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BUSHFIRE STRATEGIC STUDY

REPORT PREPARED IN RELATION TO:	**PLANNING PROPOSAL AND RURAL SUBDIVISION**
PROPERTY DESCRIPTION:	**LOT 2 in DP 550362, 189 GAUDRON'S ROAD, SAPPHIRE BEACH.**
REPORT COMMISSIONED BY: (my Client)	**Mr Stephen Sawtell, Factor X Solutions.**
	DATE ISSUED: 25/08/2021

IMPORTANT NOTICE

Site inspections, and the results found herein, are carried out generally in accordance with the methodology as set out in the document ***"Planning for Bushfire Protection 2019"***, but also having regard for the wider 'reach' of the criteria set out for a Bushfire Strategic Study.

The results of the site inspections and their correlation with ***PBP-2019*** are based on information provided by the "Reference Documents" and information provided by the Client (or his/her agents). **Holiday Coast Bushfire Solutions Pty Ltd** will not be held liable for the omission to provide, or restrict access to, critical information (such as restrictions on property Title, easements, relevant consultant reports, etc) relevant to this development proposal.

The author of this Report, S. Ellis possesses industry-relevant qualifications including Graduate Diploma in Design for Bushfire Prone Areas (UWS) and Certificate 2 & 3 in Firefighting Operations and Certificate 4 in Firefighting Supervision.

VERSION	REVISION
1	Original
2	Amended following provision of Concept Access Plan (9/2/21), and comments provided by project Planner (1/7/21).
3	Finalised plan (29/7/21) showing indicative dwelling envelopes and BAL zones across site.

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GLOSSARY

Acceptable solution	Measures which have been deemed to meet the specified performance criteria.
Assembly point	An area or building/structure that is used to assemble people for evacuation or that have evacuated from a site in an emergency situation.
Asset protection zone (APZ)	A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required asset protection zone varies with slope, vegetation and Fire Danger Index (FDI).
Australian Standard AS 3959 (AS 3959)	AS 3959:2009 *Construction of buildings in bushfire-prone areas*, Standards Australia, 2009.
BAL certificate	A certificate issued to identify the bushfire attack level (BAL) of a proposed development in the Complying Development process under State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.
BFCC	Bush Fire Coordinating Committee
BFMC	Bush Fire Management Committee
Bushfire assessment report	A report submitted with the development application (DA) which establishes compliance with PBP. The report determines the extent of bushfire attack and the proposed mitigation measures. Appendix 1 sets out the information requirements for a bushfire assessment. See also clause 44 of the *Rural Fires Regulation 2013*.
Bushfire attack level (BAL)	A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. In the Building Code of Australia, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements.
Bushfire	An unplanned fire burning in vegetation; also referred to as wildfire.
Bushfire attack	Attack by burning embers, radiant heat or flame generated by a bushfire.
Bushfire hazard	Any vegetation that has the potential to threaten lives, property or the environment.
Bushfire prone land (BPL)	An area of land that can support a bushfire or is likely to be subject to bushfire attack, as designated on a bushfire prone land map.
Bushfire prone land map (BPLM)	A map prepared in accordance with NSW RFS requirements and certified by the Commissioner of the NSW RFS under section 10.3(2) of the *Environmental Planning and Assessment Act 1979*.
Bushfire protection measures (BPMs)	A range of measures (controls) used to minimise the risk arising from a bushfire. BPMs include asset protection zones (APZs), construction standards, suitable access, water and utility services, emergency management and landscaping.
Bushfire risk	Is the likelihood and consequence of a bushfire igniting, spreading and causing damage to assets of value to the community. Risk may be rated as being extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset.
BRMP	Bushfire Risk Management Plan
Bushfire safety authority (BSA)	An approval by the Commissioner of the NSW RFS that is required for a subdivision for residential or rural residential purpose or for a SFPP development listed under section 100B (6) of the *Rural Fires Act 1997*.
Certifying authority	As defined in the *Environmental Planning and Assessment Act 1979,* those with authority to issue Part 6 certificates and Complying Development Certificates (CDCs).
Complying development	Complying development is a combined planning and construction approval for straightforward development that can be determined through a fast track assessment by a council or private accredited certifier.
Consent authority	As defined in the *Environmental Planning and Assessment Act 1979*, in relation to development consents, usually the local council.
Defendable space	An area adjoining an asset that is managed to reduce combustible elements and is free from constructed impediments. It is a safe working environment in which active firefighting can be undertaken to defend the structure, before and after the passage of a bushfire.
Development	As defined in the *Environmental Planning and Assessment Act 1979*.
Development application (DA)	An application for consent to carry out development such as building, subdivision, or the use of a building or land. Applications are normally made to the local council.
Development footprint	The building envelope or area shown on a plan over which any buildings and associated asset protection zones may be constructed.

Ecologically sustainable development	As defined in section 6 of the *Protection of the Environment Administration Act (NSW) 1991*.
Effective slope	The land beneath the vegetation which most significantly affects fire behaviour, having regard to the vegetation present.
Exit	A doorway opening to a road or open space, as defined in the National Construction Code (NCC).
Fire Danger Index (FDI)	The chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects. Note: FDI in PBP refers to the Forest Fire Danger Index calculated by the McArthur Mk 5 Forest Fire Danger Meter using the equations published by Noble, I.R., Bary, G.A.V., and Gill, A.M., 1980. Grassland Fire Danger Index (GFDI) values are calculated by the McArthur Mk 4 Grassland Fire Danger Meter using the equations published by Purton, C.M., 1982.
Flame zone	The distance from a bushfire at which there is deemed to be significant potential for sustained flame contact to a building. The flame zone is determined by the calculated distance at which the radiant heat from the design fire exceeds 40kW/m^2.
Grasslands	Grassed areas capable of sustaining a fire. Under Australian Standard 3959, this is identified as low open shrubland, hummock grassland, closed tussock grassland, tussock grassland, open tussock, sparse open tussock, dense sown pasture, sown pasture, open herbfield, and sparse open herb field. Grass, whether exotic or native, which is regularly maintained at or below 10cm in height (including maintained lawns, golf courses, maintained public reserves, parklands, nature strips and commercial nurseries) is regarded as managed land.
Grassland deeming provision	An acceptable solution applying to properties in grassland hazard areas which replaces the site assessment procedure in AS 3959.
Infill development	Refers to the development of land by the erection of or addition to, a building (or buildings), which is within an existing allotment and does not require the spatial extension of services. Existing services may include public roads, electricity, water or sewerage.
Inner protection area (IPA)	The component of an asset protection zone which is closest to the asset (measured from drip line). It consists of an area maintained to minimal fuel loads so that a fire path is not created between the hazard and the building.
Integrated development	As referred to under s4.46 (formerly S91) of the *Environmental Planning and Assessment Act 1979*, an integrated development is one that requires development consent and approval from one or more government agencies, and is not a state significant development (SSD) or complying development.
Isolated development	Development which is located predominantly in native bushland or is considered to be within a remote area. Access and evacuation may be challenging due to distances that are required to be travelled through bushfire prone areas.
Local Environmental Plan (LEP)	An environmental planning instrument prepared under Part 3 of the *Environmental Planning and Assessment Act 1979*. Local environmental plans guide planning decisions and the ways in which land is used through zoning and development controls.
Managed land	Land that has vegetation removed or maintained to a level that limits the spread and impact of bushfire. It may include existing developed land (residential, commercial or industrial), roads, golf course fairways, playgrounds, sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries. Most common will be gardens and lawns within curtilage of buildings. These areas will be managed to meet the requirements of an asset protection zone.
National Construction Code (NCC)	The National Construction Code, published by the Australian Building Codes Board, comprising the Building Code of Australia as Volumes One and Two, and the Plumbing Code of Australia as Volume Three.
Outer protection area (OPA)	The outer component of an asset protection zone, where fuel loads are maintained at a level where the intensity of an approaching bushfire would be significantly reduced. Applies to forest vegetation only.
Performance-based solution	A method of complying with the Performance Criteria other than by an acceptable solution.
Primitive camping	A predetermined site which is part of a commercially operated venture where there may already be a site for a tent and a fire pit.

Setback	The distance required through planning provisions to separate a building from the bushfire hazard, street frontage or from adjacent buildings or property boundary.
Short fire run	A fire run which has a single point of ignition and a short distance to travel, where the calculated resultant head width is less than 100 metres.
Special fire protection purpose (SFPP) developments	Developments where the vulnerable nature of the occupants means a lower radiant heat threshold is required in order to allow the evacuation of occupants, and emergency services to operate in support of those occupants.
State Environmental Planning Policy (SEPP)	An environmental planning instrument prepared under Part 3 of the *Environmental Planning and Assessment Act 1979*.
Subdivision	As defined in the *Environmental Planning and Assessment Act 1979*.
Tourist accommodation	A building or place that provides temporary or short-term accommodation on a commercial basis including backpackers accommodation, bed and breakfast accommodation, farm stay accommodation, hotel or motel accommodation and serviced apartments.
Vegetation classification	Vegetation type identified using the formations and classifications within *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT (Keith, 2004).*

1.0 FRAMEWORK

Below are relevant extracts of the document "*Planning for Bushfire Protection 2019*" (*PBP*). Sections have been suitably modified to reflect the scope of this proposed development and its relationship with the relevant legislation.

1.1 Legal Framework

The Environmental Planning and Assessment Act 1979 (EP&A Act) and the *Rural Fires Act 1997* (RF Act) were amended on 1 August 2002 to enhance bushfire protection in the development assessment process.

The NSW land use planning framework provides, in broad terms, two main phases: strategic planning and development assessment.

PBP provides the foundation for the application of bushfire protection during both of these phases of development. Appropriate consideration of bushfire hazards at the strategic planning phase is required by the EP&A Act s.9.1(2) and PBP should be considered in applying the Section 9.1 Direction.

At the development assessment phase, development on land that is identified as being bushfire prone must comply with PBP. Some types of development on BPL can be undertaken as Complying Development and must also comply with PBP.

A bushfire safety authority (BFSA) is required from the NSW RFS for residential and rural residential subdivision and SFPP developments on BPL. An application for a BFSA must address the extent to which the development complies with PBP.

Building work on BPL must also comply with the requirements of the National Construction Code (NCC). The NCC contains the technical provisions for the design and construction of buildings. Under the Deemed to Satisfy provisions of the NCC, building work on BPL must comply with *Australian Standard 3959:2018 Construction of buildings in bushfire-prone areas* (AS 3959) or the *National Association of Steel Framed Housing (2014) Steel Framed Construction in Bushfire Areas* (NASH Standard). This does not apply however in Bushfire Attack Level - Flame Zone (BAL-FZ), or where modified by the specific conditions of the relevant development consent.

1.2 Bushfire Prone Land Mapping

The identification of Bushfire Prone Land in NSW is required under the EP&A Act s.10.3. BPL Maps provide the trigger for the various development assessment provisions.

The Commissioner of the NSW RFS designates what constitutes BPL and how it is to be mapped. Each council prepares a map in accordance with the guidelines and submits the map to the NSW RFS for certification by the Commissioner. These maps are required to be recertified at least every five years and the Commissioner may make direct changes to a BPL Map at any time.

Guidelines for the mapping of BPL can be found on the NSW RFS website at www.rfs.nsw.gov.au.

You can determine whether a site is mapped as being bushfire prone by referring to the BPL Map which is held by the local council, or on the NSW RFS website.

The BPL Map is a trigger for the consideration of BPL Maps for new development. It is not intended as a detailed measure of risk. The map does not form part of the site assessment process, which must be carried out in accordance with Appendix 1. A consent authority can refer a development application (DA) to the NSW RFS under the provisions of EP&A Act s.4.15, even where it is not mapped as BPL.

The subject property has been identified as BPL by the Coffs Harbour City Council's BPL map, an extract of which is provided below.

