Appendix O
Bushfire Assessment Report

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BUSHFIRE ASSESSMENT REPORT FOR MODIFIED CONCEPT PLAN

Residential and mixed-use subdivision

Elysian

Lot 32 DP 1085109, Lot 33 DP 1085109, Lot 31 DP 850230,
Lot 2 DP 867486, Lot 4 DP 822786, Lot 1 DP 1033807, Lot 1 DP 1033810
& Lot 1 DP 595529, Lot 2 DP 1156202, Lot 1 DP 10333811
Marana Street, Bilambil Heights

Prepared for: Greenland Development Pty Ltd

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BPAD-L3 Accredited Practitioner

Date: 17 November 2024

Reference: 23/255 Rev C

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DOCUMENT CONTROL				
Revision	**Date**	**Description**	**Prepared**	**Authorised**
A	26.06.2024	Preliminary bushfire constraints report – Not for DA submission	Peter Thornton	Peter Thornton
B	30.10.2024	Concept modification report	Peter Thornton	Peter Thornton
C	17.11.2024	Minor amendments	Peter Thornton	Peter Thornton

GLOSSARY	
Abbreviation	**Definition**
Owner	Greenland Development Pty Ltd
APZ	Asset Protection Zone
AS 3959	Australian Standard 3959-2018 Construction of Buildings in Bushfire Prone Areas
BAL	Bushfire Attack Level
BFMP	Bush Fire Management Plan
BPMs	Bushfire Protection Measures
BFSA	Bush Fire Safety Authority
Council	Tweed Shire Council
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
IPA	Inner Protection Area
NCC	National Construction Code, Building Code of Australia 2022 including NSW variations
OPA	Outer Protection Area
PBP2019	Planning for Bushfire Protection 2019 and Addendum 2022
NSW RFS (RFS)	New South Wales Rural Fire Service
SFPP	Special Fire Protection Purpose
VMP	Vegetation Management Plan

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1.0 EXECUTIVE SUMMARY

This Bushfire Assessment Report has been prepared to assess the modified concept subdivision layout pursuant to Planning for Bushfire Protection 2019. The report identifies the acceptable solution requirements of PBP2019, and areas where performance solutions, in consultation with NSW Rural Fire Service via a bushfire design brief process may have merit in accordance with Planning for Bushfire Protection 2019.

The report has been prepared for the proposed residential and mixed-use subdivision of Lot 32 DP 1085109, Lot 33 DP 1085109, Lot 31 DP 850230, Lot 2 DP 867486, Lot 4 DP 822786, Lot 1 DP 1033807, Lot 1 DP 1033810 & Lot 1 DP 595529, Lot 2 DP 1156202, Lot 1 DP 10333811, Marana Street Bilambil Heights pursuant to Planning for Bushfire Protection 2019. The final report will be required to accompany an application for a Bush Fire Safety Authority under Section 100B of the Rural Fires Act 1997.

The staged subdivision incorporates residential allotments with a village precinct incorporating commercial/retail and possibly Special Fire Protection Purpose (SFPP). SFPP uses have more onerous bushfire protection measure requirements in Planning for Bushfire Protection 2019 (PBP2019) where within 100m of a bushfire hazard.

The plans provided to this office appear to show SFPP uses would be limited to parts of the 'Village' area located greater than 100m from the nearest bushfire hazards (subject to confirmation that management of the adjacent parks as non-hazard areas can be achieved). Should any other lots be used for SFPP use the assessment of those lots will require amendment. The future SFPP development on Lot 32 Precinct B to the east has not been considered in this report.

It is noted a full description of the development consistent with the Statement of Environmental Effects to be lodged with the development application will be required prior to commencement of the final Bushfire Assessment Report.

A bushfire report prepared by Cardno dated 30 August 2010 Version 6 accompanied the previously approved Concept Plan identifying similar constraints such as areas where perimeter roads cannot be provided and where the bushfire hazard is on topography exceeding 20 degrees downslope, although no APZ depths were provided.

This report similarly identifies the areas which do not meet the Acceptable Solutions of PBP2019, however, identifies merit where there is opportunity to prepare performance solutions in consultation with the NSW Rural Fire Service for the issue of a Bush Fire Safety Authority.

Summary of Information required and items for further consideration

The following matters will need to be addressed for design development purposes in relation to the subdivision.

Access

- The civil designer will be required to provide an assessment against the acceptable solution of PBP2019 for all access requirements of PBP2019. Any variations from the acceptable solutions will need to be addressed in consultation with the NSW Rural Fire Service.

- Staging of the subdivision is proposed. Future bushfire reporting will need to address the additional requirements for staged developments in terms of access road considerations to ensure more than one access road is available to and from each stage of the development in accordance with Table 5.3b PBP2019.

- Acceptable solutions of PBP2019 Table 5.3b require perimeter roads between all future lots and hazard vegetation. There are several areas that have not been provided with perimeter roads. In this regard a bushfire design brief in consultation with NSW RFS will be required to address the few areas where perimeter roads are not provided as shown in Figure 17. An initial assessment of the bushfire risk has been undertaken and a performance solution is considered to have merit.

- The civil engineer is to confirm the requirements of Table 5.3b PBP2019 for all roads can be achieved. Parking locations and street parking restrictions (no parking) need to be included in final plans to confirm compliance with the unobstructed width requirements.

- The property access roads to future dwellings are to comply with Table 7.4a PBP2019, noting that allotments with building envelopes within 70m of the public road supporting street hydrants to AS 2419.1-2021 and within a maximum 70km/hr traffic zone do not need to comply. Further, consideration of property access road compliance will need to be undertaken once a fire hydrant design has been provided and road speed limits are known.

Asset Protection Zones and Managed/Non-hazard areas

- Staging of the future subdivision is proposed. A staging plan has been provided as attached in Appendix A. Each stage of the future subdivision must be assessed to ensure building envelopes on perimeter lots are protected with temporary APZ's to ensure a future dwelling on the lots will receive ≤29kW/m^2 of forecast radiant heat. This may require an easement over the residual lots and 88B instrument to ensure ongoing management of temporary APZ's. Temporary APZ's will likely be required to ensure a future dwelling will be capable of complying with Table A1.12.3 of PBP 2019.

- Asset protection zone setbacks are be demonstrated on plans in accordance with the recommendations of this report and the acceptable solutions of PBP2019. Provide confirmation that APZs and setbacks to building envelopes as detailed in this report can be achieved.

- The final RLs for the cut and fill batters along road reserves, and within the perimeter lots needs to be confirmed for the final modelling of slopes exceeding 20 degrees within the bushfire hazard as identified in this report. In establishing preliminary APZ setbacks we have made assumptions that will need to be confirmed.

    - Approximate 24-degree downslope to forest vegetation located on the eastern side of McAllisters Road, adjacent to the northeastern corner of Precinct C.

    - Approximate 22-degree downslope to rainforest to the south/southwest of Precinct C. The slope is likely to change with the road construction.

    - Approximate 27-degree downslope to rainforest within Precinct G to the south of Precinct C . The slope is likely to change with the road construction.

    - Approximate 22-degree downslope to rainforest on the adjoining site to the north Precinct D in the vicinity of the water reservoir. The slope is likely to change with the road construction.

    - Areas of rainforest vegetation approximately 22-degree downslope to the west of Precinct D.

    - Approximate 22-degree downslope to rainforest to the northeast of Precinct D.

  These slopes fall outside of the acceptable solutions of Table 1.12.3 PBP2019. As such performance solutions via a bushfire design brief in consultation with NSW RFS will be required for these allotments.

- Areas designated, stormwater basins, scenic park and neighbourhood park will require confirmation as to whether these will be managed as low threat parkland and by whom, or vegetation type as appropriate. If not adequately managed, these areas will be treated as a potential bushfire risk.

  Most stormwater basins have been assumed to have rainforest plantings within and are assumed as being part of the bushfire hazard. Confirm plantings in all basins and open space areas including vegetation buffer areas and land use conflict (LUCRA) setback areas. This may vary the preliminary APZs specified.

- Confirmation of any revegetation areas on the site.

- Confirmation of the extent and gradient of cut/fill required for road construction where it is located within 100m of the proposed building envelopes, to allow finalisation of slopes and associated APZ setbacks to building envelopes.

- Confirmation that designated asset protection zones will not be located on land steeper than 18 degrees. In this regard it is noted that all residential and commercial lots, managed parks, substation lot, and the water tower lot must be managed as APZ (inner protection area - IPA). Confirmation required.

Water Supply and Utilities

- The subdivision will be serviced with a reticulated water service. The street hydrants must be designed in accordance with Australian Standard 2419.1-2021 and the relevant requirements of Table 5.3c PBP2019. Further information is included in Appendix D of this report.

- Electrical transmission lines, if required, are to comply with Table 5.3c of Planning for Bushfire Protection 2019 as follows. SFPP to comply with Section 6.8.3 and Table 6.8c of PBP2019.

- Gas supply is to comply with Section 5.3.3 and Table 5.3c of Planning for Bushfire Protection 2019. SFPP to comply with Table 6.8c PBP2019.

Landscaping

Landscaping and fencing are to comply with Table 5.3a of Planning for Bushfire Protection 2019. Any proposed replanting must not put existing development at greater risk.

A full description of the development consistent with the Statement of Environmental Effects is to be provided prior to commencement of the final Bushfire Assessment Report. The following compliance table is provided as a summary of the preliminary or likely recommendations and method of assessment for each consideration relating to acceptable solutions of Planning for Bushfire Protection 2019.

Table 1: Summary of acceptable solutions PBP2019

MEASURE	LIKELY RECOMMENDATION	ASSESSMENT
Construction	To comply with Planning for Bushfire Protection 2019 and Addendum 2022. All future residential lots to be sited to ensure BAL 29 construction can be achieved, i.e forecast radiant heat will not exceed 29kW/m^2. Any SFPP development to comply with PBP 2019 Table 6.8a and addendum 2022, and will need to be assessed individually, with exposure to forecast radiant heat limited to 10kW/m^2 in some instances with BAL 19 construction required. Any construction requirements of the National Construction Code are to be applied in addition to PBP2019.	Acceptable Solution and Performance Solution
APZ Required	To comply with Planning for Bushfire Protection 2019. Asset Protection Zones to residential and commercial lots to comply with Table 5.3a and A1.12.3 Planning for Bushfire Protection 2019, and RFS document Standards for Asset Protection Zones 2005. Any variations will require consideration to determine if a performance solution has merit. The entire area of all residential and commercial lots, substation lot, will be required to meet APZ criteria for an Inner Protection Area (IPA). Landscaped areas including the scenic park adjacent to the water tower, road reserves and neighbourhood parks may be included in setback areas to hazard vegetation if they are managed and maintained as low-threat managed land so as not to create a bushfire hazard. SFPP Asset Protection Zones to comply with Table 6.8a and Table A1.12.1 PBP2019. Temporary APZs will be required to afford each stage of the development an appropriate level of bush fire protection.	Acceptable Solution and Performance solution
Water Supply	To comply with Planning for Bushfire Protection 2019 and Addendum 2022 including Table 5.3c.	Acceptable Solution

	All allotments to be serviced with street hydrants in accordance with Australian Standard 2419.1-2021, and the requirements of Section 5.3.3 Table 5.3c PBP 2019. In addition hydrant coverage must be provided around the perimeter of buildings. SFPP to comply with Section 6.8.3 and Table 6.8c of PBP2019.	
Electricity	To comply with Planning for Bushfire Protection 2019 including Table 5.3c of PBP2019. SFPP to comply with Section 6.8.3 and Table 6.8c of PBP2019.	Acceptable Solution
Gas Supply	To comply with Planning for Bushfire Protection 2019 including Table 5.3c of PBP2019. SFPP to comply with Section 6.8.3 and Table 6.8c of PBP2019.	Acceptable Solution
Landscape	To comply with Planning for Bushfire Protection 2019 including Table 5.3a and Appendix 4 of PBP2019. SFPP landscaping is to comply with Table 6.8a and Appendix 4 of PBP2019. Any proposed replanting must not put existing development at greater risk.	Acceptable Solution
Access	The road and driveway network is to comply with Planning for Bushfire Protection 2019 and Addendum 2022. Roads are to be designed to meet s3.4 and Table 5.3b of PBP2019. Roads serving SFPP development to comply with and Table 6.8b PBP2019. Matters to be addressed- • Confirm there will be more than one access road in and out of the development for each stage of the subdivision. Further details will be required. • Perimeter roads are not provided to all lots. Amend plans to provide perimeter road or performance solution for areas where no perimeter road is provided to lots as identified in the report. • Civil designer to provide as assessment against the access requirements of PBP2019 including Table 5.3b PBP2019. • The bushfire tracks will require further consideration to determine if a performance assessment has merit as a variation to perimeter road requirements. Amend plans, or investigate performance solutions for areas where acceptable solutions of PBP2019 cannot be achieved. SFPP development to comply with Section 6.8.2 and Table 6.8b of PBP2019 and additional requirements of Table PBP Addendum 2022.	Further detail required to determine compliance, or performance solution required. Civil designer to provide assessment against each of the access requirements of Table 5.3b PBP2019.

2.0 INTRODUCTION

2.1 General

This report has been prepared on behalf of Greenland Development Pty Ltd, ('the applicant') for consideration by the Department of Planning, Housing and Infrastructure (DPHI) to modify the Major Project ('Concept Plan') Approval No. 08_0234 for Elysian, formerly known as the 'Rise', located at Marana Street, Bilambil Heights NSW 2486 (formally described as Lot 32//DP1085109, Lot 33//DP1085109, Lot 31//DP850230, Lot 2//DP867486, Lot 4//DP822786, Lot 1//DP1033807, Lot 1//DP595529 and Lot 1//DP1033810, Lot 2//DP1156202 and Lot 1//DP1033811) as shown in Figure 1.

This Bushfire Assessment Report has been prepared to assess the modified concept subdivision layout pursuant to Planning for Bushfire Protection 2019. The report identifies the requirements to comply with the acceptable solutions of PBP2019. Areas where performance solutions may have merit have been identified for further consultation with NSW Rural Fire Service via a bushfire design brief process as identified in Planning for Bushfire Protection 2019 with a developed subdivision plan.

The proposal seeks approval to modify the Major Project consent pursuant to clause 3BA(5) of Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (Transitional Regulation).

The modification seeks changes to the land uses of the approved project and the conditions of the consent. It is proposed to modify the approval by consolidating and simplifying land uses, omitting inappropriate uses and removal of the detailed layout to allow for flexibility at the detailed design stage. A summary of the proposed changes include:

- Consolidation and updating of land uses and precincts
- Change of residential product type and density
- Increase in residential areas with an overall reduction in the yield of the development
- Deletion of precincts for a private school and nursing home
- Increase in open space overall, including additional land for conservation
- Reduced village centre precinct area
- Reduction in the number of precincts allocated for retirement living
- Realignment of major spine road and internal roads
- Relocation and consolidation of the reservoirs
- Change in tenure from Community title scheme/Body corporate to Freehold

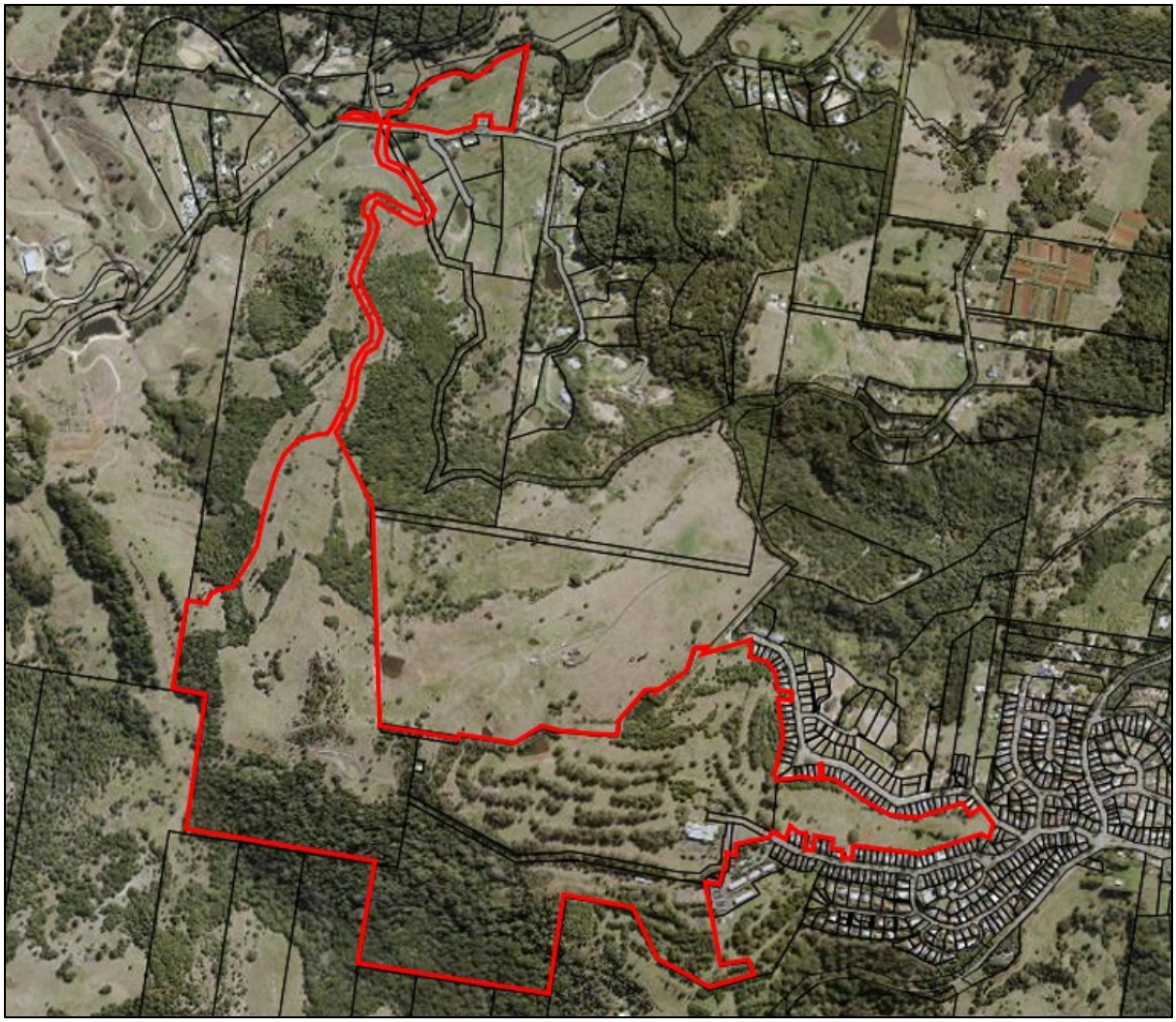


Figure 1: Major Project approval – revised concept plan approximate boundary
(Source: Tweed Council interactive mapping)

The subdivision incorporates residential allotments with some commercial/retail and possibly Special Fire Protection Purpose (SFPP) uses in the 'village' area in the eastern precinct. SFPP uses have more onerous bushfire protection measure requirements in Planning for Bushfire Protection 2019 (PBP2019) where within 100m of a bushfire hazard. The advice provided within this constraints report will need to be updated with the detailed subdivision layout, or with any change to the proposed uses.

