Bushfire Constraints and Opportunities Assessment for Rezoning at 680 The Northern Road, Oran Park

Greenfields Development Company No. 2 Pty Ltd

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Template 2.8.1

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1. Introduction

1.1 Background

This report was commissioned by Greenfields Development Company No. 2 Pty Ltd to investigate the bushfire protection requirements associated with the potential development of part of 680 The Northern Road, Oran Park, hereafter known as the 'subject land' and shown in **Figure 1**. This report assesses the bushfire constraints and opportunities associated with a proposal to rezone and develop the subject land for a residential subdivision development. The proposed development contains both single residential and medium density residential development.

NB: This Bushfire Constraints and Opportunities Assessment is valid as of the date of issue and is suitable for the purpose for which it was commissioned and is not a bushfire assessment report suitable for submission with a Development Application (DA).

Part of the proposed development is located within Lot 4 DP 1223563 which is mapped as Bush Fire Prone Land (BFPL) under Camden Council's Bush Fire Prone Land Map (**Figure 2**). A Bushfire Protection Assessment is required for future residential subdivision of the land in accordance with the *Environmental Planning and Assessment Act 1979*, Section 100B of *the Rural Fires Act 1997 and Planning for Bush Fire Protection 2019* (RFS 2019), herein referred to as PBP.

A Bush Fire Safety Authority issued by the NSW Rural Fire Service (RFS) will be required for future subdivision.

1.2 Location and description of land

As shown in Figure 1 the subject land consists of four land parcels:

- Lot 50 DP 1232523
- Lots 4, 5 and 6 DP 1223563; and
- Part Lot 11 DP 1229416

The subject land is approximately 41 ha in size and surrounded by grazed pastural lands. The Oran Park Precinct is further to the south (**Figure 1**).

The subject land is zoned as RU1 Primary Production under the Camden Local Environment Plan (CLEP) 2010 (NSW Government 2010).