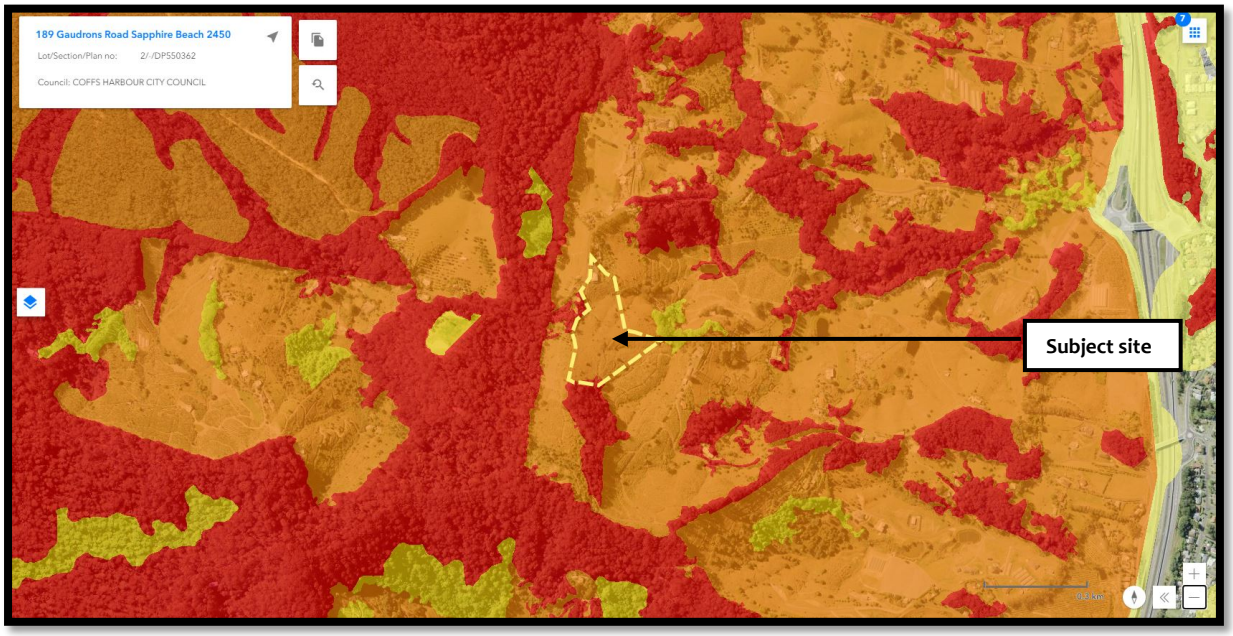

Figure 1: extract of CHCC's BPLM
(©NSW Crown Copyright – Department of Planning, Industry and Environment)

1.3 Strategic planning

Strategic planning is the preparation of planning instruments and policies and includes the making of Local Environmental Plans (LEPs), Development Control Plans (DCPs), housing strategies and other planning instruments that identify proposed uses and land zonings. This also includes any associated strategic proposals and studies.

The strategic planning phase of development is particularly important in contributing to the creation of safer and sustainable communities (COAG 2011). It is an effective way of achieving bushfire protection objectives in new developments.

Strategic bushfire planning and studies are needed to avoid high risk areas, ensure that zoning is appropriate to allow for adequate emergency access, egress, and water supplies, and to ensure that future compliance with this document is achievable.

The most important objective for strategic planning is to identify whether new development is appropriate subject to the identified bushfire risk on a landscape scale. An assessment of proposed land uses and potential for development to impact on existing infrastructure is also a key element of the strategic planning process in bushfire prone areas. Land use planning policies can be introduced to limit the number of people exposed to unacceptable risk.

Planning instruments and policies can ensure bushfire management principles are given appropriate consideration at all stages of the planning and development process.

Once development has been assessed as being appropriate in its bushfire prone context, it will need to be capable of complying with PBP. The ability of proposed land uses and associated future developments to comply with PBP will be assessed at the strategic planning stage. The expectation will be that the development will be able to comply with PBP at the DA stage.

1.4 Development assessment

The provisions of this document apply to all development on land which is bushfire prone (see section 2.2 of this document). This document may also apply where proposals are referred to the NSW RFS under other referral instruments such as EP&A Act s.4.15.

If a development of a type not specifically addressed in this document is proposed on BPL, the development must meet the Aim and Objectives of PBP and the consent authority can refer the proposal to the NSW RFS for advice. The NSW RFS will advise which specific standards apply to that development. In these circumstances, the development proposal will be a performance based solution and in more complex cases, this may be achieved collaboratively through the BFDB process.

The vast majority of DAs in NSW are assessed by local councils. Councils may assess DAs for certain developments on BPL that are compliant with this document without the need to refer the proposal to the NSW RFS.

In certain cases building work may not require development consent and can proceed through the Exempt or Complying Development process if the development type is covered by a State Environmental Planning Policy (SEPP) or the relevant LEP.

For further information on development types, please contact the local council or the NSW Department of Planning, Industry and Environment (DPIE).

1.4.1 Development requiring a BSA

Proposals for subdivision and SFPP development on BPL require an approval from the NSW RFS in the form of a BFSA under RF Act s.100B.

Development requiring a BFSA is considered Integrated Development under EP&A Act s.4.46.

The BFSA is critical in ensuring these key developments are designed and located in a manner that is suitable to protect human life and facilitate appropriate operational firefighting arrangements. This is a means by which the NSW RFS Commissioner fulfills their statutory obligation to ensure the protection of the community, including firefighters from the impacts of bushfire.

1.4.2 State significant development and infrastructure

In September 2011, EP&A Act pt. 3A was repealed, leading to the creation of two new major project development categories: state significant infrastructure (SSI) and state significant development (SSD).

Because of their size, complexity, importance and/or potential impact, DPIE is predominantly responsible for assessing these DAs. The Minister for Planning and Public Spaces is the consent authority for SSI and SSD applications.

Applications under the now-repealed Part 3A of the EP&A Act and state significant projects are exempt from requiring a BFSA and are not required to be assessed under EP&A Act s4.14.

Given the scale of SSI and SSD projects, the requirements of this document should still be applied, and seeking advice from the NSW RFS is encouraged. Even where comments have been provided by the NSW RFS at the strategic planning stage, future DAs may benefit from further advice from the NSW RFS.

1.4.3 Streamlining development assessment

The NSW Government has provided a pathway for streamlined assessment to occur under the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) cl.273 for new lots in Urban Release Areas (URAs) that are located on BPL.

The streamlining process allows the assessment of bushfire provisions at subdivision stage within URAs and may exempt the lots from reassessment of bushfire issues when land owners are ready to develop their lots. Post-Subdivision Bushfire Attack Level Certificates may be issued assigning BALs to all individual lots within the subdivision. An applicant can rely on this Post-Subdivision BAL Certificate for Complying Development up to and including BAL-29.

The option to use Complying Development also allows for a streamlined process for developing on BPL.

1.4.4 Infill and other development

The EP&A Act s.4.14 requires that the consent authority be satisfied that the relevant specifications and requirements of this document are complied with for development on BPL. This applies to any development other than subdivision of land that could lawfully be

used for residential purposes or development for a SFPP. This can be achieved by the following means:

a. the consent authority is satisfied that the development conforms to the specifications and requirements of PBP; or

b. the consent authority has been provided with a certificate by a person who is recognised by the NSW RFS as a qualified consultant in bushfire risk assessment stating that the development conforms to the relevant specifications and requirements; or

c. If the consent authority is satisfied that the development does not conform to the relevant requirements of PBP, it may still grant consent to the development but only after it has consulted with the Commissioner of the NSW RFS concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bushfire.

1.4.5 Exempt and Complying Development

Some straightforward residential, commercial and industrial development can be undertaken as Exempt or Complying Development under various SEPPs and LEPs.

Exempt Development is minor building works that can be carried out without development approval, such as decks, garden sheds, carports and fences.

Complying Development can be undertaken on lower risk BPL up to and including BAL-29 where the appropriate construction requirements and all other relevant development standards have been met. Complying Development is not permitted on higher risk BPL (BAL-40 or BAL-FZ) and a DA is required in these circumstances.

Specified development requirements and standards apply to new development, including alterations and additions, to ensure the relevant provisions of this document are met. This allows for Complying Development on BPL, while maintaining an appropriate assessment regime for managing bushfire risk.

In certain circumstances, a BAL Certificate must be obtained from the local council or a person recognised by the NSW RFS as a suitably qualified consultant in bushfire assessment, stating that the development is not located in BAL-40 or BAL-FZ.

The development must also meet the identified development standards within the relevant SEPP or LEPs.

1.5 Construction provisions: the National Construction Code (NCC) and bushfire standards

The NCC is a performance based code which comprises the Building Code of Australia (BCA) as Volumes 1 and 2 and the Plumbing Code of Australia as Volume 3.

The NCC contains Performance Requirements and Deemed-to-Satisfy provisions relating to the construction of buildings in bushfire prone areas. In NSW, these provisions apply to

Class 1, 2 and 3 buildings, Class 4 parts of a building, Class 9 buildings that are SFPPs, and associated class 10a buildings and decks.

The construction requirements of AS 3959 and the National Association of Steel-framed Housing (NASH) Standard are a Deemed-to-Satisfy solutions in the NCC, as varied in NSW, for buildings in designated bushfire prone areas.

1.6 Planning for Bushfire Protection

1.6.1 Aim and objectives

All development on BPL must satisfy the aim and objectives of Planning for Bushfire Protection (PBP).

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives are to:

- afford buildings and their occupants protection from exposure to a bushfire;
- provide for a defendable space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- provide for ongoing management and maintenance of BPMs; and
- ensure that utility services are adequate to meet the needs of firefighters.

1.6.2 Bushfire protection principles

Bushfire protection can be achieved through a combination of strategies which are based on the following principles:

- control the types of development permissible in bushfire prone areas;
- minimise the impact of radiant heat and direct flame contact by separating development from bushfire hazards;
- minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers;
- enable appropriate access and egress for the public and firefighters;
- provide adequate water supplies for bushfire suppression operations;
- focus on property preparedness, including emergency planning and property maintenance requirements; and
- facilitate the maintenance of Asset Protection Zones (APZs), fire trails, access for firefighting and on site equipment for fire suppression.

1.6.3 How to use PBP

Applications for development on BPL should include a bushfire assessment report. This report must demonstrate that the proposal satisfies the requirements of PBP. All applications must meet the Aim and Objectives of PBP.

PBP uses a performance based approach, and identifies objectives and detailed performance criteria to satisfy desired outcomes and meet the Aim and Objectives. Ultimately, any performance based approach must demonstrate that bushfire protection is afforded to a proposed development commensurate with the assessed level of bushfire risk and the characteristics of the occupants.

This can be achieved by either applying the identified acceptable solutions, or by preparing a performance based solution.

A performance based solution must be designed to achieve the appropriate level of protection by tailoring a package of measures which meet the intent and performance criteria relevant to the proposed development.

BPMs are set out in Chapter 3 of BPB. Performance criteria and acceptable solutions are shown for each specified development type in Chapters 5-8.

1.6.3.1 Bushfire protection measures

BPM's are the relevant specifications and requirements that need to be satisfied to improve life safety, property protection and community resilience to bushfire attack.

They include:

- APZs;
- Access;
- Construction, siting and design;
- Landscaping;
- Services; and
- Emergency and evacuation planning.

1.6.3.2 Intent

For each BPM, a broad intent is outlined. The ensuing performance criteria and acceptable solutions are designed to ensure that the general intent for each BPM is met.

1.6.3.3 Performance criteria

Performance criteria are the outcomes that need to be achieved to satisfy the intent. The performance criteria can be satisfied in one of the following ways:

- acceptable solutions; or
- performance based solution; or
- the combination of the above.

1.6.3.4 Acceptable solutions

Chapters 5-8 identify acceptable solutions which are considered by the NSW RFS as meeting the performance criteria.

1.6.3.5 Performance based solutions

Performance based solutions allow flexibility and innovation in responding to site-specific opportunities and constraints while still meeting the identified performance criteria. They also allow the consideration of a broad range of issues and information, including bushfire risk, community expectations, environmental protection and the application of new science, processes and technologies.

Performance based solutions must provide substantiated evidence and clearly demonstrate how the specific objectives and performance criteria are to be satisfied.

When performance based solutions are proposed, they will be assessed on their merits and individual circumstances. In these circumstances, a Bushfire Design Brief (BDB) process can be undertaken which would involve early agreement on the key elements and acceptance criteria from all stakeholders including the NSW RFS.

Performance based solutions may be undertaken for any of the BPMs detailed in Chapter 3 and supported in accordance with the submission requirements in Appendix 2 of PBP.

Figure 2: proposed subdivision (Ian G. Everson & Partners, 22/7/2020, Ref: 6511, 'D')

2.0 BUSHFIRE STRATEGIC STUDY

2.1 Bushfire Landscape Assessment

A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.

Some of the information provided below has been extracted from the Mid North Coast Bushfire Risk Management Plan (MNC BRMP). The aim of the MNC BRMP is to minimise the risk of adverse impact of bushfires on life, property and the environment. The objectives of the MNC BRMP are to:

- reduce the number of human-induced bush fire ignitions that cause damage to life, property and the environment;
- manage fuel to reduce the rate of spread and intensity of bush fires, while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment.

Chapter 4 of the MNC BRMP states that the Plan must be reviewed and updated within each successive five-year period from the constitution of the Bush Fire Management Committee. The BFMC will also review this plan as necessary to account for any changes in context or risk. This may be triggered by a range of circumstances, including but not limited to:

- changes to the BFMC area, organisational responsibilities or legislation;
- changes to the bushfire risk in the area; or
- following a major wildfire event.

The current Plan was signed by the Chairperson of the BFMC on 2/8/2017, and then 'signed off' by the Bush Fire Coordinating Committee on 23/5/2018, meaning that the BRMP is current at the time of preparing this Study.

2.1.1 The bush fire hazard in the surrounding area, including: Vegetation; Topography; Weather

2.1.1.1 Vegetation

The site is located on the east coast escarpment, overlooking the coastline to the north of Coffs Harbour. It occupies land previously used as banana plantation, which is consistent with the general landuse along the stretch of escarpment. Although many of the banana plantations are still in use, there are also large tracks of "scrubland" where banana plantations once existed but are now dominated by grasslands and shrubby weeds such as lantana. This type of vegetation occupies the majority of the subject site as well as most of the land adjoining to the east, south-east and west of the site. The Orara East State

Forest is located with 100 to the west of the site, extending west for approximately 10 km, while a small remnant of forest is located at the southern boundary of the site.