This report has been prepared on the basis that the future residential development will be for long-term residential use only except for areas designated as 'village' commercial and retail precinct which are greater than 100m from the nearest bushfire hazard (subject to the adjacent parks being managed as a non-hazard). Special Fire Protection Purpose (SFPP) uses include developments occupied by people who are at-risk members of the community e.g. group homes, aged care facilities, seniors living, childcare facilities, short-term tourist accommodation, hotel or motel accommodation etc.

2.2 Scope/Limitations

This report relates to the proposed concept subdivision only and is limited due to concept being in the initial design development stage. Recommendations will be made for design development in accordance with the acceptable solutions of PBP2019.

A staging plan has been provided which will require further demonstration in relation to compliance with PBP2019 for the provision of temporary asset protection zones (APZ's) to perimeter lots until future stages are developed. A management plan will be required for the temporary APZ's over to the residual allotments and any unformed road reserves. There have been no specific details provided for the management of open space areas, drainage reserves, parks etc.

Due to a range of limitations, the measures contained in this document do not guarantee that loss of life, injury and/or property damage will not occur during a bush fire event. Limitations of this document include, but are not limited to uncertainties in the following areas:

- Fire Danger Index;
- Fuel loads;
- Existing developments;
- Human behaviour;
- Maintenance.

2.3 Significant Environmental Features

An assessment is to be undertaken, if applicable, regarding:

- SEPP (Biodiversity and Conservation) 2021
- SEPP (Resilience and Hazards) 2021
- Biodiversity Conservation Act 2016 (NSW)
- Local Land Services Act 2013 (NSW)
- Land Management (Native Vegetation) Code 2017 (NSW)
- National Parks and Wildlife Act 1974 (NSW)
- Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)

This report does not consider the above legislation and in this regard this report should be read in conjunction with the Statement of Environmental Effects submitted with the development application.

2.4 Report Details

Report Reference No.:	23/255 concept modification
Local Government Area:	Tweed Shire Council (FFDI 80)
Proposal:	Residential and mixed-use subdivision
Drawings:	Attached in Appendix A
Client:	Greenland Developments Pty Ltd

2.5 Exclusions

This report does not address the following-

1. The proposed Seniors Living SFPP development within existing Lot 32 DP 1085109 to the east of the development area has not been considered in this report. Noting SFPP development is to comply with Planning for Bushfire Protection 2019 and Addendum 2022, together with NCC 2022 provisions.

2. Additional requirements of the National Construction Code 2022 may also be applicable including for SFPP developments which have not been considered in this report.

3. This report is limited to provision of broad recommendations to facilitate design development based on the concept plans only. The report does not include any performance assessments.

3.0 PROPOSED DEVELOPMENT

A residential and mixed-use subdivision is proposed. The subdivision incorporates residential allotments with some commercial/retail and possibly Special Fire Protection Purpose (SFPP) uses in the 'village' area in Precinct A as shown in Figure 2.

SFPP uses have more onerous bushfire protection measure requirements in Planning for Bushfire Protection 2019 (PBP2019) where within 100m of a bushfire hazard. It is noted that Class 9b community/assembly buildings having a floor area greater than 500m^2 also are required to be treated as SFPP developments for the purposes of PBP2019. Where a lot is proposed to be used for purposes other than residential long-term use, it is advisable to confirm whether these are considered as SFPP uses.

A full description of the development consistent with the Statement of Environmental Effects to be lodged with the development application will be needed prior to commencement of the final Bushfire Assessment Report.

This constraints report applies to the broad subdivision layout only in relation to the modification of the concept plan. Separate reporting will be required for subdivision and development approval of the future proposed buildings under Section 4.14 of the *EP&A Act 1979,* and Section 100B BFSA.

The precinct plan in Figure 2 provides the concept layout noting a bushfire assessment of Precinct B (Lot 32 DP 1085109) has not been undertaken.

The plans provided to this office to date appear to show SFPP uses would be limited to areas within Precinct A being greater than 100m from the nearest bushfire hazards (subject to confirmation that the adjacent parks as non-hazard areas can be achieved). SFPP uses to be specifically addressed with future bushfire reporting.

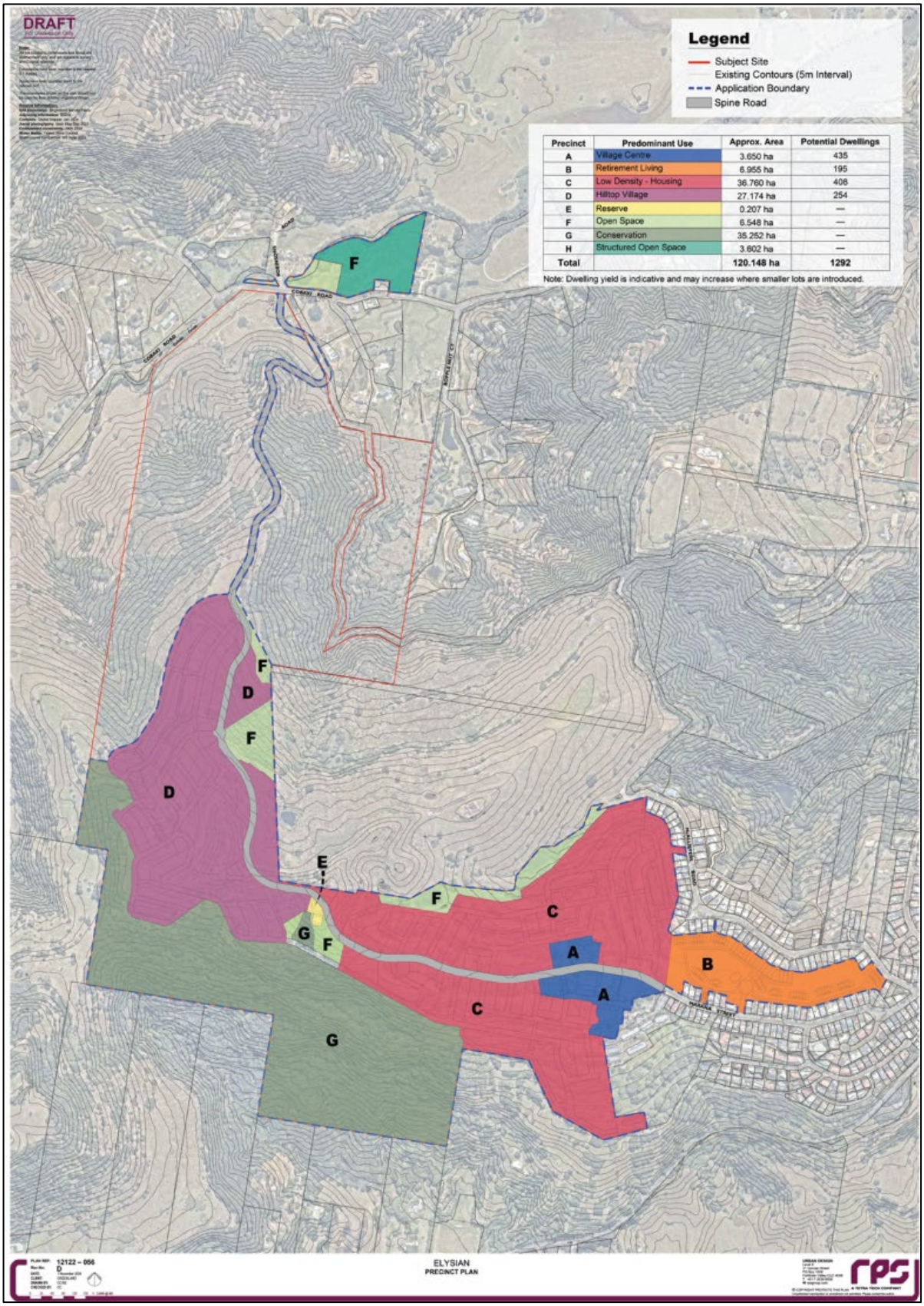


Figure 2: Subdivision precinct plan

4.0 BUSHFIRE THREAT ASSESSMENT – ASSET PROTECTION ZONE SETBACKS

4.1 Overview

Asset Protection Zones are areas established and maintained to ensure bushfire fuels are progressively reduced between the development and the bushfire hazard. The asset protection zone incorporates an Inner Protection Area (IPA) having reduced fuel loadings to Appendix 4 PBP2019.

Tweed Shire Council's Policy of limiting APZs on public land is to be considered in relation to required managed/low-threat land between the proposed allotments and bushfire hazard vegetation. Open space, parks and the like be dedicated back to Tweed Shire Council shall be assessed to determine if they are considered managed as either an asset protection zone or the use and function meet the definition of 'low-threat vegetation' pursuant to A1.10 of Planning for Bushfire Protection 2019.

Future buildings on the proposed lots mapped as bush fire prone land are to be separately assessed at the development application stage in accordance with s4.14 or s4.15 of the *Environmental Planning and Assessment Act 1979, s100B Bush Fire Safety Authority,* or complying development.

All residential and commercial lots on bushfire prone land are to be managed and maintained as an Inner Protection Area (IPA) to prevent the spread of a fire towards the future buildings in accordance with Appendix 4 of Planning for Bushfire Protection 2019 and the requirements of 'Standards for Asset Protection Zones' RFS 2005. Details of function and vegetative plantings in open space areas, bio-basins, stormwater retention basins and the like must be provided prior to preparation of the final bushfire assessment report for subdivision.

Bushfire prone land mapping identifies the subject site as being bushfire prone as shown in the bushfire maps in each of the following sub-sections.

- Eastern Area (incorporating Precincts A commercial/village, C, E, F and G).
- Western Area (incorporating Precincts D and F).
- Northern Area (incorporating Precinct F open space and structured open space).

Precinct B Retirement living has not been assessed in this report.

The hazards impacting the proposed lots is mainly rainforest and grassland except for a small area of forest to the south of the existing town water supply reservoir in Precinct E.

A revegetation/replanting plan has not been assessed; accordingly, any future replanting has not been considered in this report other than the conservation areas and existing perimeter vegetation where noted. If revegetation is proposed, an amended assessment for the proposed lots within 100m of the revegetation areas may be required.

Any proposed replanting must not put existing development at greater risk including adjacent to Precinct F on the northern side of Cobaki Road. Details of management and planting within 100m of existing off-site development will need to be considered with future reporting.

Areas nominated as parkland, stormwater basins and buffers will require further assessment to establish the extent of bushfire hazard, and areas that will be managed in perpetuity as low threat (non-bushfire hazard). Further details are required describing each green space within the boundaries of the subdivision and replanting/management within the space. For the purposes of this report the designated stormwater basins and buffer areas have been assessed as remnant hazard.

The entire area of all residential and commercial lots will be required to be managed as an asset protection zone (inner protection area). It is noted that APZ's and associated setback distances should not be located on land steeper than 18 degrees. Confirmation will be required that all proposed lots can achieved the nominated APZ setbacks with the APZ located on land no steeper than 18 degrees.

This report provides setback distances from proposed residential development to hazard vegetation. Special Fire Protection Purpose (SFPP) development such as schools, retirement living, child care, and nursing homes will require larger setback distances to hazard vegetation than for residential development.

Areas of the proposed village/commercial precinct located greater than 100m from hazard vegetation will potentially be capable of supporting SFPP development. Should SFPP development be proposed in other areas of the development site within 100m of hazard vegetation, additional setback distances will need to be provided for the specific locations.

Staging of the future subdivision is proposed. A staging plan has been provided as attached in Appendix A. Each stage of the future subdivision must be assessed to ensure building envelopes on perimeter lots are protected with temporary APZ's to ensure a future dwelling on the lots will receive ≤29kW/m^2 of forecast radiant heat. This may require an easement over the residual lots and 88B instrument to ensure ongoing management of temporary APZ's. Temporary APZ's will likely be required to ensure a future dwelling will be capable of complying with Table A1.12.3 of PBP 2019.

4.2 Precincts A, C, E, F and G asset protection zones (eastern area)

A slope analysis and vegetation classification assessment (based on referenced plans) forms the basis of the preliminary bushfire assessment. The analysis will need to be updated with confirmation of final lot layout and any changes because of proposed revegetation and confirmation of management of green spaces within the subdivision.

Precinct	Predominant Use	Approx. Area	Potential Dwellings
A	Village Centre	3.650 ha	435
B	Retirement Living	6.955 ha	195
C	Low Density - Housing	36.760 ha	408
D	Hilltop Village	27.174 ha	254
E	Reserve	0.207 ha	—
F	Open Space	6.548 ha	—
G	Conservation	35.252 ha	—
H	Structured Open Space	3.602 ha	—
Total		**120.148 ha**	**1292**

Note: Dwelling yield is indicative and may increase where smaller lots are introduced.

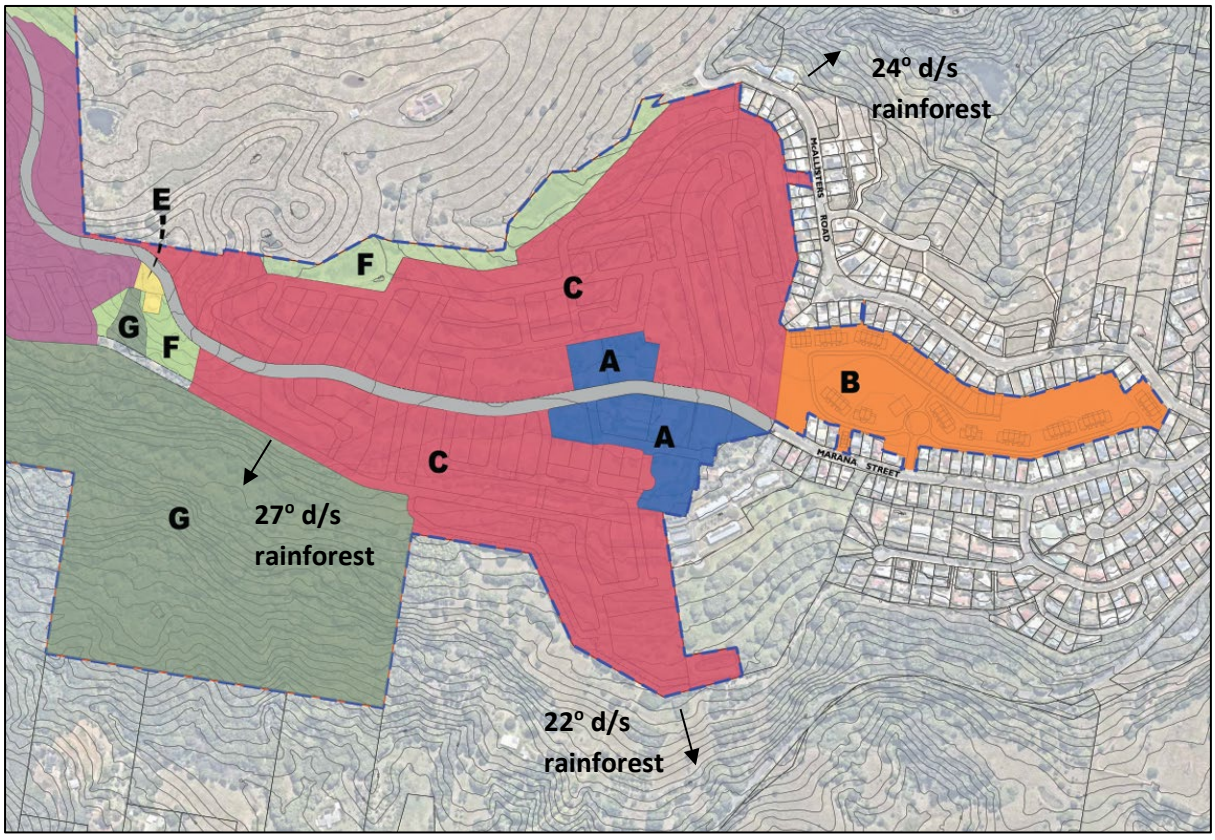


Figure 3: Precincts A, C, E, F and G eastern area

Precinct C will contain low-density housing. The residential precincts have been assessed as long-term residential use (non-SFPP purposes). Some Village Centre allotments in Precinct A are located greater than 100m from the nearest bushfire hazard, and may be suitable for

SFPP uses, subject to the adjacent neighbourhood parks being managed as a non-hazard. Detailed assessment of future uses will be required.