Figure 1: Location of subject land

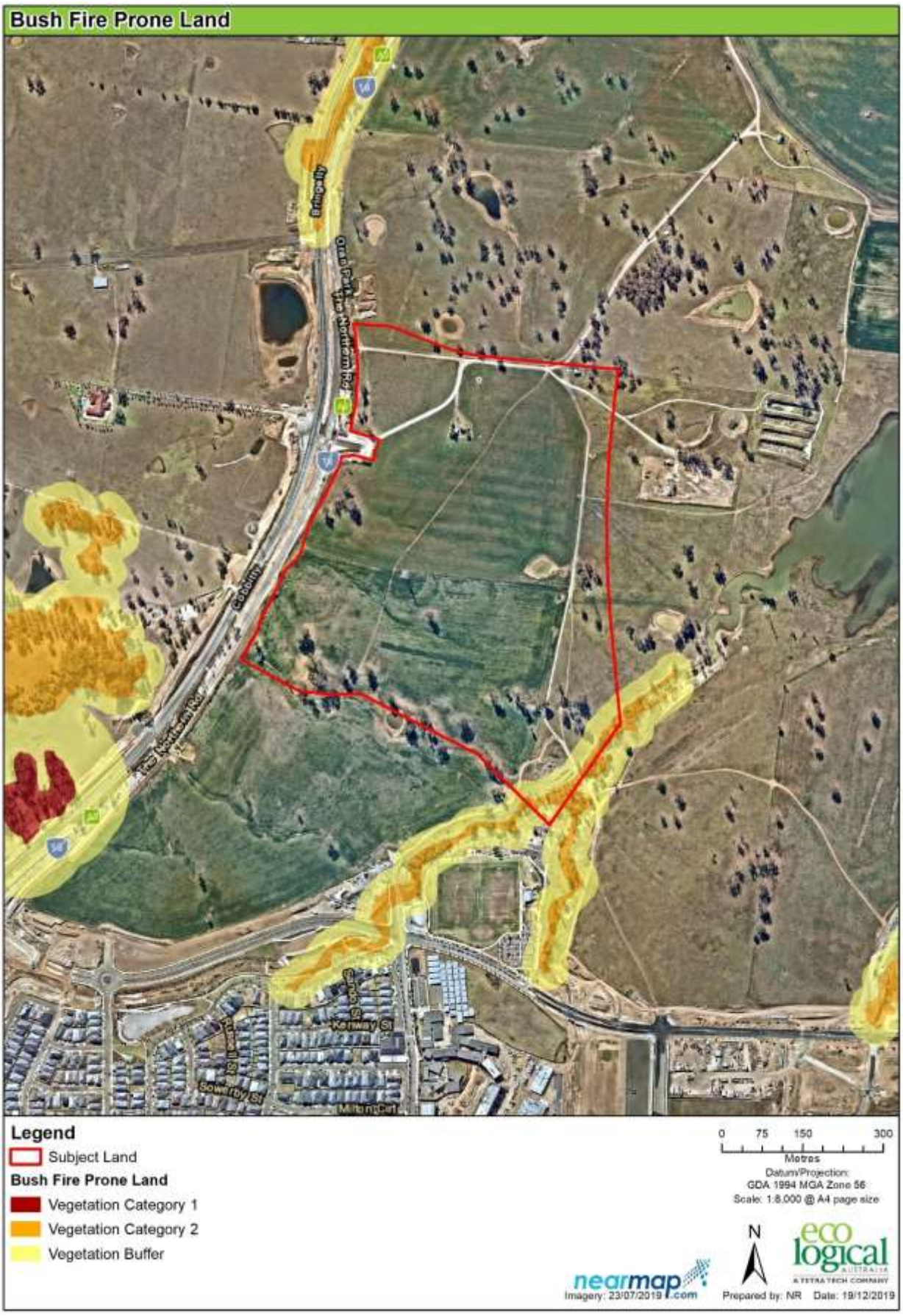


Figure 2: Bush Fire Prone Land Map (BFPL)

2. Methods and approach

This bushfire assessment followed the methods and approach outlined in **Table 1** below.

Table 1: Methods and approach

Step	Tasks	Considerations
Review	A review of relevant reports and plans occurred.	Camden Council Bush Fire Prone Land Map; CLEP data
Desk top analysis	Review and analysis of all available mapping layers in GIS relevant to bushfire hazard.	GIS layers include: satellite imagery, vegetation mapping, topographical data (e.g. contours), biodiversity layer, land zoning and other environmental protection layers.
Assessment	Determine all relevant bush fire protection measures which may constrain development from a bushfire perspective.	Constraints analysis based on Planning for Bush Fire Protection (PBP) methodology and other related RFS policy relating to residential subdivision developments in bush fire prone areas.
Reporting	Preparation of bushfire constraints analysis report.	Summaries the bushfire constraints which would apply to a residential subdivision development on bushfire prone land.

This assessment identifies the minimum and recommended bushfire requirements for residential subdivision development to achieve compliance with PBP.

3. Bushfire threat assessment

An assessment of the bushfire hazard is necessary to determine bushfire protection measures such as Asset Protection Zone (APZ) locations and dimensions. The vegetation communities (bushfire fuels) and the effective slope that combine to create the bushfire hazard are detailed in the following sections.

3.1 Vegetation communities influencing bushfire

The 'predominant vegetation' influencing fire behaviour approaching and within the subject land is assessed in accordance with the methodology specified within PBP.

There are several bushfire hazards within 140 m of the subject land including within the proposed development. The bushfire hazards consist of unmanaged grassland and riparian corridors that will be subject to future revegetation. Plant Community Types within the area (OEH 2013) are a mix of *Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion* and *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*.

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion which falls under the Vegetation Formation of Forested Wetland and the Vegetation Class of Coastal Floodplain Wetlands (Keith 2004). This vegetation is classified as 'forested wetland' under PBP.

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion which falls under the Vegetation Formation of Grassy Woodlands and Vegetation Class of Coastal Valley Grassy Woodlands (Keith 2004). This vegetation is classified as 'grassy woodland' under PBP.

As there is no Vegetation Management Plan (VMP) developed for the revegetation of the riparian corridors and it is not yet clear what vegetation community type the corridors will contain in future state However it is likely revegetation will consist of a mix of the two. The assessment approach used for the corridors is discussed in further detail below.