The forest vegetation is predominantly a mix of wet and dry sclerophyll forest. The gullies and southern slopes dominated by wet sclerophyll communities, and the northern slopes dominated by more sparsely-spaced structure of dry sclerophyll communities.

Embers and fire brands from the upslope forest fires have the potential to travel long distances, causing spotting well ahead of the main fire front(s). Fires occurring in grasslands tend to result in less ember attack.

The Orara East State Forest has been identified as an "Economic Infrastructure" in the MNC BRMP. This would be primarily due to the tourist attraction to the SF, however, plantation harvesting does occur within the SF with harvesting operations generally planned on a 35-year cycle.

2.1.1.2 Topography

Slopes on the development site and on the neighbouring lands are generally exceeding 20°, with only small sections of ridgelines having less than severe slopes. This is generally consistent with all of the coastal escarpment lands.

A slope analysis of the site, including 100 m beyond the site boundary, has been undertaken. This slope analysis has been conducted perpendicular to the site boundaries and has been used to determine the effective slope constraining the site.

Fires occurring in these areas have the potential to be high intensity fire events on the upslopes, however the subsequent downslope-running intensities would be much lower.

The steep nature of the topography can also create localised wind patterns that do not conform to the predicted predominant wind direction at that time.

2.1.1.3 Weather

The typical/average climate in the Mid North Coast BFMC area is sub-tropical, characterised by warm, wet summers, and the bushfire season generally runs from September to January.

The NSW statutory Bushfire Danger Period is from 1st October to 31st March each year, however it may vary due to local conditions. It is not unusual, however, for the NSW Rural Fire Service to commence early, or extend, the Bushfire Danger Period due to localised climatic conditions.

The extension of the Bushfire Danger Period is not necessarily the result from the expectation of the extreme bushfire weather conditions usually associated with mid-

summer, but rather is due to the weather conditions for these other periods being unusually warm or dry (or both) for that period of the year. The Bushfire Danger Period is the period within which permits must be obtained from the fire authorities for certain types of fires; it does not prohibit the lighting of fires. In the Mid North Coast BFMC area, the issuing of fire permits is not permitted from midnight 22nd December to midnight 5th January.

Prevailing weather conditions conducive to erratic bushfire conditions in the Mid North Coast BFMC area are strong west to north-west winds, accompanied by high temperatures and lower relative humidity.

Between 1994 – 2006 only 3 occurrences were recorded at the Coffs Harbour Bureau of Meteorology weather station where the FFDIs was ≥80, with all of these instances coinciding with a westerly wind influence (western quarter).

Table 1: *Occurrences at Coffs Harbour where FFDI was 80 or more (from 1994 to 2006)*

Date	FFDI	Wind Speed	Wind Direction	Rel. Humidity	Air Temp	DF Forest	DF Scrub	KBDI	Rainfall	Days Since Rain
27/9/2003	87.3	46.4	260 (W)	7.1	32.9	10	12	151	0	14
2/1/2002	83.7	38.9	300 (NW)	8.3	39	9.7	10	151	0	2
12/1/2002	112.1	42.5	270 (W)	6.8	42.7	10	12	167	0	2

2.1.2 Potential Bushfire Behaviour (based on vegetation, topography, weather)

Refer to 2.1.4 below.

2.1.3 Bushfire History in the Area

A request has been made to the NSW Rural Fire Service for the supply of any relevant wildfire history for the general vicinity of the subject site. The information requested has not been provided before the completion of this Study.

The Mid North Coast BFMC area has on average 185 bushfires per year, of which two on average can be considered to be major fires. The main sources of ignition in the Mid North Coast BFMC area are:

- Escaped private hazard reduction burns;
- Lightning strikes;
- Arson.

2.1.4 Potential Fire Runs and their Intensities

Potential fire runs through consistent vegetation forms are the longest from east-to-west. This is through grassland landscape associated with scattered rural-living development and disused banana plantations. Slopes from this exposure are generally +20° downslope.

Wildfires from this direction could impact on the site with intensities much lower than those modelled by *PBP-2019* (i.e., FFDI of <80). The frequency of days with FFDIs of ≥80 are low, with only 3 recoded occurrences at the Coffs Harbour Bureau of Meteorology weather station between 1994 – 2006. None of these instances occurred under an easterly wind influence.

From the north the vegetation formation is similar to the east, however slopes from this exposure are generally across-slope, from a landscape perspective. A more detailed slope analysis is provided later in this Report.

From the south the vegetation formation comprises a remnant of *dry sclerophyll forest* with slopes being generally across-slope, from a landscape perspective. A more detailed slope analysis is provided later in this Report. This remnant is partially connected with forest vegetation further south and west of the subject site.

Wildfires from the west pose the biggest threat and risk to this site, due to the vegetation formations and frequency of poor wildfire weather conditions. The potential fire run directly to the subject site from the west is through grasslands, with a potential fire run distance of <100 m. Further west is the wet and dry sclerophyll forest within the Orara East State Forest. Slopes in this direction vary, but from a landscape-assessment perspective they are generally across contours.

2.1.5 The difficulty in Accessing and Suppressing a Fire, the Continuity of Bushfire Hazards or the Fragmentation of Landscape Fuels and the Complexity of the Associated Terrain

The continuity of the bushfire hazards does not pose any specific substantial difficulty in suppressing wildfires in the vicinity. The mosaic nature of the existing rural-living development actually provides a separation in bushfire fuels which benefit suppression activities.

Due to the steep nature of the landscape in the vicinity of the subject site, emergency vehicle access to properties is problematic. Gaudron's Road is narrow, winding, and power and telecommunication wires hang low over the road. Driveways generally enter the public road system from only one direction (to the east), and fire truck access onto the individual properties beyond the established APZs is almost non-existent. Rudimentary tracks, remnants of the banana plantation operations, provide limited safe firefighting vehicle access to large tracts of the landscape.

Vehicle access west from Gaudron's Road is via gravel roads and fire trails. These trails have been identified in the MNC BRMP, and are subject to inspections and maintenance by the land manager (Forestry Corporation NSW).

Access into the State Forest in order to carry out firefighting activities would be ideally done only after plantation harvesting within the SF. The large cleared areas provide a

significantly saver environment than if no recent harvesting had occurred. Recent experiences (Canberra, Jan 2003; Kian Road, Oct-Nov 2019) have resulted in an acceptance that terrain can severely hamper firefighting operations (extinguishment). A single-point ignition (such a from a lightning strike) in a similarly contoured landscape can be difficult to extinguish by ground-crews, resulting in a gradual fire spread over days or weeks. Larger established wildfires, during extreme fire weather conditions, pose a firefighter safety risk.

The proper maintenance of the fire trail network could aid in the preparation and undertaking of hazard reduction burning, should that be deemed appropriate depending on the life-cycle of the plantation at that point in time. However, as previously stated, accessing these steep areas during a wildfire event is not only problematic and requires a thorough risk assessment, it does not provide any degree of certainty that fire containment and extinguishment could occur.

The MNC BRMP identifies a large "Strategic Fire Advantage Zones" (SFAZ) to the north-west of the subject site. This SFAZ provides limited benefit to the subject site due to the distance between the site and the SFAZ.

2.2 Land Use Assessment

The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.

2.2.1 The risk profile of different areas of the development layout based on the above landscape study

The following comment is extracted from the project Planner's Report.

> *The Planning Proposal does not involve business, industrial or employment land zones or land uses, however it will have a positive community benefit in terms of providing for land for housing in the Sapphire locality.*

The following plan shows the development footprints, or indicative dwelling envelopes, in relation to boundaries and proposed road infrastructure. The bushfire attack level (BAL) across the site has been shown on the plan. The indicative DEs are shown to be located within either BAL-29, BAL-19, or BAL-12.5 areas.

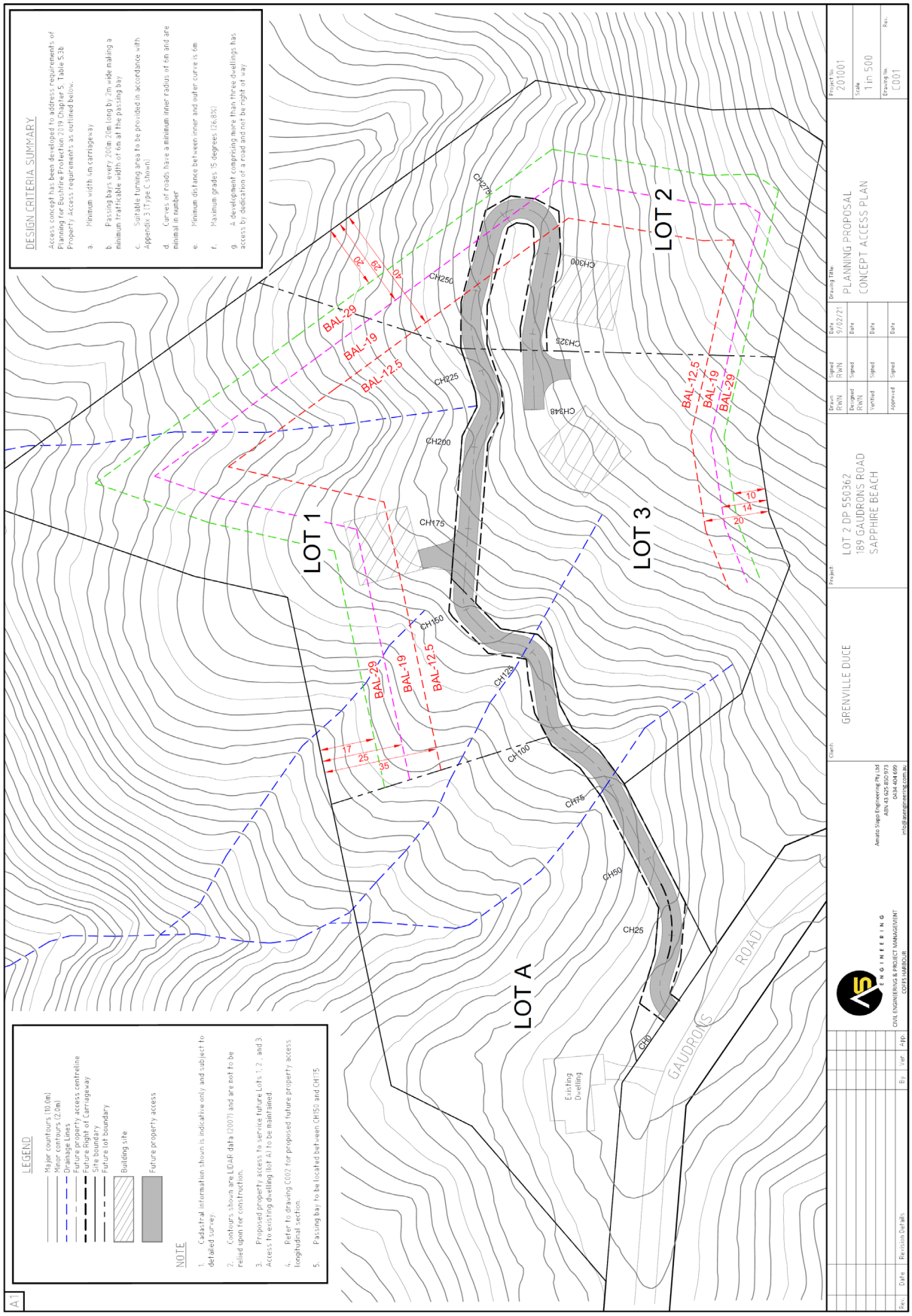

Figure 3: plan identifying BAL zones across indicative DEs (Amato Slapp Engineering Pty Ltd, 29/7/21)

2.2.2 The proposed land use zones and permitted uses

The following comments are extracted from the project Planner's Report.

> *We are rezoning the land from rural to R5 Large Lot Residential. The R5 zone has a limited range of residential accommodation that is permissible. It is a very low density zone. Only Dwellings, Attached Dual Occs and Secondary dwellings are permitted. This means that there will not be a significant increase in the number of dwellings at risk as a result of the rezoning.*

> *This report has been prepared to support a proponent funded Planning Proposal application to amend Coffs Harbour LEP 2013. The land is within a rural residential candidate area first identified in 2009 in the Coffs Harbour City Rural Residential Strategy (RRS) 2009 and is identified in Chapter 6 Large Lot Residential of the Coffs Harbour Local Growth Management Strategy (LGMS) to 2040.*

> *Increasing the density of the land is considered to be a 'quick win' in terms of providing land for housing within the footprint of a well-established rural residential area. Minor proposals such as this one, meet compact city objectives and reduce pressure for development of outlying rural areas.*

2.2.3 The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site)

Refer to 2.2.1 and 2.2.2 above.
The site is constrained topographically, that is to say that the only developable land on the site all slopes to the east. A ridgeline is located adjacent to the western boundary of the site and the dwelling envelopes have been located clear of this area.