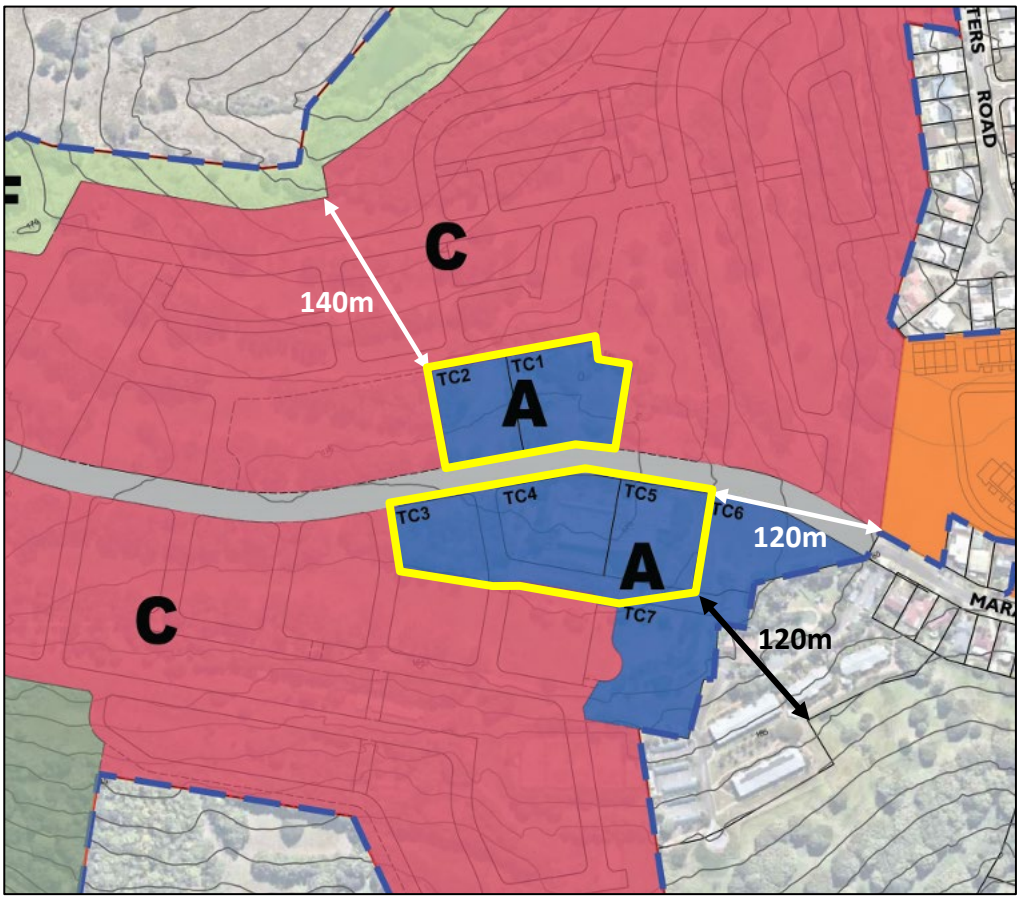


Figure 4: Areas within Precinct A locater greater than 100m from the bushfire hazard

Consultation with RFS and Essential Energy will be required to determine bushfire setback requirements to future electrical infrastructure such as substations. Discussions RFS will be required in relation to critical infrastructure bushfire protection measures and any additional setbacks or bushfire protection measures that may be required in excess to the restrictions required by the energy provider.

Precinct A and C are primarily subject to rainforest and grassland hazards on downslopes of no greater than 20 degrees with exception to the following:

- Approximate 24-degree downslope to forest vegetation located on the eastern side of McAllisters Road, to the northeast of Precinct C.
- Approximate 22-degree downslope to rainforest/grassland to the south and southwest of Precinct C.
- Approximate 27-degree downslope to rainforest to the south of Precinct C within Precinct G.

These slopes fall outside of the acceptable solutions of Table 1.12.3 PBP2019. As such performance solutions will be required to determine APZ setbacks based on performance modelling.

Considerations for Precincts A, C, E, F and G regarding required setbacks to hazard vegetation and asset protection zones include:

- Areas designated as parks, stormwater basins, neighbourhood parks and scenic park will require confirmation as to whether these will be managed as low threat parkland and by whom, or vegetation type as appropriate. If they are not adequately managed, then they will be treated as a potential bushfire risk.

- Confirmation of any revegetation areas on the site.

- Confirmation that required setbacks between hazard vegetation and future building envelopes can be achieved.

- Confirmation that designated asset protection zones will not be located on land steeper than 18 degrees. Noting the entire area of residential and commercial allotments will need to be managed as an asset protection zone (inner protection area) IPA.

- Confirmation of the extent and gradient of cut/fill required for road construction where it is located within 100m of the proposed building envelopes.

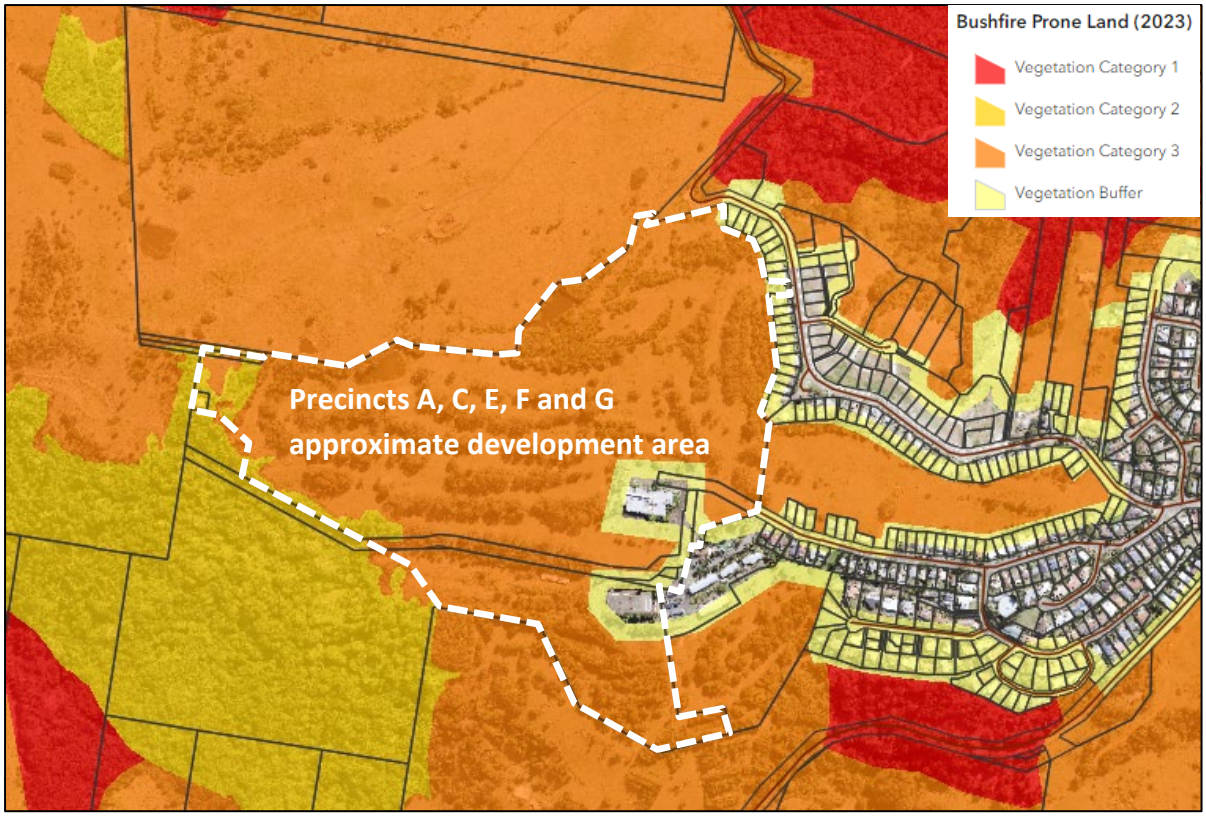


Figure 5: Bushfire prone land map *Source: TSC online mapping*

Figure 6: Aerial map eastern area of the development site *Source: Nearmap image 04.10.24*

4.3 Precincts D and F asset protection zones (western area)

Slope analysis and vegetation classification has been undertaken (based on referenced plans) and forms the basis of the bushfire assessment. The analysis will need to be updated with developed subdivision plans, any changes because of proposed revegetation. Confirmation of management of green spaces within the subdivision will be required.

There is potential to provide a performance solution based on a split assessment methodology to reduce the APZs on some lots. This is to be undertaken with the final bushfire assessment report for issue of a Bush Fire Safety Authority.

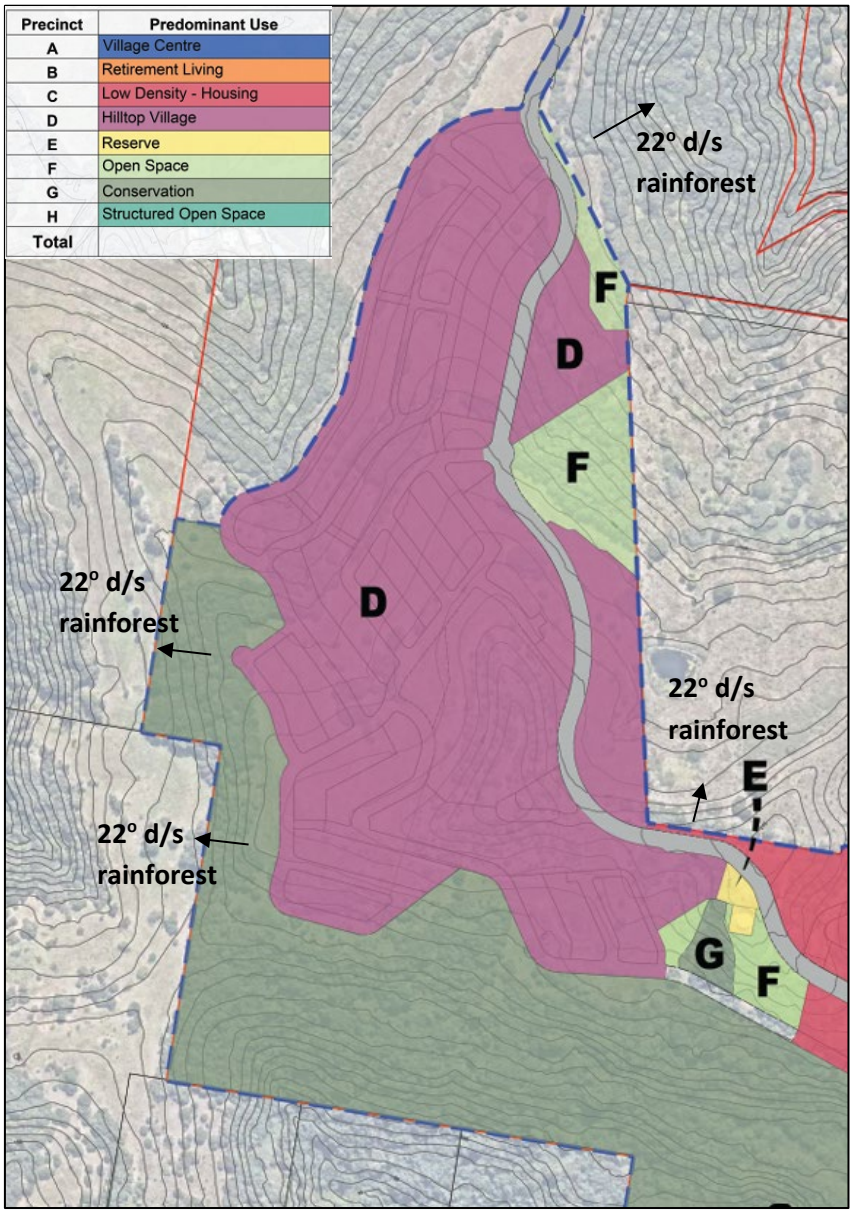


Figure 7: Precinct D and F western area of the development site

The proposed residential Precincts have been assessed for long-term residential use (non-SFPP purposes). Precinct D is primarily subject to forest, rainforest and grassland hazards on slopes of no greater than 20 degrees with exception to the following:

- Areas of rainforest vegetation exceeding 20-degree (22^{o}) downslope to the west of Precinct D.

- Areas of rainforest vegetation exceeding 20-degree (22^{o}) downslope on the adjoining lot to the north of precinct D (to the north of the existing water tower).

- Approximate 22-degree (22^{o}) downslope to rainforest to the northeast of Precinct D

These slopes fall outside of the acceptable solutions of Table 1.12.3 PBP2019. As such performance solutions will be required to determine setback distances between building envelopes and the hazard vegetation based on modelling.

Considerations for this precinct regarding required setbacks to hazard vegetation and asset protection zones include:

- APZ setback distances to building envelopes to be demonstrated with future developed subdivision plans. Setbacks distances to any SFPP development have not been considered.

- Confirm areas designated as parks will be managed as non-hazard/low threat and by whom. Confirm any replanting/revegetation areas on the site.

- Confirmation that designated asset protection zones will not be located on land steeper than 18 degrees. Noting the entire area of all residential lots must be managed as an Inner Protection Area (IPA).

- Confirmation of the extent and gradient of cut/fill required for road construction where it is located within 100m of the future building envelopes.

- Bushfire prone land mapping identifies areas of Category 1 vegetation which have been assessed as rainforest in accordance with Ecological advice and site inspection.

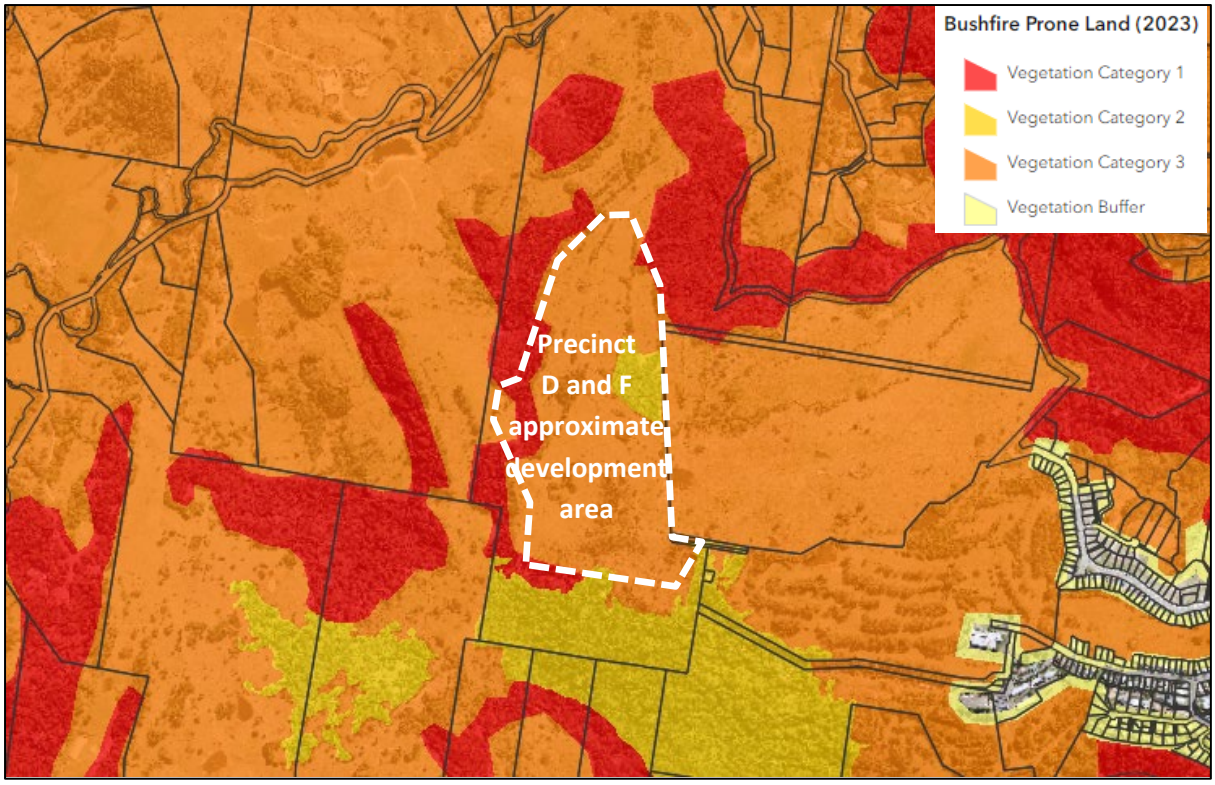


Figure 8: Precinct D and F prone land map *Source: TSC online mapping*

Figure 9: Aerial map western area Nearmap image 04.10.24

4.4 Precinct F (north)

Precinct F consists of a proposed local park and structured open space. Landscaping and replanting within Precinct F will need to have regard to existing off-site development within 100m. Any proposed replanting must not put existing development at greater bushfire risk. Details of management and planting within 100m of existing off-site development will need to be considered with future reporting.

