

peterson bushfire

expert consulting services

Bushfire Assessment

Residential Subdivision

Stage 1 Orchard Hills North

Legacy Property

17 May 2024

(Ref: 23067)

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FPA AUSTRALIA (NO.BPAD18882)
BPAD LEVEL 3 ACCREDITED PRACTITIONER

ABN 28 607 444 833

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1 Introduction

Street or property name:	Stage 1	
Suburb, town or locality:	Orchard Hills North	Postcode: 2748
Local Government Area:	Penrith City Council	
Type of development:	Residential subdivision	

1.1 Background

This Bushfire Assessment Report prepared by Peterson Bushfire is submitted to Penrith City Council (Council) in support of a Development Application (DA) for the subdivision of land within recently rezoned land known as Orchard Hills North. The Orchard Hills North Structure Plan is shown at Figure 1.

Specifically, this DA relates to Stage 1 of the Orchard Hills North development being delivered by Legacy Property.

The land subject to the DA is identified as 'bush fire prone land', therefore this report presents the assessment and recommendations to ensure compliance with the relevant bushfire protection legislation and policy.

This bushfire assessment has been prepared by a consultant accredited by the Fire Protection Association of Australia's BPAD scheme (Accreditation No. BPD-L3-18882).

1.2 Site location and description

The site is located over four large rural residential lots (Lots 12-14 DP 1344 and Lots 100 and 101 DP 700141), being 114-146 Caddens Road, Orchard Hills. Figure 2 shows the location of the site.

The site is predominantly cleared and consists of grassland. Some sporadic vegetation occurs along Werrington Creek which crosses the south-eastern corner of the site. The adjoining lands to the east, south and west fall within the future stages of the Orchard Hills North development and share the same characteristics as Stage 1. The lands to the north of Caddens Road are developed.

1.3 Description of proposed development

This DA seeks approval for the Stage 1 residential subdivision, including the creation of residential lots, public roads and residue lots.

A plan of proposed subdivision is included at Figure 3.