Council's LEP provides:

> **Zone R5 Large Lot Residential**
> **1 Objectives of zone**
> · To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality.
> · To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future.
> · To ensure that development in the area does not unreasonably increase the demand for public services or public facilities.
> · To minimise conflict between land uses within this zone and land uses within adjoining zones.
> **2 Permitted without consent**
> Building identification signs; Extensive agriculture; Home-based child care; Home occupations
> **3 Permitted with consent**
> Animal boarding or training establishments; Bed and breakfast accommodation; Bee keeping; Boat launching ramps; Business identification signs; Camping grounds; Cellar door premises; Centre-based child care facilities; Community facilities; Dual occupancies (attached); Dwelling houses; Eco-tourist facilities; Emergency services facilities; Entertainment facilities;

Environmental facilities; Environmental protection works; Farm buildings; Farm stay accommodation; Flood mitigation works; Group homes; Home businesses; Home industries; Horticulture; Information and education facilities; Jetties; Kiosks; Neighbourhood shops; Oyster aquaculture; Places of public worship; Pond-based aquaculture; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Research stations; Respite day care centres; Restaurants or cafes; Roads; Roadside stalls; Self-storage units; Tank-based aquaculture; Veterinary hospitals; Water recreation structures; Water storage facilities

4 Prohibited

Any development not specified in item 2 or 3

The BPMs from *PBP-2019* that are applied to home-based child care are commensurate with the "*residential*" requirements rather than the *Special Fire Protection Purpose* requirements. Therefore, the fact that home-based child care can occur on the lots without consent, the RFS views this type of occupancy in the same light as normal single-dwelling residential use (with the exception that a *Bushfire Emergency Response Plan* needs to be prepared for home-based child care premises).

The plan provided above as Figure 3 demonstrates that that this D-t-S provision of *PBP-2019* has been satisfied. This is discussed in further detail in Section 3.1.1 of this Report.

2.2.4 The impact of the siting of these uses on APZ provision

As a residential subdivision, only residential-sized APZs will be provided between the proposed dwelling envelopes (DE) and the property boundaries. The plan provided above as Figure 3 demonstrates that that this D-t-S provision of *PBP-2019* has been satisfied. This is discussed in further detail in Section 3.1.1 of this Report.

Due to the steep nature of the site, some of the APZs on the site will be created over land that exceeds 20° slope. In these instances the APZ will be created and maintained in accordance with a *Vegetation Management Plan* developed for the site, as well as meeting the objectives for APZs set out in various NSW Rural Fire Service documents. This will be addressed in more detail at Section 3.1.1 of this Report.

It would not be unreasonable to expect that all of the land within the proposed new lots is to be managed in a bushfire-hazard-reduced state. Rather than complying with inner protection area (IPA) standards of an APZ, those parts of the lots that are outside of the required APZ should be managed as part of the APZ, to outer protection area (OPA) standards.

Concerning the ultimate use of the site and its land; if not rezoned to higher residential densities, it is most unlikely that any form of land use or horticulture would be implemented. Accordingly, the site could become unmanaged and eventually invasive vegetation such as Camphor Laurel, Lantana and other persistent wild grasses will take over this land. On the other hand, allowing residential intensification with associated landscape management, will assist in mitigating the above and potential fire risk hazards.

2.3 Access and Egress

A study of the existing and proposed road networks both within and external to the masterplan area or site layout

2.3.1 The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile

The proposed internal road will comply with nearly all of the D-t-S provisions (*Acceptable Solutions*) of *PBP-2019*.

The proposed new road will not form a perimeter road. It will be located centrally to allow the greatest ease of access for vehicles entering / exiting the proposed new lots, and located as close as possible to each of the proposed indicative dwelling envelopes. The location and alignment of the proposed new road will enable the lowest gradient possible, providing a safer entry / exit path. The CHCC development standards for roads will also be met. A perimeter road would be impractical for the scope and scale of the proposed development.

Only 3 lots access the proposed new road. The access for the existing dwelling on lot 2//550362 remains unchanged from the current arrangements.

The road is not a through-road, and has a length of approximately 330m. A 24 m diameter turning circle, or manoeuvring area meeting the specifications of Appendix 3 of *PBP-2019*, will be provided at the end of the proposed new road. This will be verified by civil engineering plans being prepared at the time of preparation of this Report.

The proposed new road will be aligned to avoid areas of forest, woodland or heath vegetation, and will be bordered by APZs along its entire length.

Secondary access to Gaudron's Road is not provided as the site's road frontage is relatively narrow, and no material benefit would be achieved by providing an additional access point.

The road surface, and any bridge constructed over drainage channels, will be capable of carrying loads in excess of a fully-loaded Category 1 firefighting tanker.

Where pressure and flows from the proposed static water supply are not commensurate with AS 2419.1:2005 standards, suitable access will be provided to within 4m of a firefighting water supply (or the access point to it). This access point will be located between 5 m and 20 m from the future dwellings on the proposed lots.

The proposed new road will have a minimum width of 5.5 m and parking on the road will be either prohibited, or parking areas will be provided in addition to the 5.5 m road width. A 4 m vertical clearance to overhead obstructions will be maintained. Curves will have a minimum inner radius of not less than 6 m. The cross-fall of the road pavement will not exceed 3°.

Where fire truck access is required on to a new lot, property access roads (driveways) will meet the following standards:

- minimum 4m carriageway width;
- a minimum vertical clearance of 4m to any overhanging obstructions;
- provide a suitable turning area in accordance with Appendix 3 of *PBP-2019*;
- 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 cross-fall is not more than 10°;
- maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads.

2.3.2 The location of key access routes and direction of travel

Primary access to the site is currently from the east via Gaudron's Road. Any access from the west would be via the gravel road and fire trail network from within Orara East State Forest.

The "Gaudron's Road" route is approximately 2 km in length and is a bitumen-sealed, minor two-way rural road. It services approximately 40 properties between the Pacific Motorway and the subject site.

The alternative access route to the site is from the west via Orara East State Forest. Vehicles using this route would most likely be recreational four-wheel-drivers or tourist traffic visiting the SF and surrounds. Access to / from the west should be avoided during a bushfire emergency event in the area.

2.3.3 The potential for development to be isolated in the event of a bush fire

The main development along Gaudron's Road is rural-living or small-scale agriculture. This has resulted in a large majority of the road frontage being exposed to a 'grassland' or 'managed land' use.

There are small remnants of native vegetation fronting the road. Fires occurring in these remnants would be from spot-ignitions associated with escaped hazard-reduction burns (such as pile burns), or arson, or spotting from fires elsewhere. The chance of these events blocking the public road would be low given the shorter fire-run distances associated with remnants.

Wildfires occurring in unmanaged grassland environments have the potential to burn with high intensities (given the steep slopes) however the flaming residence time in grasslands

is much shorter than in forest-type vegetation. Again, the chances of these fires blocking the public road would be low.

2.4 Emergency Services

An assessment of the future impact of new development on emergency services.

2.4.1 Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades

As more of the unmanaged grasslands or disused banana plantations are developed, the amount of land able to support a wildfire is reduced. It could quite possibly be the case that developments such as these provide a benefit to surrounding areas. I would doubt that there would be a dataset available that quantifies this, however.

There may be a perception that this development may pose an increase in demand on the existing fire services, particularly in relation to wildfire events. I think this would be a misconception based on the fact that although the development creates an increase in the total number of properties within the Gaudron's Road precinct, the resulting development would be more bushfire-resilient than much of the existing development in the same area.

The whole idea of adopting *PBP-2019* as a planning tool is to help create a system that places the onus of bushfire-protection on the individual lots being created. Vehicle access is adequate for an emergency response to each asset on the site, each lot has ready-access to a firefighting water supply, buildings are constructed to withstand the adverse affects of wildfires, and landscaping and APZs have been properly designed and maintained. The result of this is that the development site is more bushfire-resilient than the existing development on the same interface area, and therefore actually less reliant on the fire services.

Although the site is currently within a Rural Fire district, it is possible that over time as more similar land is developed (either through rezoning, subdivision or infill development) that the western side of the Pacific Motorway will be included in the Fire & Rescue NSW fire district, as has been the case on the eastern side of the Pacific Motorway. This would occur when representatives from both of the fire services routinely meet to negotiate on Fire District boundary changes.

The local Fire & Rescue NSW fire station in Coffs Harbour is a station with permanent (full-time) and retained (on-call) staffing, providing "24/7/365" response to emergencies. It is unlikely that this development would pose an increase in demand for this station, or the neighbouring Woolgoolga or Sawtell stations.

There are several NSW Rural Fire Service brigades located between Coffs Harbour and Woolgoolga, including Korora and Moonee Beach brigades. These brigades are volunteer-based brigades. And only respond to emergency incidents when crew members are available. It is unlikely that this development would pose an increase in demand for this stations.

2.4.2 Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency

As pointed out elsewhere in this Report, obtaining safe firefighter access to the landscape around the development site for the purpose of firefighting poses several problems, including the fact that recent experience shows that firefighting operations away from the interface has little chance of being effective under the weather conditions predicted by *PBP-2019*.

Access around the development site will comply with the requirements of *PBP-2019*, as detailed in section 3.1.2 of this Report.

Access to other lands within the Gaudron's Road precinct will generally be more difficult. This will be mainly due to the terrain making vehicular access difficult, but also to the potential rate of spread (RoS) that a wildfire on the steep terrain. Trying to 'get ahead' of the fire front to gain a tactical advantage would be difficult due to the RoS. Firefighting activities would be concentrated on identifying a fall-back position at an asset and carrying out asset-protection firefighting.

2.5 Infrastructure

An assessment of the issues associated with infrastructure and utilities.

2.5.1 The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants

There is no reticulated water supply provided to the Gaudron's Road properties. Firefighting water supplies for the development will be provided by on-site static water supplies.

The supply could be individual water tanks on each proposed new lot, or alternatively the total supply required by *PBP-2019* could be provided as an amalgam of supplies in the one tank, and then distributed to the dwelling envelopes of each new lot.

Section 3.1.3 of this Report deals with the water supply in more detail.

2.5.2 Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc

There are no major infrastructure services affected, or likely to be affected, by the proposed development.

There are no (existing or proposed) major infrastructure services that are likely to affect life-safety.

2.6 Adjoining Land

The impact of new development on adjoining landowners and their ability to undertake bush fire management.

2.6.1 Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans

This proposed development does not pose any pressure on surrounding lands, from a bushfire-perspective.

To the contrary, the proposed development increases the level of bushfire-protection to the adjoining lands, particularly those further west (upslope) of the subject site, as the suite of BPMs are provided within the development site.

All of the BPMs required to be provided for the proposed development will be provided within the boundaries of the property being developed.

A Land Use Conflict Risk Assessment (LUCRA) is required by the CHCC to be completed for this proposal. The LUCRA will specifically address any landuse conflict issues.

3.0 MINISTERIAL DIRECTIONS (SECTION 9.1(2) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979)

4.4 Planning for Bushfire Protection

Objectives

(1) The objectives of this direction are:

(a) to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and

(b) to encourage sound management of bush fire prone areas.

Where this direction applies

(2) This direction applies to all local government areas in which the responsible Council is required to prepare a bush fire prone land map under section 10.3 of the Environmental Planning and Assessment Act 1979 (the EP&A Act), or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of that Act.

When this direction applies

(3) This direction applies when a relevant planning authority prepares a planning proposal that will affect, or is in proximity to land mapped as bushfire prone land.

What a relevant planning authority must do if this direction applies

(4) In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 3.34 of the Act, and prior to undertaking community consultation in satisfaction of Schedule 1, clause 4 of the Act, and take into account any comments so made,

(5) A planning proposal must:

(a) have regard to Planning for Bushfire Protection2019,

(b) introduce controls that avoid placing inappropriate developments in hazardous areas, and

(c) ensure that bushfire hazard reduction is not prohibited within the APZ.

(6) A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:

(a) provide an Asset Protection Zone (APZ) incorporating at a minimum:

(i) an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and

(ii) an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,

(b) for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with,

(c) contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,

(d) contain provisions for adequate water supply for firefighting purposes,

(e) minimise the perimeter of the area of land interfacing the hazard which may be developed,

(f) introduce controls on the placement of combustible materials in the Inner Protection Area.

Consistency

(7) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the council has obtained written advice from the Commissioner of the NSW Rural Fire Service, to the effect that, notwithstanding the noncompliance, the NSW Rural Fire Service does not object to the progression of the planning proposal

3.1 A planning proposal must have regard to Planning for Bushfire Protection 2019

3.1.1 Asset Protection Zones

Below is a table setting out the *Performance Criteria* and *Acceptable Solutions* for residential and rural-residential subdivisions as required by Chapter 5 of *PBP-2019*, and a statement as to whether the proposal meets the *Acceptable Solution*.

Table 2

	Performance Criteria	Acceptable Solution	Complies / Does not comply
Asset Protection Zones	**[1]** Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	**[1.1]** APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	Does not comply
	[2] APZs are managed and maintained to prevent the spread of a fire towards the building.	**[2.1]** APZs are managed in accordance with the requirements of Appendix 4.	Complies
	[3] The APZs is provided in perpetuity.	**[3.1]** APZs are wholly within the boundaries of the development site	Complies
	[4] APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	**[4.1]** APZs are located on lands with a slope less than 18 degrees.	Does not comply
Landscaping	**[5]** Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	**[5.1]** Landscaping is in accordance with Appendix 4; and **[5.2]** Fencing is constructed in accordance with section 7.6.	Complies Complies

In relation to *Acceptable Solution* [1.1] & [4.1], some of the land surrounding the development has slopes that are in excess of 20°. *PBP-2019* states:

> APZ tables within PBP are provided for acceptable solutions with slopes of up to 20 degrees. Effective slopes are to be assessed with hazards on slopes in excess of 20 degrees will require a detailed performance assessment. This may include a consideration of the potential flame length and its impact on the proposed development.

