb to kerb;	**Complies with performance criteria** Performance solution detailed in Table 7.
	Parking provided outside of the carriageway width;	**Complies** Roads C2, D and E provide dedicated parking bays outside the carriageway width. Perimeter K is designated 'no parking'.
	Hydrants are located clear of parking areas;	**To comply** Detail not yet provided in design.
	There are through roads, and these are linked to the internal road system at an internal of no greater than 500m;	**Complies with 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 with performance criteria** Performance solution detailed in Table 7.
	Parking is provided outside of the carriageway width;	**Complies** Parking is provided in designated parking bays outside of the carriageway width, where designated parking bays are not provided 'no parking' will apply.
	Hydrants are located clear of parking areas;	**To comply** Detail not yet provided.
	Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	**Complies with performance criteria** Performance solution detailed in Table 7.
	Curves of roads have a minimum inner radius of 6m	**To comply**
	The road crossfall does not exceed 3 degrees;	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.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	

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