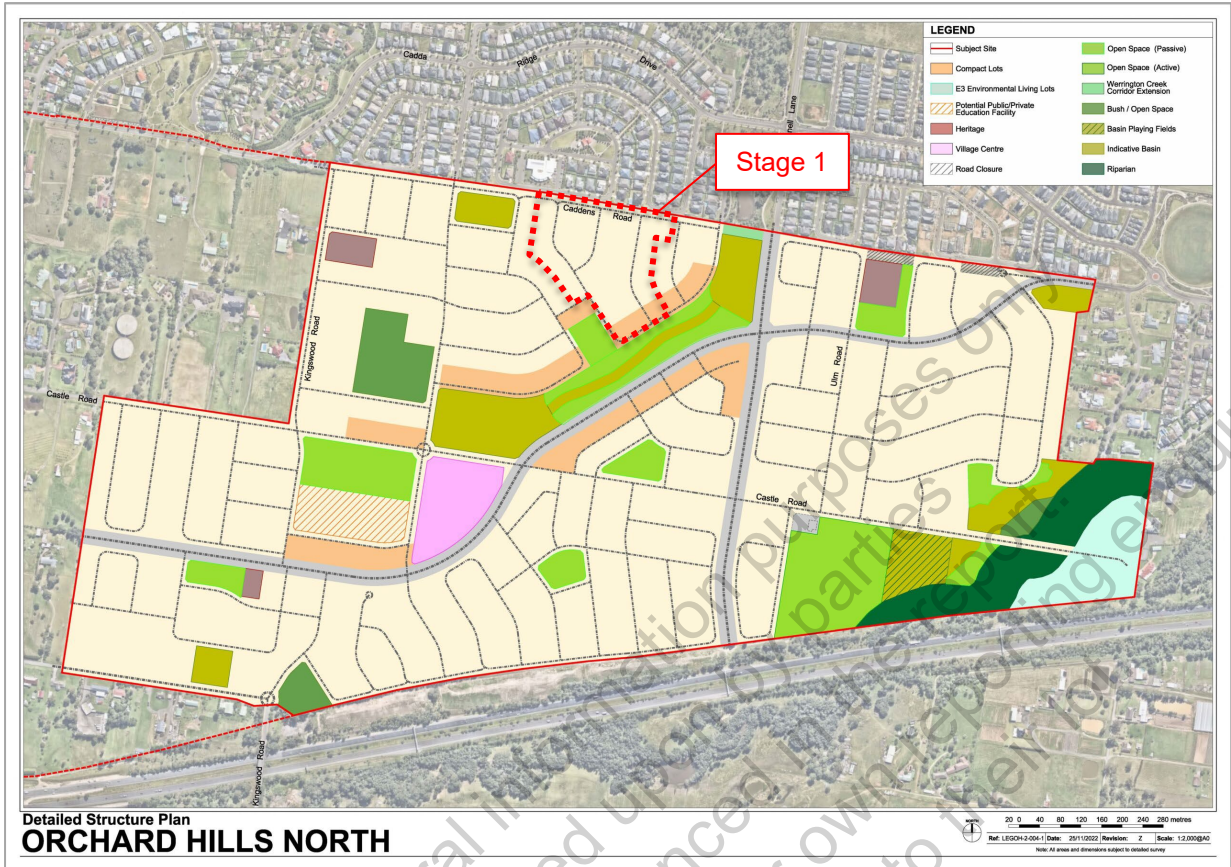
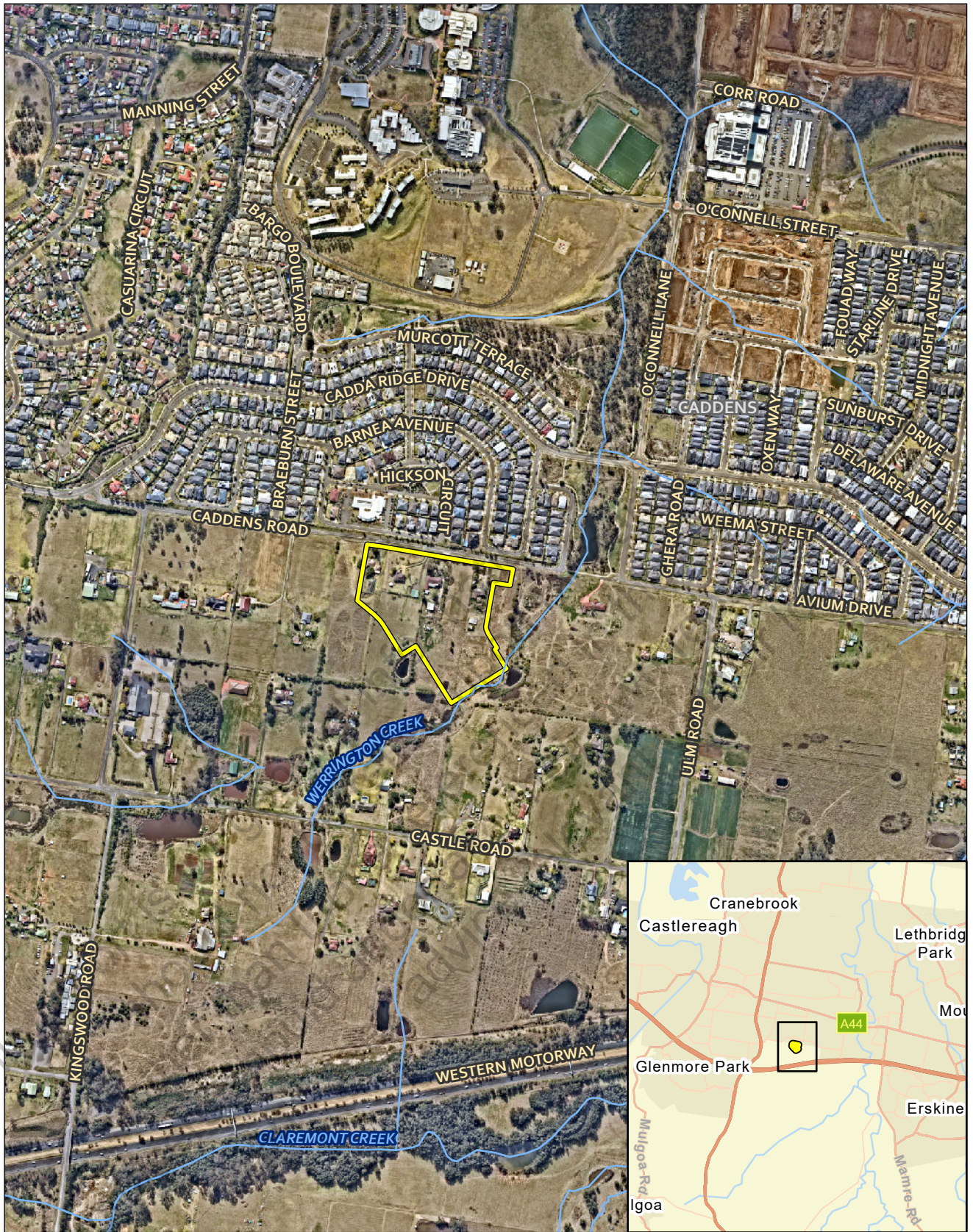