The upslopes of >20° do not adversely affect this proposal and the D-t-S provisions of Appendix 1 of *PBP-2019* will be used for those steep upslopes. These slopes generally only occur at the south-western corner of the subject site.

However, where >20° downslopes occur, a detailed slope-and-APZ analysis has been undertaken to ensure that:

- the dwelling envelopes will not be exposed to radiant heat levels exceeding 29 kW/m²; and
- the dwelling envelopes are located outside the Flame Zone as defined in *PBP-2019*.

In relation to the downslope to the east, various evenly-spaced transects were selected along the eastern boundary and extend for 100 m from the boundary. Slopes varied generally between 18° and <23° downslope. For this aspect a worse-case slope of 22° downslope has been adopted.

In relation to the downslope to the west, various evenly-spaced transects were selected along the western boundary and extend for 100 m from the boundary. Slopes varied in this aspect. Slopes immediately west of the boundary are upslope for a distance of between 30 m and 43 m, and then downslope at ranges between >8° to <17°. For this aspect a worse-case slope of either:

- upslope at the boundary; or
- >15° - 20° downslope at a distance of 30 m.

A slope summary is provided on the following Figure.

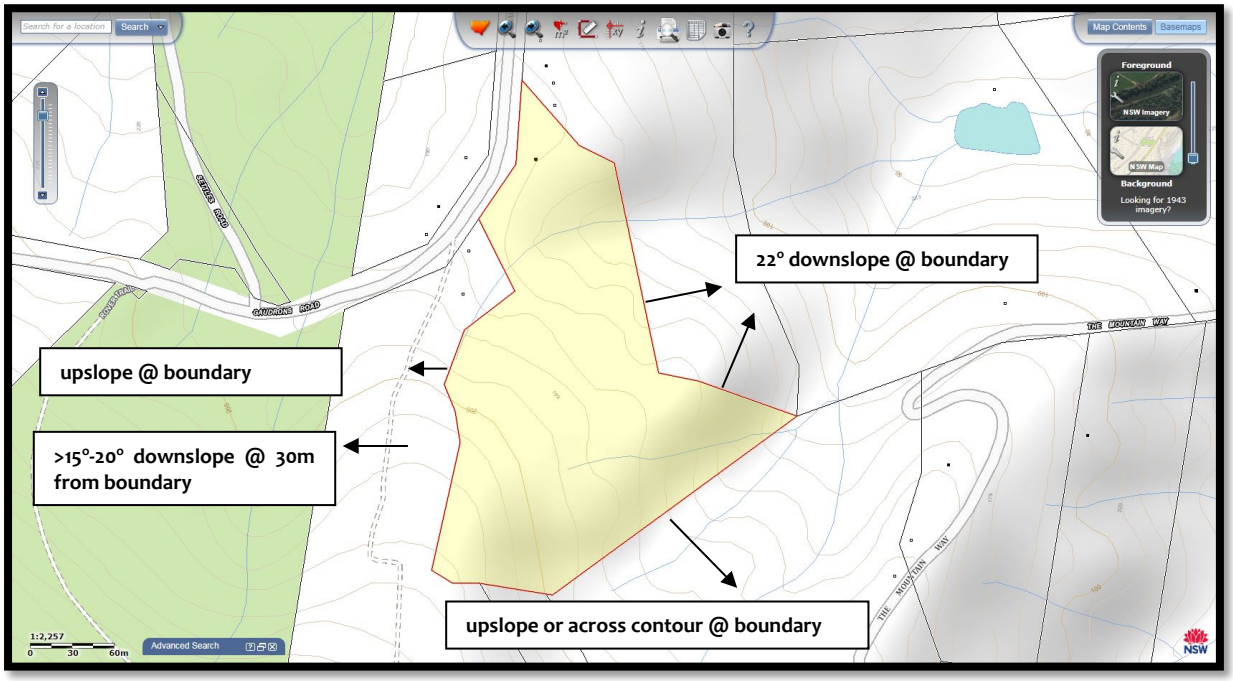

Figure 4: slope assessment summary

The resulting APZs for the various aspects are summarised below.

Table 3 – Vegetation and slope summary

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ DISTANCE
North	Managed land	Not applicable	Not applicable
East	Grassland	22° downslope	17m
South	Forest	Upslope	20m
West	Grassland	Upslope @ site boundary	10m
West	Grassland	>15° - 20° downslope @ 30m from site	16m

The required setback from the downslope located at least 30m from the site boundary does not impose a bigger setback than the upslope at the boundary. for this reason the constraint imposed by the downslope located 30m from the western boundary can be disregarded, and APZs and BALs can be determined using the vegetation on the upslope at the boundary. Table 3 can then be simplified as follows.

Table 4 – Vegetation and slope summary

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ DISTANCE
North	Managed land	Not applicable	Not applicable
East	Grassland	22° downslope	17m
South	Forest	Upslope	20m
West	Grassland	Upslope @ site boundary	10m

***NOTE**: these distances are indicated on the plan attached as Figure 3.*

In relation to *Acceptable Solution* [4.1], where APZs are proposed on land in excess of 20° slope, the APZ should be designed and maintained in accordance with a *Vegetation Management Plan*. The *Vegetation Management Plan* should have regard for both Appendix 4 of *PBP-2019* and the RFS document "Standards for Asset Protection Zones", as well as addressing the issues of soil stability and erosion, and sediment control.

In relation to *Acceptable Solution* [5.2], *PBP-2019* states:

> Fences and gates in bush fire prone areas may play a significant role in the vulnerability of structures during bush fires. In this regard, all fences in bush fire prone areas should be made of either hardwood or non-combustible material.
> However, in circumstances where the fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.

3.1.2 Access

Below is a table setting out the *Performance Criteria* and *Acceptable Solutions* for residential and rural-residential subdivisions as required by Chapter 5 of *PBP-2019*, and a statement as to whether the proposal meets the *Acceptable Solution*.

Table 5

	Performance Criteria	Acceptable Solution	Complies / Does not comply
General Access Requirements	[6] Firefighting vehicles are provided with safe, all-weather access to structures.	**[6.1]** Property access roads are two-wheel drive, all-weather roads;	Complies
		[6.2] Perimeter roads are provided for residential subdivisions of three or more allotments;	Not applicable
		[6.3] Subdivisions of three or more allotments have more than one access in and out of the development;	Complies
		[6.4] Traffic management devices are constructed to not prohibit access by emergency services vehicles;	Complies
		[6.5] 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;	Complies
		[6.6] All roads are through roads;	Does not comply
		[6.7] 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;	Does not comply
		[6.8] Where kerb and guttering is provided on perimeter roads, roll top kerbing should be	Not applicable

		used to the hazard side of the road;	
		[6.9] 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	Not applicable
		[6.10] One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	Not applicable
	[7] The capacity of access roads is adequate for firefighting vehicles.	**[7.1]** 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.	Complies
	[8] There is appropriate access to water supply.	**[8.1]** Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	Not applicable
		[8.2] Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 **-** *Fire hydrant installations System design, installation and commissioning*; and	Not applicable
		[8.3] There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available	Able to comply

Perimeter Roads	**[9]** 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	**[9.1]** Are two-way sealed roads;	Not applicable
		[9.2] Minimum 8m carriageway width kerb to kerb;	Not applicable
		[9.3] Parking is provided outside of the carriageway width;	Not applicable
		[9.4] Hydrants are located clear of parking areas;	Not applicable
		[9.5] Are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	Not applicable
		[9.6] Curves of roads have a minimum inner radius of 6m;	Not applicable
		[9.7] The maximum grade road is 15 degrees and average grade of not more than 10 degrees;	Not applicable
		[9.8] The road crossfall does not exceed 3 degrees; and	Not applicable
		[9.9] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Not applicable
Non-Perimeter Roads	**[10]** Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	**[10.1]** Minimum 5.5m carriageway width kerb to kerb;	Complies
		[10.2] Parking is provided outside of the carriageway width;	Complies
		[10.3] Hydrants are located clear of parking areas;	Not applicable
		[10.4] Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	Does not comply
		[10.5] Curves of roads have a minimum inner radius of 6m;	Complies
		[10.6] The road crossfall does not exceed 3 degrees; and	Complies

		[10.7] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Complies

Property Access Roads	**[11]** Firefighting vehicles can access the dwelling and exit the property safely.	**[11.1]** 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.	Able to comply
		In circumstances where this cannot occur, the following requirements apply:	
		[11.2] Minimum 4m carriageway width;	Able to comply
		[11.3] 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;	Able to comply
		[11.4] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;	Able to comply
		[11.5] Provide a suitable turning area in accordance with Appendix 3;	Able to comply
		[11.6] Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	Able to comply
		[11.7] The minimum distance between inner and outer curves is 6m;	Able to comply

		[11.8] The crossfall is not more than 10 degrees;	Able to comply
		[11.9] Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and	Able to comply
		[11.10] 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.	Complies

In relation to *Acceptable Solution* [6.3], the three new lots are provided with a new road while the lot retaining the existing dwelling retains its existing driveway. Only three lots are serviced by the new road.

In relation to *Acceptable Solution* [6.6] & [6.7] & [10.4], the road design incorporates a centrally-located, non-perimeter road that forms a dead-end, and has a length of approximately 330 m. Where an *Acceptable Solution* has not been complied with the proposal should be assessed against the corresponding *Performance Criteria*, which states:

> **[6]** Firefighting vehicles are provided with safe, all-weather access to structures.

This *Performance Criteria* is easily addressed by compliance with the relevant *Acceptable Solutions* in a predominantly grassland environment. In addition, the subject properties would be landscaped and maintained in accordance with NSW Rural Fire Service APZ standards, therefore the road would be centrally located within a large APZ. In relation to the cul-de-sac head, options are available, such as:

- Providing a 24 m diameter turning circle where parking is permitted in the turning circle; or
- Providing a 18 m diameter turning circle where parking is not permitted in the turning circle; or
- Providing a turning head that complies with the specifications of Appendix 3 of *PBP-2019*. The plan provided as Figure 3 indicates this option.

In relation to *Acceptable Solution* [6.9], the neighbouring lands are classed as grasslands, the new road will be centrally located through land that will be managed as APZ.

In relation to *Acceptable Solution* [8.3], the proponent intends to supply part of the firefighting water supply for the proposed three new lots as an amalgam of minimum quantities. The intention is to provide the supply for proposed lots 2 and 3 as an amalgam of 40,000 litres in one tank, while proposed lot 1 will be provided with its own on-site firefighting supply of 20,000 litres.

The access point for the firefighting water supply for proposed lots 2 & 3 will be at the dead-end turning area, generally between the two Dwelling Envelopes. The access point will either be a pillar hydrant gravity-fed from a tank located remote from the dead-end turning area, or the firefighting water supply tank will be located at the dead-end turning area. The access point for the firefighting water supply should be located between 5 m and 20 m from the Dwelling Envelopes on proposed lots 2 & 3. Design details of either arrangement have not been provided to this office at the time of finalising this Report, however it is noted that the distance from the dead-end turning area to the indicative DE on proposed lot 2 is shown to be greater than 20 m.

This is proposed as an alternative to the *Acceptable Solutions* due to the steep nature of the site. If this is the case then fire truck access is to be provided to lots 2 and 3 in one of the following manners:

A. Where the firefighting water supply is gravity fed, and a Hydraulic Engineer verifies that supplies can meet the flow of 10 L/s at 150 kPa (from Table 2.2 of AS 2419) simultaneously, then fire truck access needs to be provided to within 20 m of either dwelling (including in a parking bay on the new road) whilst not obstructing other traffic entering or leaving either lot.
B. Where the firefighting water supply is gravity fed, and a Hydraulic Engineer verifies that supplies can not meet the flow of 10 L/s at 150 kPa (from Table 2.2 of AS 2419) simultaneously, then fire truck access needs to be provided to within 4 m of the pillar hydrant whilst not obstructing other traffic entering or leaving either lot. The vehicle manoeuvring area specifications of Appendix 3 of *PBP-2019* are to be provided on site.
C. Where the firefighting water supply is gravity fed, and a Hydraulic Engineer verifies that supplies can not meet the flow of 10 L/s at 150 kPa (from Table 2.2 of AS 2419) simultaneously, the supply is to be pressurised by a petrol or diesel powered pump and the provisions of A above are to be provided.
D. With respect to proposed lot 1, the *Acceptable Solutions* of *PBP-2019* will be met for property access and on-site static firefighting water supplies.

In relation to *Acceptable Solution* [10.1], the plan provided as Figure 3 indicates the road width to be 12 m, accommodation the 5.5 m minimum width, with an additional +2.5 m on either side for parking areas.

In relation to *Acceptable Solution* [11.1], access complying with these *Acceptable Solutions* will only need to be provided onto proposed lots 2 and 3 where the firefighting water supply does not meet 10 L/s at 150 kPa (from Table 2.2 of AS 2419) at the pillar hydrant provided at each lot.