Bushfire protection measures for Precinct F will need to be determined as further information becomes available, including access, water supply, landscaping, APZ's, and electricity supply.

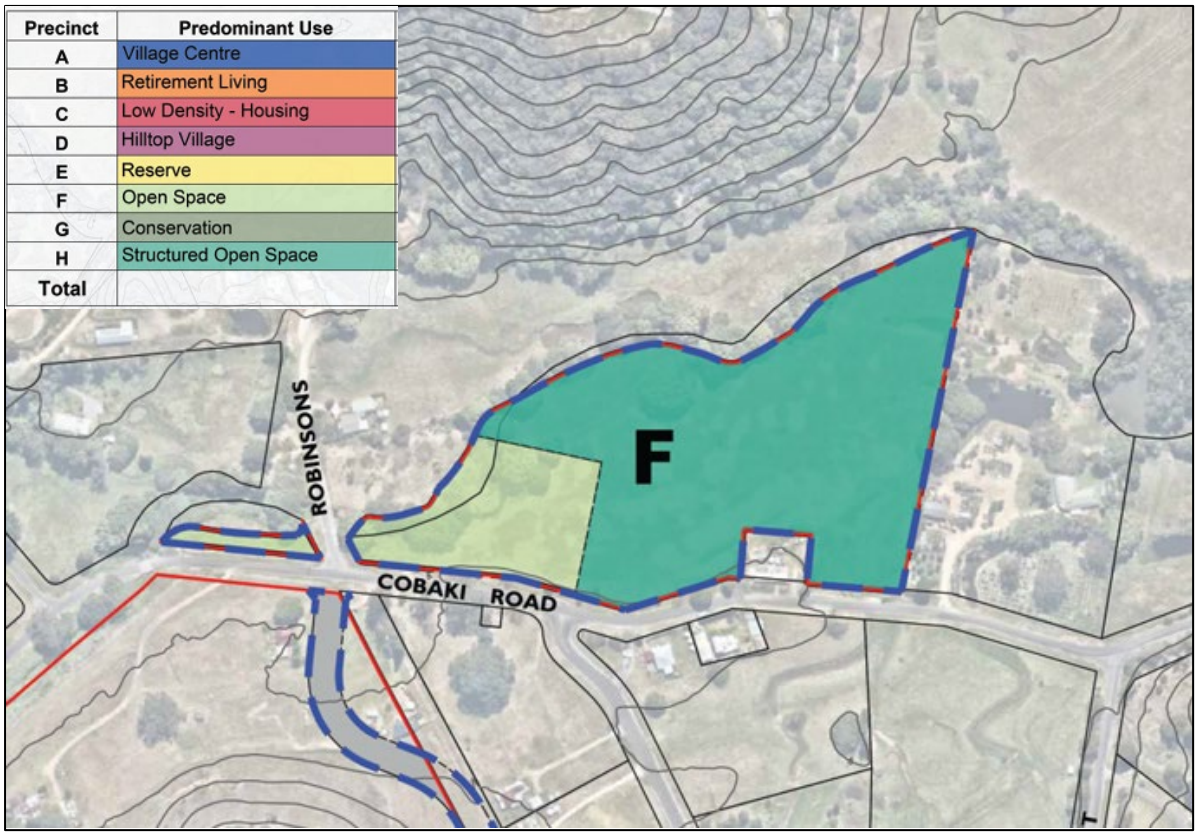


Figure 10: Northern Precinct F to the north of Cobaki Road – Local park and structured open space

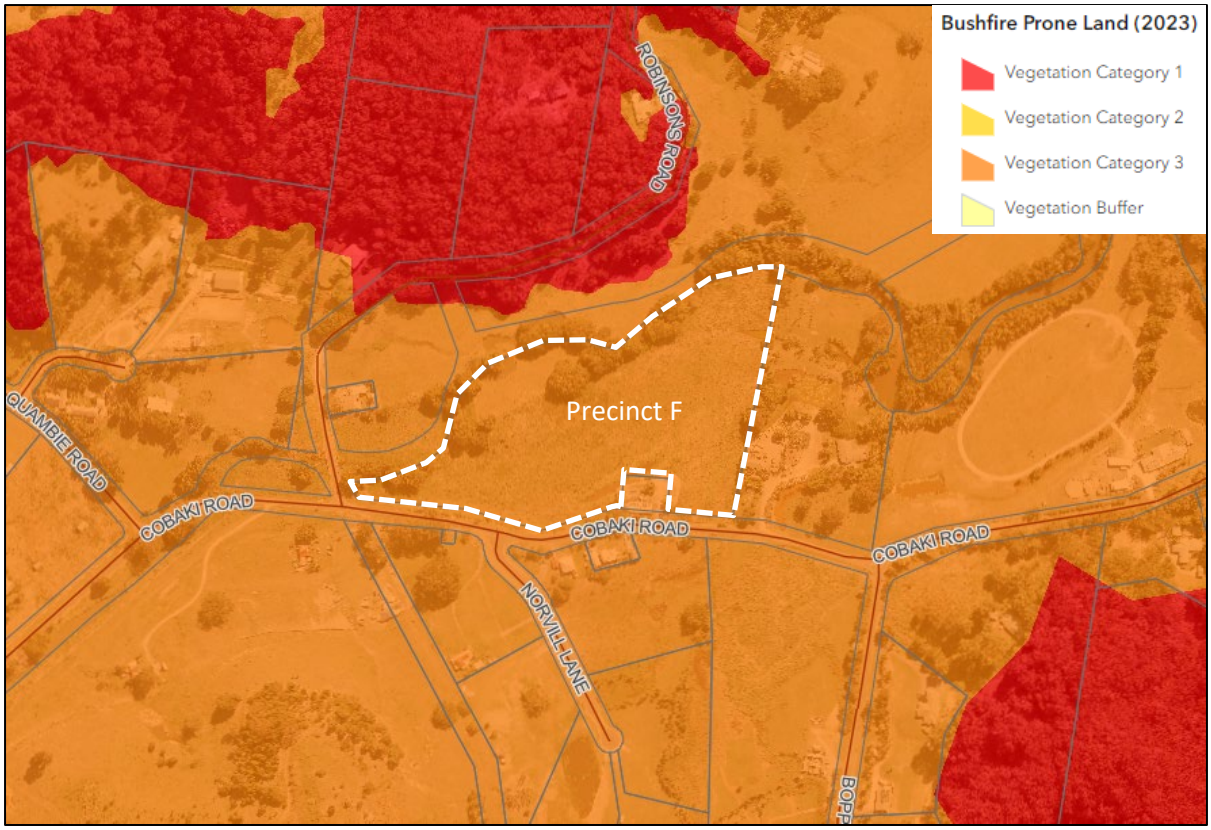


Figure 11: Bushfire Prone Land Map Precinct F

Figure 12: Aerial map, northern Precinct F (north)

5.0 WATER AND UTILITY SERVICES

5.1 Water Services

The future subdivision will be provided with a reticulated water service. Street hydrants must be designed in accordance with Australian Standard 2419.1-2021. The design shall also demonstrate compliance with the relevant requirements of Table 5.3c PBP2019.

Hydraulic plans are to be designed by an Accredited Practitioner (Fire Safety) or a person deemed competent by the consent authority, and submitted to the Local Authority for approval. Design certificates must reference these requirements. The Accredited Practitioner (Fire Safety) or a person deemed competent by the Authority, must certify design, installation, and commissioning.

The following requirements of Planning for bushfire protection are applicable to the development-

- Section 5.3.3 and Table 5.3c PBP2019 – Residential Subdivisions;
- Section 6.8.3 and Table 6.8c of PBP2019 - SFPP development.
- Class 9 (NCC) Special Fire Protection Purpose developments must be specifically assessed at DA stage if located on designated bushfire prone land pursuant to PBP2019 and Addendum 2022.

Full information is included in Appendix D of this report.

5.2 Electricity Services

New electrical transmission lines, if required, are to comply with Section 5.3.3 and Table 5.3c of Planning for Bushfire Protection 2019, and SFPP to comply with Section 6.8.3 and Table 6.8c of PBP2019.

5.3 Gas Services

Gas services to comply with Section 5.3.3 and Table 5.3c of Planning for Bushfire Protection 2019

6.0 ACCESS

Access to the future subdivision from the southeast is proposed by way of an extension of Marana Street. A 20.9m wide 'Collector Road' is proposed to run through the centre of the eastern precinct of the subdivision before narrowing slightly to 18.5m through the western precinct and turning north to connect with Cobaki Road as shown in Figure 15.

Cobaki Road connects with Piggabeen Road to the northeast and then further connects to Kennedy Drive, providing an alternate egress in conjunction with the Marana Street connection.

Robinsons Road directly to the north of the subdivision loops to and connects with Piggabeen Road to the east. The nearest public through road to the northeast is Kennedy Drive/Gollan Drive. To the south the nearest public through road is Scenic Drive. In this regard, it is considered the two entry/egress points at either end of the internal connector road through the entire subdivision provide adequate options for fire-fighters and future residents to evacuate.

The public roads are required to comply with the acceptable solutions of 5.3b Planning for Bushfire Protection 2019, see attached in Appendix D. The consultant civil designers will need to provide confirmation of the following-

- Provide an assessment against each consideration of Section 5.3.2 and Table 5.3b of PBP2019. Confirm all acceptable solutions can be achieved, or alternatively, nominate all variations from the acceptable solutions so a merit-based assessment can be undertaken to determine if a performance solution option is available.

- Provide details of the width of all roads measured kerb to kerb in accordance with PBP2019 Table 5.3b, noting that any parking must be located outside the required unobstructed road width as detailed in Table 1.

- Any staging of the development must provide for more than one access road in and out of the development in accordance with Table 5.3b PBP2019, or a performance solution will need to be investigated in consultation with the RFS via a performance brief. A temporary alternative access road may be considered during early stages of the development, complying with Table 5.3b to be relied upon for emergency evacuation.

The following preliminary comments are made regarding movement network plans. Refer to road network plan in Figures 13 and 14 and Appendix A.

Table 1: Comments regarding the proposed road widths and on-street parking

Road		Street parking indicated	Street parking restrictions PBP2019 Table 5.3b
a	Neighbourhood Connector Street 20.9 reserve (dark blue) part perimeter road	Pavement width 13.4m. Parking indicated on both sides of the street	No restrictions to parking
	Main Street 20.9 reserve (Dark blue)	8.2m wide minimum pavement. Indented parking bays 13.4 pavement	Parking in designated indented parking bays. Parking restrictions in other areas required.
	Neighbourhood connector street 18.5m wide reserve (light blue dashed) Northern connector road.	11m wide pavement, parking proposed both sides of the street	This road is relied upon as a bushfire perimeter road. Must have 8m wide pavement clear of parking areas. Restrict parking or widen the road if on-street parking is proposed.
b	Access street 14.5 reserve (orange) Perimeter road in some areas	7.5m wide pavement	This road is relied upon as a bushfire perimeter road in some areas. Must have 8m wide pavement clear of parking areas. For non-perimeter roads Civil designer to confirm if parking restrictions will be required, i.e., ensure 5.5m clear road width can be achieved if on-street parking is proposed.
	Narrow access street 6m wide pavement (pink) Includes dead end roads around part of the perimeter of the scenic park (hazard) in Precinct D	6m wide pavement	Required to be 8m wide clear of parking areas where forming a perimeter road. In areas other than perimeter road, restrict parking on both sides of the road to ensure 5.5m clear of carparking at all times.
	Esplanade perimeter road 15m wide reserve (green) Southern and western bushfire perimeter roads	8m wide pavement.	Relied upon as a bushfire perimeter road. Must have 8m wide pavement clear of parking bays. Restrict parking on both sides of the street or provide parking bays clear of the 8m wide pavement.
c	Laneway access 8m wide reserve (yellow)	6m wide pavement	Restrict parking on both sides of the land to ensure 5.5m wide clear of parking at all times.
d	Bushfire trail 10m wide reserve	4m wide pavement	Consultation with RFS required, does not meet acceptable solutions for perimeter road. Management of road reserve to be confirmed.

