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BUSHFIRE STRATEGIC STUDY

REPORT PREPARED IN RELATION TO:	**PLANNING PROPOSAL AND COMMUNITY TITLE SUBDIVISION**
PROPERTY DESCRIPTION:	**LOT 456 in DP 755557, ENDEAVOUR DRIVE AND HILL STREET, BELLINGEN.**
REPORT COMMISSIONED BY: (my Client)	**Steve Smith, c/- Keiley Hunter Town Planning**
	DATE ISSUED: 26/11/2020

VERSION	REVISION
1	Original

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.

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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 of *PBP-2019* 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 of *PBP-2019*. 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 Bellingen Shire Council's BPL map, an extract of which is provided below.

Figure 1: extract of BSC'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.

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 interfaces with forest vegetation along its eastern, southern and western boundaries. The northern boundary borders the existing urban development of Bellingen.

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.

The development site adjoins the Tarkeeth State Forest along its south-western boundary. The Tarkeeth State Forest is used as a Eucalypt Plantation, with harvesting operations generally planned on a 35-year cycle.

2.1.1.2 Topography

Slopes on the development site are often exceeding 10°, and generally all of the development site has gradients within the slope range of >10° - <25°.

To the immediate south of the development site, on the southern slope forming the interface, some slope ranges of >30° - <35° occur.

A slope analysis of the southern portion of the site has not been undertaken, however, observation of the available topographic data indicate that generally the slopes of the area (both within and external to the site) are generally consistent with the development site, i.e., >10° - <30°.

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. Embers and fire brands from the upslope-fires have the potential to travel long distances, causing spotting well ahead of the main fire front(s).

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 were ≥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 comment was sought from the Mid North Coast Fire Control Centre (Aviation Drive, Coffs Harbour) regarding bushfire history for the sight and surrounds. Whilst initial contact was made, no wildfire history has been provided at the time of completing this Report. The following information is an extract from the MNC BRMP.

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 are the longest from due west. From this direction the forest vegetation is continuous for approximately 50 km to the escarpment of the Dorrigo plateau. A fire from this direction could impact on the site with the intensities 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.

A fire from the south has a potential maximum fire run distance of approximately 5 km through forest vegetation. Weather data from the Coffs Harbour Bureau of Meteorology

weather station reveals that days with a southerly wind influence did not coincide with an FFDI of ≥80.

The greatest threat from a fire from the south would occur after a "southerly change" during a fire run from the west. Under high FFDI conditions, the northern flank of a fire would become the fire front following a southerly change.

A fire from the east has a potential maximum fire run distance of <1 km through forest vegetation as only remnant forest vegetation exists between the development site and the neighbouring farmlands. Weather data from the Coffs Harbour Bureau of Meteorology weather station reveals that days with an easterly wind influence did not coincide with an FFDI of ≥80.

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 western and southern boundaries of the site are bordered with public road reserves (Noble's Lane). Further west and south of the site is a network of public roads and trails. Notwithstanding the steep gradients of the general area, frequent vehicular access throughout the areas adjacent to the development site is available.

The issue is, to a certain extent, whether the same areas would be accessed for firefighting activities. 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.

In simple terms, it would be wise to accept that any fire occurring in the surrounding landscape to the development site could impact on the site regardless of the accessibility for firefighting ground-crews.

The MNC BRMP identifies the adjoining Tarkeeth State Forest as an Economic asset. The "treatment" listed in the MNC BRMP states "Inspect and maintain fire trails as per BFMC" with the responsibility falling on the land manager – Forestry Corporation NSW.

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 careful risk assessment, it does not provide any degree of certainty that fire containment and extinguishment could occur.

The MNC BRMP identifies two "Strategic Fire Advantage Zones" (SFAZ) adjacent to the site. A SFAZ is described in the MNC BRMP as follows:

Table 2: extract from MNC BRMP

Zone	Purpose	Suppression	Zone
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential spot fire development. To aid containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of: Parallel Attack suppression strategies within the zone. and/or Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone. and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependant upon: Topography Aspect Spotting propensity Location of adjacent fire breaks Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.

These areas, to a certain extent, create a degree of discontinuity of the bushfire hazard fuels in the landscape around the site. The two SFAZ adjacent to the site are identified as blue in the following extract from the MNC BRMP.