In relation to *Acceptable Solution* [11.1], access complying with these *Acceptable Solutions* will be provided onto proposed lot 1. The fire truck manoeuvring area for access to the firefighting water supply will comply with Appendix B of this Report.

3.1.3 Utility Services

Below is a table setting out the *Performance Criteria* and *Acceptable Solutions* for residential and rural-residential subdivisions as required by Chapter 5 of *PBP-2019*, and a statement as to whether the proposal meets the *Acceptable Solution*.

Table 6

	Performance Criteria	Acceptable Solution	Complies / Does not comply
Water Supplies	**[12]** Adequate water supplies is provided for firefighting purposes	**[12.1]** Reticulated water is to be provided to the development where available;	Not applicable
		[12.2] A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and	Complies
		[12.3] Static water supplies shall comply with Table 5.3d of *PBP-2019*.	Complies
	[13a] Water supplies are located at regular intervals; and **[13b]** The water supply is accessible and reliable for firefighting operations.	**[13.1]** Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005;	Not applicable
		[13.2] Hydrants are not located within any road carriageway; and	Not applicable
		[13.3] Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	Not applicable
	[14] Flows and pressure are appropriate.	**[15.1]** Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005	Not applicable
	[15] The integrity of the water supply is maintained.	**[15.1]** All above-ground water service pipes are metal, including and up to any taps; and	Complies
		[15.2] Above-ground water storage tanks shall be of concrete or metal	Complies

Electricity Services	**[16]** Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	**[16.1]** 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*.	Complies
Gas Services	**[17]** Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	**[17.1]** 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; **[17.2]** All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; **[17.3]** Connections to and from gas cylinders are metal; **[17.4]** Polymer-sheathed flexible gas supply lines are not used; and **[17.5]** Above-ground gas service pipes are metal, including and up to any outlets.	Complies Complies Complies Complies Complies

In relation to *Acceptable Solution* [12.3], *PBP-2019* requires 20,000 litres of firefighting water supply to be provided for each dwelling. It is proposed to provide this on lot 1 as an independent static supply; and for proposed lots 2 and 3, 40,000 litres as an amalgam, located centrally for the proposed lots.

An alternative has been proposed at Section 3.1.2 above in relation to the provision of a firefighting water supply and fire truck access for the proposed lots. These alternative arrangements have been provided due to the steep nature of the site.

In relation to the other relevant *Acceptable Solutions*, these matters are able to be addressed via the conditions of consent.

3.2 A planning proposal must introduce controls that avoid placing inappropriate developments in hazardous areas

PBP-2006 and *PBP-2001* provide lists of development types that are both suitable, and unsuitable, for bushfire-prone areas, summarised as follows:

Table 7

Not Desirable	Desirable
• Camping grounds • Assembly buildings • Land sharing communities • Commercial and retail premises • Education premises • Prisons • Premises for people with mental or physical incapacities • Hospitals • Flammable material bulk storage • Stock / sale yards • Timber yards • Factories / warehouses • Plantations • Waste disposal / landfill depots • Power generating works • Sawmills • Junk yards • Liquid fuel depots • Offensive and hazardous industries • Chemical industries • Service stations • Ammunition storage/manufacture • Fireworks manufacture/storage	• Tennis courts • Golf courses • Swimming pools • Cemeteries • Airstrips • Cleared open space / recreation areas

The LEP should prohibit the listed undesirable developments within the bushfire-prone areas (land within 100m of identified bushfire hazard vegetation) of the subject site. Other types of development should be assessed on a case-by-case basis.

3.3 A planning proposal must ensure that bushfire hazard reduction is not prohibited within the APZ

This has been discussed in more detail at section 3.1 above. The entire property should be managed as APZ. The minimum APZ required by *PBP-2019* should be managed as Inner Protection Area (IPA), the remaining area of each should be managed as a bushfire hazard free area by managing as an Outer Protection Area (OPA). Appendix A of this Report sets out the standards for APZs.

3.4 A planning proposal must, where development is proposed, comply with the following provisions, as appropriate - provide an Asset Protection Zone (APZ) incorporating at a minimum an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property

This has been discussed in more detail at section 3.1 above. The scale of the proposal does not warrant a perimeter road. The minimum required APZs have been provided.

3.5 A planning proposal must, where development is proposed, comply with the following provisions, as appropriate - an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road

This has been discussed in more detail at section 3.1 above. The scale of the proposal does not warrant a perimeter road. The minimum required APZs have been provided, additionally, the areas within the site and beyond the proposed IPA will be managed as OPA.

3.6 For infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with

There is an existing dwelling on the property. An assessment of this dwelling has been carried out in relation to the suit of bushfire protection measures available using the NSW Rural Fire Service document "*Protection of existing buildings*". The following tables set out the results of that assessment.

Table 8

BUILDING ELEMENT	MINIMAL PROTECTION MEASURES	COMMENTS
GENERAL	Seal all gaps (>3mm) around the house (excluding subfloor) with: • appropriate joining strips; • flexible silicon based sealant; or • mesh with a maximum aperture of 2mm, made from corrosion resistant steel, bronze or aluminium.	Recommended
WALLS	Install sarking with a flammability index of not more than 5 behind weatherboards or other external cladding when they are being replaced for maintenance or other reasons.	Recommended
SUBFLOOR	Removal of combustible materials and keeping areas clear and accessible.	Recommended
DOORS	Install weather strips, draught excluders or draught seals at the base of side-hung doors.	Recommended
VENTS & WEEPHOLES	Seal vents and weepholes in external walls with mesh (with an aperture size of 2 mm) of corrosion resistant steel, bronze or aluminium.	Recommended
ROOFS	Seal around roofing and roof penetrations with a non-combustible material.	Recommended
	Install sarking with a flammability index of not more than 5 beneath existing roofing when it is being replaced for maintenance or other reasons. If installed, gutter and valley leaf guards shall be non-combustible.	Recommended
WINDOWS	Install mesh with a maximum aperture of 2mm, made from corrosion resistant steel, bronze or	Recommended

	aluminium to all external doors and openable windows	
EXTERNAL STRUCTURES		
DECKING		

Table 9

APZ Dimensions	Existing APZs are summarised below: • Approximately 40 m to the north, and onto the APZ on the adjoining property. • Approximately 40 m to the east through terraced gardens, and extending into grasslands on the subject lot and adjoining property. • Approximately 20 m to the south through terraced gardens, and extending into grasslands on the subject lot and future APZs on proposed lots. • Approximately 40 m to the west, and extending into grasslands on the adjoining property.
Landscaping	Landscaping generally complies with *PBP-2019* requirements save for a few instances where garden beds in close proximity to the home allows for vegetation to contact the structure. An alternative to combustible mulch should be used, especially in close proximity to the suspended timber deck areas.
Vehicular Access	 Figure 5: view south along existing driveway

	 Figure 6: view north along existing driveway A well-formed driveway exists for access to the existing static water supplies (SWS). The southern tank along the driveway is fitted with a 65 mm Storz fitting, with another tank in the driveway and two other tanks under the home. Fire truck access to the driveway is suitable however the area for vehicle manoeuvring and reversing up to the SWS does not meet *PBP-2019* standards. Continued use of the driveway is also impeded when a fire truck is accessing the SWS.
Water Supply	There are four above-ground plastic water tanks on the property. Two x 10,000 litre tanks along the driveway (Figure 5 & Figure 6). Two x 17,600 litre tanks under home.  Figure 7: 2 x 17,600 L SWS
Electricity Supply	The existing supply is overhead across Gaudron's Road on the southern side of the home, to a private pole. The supply to the home from the private pole is underground.

LPG Supply	There are two fixed LPG cylinders located under the home. There are shielded from hazard vegetation and do not require addition protection measures.  Figure 8: existing LPG cylinder housing area

3.7 Contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks

This has been discussed in more detail at section 3.1 above. The scale of the proposal does not warrant a perimeter road, although the proposed road will meet the two-way traffic specifications of *PBP-2019*.

3.8 Contain provisions for adequate water supply for firefighting purposes

This has been discussed in more detail at section 3.1 above. An alternative solution has been proposed for lots 2 and 3 with an amalgam of minimum quantities. The firefighting water supply for lot 1 will be independent of the other two lots.

3.9 Minimise the perimeter of the area of land interfacing the hazard which may be developed

This is a criteria that is difficult to influence. The perimeter of the subdivision development is significantly less than the overall perimeter of the property, so in that regard the interface area has been minimised. It is physically impossible to reduce the perimeter of the site.

3.10 Introduce controls on the placement of combustible materials in the Inner Protection Area

This has been discussed in more detail at section 3.1 & 3.2 above.

4.0 CONCLUSION AND RECOMMENDATIONS

This Report is provided in support of a rezoning and subdivision of existing lot 2//550362, 189 Gaudron's Road, Sapphire Beach. The Report addresses the criteria set out in *PBP-2019* for a Bushfire Strategic Study, as well as Ministerial Directions 4.4 (section 9.1(2) of the Environmental Planning and Assessment Act 1979, incorporating an assessment against Chapter 5 of *PBP-2019*).

The proposal is to rezone existing lot 2//550362 from "RU2 Rural Landscape" to "R5 Large Lot Residential", and then subsequently subdivide lot 2//550362 to create four (4) new allotments (3 vacant lots and 1 lot retaining the existing home).

The site is constrained by land that is steep, and the gradient exceeds the slope ranges provided in *PBP-2019*. Modelling consistent with the *PBP-2019* methodology has been used to establish the minimum APZ (BAL-29) setback from the site boundaries.

Rather than a perimeter road arrangement, a central dead-end road has been incorporated into the concept plan. The central road arrangement locates the new road centrally within a proposed large APZ created over the site as part of the approval process. This provides a more feasible arrangement, and relocates the access / egress route away from unmanaged hazard vegetation on the neighbouring sites. The gradient of the proposed road will be within *PBP-2019* specifications.

Concerning the ultimate use of the site and its land; if not rezoned to higher residential densities, it is most unlikely that any form of land use or horticulture would be implemented. Accordingly, the site could become unmanaged and eventually invasive vegetation such as Camphor Laurel, Lantana and other persistent wild grasses will take over this land. On the other hand, allowing residential intensification with associated landscape management, will assist in mitigating the above and potential fire risk hazards.

The approval of the rezoning and consequent subdivision will not only remove and manage hazard vegetation on the site for the benefit of the future dwellings, it will provide a material benefit to the existing homes on the neighbouring properties. From a landscape-perspective, the benefits of the development are passed on to land other than the property being developed.

1. All of the land on the subject site other than the retained native vegetation should have no restriction placed on it that prohibits APZ maintenance. This will include restrictions such as "tree preservation orders" and the like.

2. A *Vegetation Management Plan* should be prepared for the parts of the site where APZs are proposed to be created over land steeper than 20°. The *Vegetation Management Plan* should have regard for both Appendix 4 of *PBP-2019* and the RFS document "*Standards for Asset Protection Zones*", as well as addressing the issues of soil stability and erosion, and sediment control.

3. Details of the proposed static water supply, and access to it, for the proposed new lots is to be provided to the NSW Rural Fire Service (via the consent authority). The details should verify acceptable flow and pressures, and distances between the firefighting water supply access point and the indicative dwelling envelopes.

4.1 Limitation

4.1.1 This Report and the subsequent recommendations reflect the reasonable and practical efforts of the author. It is important to note that the author (and State and Local Government authorities) cannot guarantee that bushfire ignition and subsequent bushfire damage will not occur.

4.1.2 Current legislation is essentially 'silent' in relation to the maintenance of bushfire protection measures. Maintenance is a major factor in the effectiveness of any BPM provided/installed. The extent to which the BPMs are implemented and maintained will affect the probability of achieving adequate bushfire safety margins.

4.1.3 Given the natural phenomenon of bushfires, and limitations in technology and research, a system to guarantee the survival of life and property cannot be made. This is reflected in the following statements of limitations:

> *The goal of 'absolute' or '100%' safety is not attainable and there will always be a finite risk of injury, death or property damage.* (IFEG-2005)

> *No development in a bushfire prone area can be guaranteed to be entirely safe from bushfires.* (**PBP-2001**)

> *Notwithstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small, always remains.* (**PBP-2001**)

25/08/2021

Holiday Coast Bushfire Solutions
Grad. Dip. Design in Bushfire Prone Areas (UWS)

5.0 REFERENCES

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NSW Rural Fire Service (2012), *Practice note 5/12 - Reuse of rezoning reports on bushfire prone land*, Sydney.

Standards Australia (2018), *Australian Standard 3959-2018 Construction of buildings in bushfire-prone areas*, Sydney.

6.0 APPENDICES

Appendix A - Standards for APZs (RFS 2005) and Appendix 4 of *PBP-2019.*

Appendix B - Appendix 3 of *PBP-2019* (access requirements for firefighting vehicles)

DUCE-2020-30 APPENDIX A

STANDARDS FOR ASSET PROTECTION ZONES

PLANNING PROPOSAL AND SUBDIVISION

LOT 2//550362,
189 GAUDRON'S ROAD,
SAPPHIRE BEACH.

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.