Riparian corridors

The riparian corridors are adjoining the southern and south-eastern boundary of the subject land as shown in **Figure 3** and will be subject to revegetation as part of this proposal. Although no VMP has been developed for revegetation of these riparian corridors, ELA's ecologist has confirmed vegetation within the southern corridor will likely consist of a 'woodland' formation whilst the south-eastern corridor will likely consist of a 'forest' formation when classified under PBP, these vegetation classifications are in line with the existing Oran Park Precinct. There may be scope for reduction of the 'woodland' classification to a 'low hazard' if the corridor is revegetated to less than 50 m in width, this is discussed further in Section 4.1.

Unmanaged grassland

There are areas of unmanaged grassland to the north and east of the subject land (**Figure 3**) and under PBP this bushfire hazard is classified as 'grassland'. This hazard is temporary in nature and will be removed once development of the land occurs in the future.

Managed areas

As shown in **Figure 3** the proposed development will incorporate various areas of open space/parkland which have been classified as 'managed land'.

The electricity easement running east to west through the centre of the development is intended to be dedicated to Council as open space. This easement is affected by the electricity authority's management policies in tandem with Council's open space management policies which will result in the area consisting of grass/turf, paths and seating/benches, as such is classified as 'managed land'.

As shown in **Figure 3** there is a detention basin/raingarden within the south-eastern corner of the development. The detention basin/raingarden is essentially a planted filter with a design that is heavily reliant on aquatic vegetation management to function properly. The detention basin/raingarden is designed with a planting species, structure, density and associated fuel management regime that will ensure that it complies as an APZ. This area is classified as 'managed land'.

Landscaping and revegetation within the development footprint has the potential to alter the bushfire hazard classification and require additional or reduce APZ based on the design and ongoing management. A bushfire risk review of landscaping and revegetation plans is therefore recommended at an early stage in the preparation of these plans.

Consideration will need to be undertaken for the development staging as at times there may be temporary bushfire hazard retained within the subject land (either grassland, woodland or forest), this is further addressed in Section 5.

3.2 Slopes influencing bushfire

The 'effective slope' that most influences fire behaviour approaching and within the subject land is assessed in accordance with the methodology specified within PBP.

The effective slope under the bushfire hazards in the north, south and east all fall into the PBP slope category '>0-5 degrees downslope'. There is no survey/contour data for the internal riparian corridors therefore the slopes within have been classified conservatively as '0-5 degrees downslope'.

Figure 3 and **Table 3** show the classification and location of the vegetation and slope assessed, with explanatory comments provided where required.

As the site is located within the Local Government Area (LGA) of Camden Council it has a Fire Danger Index (FDI) of 100 under PBP.