Figure 1: Orchard Hills North Structure Plan showing location of Stage 1



Legend

-  Watercourse
-  Stage 1



 **DKGIS**
Date: 24/10/2023

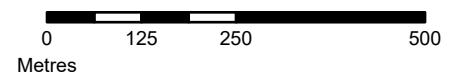




Figure 2: Location of the Subject Land

Coordinate System: GDA 1994 MGA Zone 56
Imagery: © Nearmap



Legend

-  Watercourse
-  Stage 1



Date: 17/05/2024

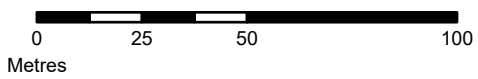


Figure 2: The Proposal

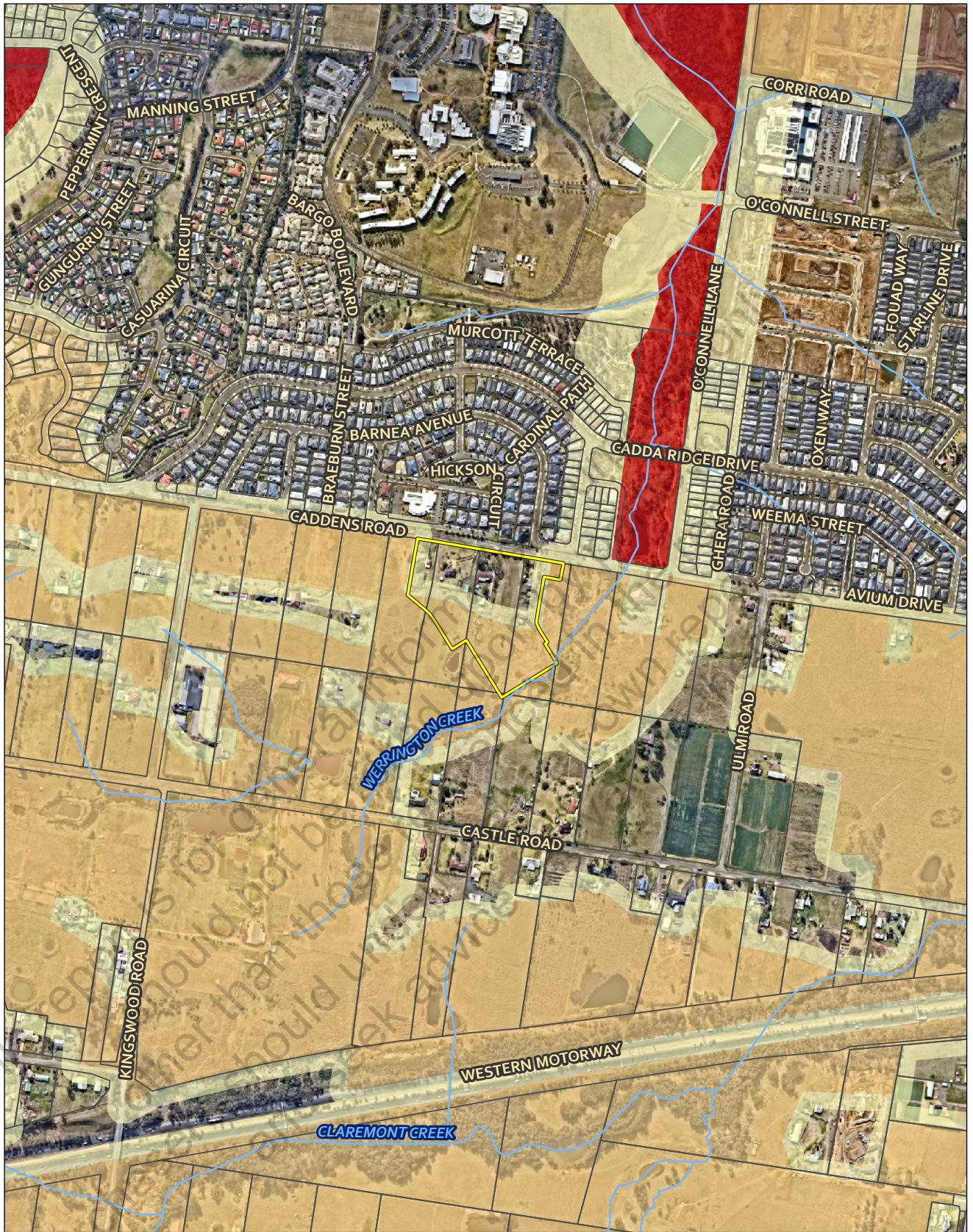
Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap




1.4 Assessment requirements

The subject land is identified as 'bush fire prone land' as shown on Figure 4. Section 4.46 of the *Environmental Planning and Assessment Act 1979* requires a bushfire assessment of residential subdivision proposals on bush fire prone land following the process and methodology set out within Section 100B of the *Rural Fires Act 1997*, Clause 45 of the *Rural Fires Regulation 2022* and the NSW Rural Fire Service (RFS) document *Planning for Bush Fire Protection 2019* (referred to as 'PBP' throughout this report).

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Legend

-  Watercourse
-  Subject Land
-  Cadastre



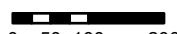
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 Date: 24/10/2023

 0 50 100 200
 Metres

Figure 4: Bushfire Prone Land

Coordinate System: GDA 1994 MGA Zone 56
 Imagery: © Nearmap

2 Bushfire hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as Asset Protection Zone (APZ) location and dimension. The following sub-sections provide a detailed account of the vegetation communities (bushfire fuels) and the topography (effective slope) that combine to create the bushfire hazard that may affect bushfire behaviour at the site.

2.1 Predominant vegetation

The vegetation within 140 m of the subject land has been assessed in accordance with the methodology specified within PBP. As shown on Figure 5, the hazards consist of a mixture of temporary grassland, low hazard riparian corridors and a drainage basin. The hazards are described below:

- **Low hazard (north-east)**

A narrow riparian corridor (Werrington Creek) around the drainage basin to the north-east of Caddens Road and east of Mariposa Circuit is classified as 'low hazard' in accordance with PBP Section A1.11.1 as it will be less than 50 m wide.

- **Future drainage basins (east and south-east)**

A future drainage basin to the east and south-east of Stage 1 has been classified as a grassland hazard to account for potential grass and reed plantings along the riparian corridor.

- **Future riparian corridor (south)**

A riparian corridor is proposed along Werrington Creek east of Stage 1. The riparian corridor is planned to be created in Stage 7. The corridor will feature basins, activated open space and plantings. The final design of the corridor is not yet known, so for the purposes of this assessment it has been assumed that the corridor could present a bushfire hazard similar to Cumberland Shale Plains Woodland for a width greater than 50 m. The corridor is therefore classified 'woodland' for the purpose of determining an APZ. This is the worst-case bushfire hazard scenario for the riparian corridor. It is likely that the final hazard outcome along the riparian corridor is less than 'woodland'. The area of revegetation between the basins may be less than 1 hectare allowing a 'low hazard' classification.

- **Grassland (east and west)**

Future stages adjoining to the east and west have the potential to present a grassland hazard if left unmanaged. The grassland hazard is temporary only and will be removed as development progresses throughout Orchard Hills North.