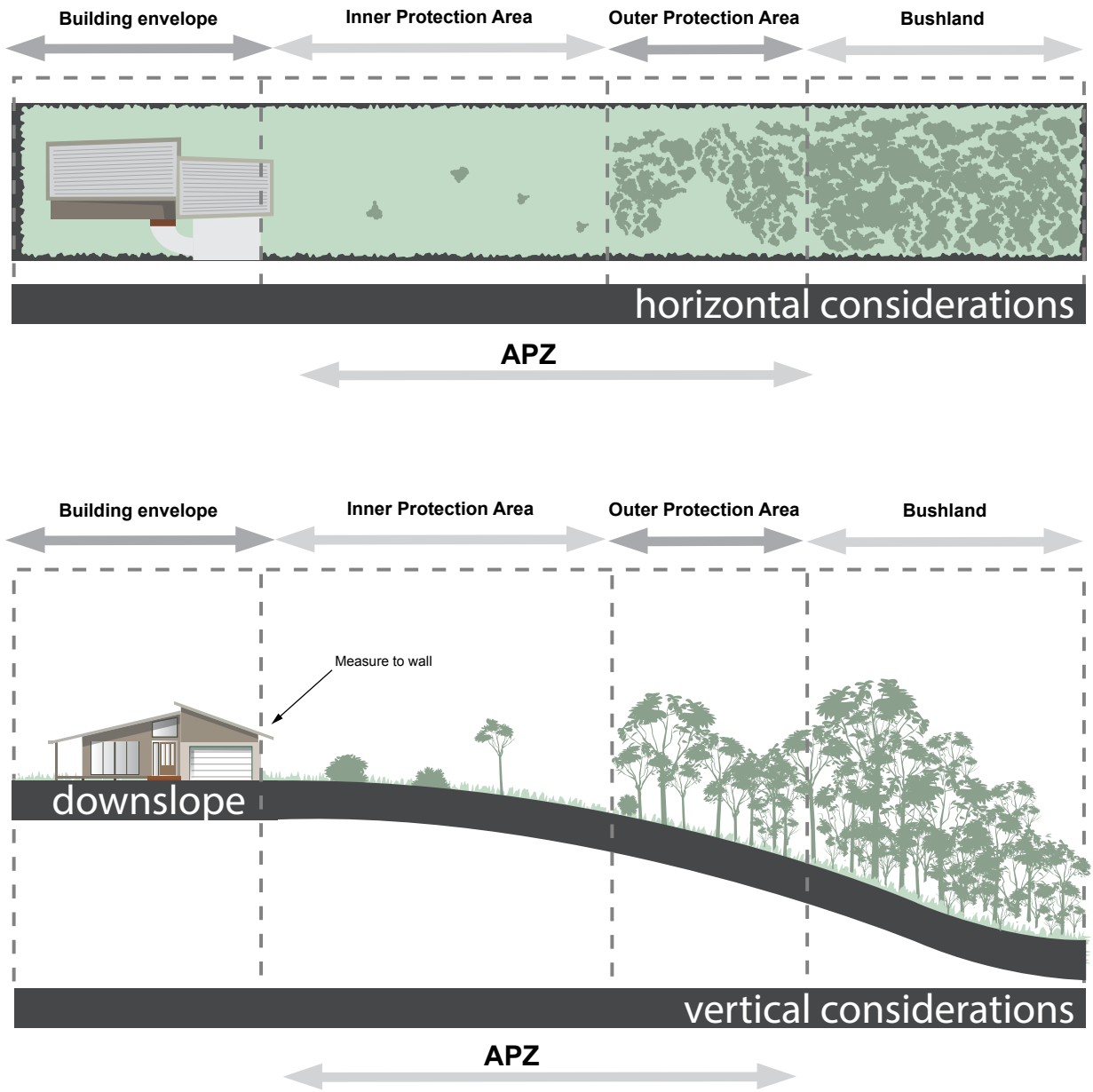
Grass

- 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.



standards

for asset protection zones

protection

NSW RURAL FIRE SERVICE

STANDARDS FOR ASSET PROTECTION ZONES

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.

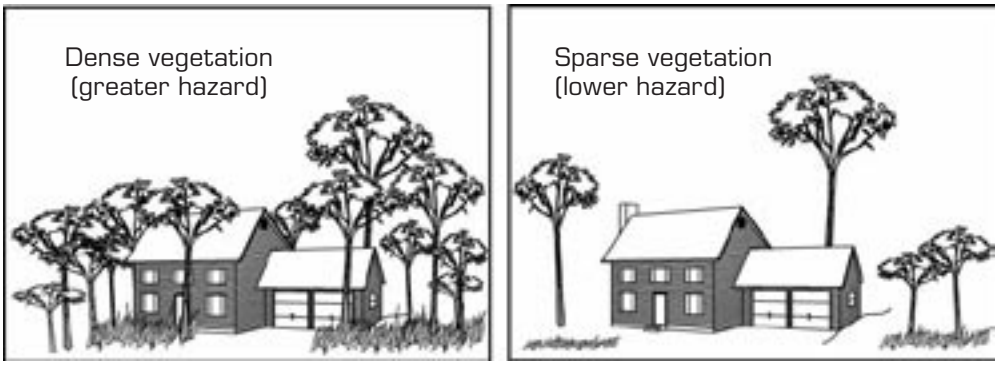
STEP 1. DETERMINE IF AN APZ IS REQUIRED

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.



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.

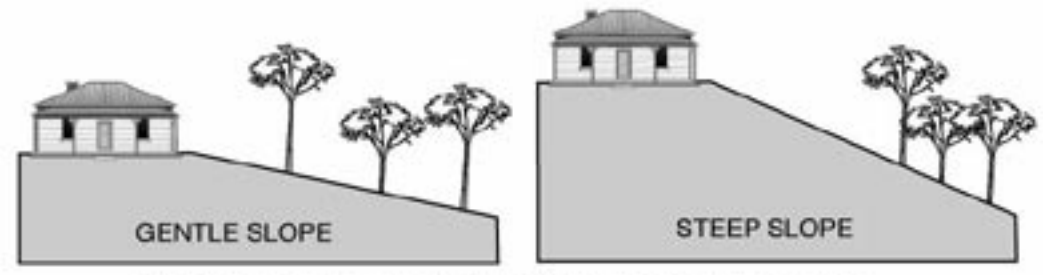
If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

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.

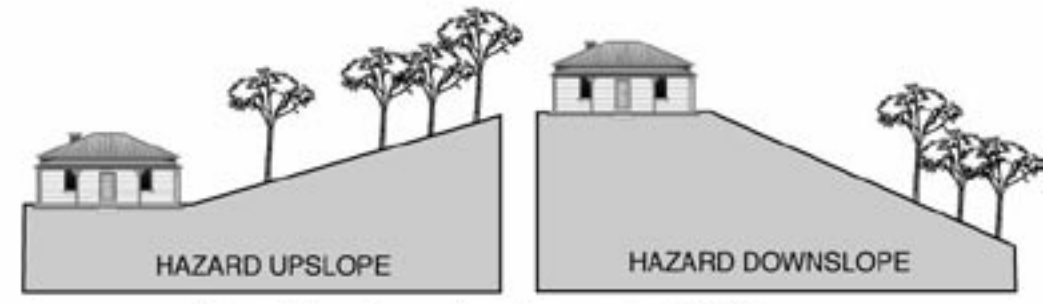
STEP 3. DETERMINE THE APZ WIDTH

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.

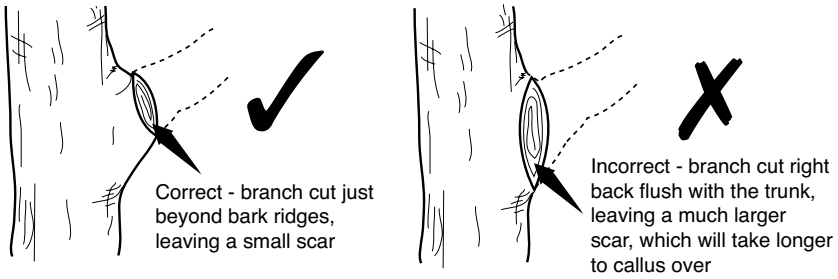
When choosing plants for removal, the following basic rules should be followed:

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.

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.

STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

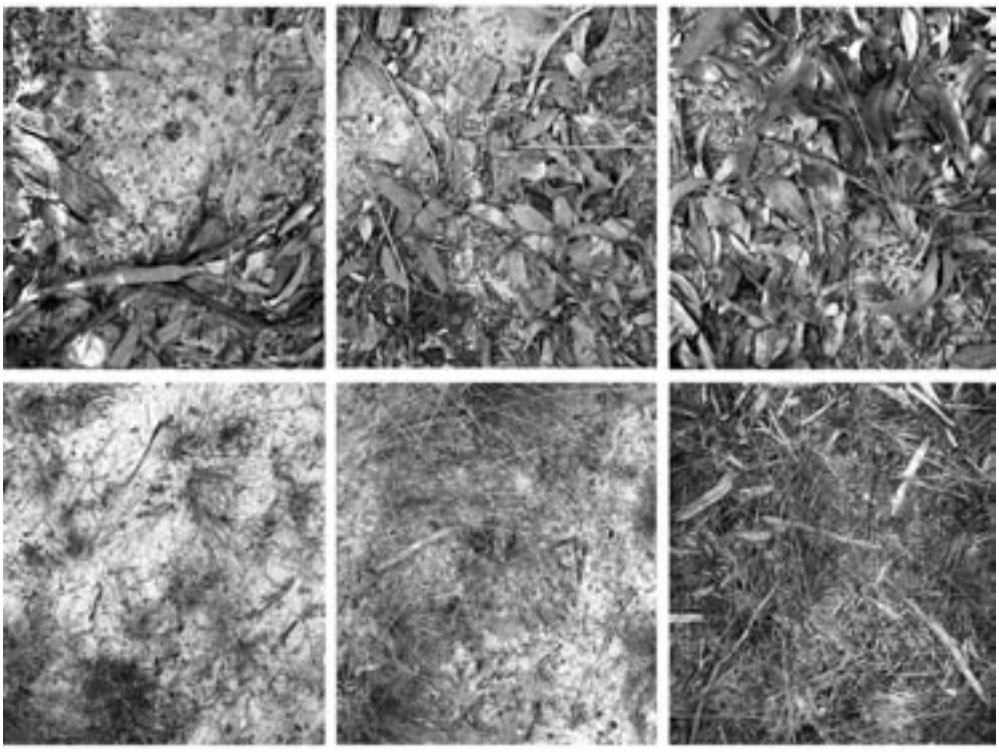
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

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.

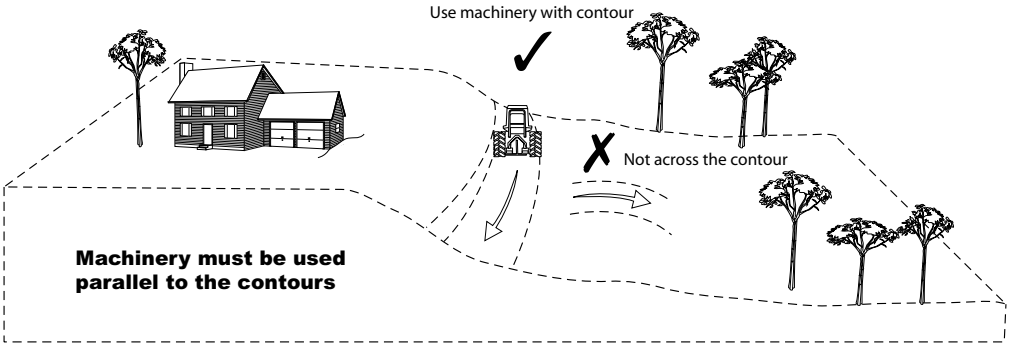
When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



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.

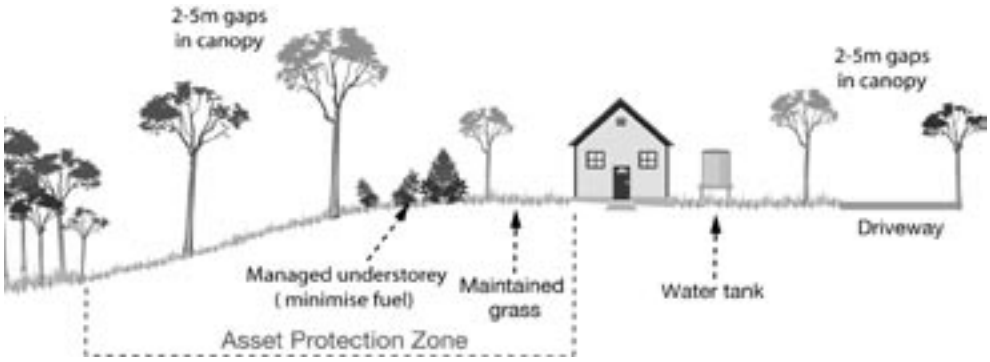


STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

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.