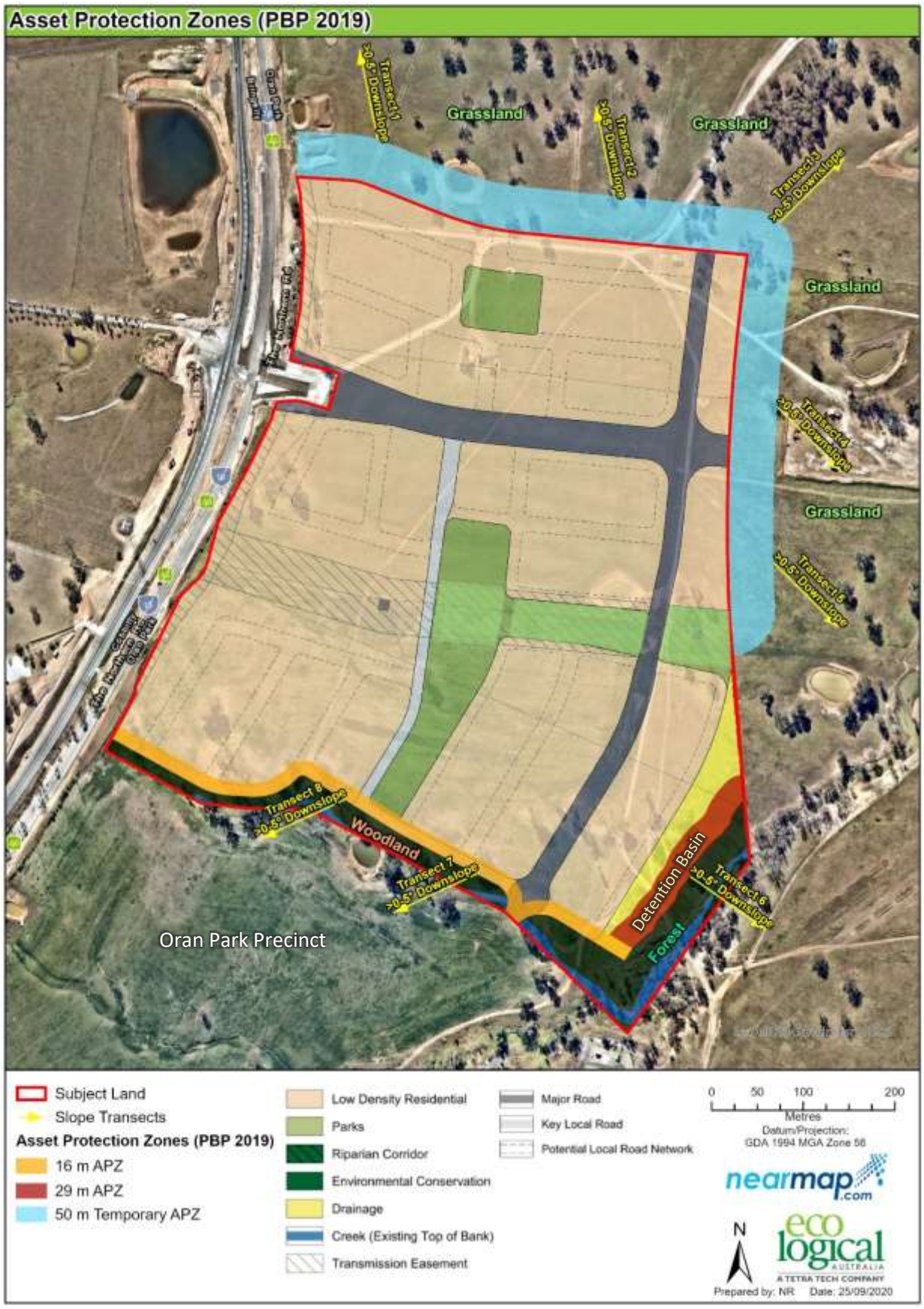


Figure 3: Preliminary Bushfire hazard assessment and Asset Protection Zones (APZ)

4. Bushfire protection measures

PBP requires the assessment of the bushfire protection measures associated with a planning proposal for a residential subdivision development listed in **Table 2**; these are discussed further in the remainder of this Section.

Table 2: PBP bushfire protection measures

Bushfire protection measures	Considerations
APZ	Location and dimension of APZ setbacks from vegetation including prescriptions of vegetation management within the APZ.
Access	Assessment to include access and egress in and out of a developable area such as alternate access, operational response and evacuation options. APZ perimeter access to be considered as is design standards of public roads and any fire trails.
Water supply and other utilities	List requirements for reticulated water supply and hydrant provisions, and any static water supplies for firefighting.
Building construction standards	Provide a guide on the application of construction standards for future buildings.
Landscaping	Principle aim to prevent flame impingement on buildings, provide defendable space for property protection, reduce fire spread, filter embers and reduce wind speed
Emergency Management Planning	Principle aim to provide suitable emergency and evacuation (and relocation) arrangements for occupants of special fire protection purpose developments.
Environmental issues	RFS requires sufficient information to ascertain whether environmental values are a constraint to development. The RFS is not providing an approval in relation to the loss or removal of these environmental assets, that is the role of the relevant consent authority.

4.1 Asset Protection Zones (APZ)

Table A1.12.2 of PBP has been used to determine the width of APZ for the proposed development using the vegetation and slope data identified in **Sections 3**. **Table 3** identifies the results of this constraints assessment which are also shown in **Figure 3**. The identified APZ is compliant with the performance criteria for potential building footprints to not be exposed to radiant heat levels exceeding 29 kW/m^2 as specified under PBP.