2.2 Effective slope

The 'effective slope' influencing fire behaviour has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the slope that would most significantly influence fire behaviour where the hazard occurs within 100 m of the proposed lots. The slope was determined using a 2 m contour layer as shown on Figure 5.

As discussed below, the slope underneath the hazards will be within the PBP slope class of 'downslope 0-5 degrees' for the riparian corridor and 'upslope/flat' for the drainage basins. The slope classes are shown on Figure 5.

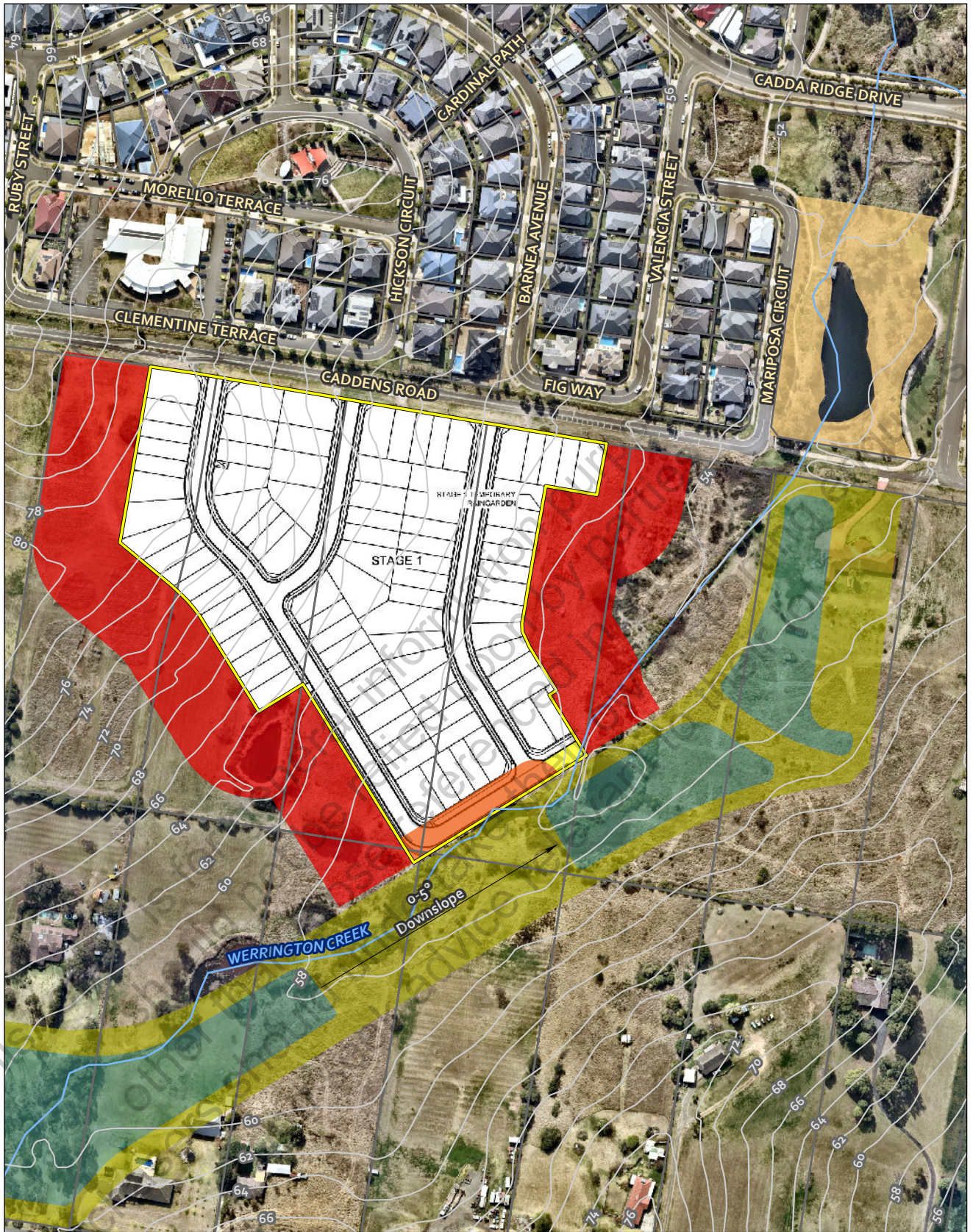
- ***Future riparian corridor (south)***

The riparian corridor is not within Stage 1 and will not be delivered until Stage 7. The slope assessment of 'downslope 0-5 degrees' is based on the likely future form of the corridor. The effective slope accepted by RFS for constructed riparian corridors in greenfield subdivisions is 'downslope 0-5 degrees' which is the slope measured in the downstream direction.