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.*

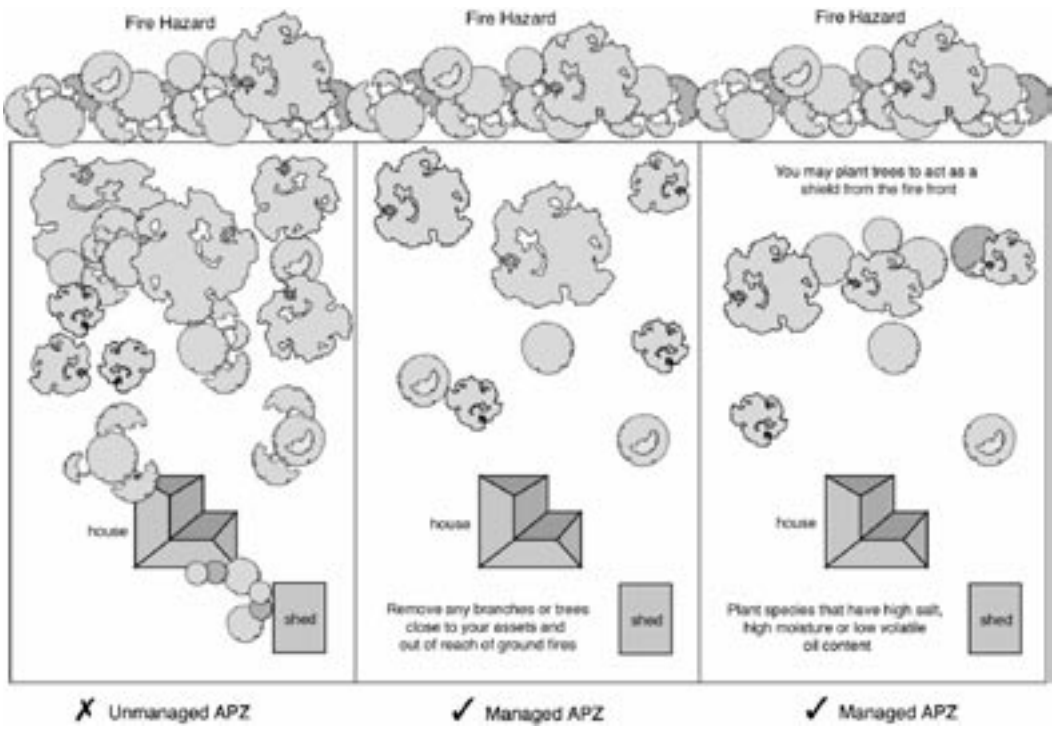
WIND BREAKS

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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DUCE-2020-30 APPENDIX B

APPENDIX 3 OF *PBP-2019* (ACCESS ROAD REQUIREMENTS FOR FIREFIGHTING VEHICLES)

PLANNING PROPOSAL AND SUBDIVISION

LOT 2//550362,
189 GAUDRON'S ROAD,
SAPPHIRE BEACH.

APPENDIX 3

ACCESS

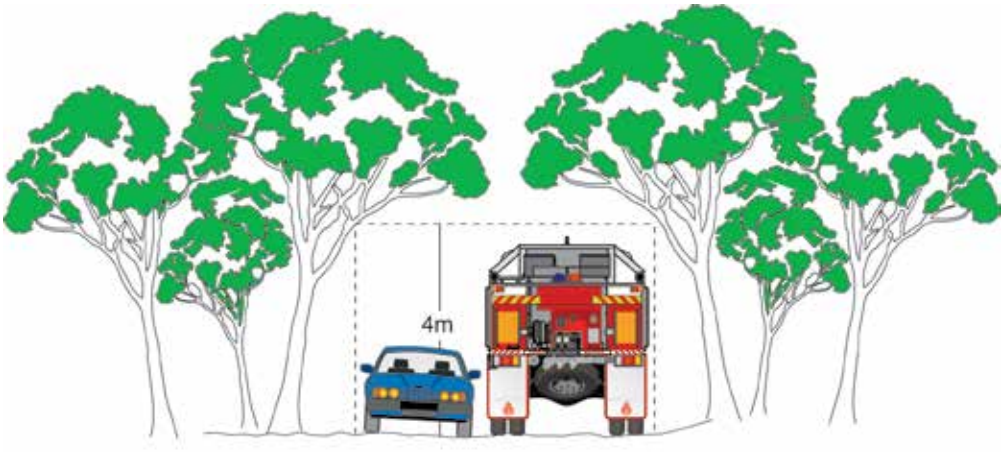
This appendix provides design principles for emergency service vehicle access.

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.

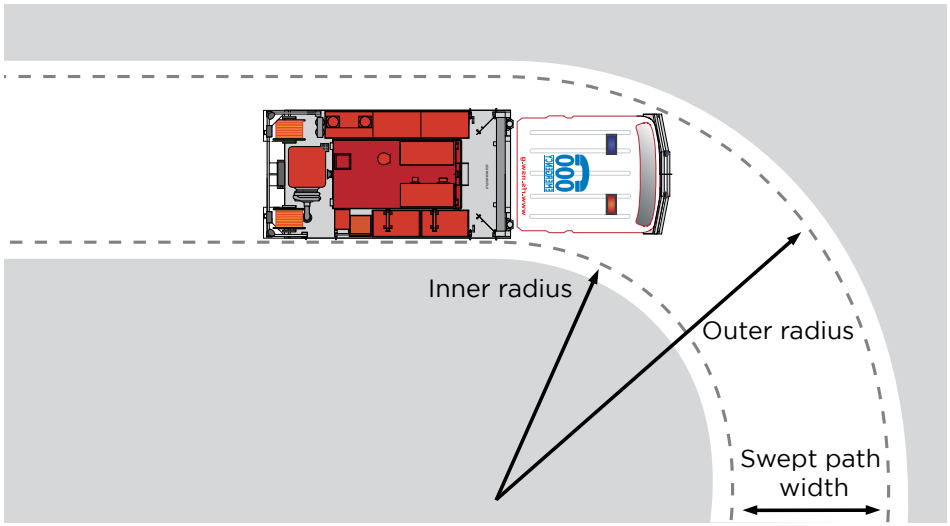
Table A3.2

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

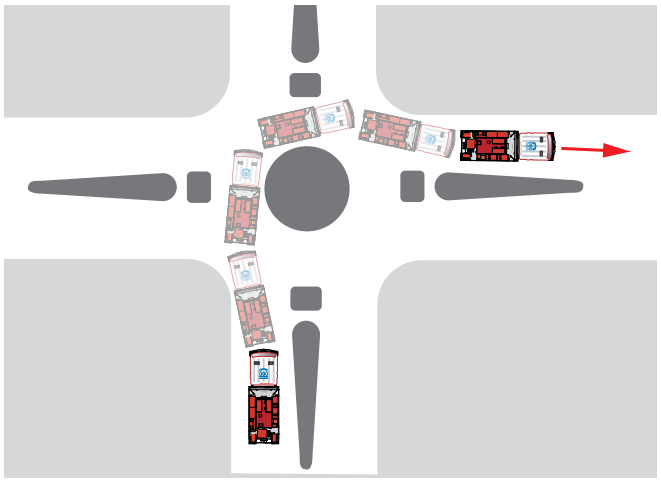
Swept path width for turning vehicles.



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).

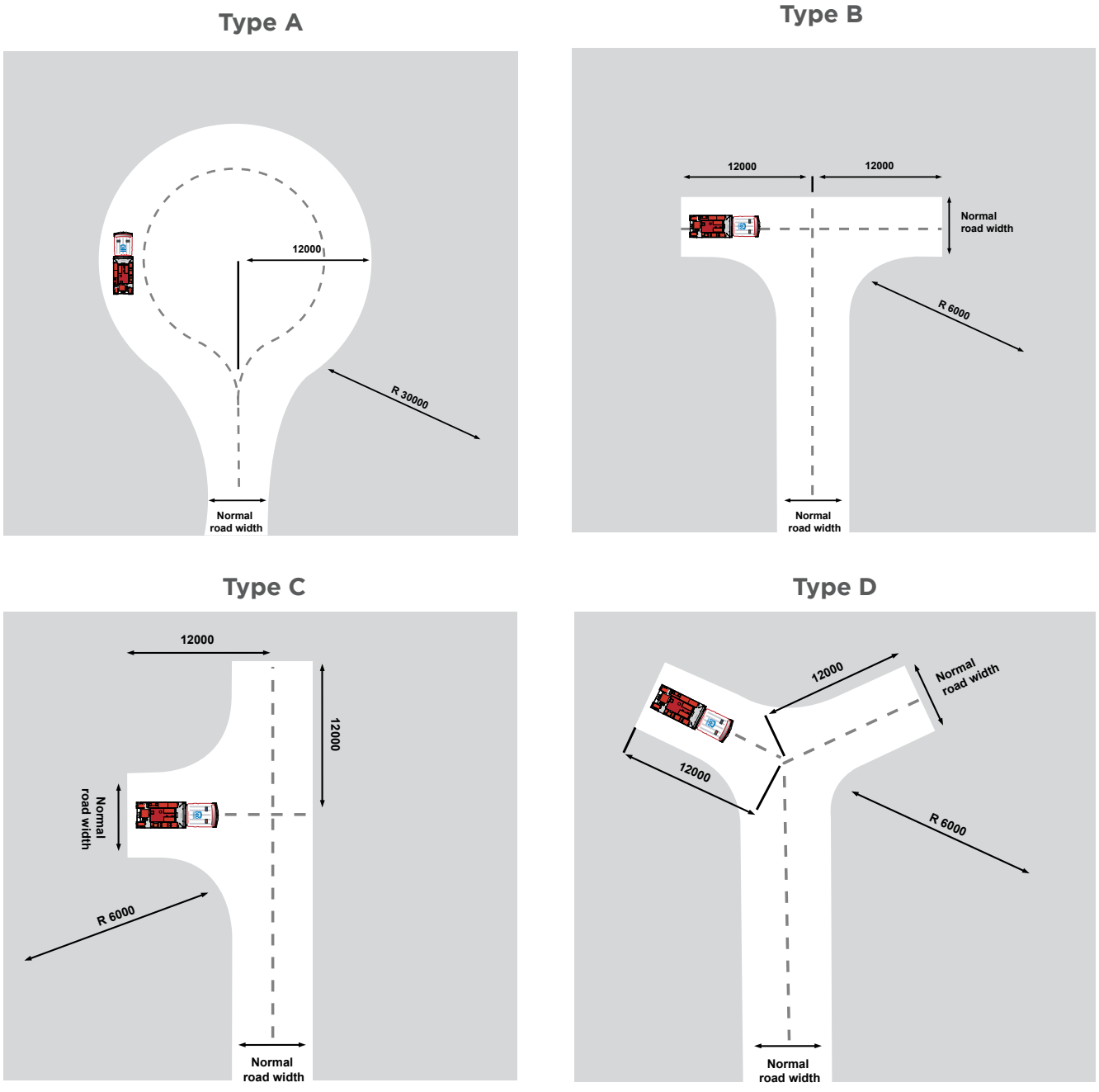
A3.3 Vehicle turning head requirements

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

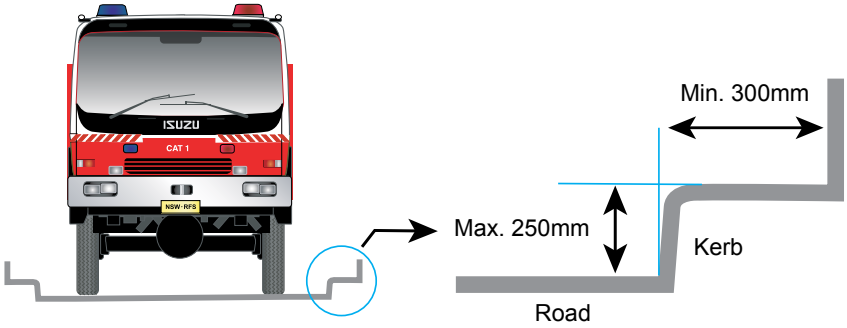
Hydrants and parking bays.

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.

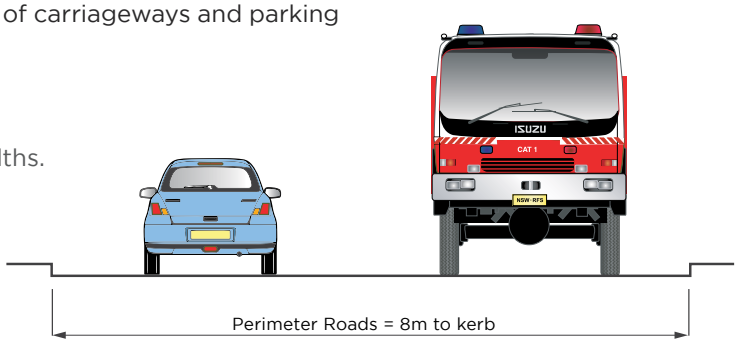
A3.9 Road types

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.

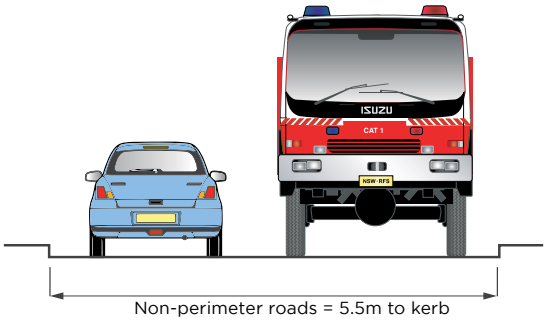


A3.9.2 Non-perimeter Roads

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.