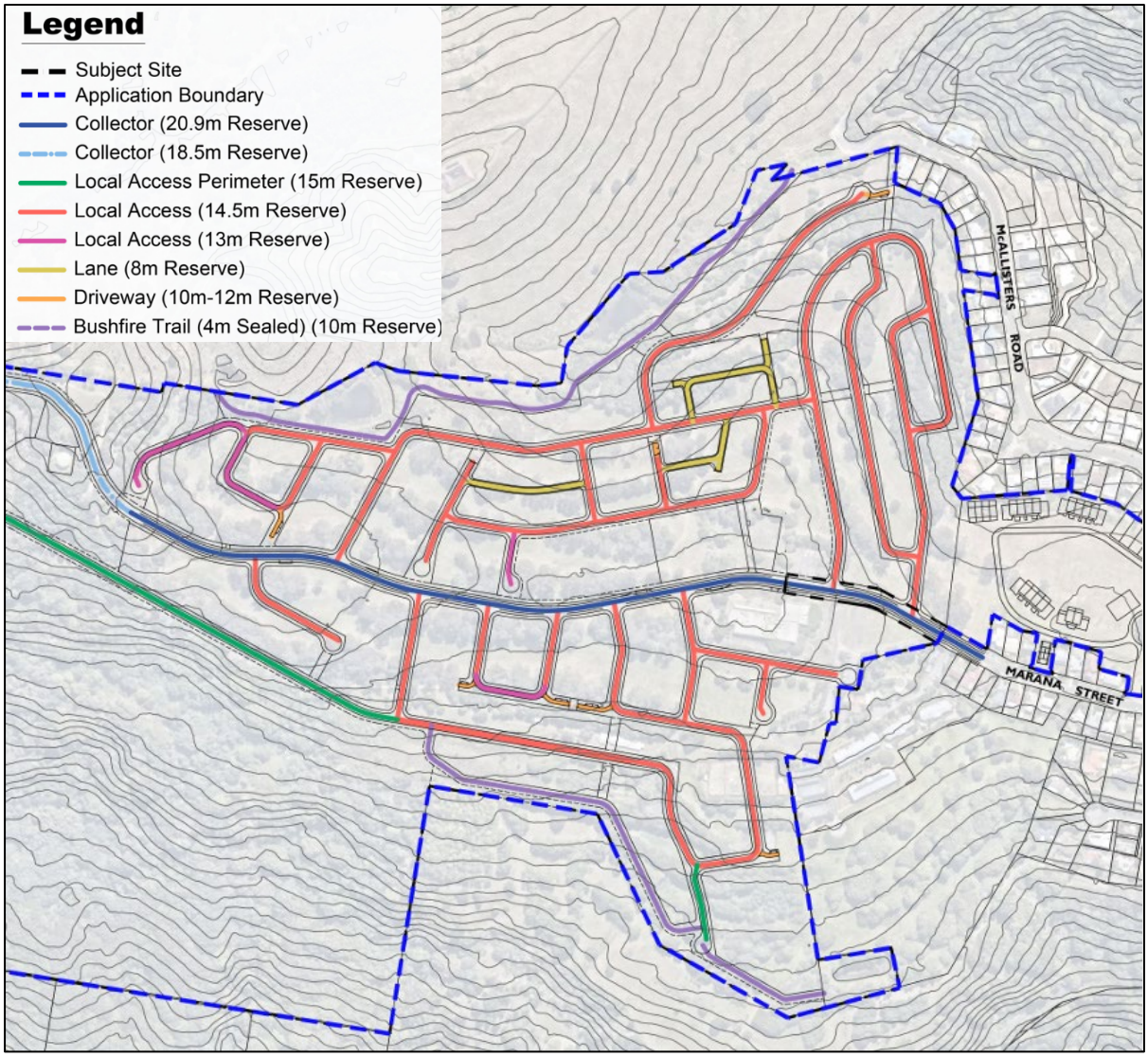


Figure 13: Eastern area of the development site - road network

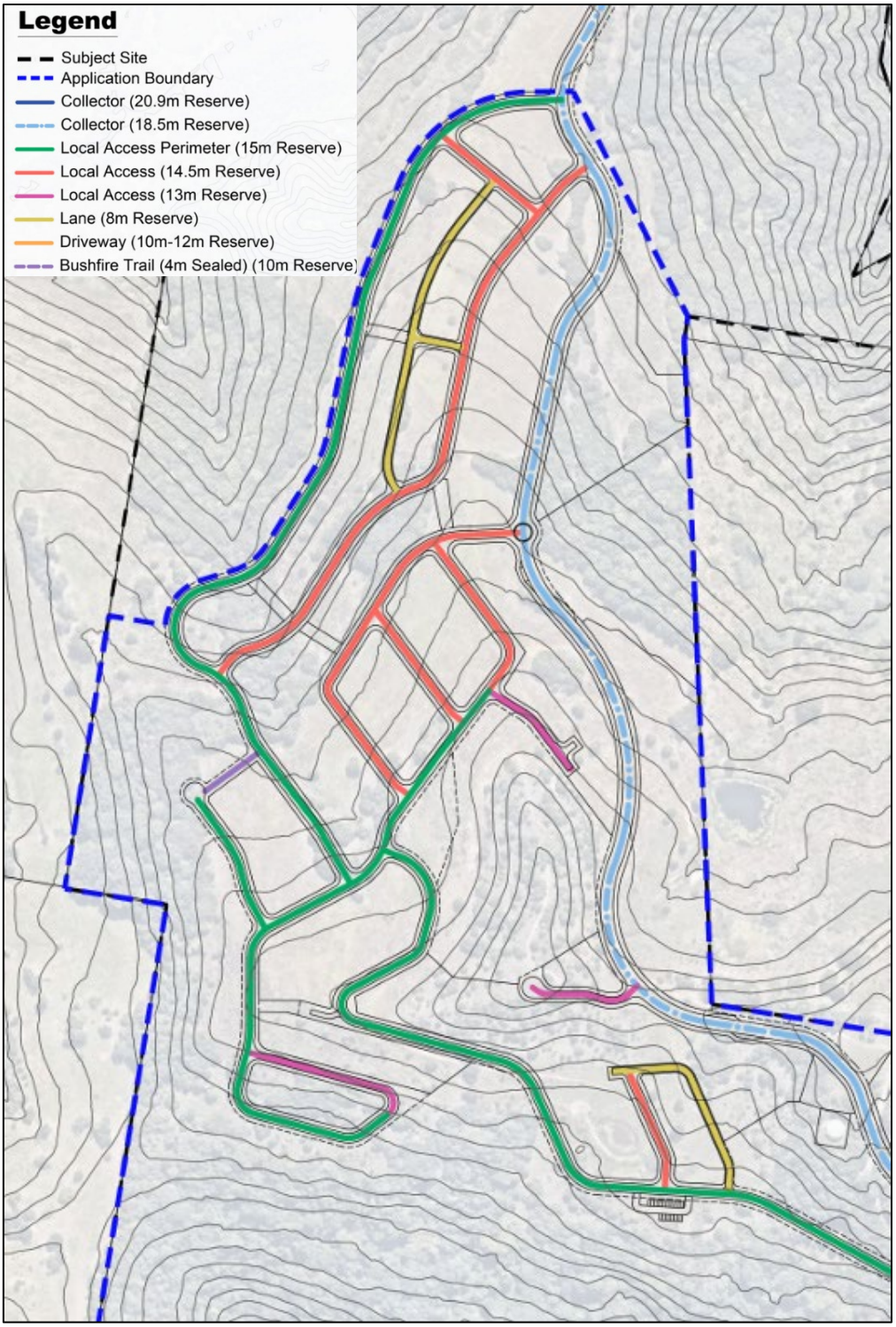


Figure 14: western area of the development site - road network

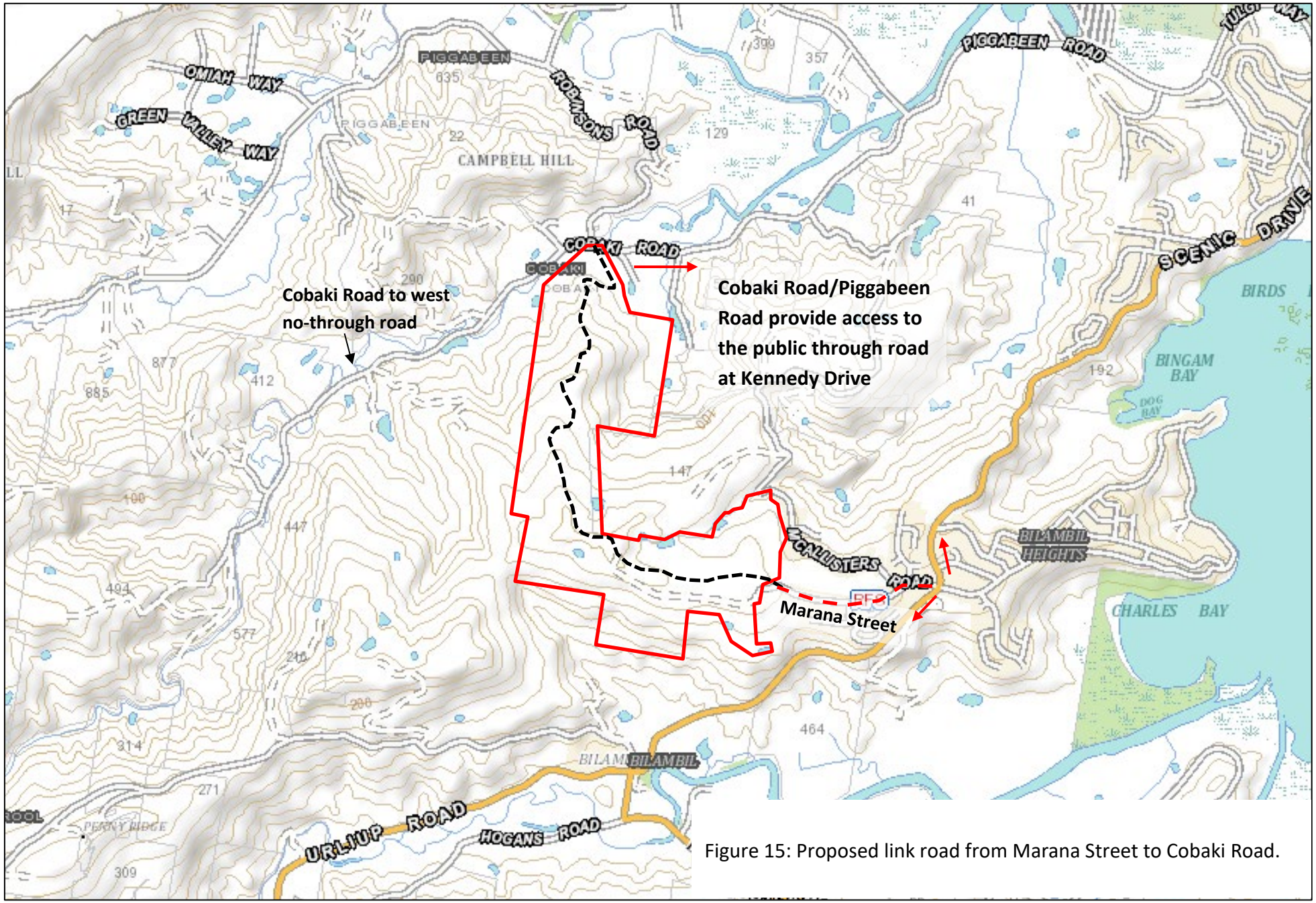


Figure 15: Proposed link road from Marana Street to Cobaki Road.

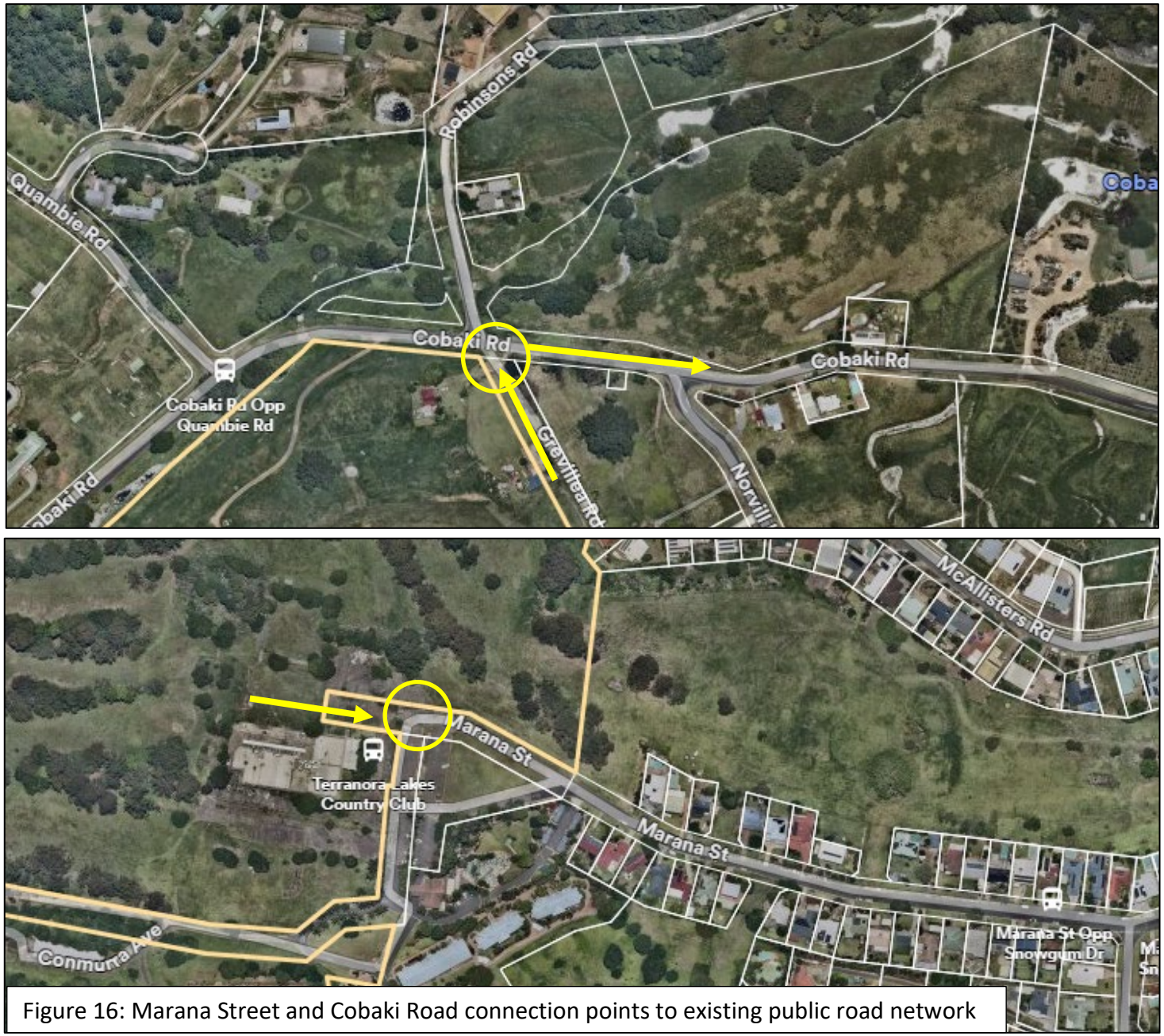


Figure 16: Marana Street and Cobaki Road connection points to existing public road network

Perimeter Roads

The subdivision is to comply with perimeter road acceptable solutions of PBP2019 Table 5.3b which requires perimeter roads between all lots and hazard vegetation. Plans to be amended to demonstrate compliance with the acceptable solutions for all proposed lots, except where a variation is proposed via a performance brief to the NSW RFS.

Consultation with NSW RFS via a bushfire design brief will be required for any variations to the acceptable solutions of Table 5.3b in relation to access requirements e.g. variation to perimeter road width, gradient, turning areas. As previously stated, the current approved concept plan had similar areas where perimeter roads were not provided.

This report also considers there is merit not to have perimeter roads in some locations due to topographical restrictions but also given they are generally adjacent to grassland or remnant rainforest areas requiring less fire brigade intervention to the hazard compared to forested areas with long fire runs threatening property and occupants.

The following matters are to be confirmed/addressed prior to issue of the final bushfire report for the future subdivision-

- Acceptable solutions of PBP2019 Table 5.3b require perimeter roads between all future lots and hazard vegetation. Plans to indicate compliance with acceptable solutions for future lots or a bushfire design brief in consultation with NSW RFS will be required to address the lack of perimeter roads in the locations identifed in Figure 17.

- The civil engineer is to confirm all requirements of Table 5.3b PBP2019 can be achieved including the minimum clear road widths measured kerb to kerb, with any parking areas located outside of the minimum clear width.

- The bushfire tracks will require consideration as a variation to perimeter road requirements, noting section 3.4.4 PBP 2019 which states that a bushfire trail is not a substitute for a road, nor is it considered an appropriate trade-off for the provision of perimeter, non-perimeter or property road access requirements. Consultation with RFS required.

Figure 17 identifies the location of the lots that have not been provided with a perimeter road, white box markup; with yellow mark-up indicating bushfire trails.

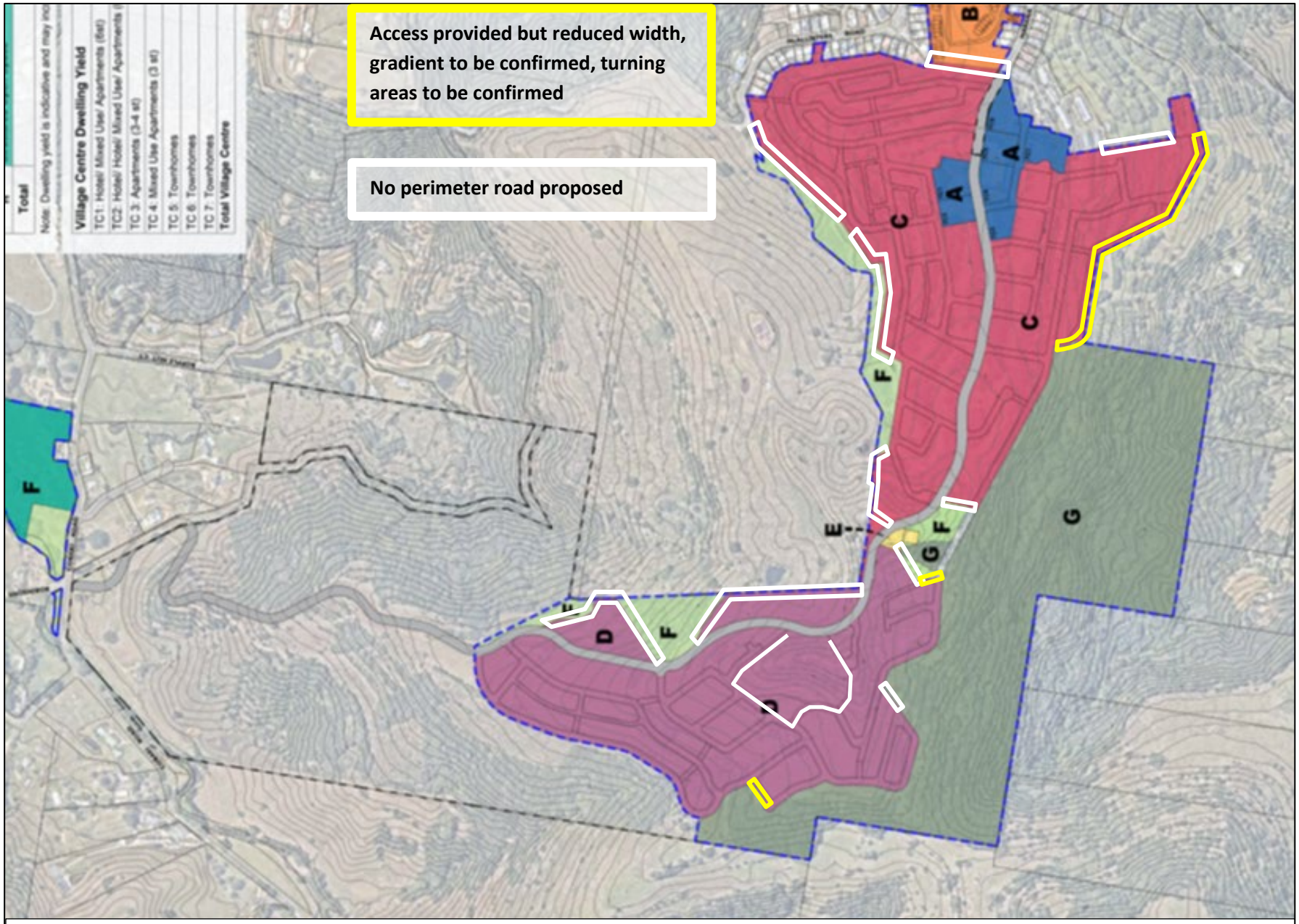


Figure 17: Location of areas with no perimeter road - white lines; and non-compliant perimeter road - yellow shape

Other Roads

The internal road network layout appears the have potential to meet the acceptable solution requirements of Planning for Bushfire Protection 2019. However, civil engineering design and traffic management report/s will need to include minimum unobstructed road widths and cul-de-sac inner radius requirements. Further details to be provided for turning areas at the end of dead ends including cul-de-sac design.