It is noted that either side of the corridor will be flanked by steep embankments in the vicinity of 1:4 (approximately 14 degrees) and these embankments will be landscaped. The slope of the embankment is not used as the effective slope to determine the APZ dimension as the width of the embankment and corresponding length of the slope is short compared to the overall width and length of the corridor, and not the slope most significantly contributing to rate of spread and intensity of a fire propagating along the corridor. This approach is accepted by RFS.

- ***Future drainage basins (east and south-east)***

The drainage basins are part of the riparian corridor works and will not be delivered until Stage 7. The effective slope of 'upslope/flat' is based on the near level base of the basins when constructed. The surrounding embankments are not assessed as the effective slope for the same reason provided above.



Legend

- Contour - 2m
- Watercourse
- Subject Land
- Cadastre

Vegetation Formation

- Woodland
- Low Hazard
- Future Potential Grassland Hazard

Asset Protection Zone

- Asset Protection Zone - 10m
- Asset Protection Zone - 16m
- Temporary Asset Protection Zone - 50m



Date: 17/05/2024

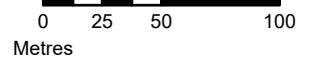


Figure 4: Bushfire Hazard Analysis and Asset Protection Zone (APZ) Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

3 Bushfire protection measures

PBP requires the assessment of a suite of bushfire protection measures that in total provide an adequate level of protection for residential subdivision. The measures required to be assessed are listed in Table 1 below and are discussed in detail in the remainder of this section.

Table 1: PBP bushfire protection measures

Measures	Considerations
Asset Protection Zones (APZ)	Location and dimension of APZ building setbacks from vegetation including prescriptions of vegetation management within the APZ.
Access	Assessment to include access and egress, perimeter access and design standards of public roads.
Water supply and other utilities	List requirements for reticulated water supply and hydrant provisions, and any static water supplies for fire-fighting.

3.1 Asset Protection Zones (APZ)

Using the vegetation and slope information presented in Section 2 and mapped on Figure 5, Asset Protection Zones (APZ) suitable for residential subdivision have been determined. The APZ determination is in accordance with Table A1.12.2 of PBP and the results are listed in Table 2 on the following page and mapped on Figure 5.

Figure 5 demonstrates that the APZs required to the low hazard riparian corridors and drainage basin and can be accommodated by the existing (Caddens Road) and proposed roads. The effective APZ will be larger than the minimum required when taking into account the building setbacks within lots, the full width of the road reserves, and any open space between the perimeter road and the landscaping to occur within the future riparian corridor.

The adjoining lands to the east and west will provide a minimum 50 m temporary APZ into future adjoining stages. This will be in the form of bulk earthworks that will occur prior to Stage 1 subdivision construction and it subject to separate DA approval. The bulk earthworks will ensure that there will be no grassland hazards within 50 m of the proposed lots as shown on Figure 5. A temporary APZ easement for the management of grassland hazards is therefore not required in this case.

Table 2: APZ determination

Location ¹	Vegetation ²	Slope ³	Required APZ ⁴	APZ provided ⁵	How will the APZ be accommodated
North-east	Low hazard (existing riparian)	Downslope 0-5°	14 m	>90 m	Caddens Road
East & south-east	Grassland (drainage basin)	Upslope/Flat	10 m	>10 m	Proposed road
South	Woodland (future riparian)	Downslope 0-5°	16 m	>16 m	Proposed road complemented by front building setbacks
Surrounding	Grassland (temporary)	Downslope 0-5°	12 m	50 m	Bulk earthworks to occur prior to subdivision construction

¹ Direction of assessment from proposed lots. Refer to Figure 5.

² Predominant vegetation classification over 140 m from proposed lots.