There may be scope for a reduction in size of APZ associated with the revegetated riparian corridors if:

a) The extent of revegetation is less than 50 m wide as it may be considered a 'low hazard'.

b) The vegetation is management to IPA standards (Section 4.2), the area may not be considered a hazard and the APZ can be removed.

APZ can be refined in line with the VMP at subdivision stage should either of the cases be relevant.

As shown in **Figure 3** the 50 m temporary APZ associated with the grassland hazard is proposed to be wholly within the adjoining lands. Greenfields Development Company No. 2 Pty Ltd (the client) own the land adjoining the northern and eastern boundaries and will commit to maintaining the temporary APZ in perpetuity or until future development of that land occurs and the hazard is removed.

Table 3: Bushfire hazard assessment and APZ requirements

Direction from development boundary	Transect	Slope	Vegetation	APZ (PBP)	Available APZ	Comment
North	1-2	>0-5 Degree Downslope	Grassland	12 m	50 m	Temporary APZ provided within adjoining lands Refer Section 4.1 and Figure 3.
North-east / East	3-5	>0-5 Degree Downslope	Grassland	12 m	50 m	As above
South-East	6	>0-5 Degree Downslope	Forest	29 m	≥29 m	APZ provided within boundaries of subject land utilising proposed access roads.
South	7-8	>0-5 Degree Downslope	Woodland	16 m	≥16 m	As above.

4.2 APZ maintenance

Landscaping within the APZ specified in **Figure 3** is to achieve the specifications of an Inner Protection Area (IPA) as described in PBP and as outlined below:

Trees

- 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;
- 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.

Any future landscaping within the development will need to consider bushfire implications as it may introduce a bushfire hazard.

4.2.1 Building construction standard (BAL)

Residential subdivisions are required to demonstrate all buildings can achieve a minimum BAL-29 construction. The APZ detailed in Section 4.1 and shown in **Figure 3** demonstrates a maximum BAL-29 construction can be achieved by all lots within the proposed development. However not all lots will be required to be constructed to BAL-29, with lower BALs (19, 12.5 and LOW) able to be achieved as separation distance from the hazard increases. This can be determined once a final footprint of the proposed development is provided.

The temporary 50 m APZ provided within the adjoining lands to the north and east will ensure a reduced construction requirement for lots that would have been impacted by the grassland hazard (i.e. BAL-LOW for lots greater than 50 m from the grassland hazard and 100 m from forest or woodland hazards).

Construction standards are governed by the National Code of Construction (NCC) which calls up Australian Standard (AS) 3959-2018 ‘Construction of buildings in bushfire-prone areas’ (Standards Australia 2018). PBP also applies variations to the construction standards of AS 3959-2018 and must be addressed.

4.2.2 Multi-storey development

PBP states 'buildings exceeding three storeys in height are considered multi-storey buildings'. There are additional considerations associated with multi-storey residential buildings, and the key issues are summarised in **Table 4** (below).

A Bushfire Engineering Brief (BEB) may need to be prepared for any proposed multi-storey components of the development, this should form part of a pre-DA meeting with the RFS to determine the need for a BEB based on PBP table below. It should be noted that presently multi-storey buildings are not proposed on the subject land, nor are they likely.

Table 4: Issues and technical considerations specific to multi-storey residential development (Table 8.2.2)

Issue	Specific Concern	Technical Considerations
Population	Impact on existing community and infrastructure	What capacity does the existing infrastructure have to allow evacuation of existing and proposed residents in the event of a bush fire?
Location of Building	Locating on ridge tops emphasises the risk of convective plume interaction and wind related impacts.	Can the building be located away from ridge tops to areas that have a reduced bush fire exposure? If unavoidable, what is the impact on modelling and risk to the building? Is this risk appropriate for the building and occupant numbers?
Fire Design	Different elements of the flame could have different impacts on different levels of the building; and The whole building could be impacted by ember attack and multiple floors could be alight simultaneously.	What are the flame dimensions, including flame angle? Where is the hottest part of the flame located? How would this impact on the proposed building? How would the warning and suppression systems in the building cope with this?
Egress	Elevations exposed to bush fire risk.	How does the emergency evacuation procedure take account of the location of bush fire prone vegetation?
Building Construction	Performance of the building façade in a bush fire scenario. Balconies may contain external features which could ignite and contribute to building ignition and fuel loads.	What wall and cladding materials are proposed and what is proposed for the openings/penetrations (i.e. windows and doors)? How does the proposed building construction deal with fire spread from the vegetation to the inside of the building? Is compliance with AS 3959 sufficient to ensure that the bush fire risk is mitigated? Is this appropriate for the design fire scenario? Are there balconies proposed? What may be stored on the balconies? Can there be restrictions on what is stored on the balconies due to fire risk?
Car Parking	Lower storey car park could be subject to ember attack and high radiant heat loads.	Is the warning and suppression system designed to take account of bush fire impact? Where are exits located? Are they guiding occupants away from the car park?