Property Access Road

The property access roads to future dwellings are to comply with Table 7.4a PBP2019, noting that allotments with building envelopes within 70m of the public road supporting street hydrants to AS 2419.1-2021 and within a maximum 70km/hr traffic zone do not need to comply. Further, consideration of property access road compliance will need to be considered once a fire hydrant design has been provided and road speed limits are known.

SFPP

PBP 2019 identifies a suite of bushfire protection measures for SFPP developments within Tables 6.8a, 6.8b and 6.8c. Table 2, 3 and 4 of PBP Addendum 2022 apply in addition to other requirements of PBP to the following Class 9 buildings located on Bushfire Prone Land- e.g.

- Hospitals
- Schools
- Childcare centre
- Residential care buildings

The acceptable solutions for the SFPP access roads to comply with Table 6.8 and Table 3 PBP Addendum 2022. Demonstration of compliance of PBP would need to be undertaken with the DA for any proposed SFPP development and any Class 9b buildings having a floor area greater than 500m^2. To be assessed with DA for specific building uses.

7.0 LANDSCAPING

Adequate management of landscaping is critical to the survivability of an asset and for occupant safety during a bushfire.

- Landscaping is to comply with Table 5.3a and Appendix 4 of PBP2019 (see attached Appendix A) and 'Standards for Asset Protection Zones' NSW RFS 2005;
- SFPP landscaping is to comply with Table 6.8a and Appendix 4 of PBP2019.
- Any proposed replanting must not put existing development at greater risk.
- Fencing is to comply with section 7.6 of PBP2019.

Disclaimer

This bushfire report was prepared for the purposes of assessing the proposed modified concept plan against the requirements of Planning for Bushfire Protection 2019 prior to a final bushfire report for submission with an integrated development application to Tweed Shire Council for a Bush Fire Safety Authority. The final report will relate to the proposed Elysian Heights residential and mixed-use subdivision as outlined in this report only and is not to be used for any other purpose or by any other person or Corporation.

The report is not to be construed as a complete assessment of civil, hydraulic, ecological or landscape plans. The report has been prepared to provide recommendations to inform design. BCA Check Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or Corporation who may use or rely on this report in contravention of the terms of this clause. The report is not to be used as an assessment tool for individual buildings, or for the purpose of determining bushfire protection measures pursuant to section 4.14 or 4.15 of the *EP&A Act 1979* or for complying development.

As identified in Planning for Bushfire Protection 2019 and the Building Code of Australia the report is to provide recommendations to reduce the risk of ignition and does not guarantee the complete protection of the building in the event of bush fire or that the building will not be adversely impacted upon.

Reporting has been based on the relevant Council and Rural Fire Service Guidelines however recommendations or suggestions given in this report are based on our site investigation at the time of reporting. In some cases site conditions may change dramatically within a few years due to rapid vegetation re-growth and invading weed species.

References

NSW Rural Fire Service and Planning NSW (2019) and Addendum 2022, *Planning for bushfire protection, A guide for councils planners fire authorities developers and homeowners.* Rural Fire Service NSW Australia.

Standards Australia, (2018), AS3959 *Construction of buildings in bushfire prone areas,* Australian Standards, Sydney.

Legislation

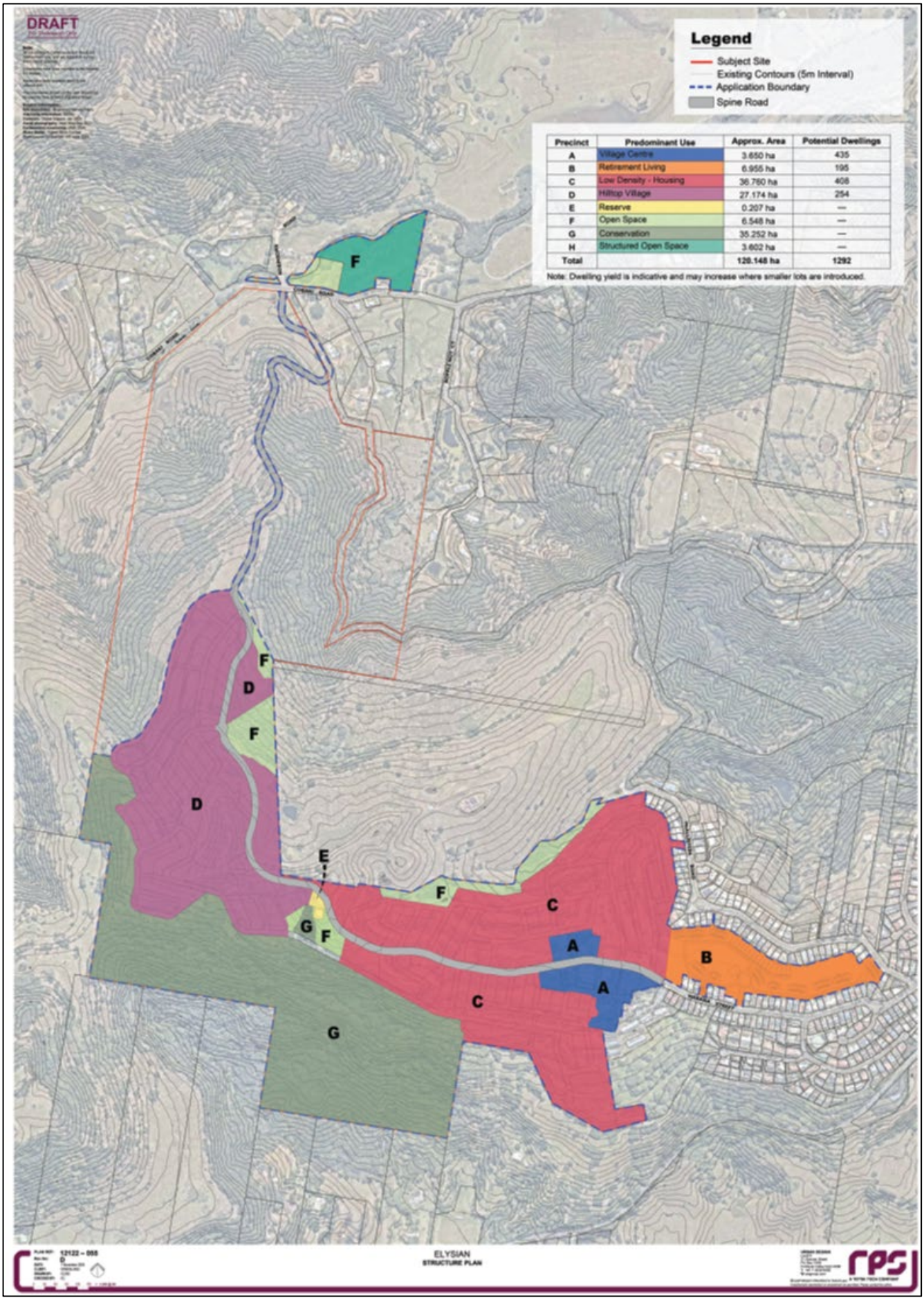
Environmental Planning and Assessment Act 1979 and Regulations 2021. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

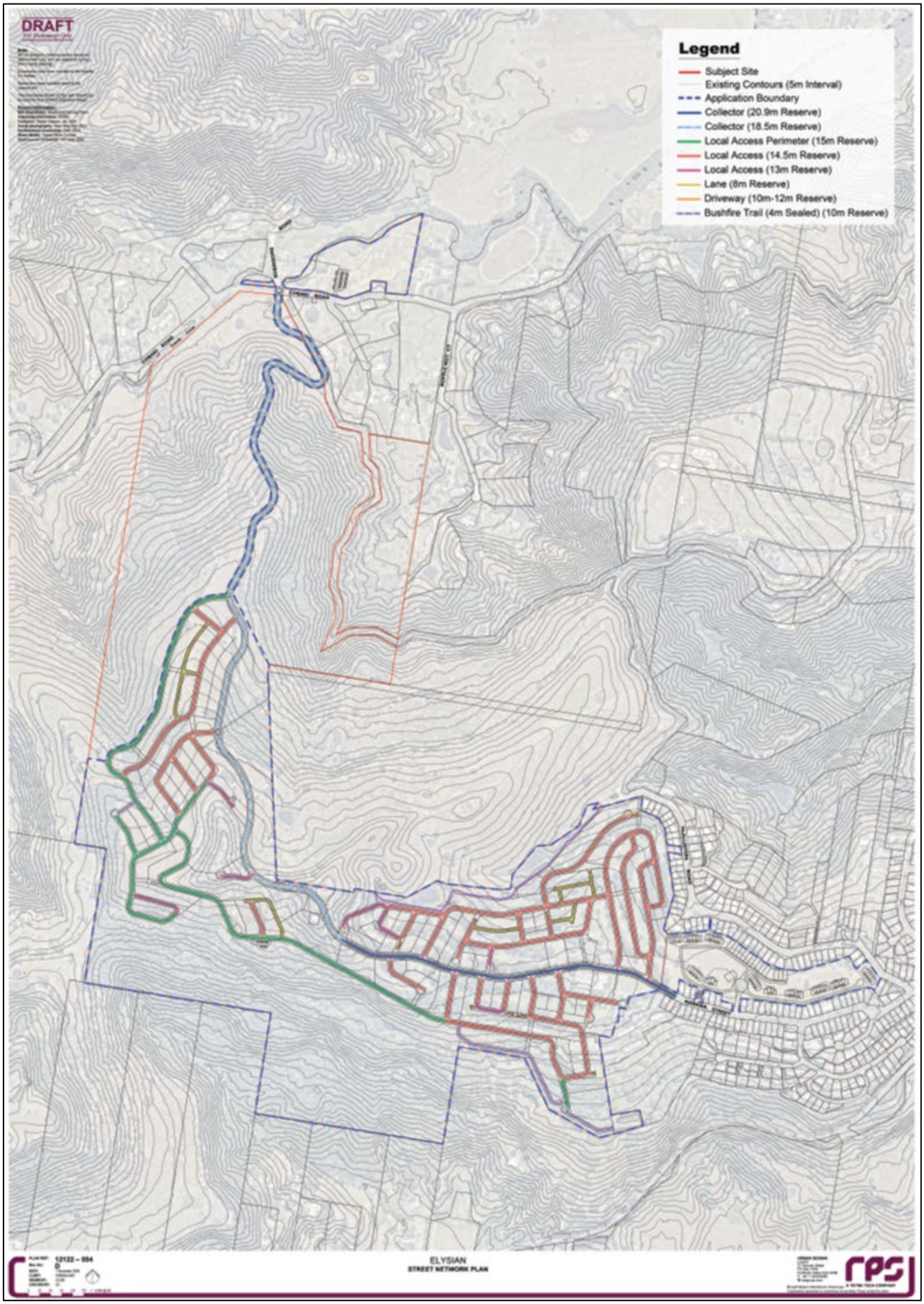
Rural Fires Act 1997. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

Rural Fires Regulation 2022. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

APPENDIX A:

Structure Plan - 12122-055 Rev D dated 1 November 2024
Street network plan - 12122-054 Rev D dated 1 November 2024


DRAFT
Legend
Subject Site
Existing Contours (5m Interval)
Application Boundary
Spine Road
Precinct | Predominant Use | Approx. Area | Potential Dwellings
A | Village Centre | 3.650 ha | 435
B | Retirement Living | 6.955 ha | 195
C | Low Density - Housing | 36.760 ha | 408
D | Hilltop Village | 27.174 ha | 254
E | Reserve | 0.207 ha | —
F | Open Space | 6.548 ha | —
G | Conservation | 35.252 ha | —
H | Structured Open Space | 3.602 ha | —
Total | | 120.148 ha | 1292
Note: Dwelling yield is indicative and may increase where smaller lots are introduced.
ELYSIAN
STRUCTURE PLAN


DRAFT
Legend
Subject Site
Existing Contours (5m Interval)
Application Boundary
Collector (20.9m Reserve)
Collector (18.5m Reserve)
Local Access Perimeter (15m Reserve)
Local Access (14.5m Reserve)
Local Access (13m Reserve)
Lane (8m Reserve)
Driveway (10m-12m Reserve)
Bushfire Trail (4m Sealed) (10m Reserve)
ELYSIAN
STREET NETWORK PLAN

APPENDIX B

Asset Protection Zone requirements - Appendix 4 PBP 2019

APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

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 defendable 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.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

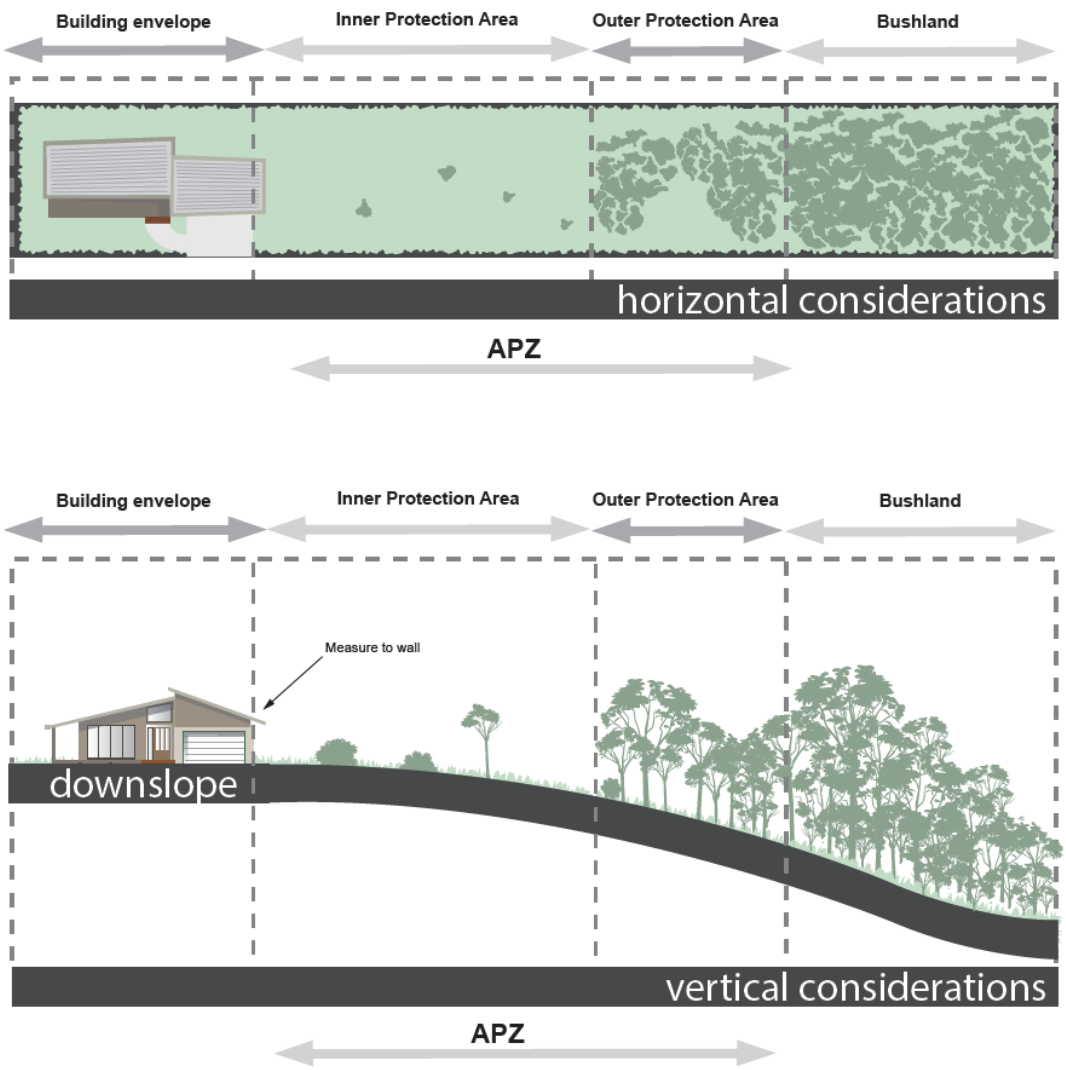
Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Figure A4.1

Typical Inner and Outer Protection Areas.