³ Effective slope assessed over 100 m from proposed lots where the bushfire hazard occurs.

⁴ APZ required by Table A1.12.2 of Planning for Bush Fire Protection 2019.

⁵ APZ provided by existing surrounding management or proposed measures.

3.2 Vegetation management

All lots and roads are to comply with the standard of an Inner Protection Area (IPA) as described within Appendix A4.1.1 of PBP.

Any landscaping proposed across the subdivision, such as street trees, is also to achieve the standard of an IPA as listed within Appendix A4.1.1 of PBP.

The IPA requirements stated within PBP are repeated below:

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defensible space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

- **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 2m above the ground;*
- *tree canopies should be separated by 2 to 5m; 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**
 - *grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and*
 - *leaves and vegetation debris should be removed.*

3.3 Access

3.3.1 Alternate access and egress

PBP requires an access design that enables safe evacuation whilst facilitating adequate emergency and operational response. All bushfire prone areas should have an alternate access or egress option depending on the bushfire risk, the density of the development, and the chances of the road being cut by fire for a prolonged period.

Stage 1 will have three access points to Caddens Road which will provide multiple alternatives for emergency access and evacuation. The subdivision layout satisfies PBP access objectives in relation to access and egress.

3.3.2 Perimeter access

Stage 1 will be surrounded by adjoining future stages such that the proposed roads within Stage 1 will be non-perimeter roads. The removal of any surrounding grassland hazards by the bulk earthworks prevents the need for a perimeter road at any interface and the low hazard riparian corridor to the south-east is not large enough to warrant the application of a perimeter road. The corridor will be isolated within further subdivision stages in due course. Therefore Stage 1 does not require the application of perimeter roads.

3.3.3 Design and construction standards

The subdivision roads have been designed to comply with the PBP Acceptable Solutions (Table 5.3b of PBP) for the design and construction of public roads in bushfire prone areas with the exception of the provision of on-street parking which has been designed to satisfy the relevant Performance Criteria of PBP Table 5.3b. The Acceptable Solution and Performance Criteria for parking are listed below:

- *Acceptable Solution: Parking is provided outside of the carriageway width.*
- *Performance Criteria: Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.*

All roads are classified 'non-perimeter roads' as they do not adjoin a permanent or significant bushfire hazard.

Caddens Road and future sub-collector roads within adjoining stages have both been designed to comply with the Acceptable Solutions by ensuring on-street parking is provided outside of the minimum required carriageway width of 5.5 m. These roads are the primary access routes for emergency services responding to an incident while residents are evacuating from Orchard Hills North. The local streets proposed in Stage 1 will have direct access to Caddens Road.

The proposed local streets will have minimum carriageway widths that comply with the Acceptable Solution width kerb-to-kerb, however do not have designated on-street parking reserves. The Acceptable Solution carriageway width is 5.5 m and the roads will be 9 m wide kerb to kerb.

Allowing on-street parking within the carriageway is considered acceptable for the local streets in this subdivision as the majority of the roads will be greater than 100 m from a bushfire hazard (i.e. not in bushfire prone land by definition) and the bushfire hazards consist of low risk riparian corridors. The sub-collector roads will have an unobstructed minimum carriageway width with additional on-street parking that complies with the Acceptable Solutions as these are viewed as the primary access pathways for emergency services responding to an incident while residents are evacuating, therefore achieving compliance with the Performance Criteria. Residential lots will also have an allowance for off-street parking within garages and stacked in driveways.

The proposed alternate solution is consistent with that approved by RFS for other release areas that have a very low bushfire risk whereby grassland and low hazards will gradually be replaced or enveloped by staged development.