Issue	Specific Concern	Technical Considerations
Other Engineering Considerations	Access for firefighters may be restricted or challenging; and Risk implications of floor to floor fire spread.	What would this mean for fire suppression? How would warning and suppression systems take account of this? What would this mean for evacuation?

4.3 Emergency management procedures

Multi-story residential developments must provide suitable emergency management plans addressing emergency evacuation arrangements for occupants. Acceptable solutions for emergency management plans are covered in Table 6.8d of PBP and not considered a constraint to the development, however any future proposal will need to comply with the relevant criteria.

4.4 Access provisions

Residential subdivisions are required to comply with the PBP design requirements in **Table 6** which specifically relate to perimeter roads, internal access roads and access to water supplies, parking etc.

Public road access to the proposed development is The Northern Road to the west (**Figure 1**). Further public road access will be provided once development of the land to the south occurs (Tranche 22 Oran Park, Oran Park Precinct). A DA for Tranche 22 Oran Park is currently before Council and will likely be determined prior to DA submission for subdivision of the subject land.

The development is required to provide two alternate egress routes to a safer place e.g. Oran Park in the south or Bringelly in the north.

The existing concept plan shows the development will temporarily provide only one access/egress onto The Northern Road in the west. However, once development of the land to the south occurs (Tranche 22 Oran Park) which is likely to occur prior to DA submission of subject land (given this is for rezoning purposes only), the subject land road network will link with surrounding public road network providing further egress routes (via via the collector road to the south) therefore dual access/egress provisions can be satisfied at DA stage.

The development is required to provide a perimeter road to any lots directly adjoining a bushfire hazard. The concept plan shows no perimeter road is proposed to the lots within the north of the development and some along the east which is considered a constraint however the development is capable of meeting the required performance criteria of PBP by the provision of a temporary fire trail to the rear of these lots within the adjoining lands owned by Greenfields Development Company Pty Ltd which can be removed once development occurs.

To comply with PBP the temporary dead end roads are to provide a minimum 12 m outer radius turning circle.

The concept layout has been provided for rezoning purposes. Assessment of the proposed road network including road widths, curve radius etc. against the requirements of PBP will be assessed at the DA stage, however the development is capable of complying with the requirements.

4.5 Services – Water, electricity and gas

4.5.1 Water

The proposed development will be serviced by reticulated water.

No specific constraints were identified with regards to meeting water supply requirements.

These services will need to be

- designed and installed according to PBP and fire hydrant spacing, design, sizing and pressure must comply with AS 2419:2017 'Fire hydrant installations – System design, installation and commissioning' (Standards Australia 2017);
- 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.

4.5.2 Electricity and gas

No specific constraints were identified with regards to electricity supply requirements. These services will need to be designed and installed according to PBP.

- Any gas services are to be installed and maintained in accordance with AS/NZS 1596:2014 'The storage and handling of LP Gas' (Standards Australia 2014);
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
- connections to and from gas cylinders are metal;
- if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2 m away from any combustible material, so they do not act as a catalyst to combustion;
- polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used; and
- above-ground gas service pipes external to the building are metal, including and up to any outlets.

5. Staging

The staged development of areas often exposes the edge of each stage to a temporary bushfire risk. Clear information on how these risks are managed will be required e.g. temporary APZ maintained beyond buildings to the extent that the longer-term BAL is achieved for the effected buildings. Similarly, temporary perimeter roads may be required to ensure no building is inadequately protected. Alternate egress routes are also essential for each stage of development.