APPENDIX C:

Standards for Asset Protection Zones RFS 2005

standards

for asset protection zones

protection

NSW RURAL FIRE SERVICE

STANDARDS FOR ASSET PROTECTION ZONES

INTRODUCTION 3

WHAT IS AN ASSET PROTECTION ZONE? 3

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STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ 5

STEP 3. DETERMINE ASSET PROTECTION ZONE WIDTH 5

STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ 6

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PLANTS FOR BUSH FIRE PRONE GARDENS 10

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INTRODUCTION

For thousands of years bush fires have been a natural part of the Australian landscape. They are inevitable and essential, as many Australian plants and animals have adapted to fire as part of their life cycle.

In recent years developments in bushland areas have increased the risk of bush fires harming people and their homes and property. But landowners can significantly reduce the impact of bush fires on their property by identifying and minimising bush fire hazards. There are a number of ways to reduce the level of hazard to your property, but one of the most important is the creation and maintenance of an Asset Protection Zone (APZ).

A well located and maintained APZ should be used in conjunction with other preparations such as good property maintenance, appropriate building materials and developing a family action plan.

WHAT IS AN ASSET PROTECTION ZONE?

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

WHAT WILL THE APZ DO?

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset;
- damage to the built asset from intense radiant heat; and
- ember attack on the asset.

WHERE SHOULD I PUT AN APZ?

An APZ is located between an asset and a bush fire hazard.

The APZ should be located wholly within your land. You cannot undertake any clearing of vegetation on a neighbour's property, including National Park estate, Crown land or land under the management of your local council, unless you have written approval.

If you believe that the land adjacent to your property is a bush fire hazard and should be part of an APZ, you can have the matter investigated by contacting the NSW Rural Fire Service (RFS).

There are six steps to creating and maintaining an APZ. These are:

1. Determine if an APZ is required;
2. Determine what approvals are required for constructing your APZ;
3. Determine the APZ width required;
4. Determine what hazard reduction method is required to reduce bush fire fuel in your APZ;
5. Take measures to prevent soil erosion in your APZ; and
6. Landscape and regularly monitor in your APZ for fuel regrowth.

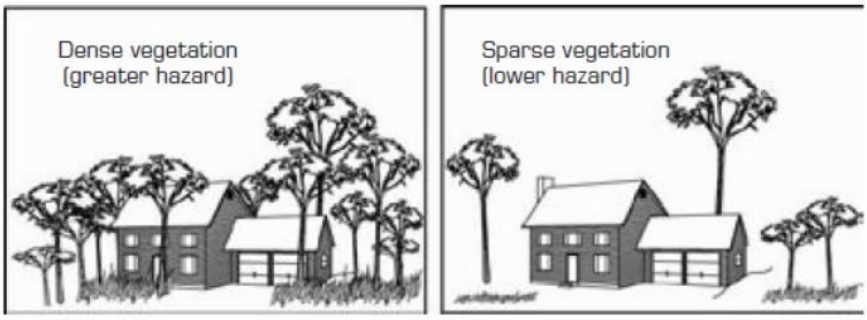
STEP 1. DETERMINE IF AN APZ IS REQUIRED

Recognising that a bush fire hazard exists is the first step in developing an APZ for your property.

If you have vegetation close to your asset and you live in a bush fire prone or high risk area, you should consider creating and maintaining an APZ.

Generally, the more flammable and dense the vegetation, the greater the hazard will be. However, the hazard potential is also influenced by factors such as slope.

- A large area of continuous vegetation on sloping land may increase the potential bush fire hazard.
- The amount of vegetation around a house will influence the intensity and severity of a bush fire.
- The higher the available fuel the more intense a fire will be.



4

Isolated areas of vegetation are generally not a bush fire hazard, as they are not large enough to produce fire of an intensity that will threaten dwellings.

This includes:

- bushland areas of less than one hectare that are isolated from large bushland areas; and
- narrow strips of vegetation along road and river corridors.

If you are not sure if there is a bush fire hazard in or around your property, contact your local NSW Rural Fire Service Fire Control Centre or your local council for advice.

STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ

If you intend to undertake bush fire hazard reduction works to create or maintain an APZ you must gain the written consent of the landowner.

Subdivided land or construction of a new dwelling
If you are constructing an APZ for a new dwelling you will need to comply with the requirements in *Planning for Bushfire Protection*. Any approvals required will have to be obtained as part of the Development Application process.

Existing asset
If you wish to create or maintain an APZ for an existing structure you may need to obtain an environmental approval. The RFS offers a free environmental assessment and certificate issuing service for essential hazard reduction works. For more information see the RFS document *Application Instructions for a Bush Fire Hazard Reduction Certificate* or contact your local RFS Fire Control Centre to determine if you can use this approval process.

Bear in mind that all work undertaken must be consistent with any existing land management agreements (e.g. a conservation agreement, or property vegetation plan) entered into by the property owner.

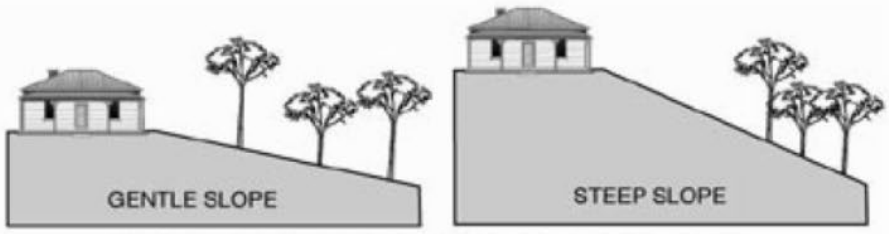
If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

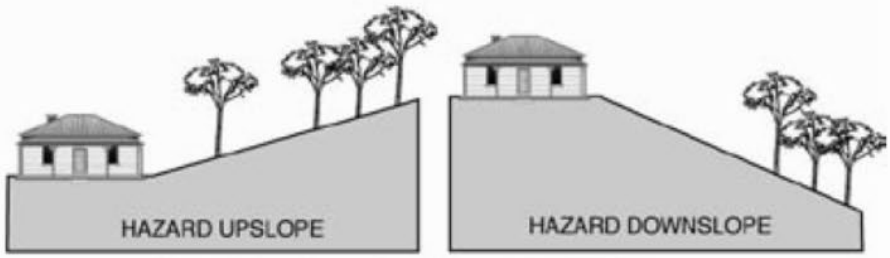
STEP 3. DETERMINE THE APZ WIDTH

The size of the APZ required around your asset depends on the nature of the asset, the slope of the area, the type and structure of nearby vegetation and whether the vegetation is managed.

Fires burn faster uphill than downhill, so the APZ will need to be larger if the hazard is downslope of the asset.



Gentle slopes require a smaller APZ distance than steep slopes



A hazard downslope will require a greater APZ distance then a hazard upslope of the asset

Different types of vegetation (for example, forests, rainforests, woodlands, grasslands) behave differently during a bush fire. For example, a forest with shrubby understorey is likely to result in a higher intensity fire than a woodland with a grassy understorey and would therefore require a greater APZ width.

A key benefit of an APZ is that it reduces radiant heat and the potential for direct flame contact on homes and other buildings. Residential dwellings require a wider APZ than sheds or stockyards because the dwelling is more likely to be used as a refuge during bush fire.

Subdivided land or construction of a new dwelling
If you are constructing a new asset, the principles of *Planning for Bushfire Protection* should be applied. Your Development Application approval will detail the exact APZ distance required.

Existing asset
If you wish to create an APZ around an existing asset and you require environmental approval, the Bush Fire Environmental Assessment Code provides a streamlined assessment process. Your Bush Fire Hazard Reduction Certificate (or alternate environmental approval) will specify the maximum APZ width allowed.

For further information on APZ widths see *Planning for Bushfire Protection* or the *Bush Fire Environmental Assessment Code* (available on the RFS website), or contact your local RFS Fire Control Centre.

STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ

The intensity of bush fires can be greatly reduced where there is little to no available fuel for burning. In order to control bush fire fuels you can reduce, remove or change the state of the fuel through several means.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide you with some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

Fuels can be controlled by:

1. raking or manual removal of fine fuels
Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire.

Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

2. mowing or grazing of grass
Grass needs to be kept short and, where possible, green.

3. removal or pruning of trees, shrubs and understorey
The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation.

Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.

Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

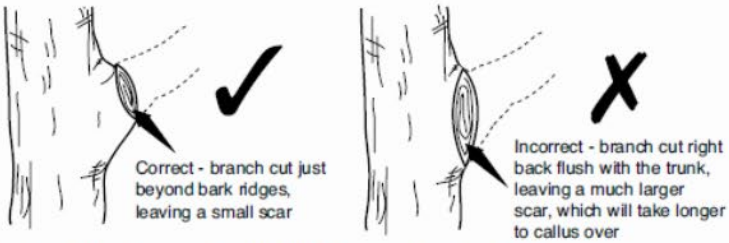
When choosing plants for removal, the following basic rules should be followed:

1. Remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at **www.agric.nsw.gov.au/noxweed/;**
2. Remove more flammable species such as those with rough, flaky or stringy bark; and
3 Remove or thin understorey plants, trees and shrubs less than three metres in height

The removal of significant native species should be avoided.

Prune in acordance with the following standards:

- Use sharp tools. These will enable clean cuts and will minimise damage to the tree.
- Decide which branches are to be removed before commencing work. Ensure that you maintain a balanced, natural distribution of foliage and branches.
- Remove only what is necessary.
- Cut branches just beyond bark ridges, leaving a small scar.
- Remove smaller branches and deadwood first.



There are three primary methods of pruning trees in APZs:

1. Crown lifting (skirting)
Remove the lowest branches (up to two metres from the ground). Crown lifting may inhibit the transfer of fire between the ground fuel and the tree canopy.

2. Thinning
Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning may minimise the intensity of a fire.

3. Selective pruning
Remove branches that are specifically identified as creating a bush fire hazard (such as those overhanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

Your Bush Fire Hazard Reduction Certificate or local council may restrict the amount or method of pruning allowed in your APZ.

See the *Australian Standard 4373 (Pruning of Amenity Trees)* for more information on tree pruning.

4. Slashing and trittering
Slashing and trittering are economical methods of fuel reduction for large APZs that have good access. However, these methods may leave large amounts of slashed fuels (grass clippings etc) which, when dry, may become a fire hazard. For slashing or trittering to be effective, the cut material must be removed or allowed to decompose well before summer starts.

If clippings are removed, dispose of them in a green waste bin if available or compost on site (dumping clippings in the bush is illegal and it increases the bush fire hazard on your or your neighbour's property).

Although slashing and trittering are effective in inhibiting the growth of weeds, it is preferable that weeds are completely removed.

Care must be taken not to leave sharp stakes and stumps that may be a safety hazard.

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5. Ploughing and grading
Ploughing and grading can produce effective firebreaks. However, in areas where this method is applied, frequent maintenance may be required to minimise the potential for erosion. Loose soil from ploughed or graded ground may erode in steep areas, particularly where there is high rainfall and strong winds.

6. Burning (hazard reduction burning)
Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

Any hazard reduction burning, including pile burns, must be planned carefully and carried out with extreme caution under correct weather conditions. Otherwise there is a real danger that the fire will become out of control. More bush fires result from escaped burning off work than from any other single cause.

It is YOUR responsibility to contain any fire lit on your property. If the fire escapes your property boundaries you may be liable for the damage it causes.

Hazard reduction burns must therefore be carefully planned to ensure that they are safe, controlled, effective and environmentally sound. There are many factors that need to be considered in a burn plan. These include smoke control, scorch height, frequency of burning and cut off points (or control lines) for the fire. For further information see the RFS document *Standards for Low Intensity Bush Fire Hazard Reduction Burning,* or contact your local RFS for advice.

7. Burning (pile burning)
In some cases, where fuel removal is impractical due to the terrain, or where material cannot be disposed of by the normal garbage collection or composted on site, you may use pile burning to dispose of material that has been removed in creating or maintaining an APZ.

For further information on pile burning, see the RFS document *Standards for Pile Burning.*

In areas where smoke regulations control burning in the open, you will need to obtain a Bush Fire Hazard Reduction Certificate or written approval from Council for burning. During the bush fire danger period a Fire Permit will also be required. See the RFS document *Before You Light that Fire* for further details.

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STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

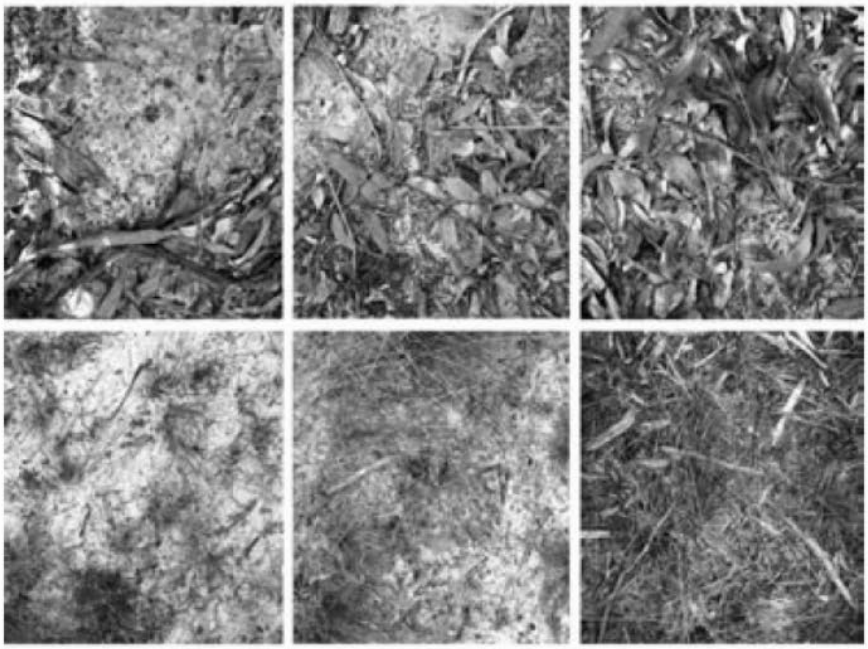
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

Soil erosion can greatly reduce the quality of your land through:

- loss of top soil, nutrients, vegetation and seeds
- reduced soil structure, stability and quality
- blocking and polluting water courses and drainage lines

A small amount of ground cover can greatly improve soil stability and does not constitute a significant bush fire hazard. Ground cover includes any material which directly covers the soil surface such as vegetation, twigs, leaf litter, clippings or rocks. A permanent ground cover should be established (for example, short grass). This will provide an area that is easy to maintain and prevent soil erosion.

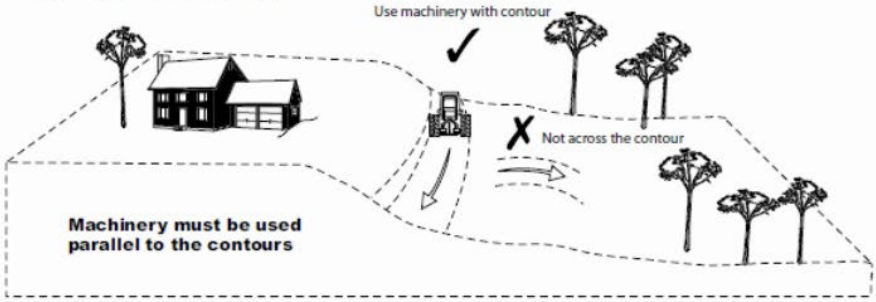
When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



50% **75%** **100%**

Ground Cover

To reduce the incidence of soil erosion caused by the use of heavy machinery such as ploughs, dozers and graders, machinery must be used parallel to the contours. Vegetation should be allowed to regenerate, but be managed to maintain a low fuel load.

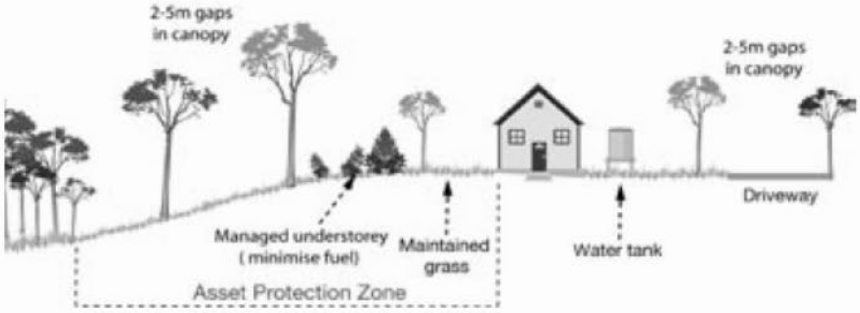


STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

Your home and garden can blend with the natural environment and be landscaped to minimise the impact of fire at the same time. To provide an effective APZ, you need to plan the layout of your garden to include features such as fire resistant plants, radiant heat barriers and windbreaks.

Layout of gardens in an APZ
When creating and maintaining a garden that is part of an APZ you should:

- ensure that vegetation does not provide a continuous path to the house;
- remove all noxious and environmental weeds;
- plant or clear vegetation into clumps rather than continuous rows;
- prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
- locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the dwelling;
- ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and
- avoid erecting brush type fencing and planting "pencil pine" type trees next to buildings, as these are highly flammable.