The PBP Table 5.3b Acceptable Solutions are listed below:

- *Property access roads are two-wheel drive, all weather roads.*
- *Perimeter roads are provided for residential subdivisions of three or more allotments.*
- *Subdivisions of three or more allotments have more than one access in an out of the development.*

- *Traffic management devices are constructed to not prohibit access by emergency service vehicles.*
- *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.*
- *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.*
- *Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.*
- *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.*
- *The capacity of perimeter and non-perimeter road surfaces and any bridges and causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); Bridges/causeways to clearly indicate load rating.*
- *Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.*
- *Hydrants are provided in accordance with AS 2419.1:2005.*
- *There is suitable access for a Category 1 fire appliance to within 4 m of the static water supply where no reticulated supply is available.*
- *Perimeter roads are:*
 - *two-way sealed roads;*
 - *8 m carriageway width kerb to kerb;*
 - *parking is provided outside of the carriageway width;*
 - *hydrants are located clear of parking reserves;*
 - *there are through roads, and these are linked to the internal road system at an interval of no greater than 500 m;*
 - *curves of roads have a minimum inner radius of 6 m;*
 - *the maximum road grade is 15° and average grade is 10°;*
 - *the road crossfall does not exceed 3°;*
 - *a minimum vertical clearance of 4 m to any overhanging obstruction, including tree branches, is provided.*
- *Non-perimeter roads are:*
 - *Minimum 5.5 m width kerb to kerb;*

- *parking is provided outside of the carriageway width;*
- *hydrants are located clear of parking reserves;*
- *there are through roads, and these are linked to the internal road system at an interval of no greater than 500 m;*
- *curves of roads have a minimum inner radius of 6 m;*
- *the road crossfall does not exceed 3°;*
- *a minimum vertical clearance of 4 m to any overhanging obstruction, including tree branches, is provided.*

3.4 Water supply and utilities

3.4.1 Water supply

The development will require fire hydrants to be installed along the nature strip of roads to comply with AS 2419.1 – 2021 *Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419).

3.4.2 Electricity supply

The electricity supply will be provided underground and will therefore comply with PBP.

3.4.3 Gas supply

The installation of any gas services is to be in accordance with Australian Standard AS/NZS 1596-2014 *The storage and handling of LP gas* (Standards Australia, 2014).

4 Conclusion and recommendations

4.1 Summary

The proposal consists of Stage 1 of residential subdivision in Orchard Hills North by Legacy Property. The bushfire hazard consists of a mixture of temporary grassland hazard, drainage basins and riparian corridors. The required APZs will be accommodated by roads, and all grassland hazards within 50 m will be removed prior as a result of bulk earthworks.

Alternate access will be provided onto Caddens Road and an alternate solution is proposed regarding the provision of on-street parking within the carriageway width, which satisfies the objectives of PBP and is consistent with recently approved subdivisions including Bush Fire Safety Authorities issued by RFS.

4.2 Conclusion

The assessment demonstrates that the proposal, together with the recommendations (see below), complies with s100B *Rural Fires Act 1997*, Clause 45 of the *Rural Fires Regulation 2022* and *Planning for Bush Fire Protection 2019*.

4.3 Recommendations

The recommendations made within this assessment are repeated below:

1. All lots and roads are to be managed to achieve the standard of an Inner Protection Area (IPA) as listed in Appendix A4.1.1 of *Planning for Bush Fire Protection 2019*.
2. Any landscaping proposed across the subdivision is to achieve the standard of an Inner Protection Area (IPA) as listed in Appendix A4.1.1 of *Planning for Bush Fire Protection 2019*.
3. The proposed roads are to comply with Table 5.3b of PBP for the design and construction of public roads in bushfire prone areas as follows:
 - a. All roads are to comply with the standard of a 'non-perimeter road'.
 - b. With regard to carriageway widths and on-street parking, the local streets may have on-street parking within the minimum carriageway width.
4. The subdivision will require fire hydrants to be installed along nature strips of roads to comply with *AS 2419.1 – 2021 Fire Hydrant Installations - System Design, Installation and Commissioning*.
5. The installation of any gas services is to be in accordance with Australian Standard *AS/NZS 1596-2014 The storage and handling of LP gas*.



David Peterson



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References

NSW Rural Fire Service (RFS). 2019. *Planning for Bush Fire Protection: A Guide for Councils, Planners, Fire Authorities and Developers*. State of New South Wales through the NSW Rural Fire Service.

Standards Australia. 2014. *The storage and handling of LP Gas, AS/NZS 1596-2014*, Standards Australia International Ltd, Sydney.

Standards Australia. 2021. *Fire hydrant installations - System design, installation and commissioning, AS2419.1*, Fourth edition 2005, Standards Australia International Ltd, Sydney.

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