A Staging Plan will require bushfire assessment as part of the DA bushfire protection assessment.

6. Assessment of environmental issues

A Riparian Assessment report is currently being prepared for the proposed development (19SUT_14565). APZ footprints will not impact any riparian corridor within or adjoining the subject land.

An assessment of significant environmental features, threatened species or Aboriginal relics identified under the *Biodiversity Conservation Act 2016* or the *National Parks Act 1974* that will affect or be affected by the bushfire protection proposals in this report has not been undertaken. However, site impacts have been minimised by carefully selected bushfire protection measures. The impact footprint of these measures e.g. APZ is clearly identified within this report and therefore capable of being clearly assessed by suitably qualified persons as required.

7. Conclusion

This report provides a Bushfire Constraints and Opportunities Assessment of the proposed rezoning and residential subdivision development of the subject land.

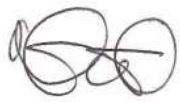
From a bushfire perspective, the development is capable of achieving the required bushfire protection measures under PBP provided such items as suitable road dimensions, perimeter roads, APZ and water supply are included in the design.

8. Recommendations

Table 5 below outlines the bushfire protection measures for the development.

Table 5: Bushfire Protection Measures

Development type	Required APZ under PBP	Construction Standard – Bushfire Attack Level (BAL)	Access
Residential	12-29 metres	BAL-29 or lower	The concept plan provided shows no perimeter road (temporary or permanent) provided for some lots to the northern and eastern boundary. This requires addressing at DA stage with either a compliant perimeter road or a performance solution e.g. perimeter fire trail.



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Appendix A – Assessment process

Vegetation types

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

Effective slope

In accord 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 where the vegetation was found.

Asset Protection Zone determination

Table A1.12.2 (FDI 100) of PBP has been used to determine the width of required Asset Protection Zone (APZ) for the proposed development using the vegetation and slope data identified in **Section 2**.

Appendix B – Access specifications

Table 6: Performance criteria for proposed public roads (PBP)

	Performance Criteria	Acceptable Solutions	Constraint can be satisfied
The intent may be achieved where:			
ACCESS (GENERAL REQUIREMENTS)	• firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation	• property access roads are two-wheel drive, all-weather roads; and	Yes
		• perimeter roads are provided for residential subdivisions of three or more allotments; and	No – refer Section 4.4
		• subdivisions of three or more allotments have more than one access in and out of the development; and	No – refer Section 4.4
		• traffic management devices are constructed to not prohibit access by emergency services vehicles; and	Yes
		• 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; and	Yes
		• 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; and	Yes – see recommendation in Section 3.4.
		• where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; and	Yes
		• 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.	Yes
	• the capacity of access roads is adequate for firefighting vehicles	• the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways	Yes
		• is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.	Yes
	• there is appropriate access to water supply	• hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	Yes

	Performance Criteria	Acceptable Solutions	Constraint can be satisfied
		• hydrants are provided in accordance with AS 2419.1:2017;	Yes
		• there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	Yes
PERIMETER ROADS	• access roads are designed to allow safe access and egress for medium rigid emergency vehicles where residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface	• perimeter roads are two-way sealed roads; and	Yes
		• 8m carriageway width kerb to kerb; and	Yes
		• parking provided outside of the carriageway width; and	Yes
		• hydrants are located clear of parking areas; and	Yes
		• there are through roads, and these are linked to the internal road system at an internal of no greater than 500m; and	Yes
		• curvers of roads have a minimum inner radius of 6m; and	Yes
		• the maximum grade road is 15° and average grade is 10°; and	Yes
		• the road crossfall does not exceed 3°; and	Yes
		• a minimum vertical cleared of 4m to any overhanging obstructions, including tree branches, is provided.	Yes
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; and	Yes
		• parking is provided outside of the carriageway width; and	Yes
		• hydrants are located clear of parking areas; and	Yes
		• roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; and	Yes
		• curves of roads have a minimum inner radius of 6m; and	Yes
		• the road crossfall does not exceed 3°; and	Yes
		• a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Yes

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