Removal of other materials
Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

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Other protective features
You can also take advantage of existing or proposed protective features such as fire trails, gravel paths, rows of trees, dams, creeks, swimming pools, tennis courts and vegetable gardens as part of the property's APZ.

PLANTS FOR BUSH FIRE PRONE GARDENS

When designing your garden it is important to consider the type of plant species and their flammability as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage the ground fire to spread up to, and then through, the crown of the trees.

Plants that are less flammable, have the following features:

- high moisture content
- high levels of salt
- low volatile oil content of leaves
- smooth barks without "ribbons" hanging from branches or trunks; and
- dense crown and elevated branches.

When choosing less flammable plants, be sure not to introduce noxious or environmental weed species into your garden that can cause greater long-term environmental damage.

For further information on appropriate plant species for your locality, contact your local council, plant nurseries or plant society.

If you require information on how to care for fire damaged trees, refer to the Firewise brochure *Trees and Fire Resistance; Regeneration and care of fire damaged trees.*

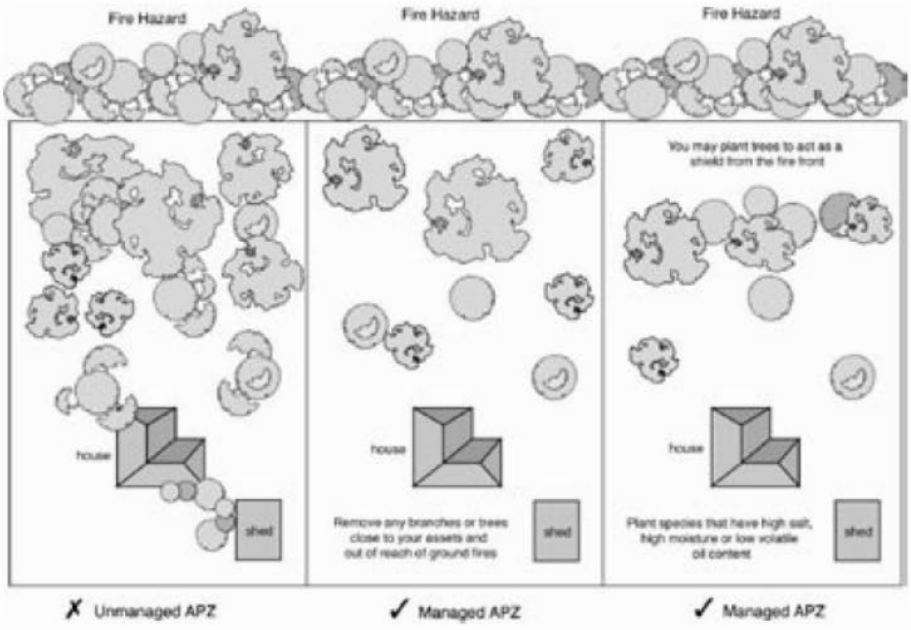
WIND BREAKS

Rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset.

You need to be aware of local wind conditions associated with bush fires and position the wind break accordingly. Your local RFS Fire Control Centre can provide you with further advice.

When choosing trees and shrubs, make sure you seek advice as to their maximum height. Their height may vary depending on location of planting and local conditions. As a general rule, plant trees at the same distance away from the asset as their maximum height.

When creating a wind break, remember that the object is to slow the wind and to catch embers rather than trying to block the wind. In trying to block the wind, turbulence is created on both sides of the wind break making fire behaviour erratic.



HOW CAN I FIND OUT MORE?

The following documents are available from your local Fire Control Centre and from the NSW RFS website at **www.rfs.nsw.gov.au.**

- Before You Light That Fire
- Standards for Low Intensity Bush Fire Hazard Reduction Burning
- Standards for Pile Burning
- Application Instructions for a Bush Fire Hazard Reduction Certificate

If you require any further information please contact:

- your local NSW Rural Fire Service Fire Control Centre. Location details are available on the RFS website or
- call the NSW RFS Enquiry Line 1800 679 737 (Monday to Friday, 9am to 5pm), or
- the NSW RFS website at **www.rfs.nsw.gov.au.**

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APPENDIX D:

Access Road Requirements Table 5.3b PBP2019 and Appendix 3 PBP2019

Perimeter roads, internal roads (non-perimeter), property access roads and vehicle turning area requirements

5.3.2 Access

Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

Table 5.3b

Performance criteria and acceptable solutions for access for residential and rural residential subdivisions.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ACCESS (GENERAL REQUIREMENTS)	› firefighting vehicles are provided with safe, all-weather access to structures.	› 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 and out of the development; › traffic management devices are constructed to not prohibit access by emergency services 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, 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 and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and › 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.
	› 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.
	› 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; › hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning*; and › there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.

Table 5.3b *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
PERIMETER ROADS	› access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	› are two-way sealed roads; › minimum 8m carriageway width kerb to kerb; › parking is provided outside of the carriageway width; › hydrants are located clear of parking areas; › are through roads, and these are linked to the internal road system at an interval of no greater than 500m; › curves of roads have a minimum inner radius of 6m; › the maximum grade road is 15 degrees and average grade of not more than 10 degrees; › the road crossfall does not exceed 3 degrees; and › a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
NON-PERIMETER ROADS	› access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	› minimum 5.5m carriageway width kerb to kerb; › parking is provided outside of the carriageway width; › hydrants are located clear of parking areas; › roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; › curves of roads have a minimum inner radius of 6m; › the road crossfall does not exceed 3 degrees; and › a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

Table 5.3b *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
PROPERTY ACCESS	❯ firefighting vehicles can access the dwelling and exit the property safely.	❯ There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. In circumstances where this cannot occur, the following requirements apply: ❯ minimum 4m carriageway width; ❯ in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay; ❯ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; ❯ provide a suitable turning area in accordance with Appendix 3; ❯ curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; ❯ the minimum distance between inner and outer curves is 6m; ❯ the crossfall is not more than 10 degrees; ❯ maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and ❯ a development comprising more than three dwellings has access by dedication of a road and not by right of way. Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.

APPENDIX 3

ACCESS

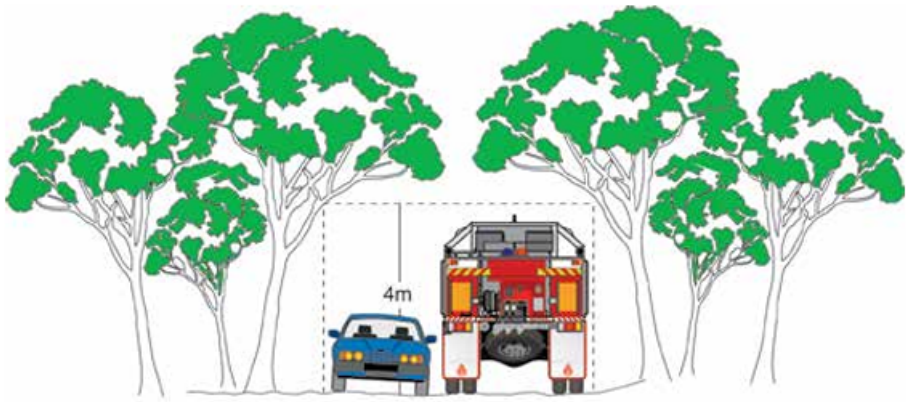
This appendix provides design principles for emergency service vehicle access.

A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

Figure A3.1

Vertical clearance.



A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

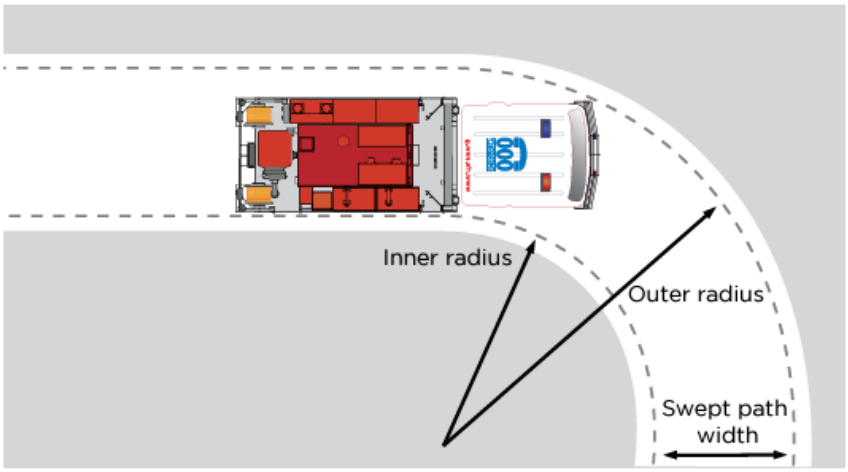
Table A3.2

Minimum curve radius for turning vehicles.

Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
> 100	2.5

Figure A3.2a

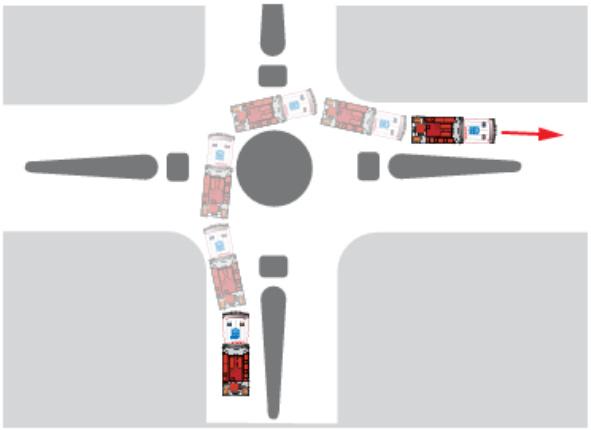
Swept path width for turning vehicles.



The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

Figure A3.2b

Roundabout swept path.



Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

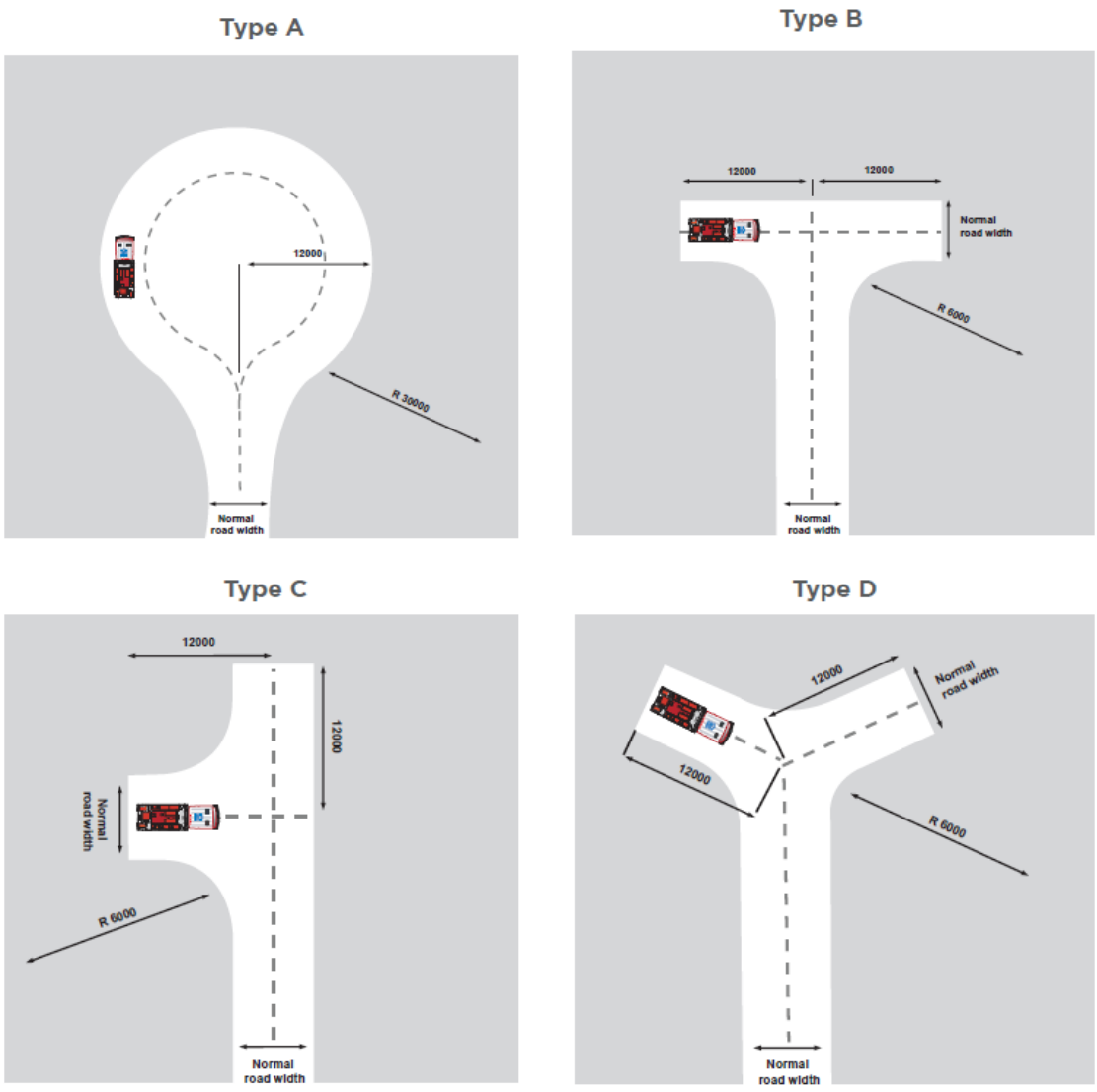
A3.3 Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. "No parking" signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.



A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.

A3.5 Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

Figure A3.5

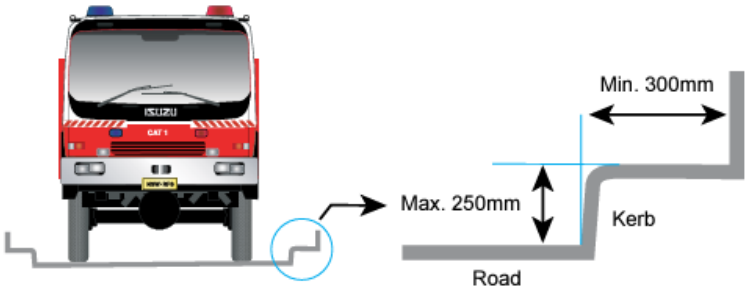
Hydrants and parking bays.

A3.6 Kerb dimensions

All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

Figure A3.6

Carriageway kerb clearance dimensions.



A3.7 Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bush fire threat where possible.

A3.8 Local Area Traffic Management (LATM)

The objective of LATM is to regulate traffic an acceptable level of speed and traffic volume within a local area.

Traffic engineers and planners should consider LATM devices when planning for local traffic control and their likely impact on emergency services. LATM devices by their nature are designed to restrict and impede the movement of traffic, especially large vehicles.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

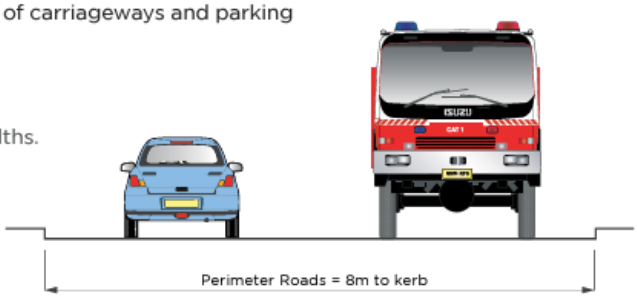
A3.9 Road types

A3.9.1 Perimeter Roads

Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.

Figure A3.9a

Perimeter road widths.

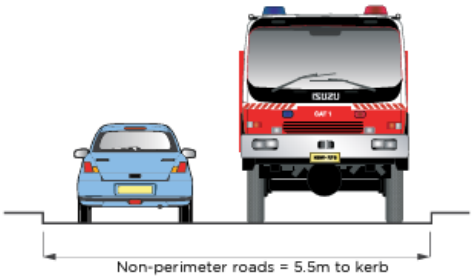


A3.9.2 Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.

Figure A3.9b

Non-perimeter road widths.



A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

Figure A3.9c

Property access road widths.

APPENDIX E:

Water, Electricity & Gas Supply Requirements (Table 5.3c only)

5.3.3 Services – Water, electricity and gas

Intent of measures: *to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.*

Table 5.3c

Performance criteria and acceptable solutions for water, electricity and gas services for residential and rural residential subdivisions.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
WATER SUPPLIES	adequate water supplies is provided for firefighting purposes.	reticulated water is to be provided to the development where available; a static water 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.
WATER SUPPLIES	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 2419.1:2005; 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.
WATER SUPPLIES	flows and pressure are appropriate.	fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.
WATER SUPPLIES	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.
ELECTRICITY SERVICES	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 of 30m, 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 *Guideline for Managing Vegetation Near Power Lines*.
GAS SERVICES	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 10m 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.