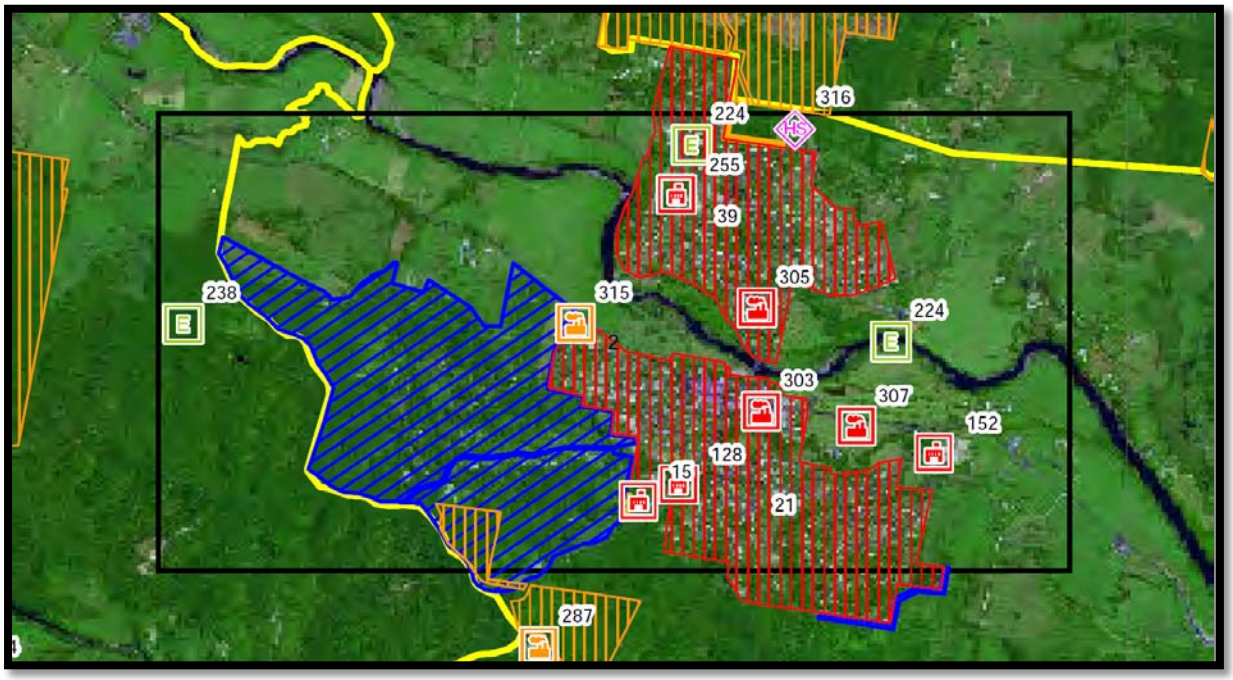

Figure 2: extract of MNC BRMP

The larger of the two SFAZ is located on the western interface of Bellingen, and provides a degree of protection to the southern part of Bellingen, including the development site.

The smaller of the two SFAZ is located on private property: partly along the north-eastern corner of the development site; and partly on the adjoining property to the east. Part of this SFAZ would be extinguished by the proposed development, with the result being a significantly larger fuel-managed area, with bushfire fuel loads being significantly lower than proposed by a 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 project Planner has provided the following information in respect to this assessment criteria.

> Comment: The land is on the periphery of the Urban Growth Area and is identified in the Bellingen Shire Council Housing Strategy as having merit for the application of the E4 Environmental Living zone. The E4 zone will distinguish future subdivision of the land from the typical greenfield offering by maximising the area of the land to be conserved under a Biodiversity Stewardship Agreement and limiting the types of residential accommodation options to 'dwellings'. The proposed average lot size is 750 m^2 and the number of dwellings per hectare is between 4 and 5. Typical low density dwelling yield per hectares is 15-20 dwellings (NSW Planning & Environmental, Housing Diversity, Sydneys Growth Areas, 2013).
> Despite the land being outside of the growth area boundary, the land is identified in an endorsed Strategy that post dates the NCRP and will deliver *environmentally sustainable growth.*

The E4 Zoning provides the following restrictions:

> Zone E4 Environmental Living
>
> 1 Objectives of zone
> - To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values.
> - To ensure that residential development does not have an adverse effect on those values.
> - To provide for the continuation of low impact agricultural land uses on land with productive value.
> - To restrict the cumulative impact of traffic generating development upon the local road systems.
> - To restrict population numbers in areas isolated during flooding events.
>
> 2 Permitted without consent
> Environmental protection works; Extensive agriculture; Forestry; Home occupations; Horticulture
>
> 3 Permitted with consent
> Agriculture; Airstrips; Animal boarding or training establishments; Boat sheds; Building identification signs; Business identification signs; Community facilities; Dwelling houses; Emergency services facilities; Environmental facilities; Farm buildings; Flood mitigation works; Helipads; Home businesses; Neighbourhood shops; Oyster aquaculture; Pond-based aquaculture; Recreation areas; Research stations; Roads; Roadside stalls; Tank-based aquaculture; Water recreation structures; Water storage facilities
>
> 4 Prohibited
> Industries; Service stations; Turf farming; Warehouse or distribution centres; Any other development not specified in item 2 or 3

2.2.2 The proposed land use zones and permitted uses

Refer to the comment from the project Town Planner above at Section 2.2.1. A BAL plan will be generated for the proposed development as the project proceeds.

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 Sections 2.2.1 & 2.2.2 above.

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

The proposed APZs along the eastern, southern and western interfaces are all based on "residential" development rather than *Special Fire Protection Purpose* development, as defined by *PBP-2019*.

As indicated by the plans provided in 2.2.1 & 2.2.2 above, the location of future development has been appropriated based on the distance from the surrounding bushfire hazard vegetation.

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 following is an extract provided by the project Engineer.

A Traffic Impact Assessment has been prepared on the proposed re-zoning assuming development in accordance with the concept for a community title subdivision comprising approximately 80 residential lots.

The Traffic Impact Assessment concludes that:

The concept design proposes and 8.0m wide perimeter road in accordance with Planning for Bushfire Protection 2019 (PBP 2019) requirements. All roads within the proposed community title subdivision are able to meet the requirements of Bellingen Shire Council Development Design Specifications and the Bellingen Shire DCP 2017.

Primary access to the community title subdivision will be from Endeavour Drive. An emergency access road from the development to Hill street is also proposed.

Endeavour Drive is a non through road currently servicing approximately 40 residential dwellings. The rezoning proposal would see an additional 80 residential dwellings with primary vehicular access to Endeavour Drive.

With an 8.0m pavement width, roll over kerb and gutter and wide verges over most of its length, Endeavour Drive can safely cater for increased traffic volumes from the proposed development in a bush fire emergency.

Emergency service vehicles will have two-way all-weather access to the site via Endeavour Drive which will continue to be a Council maintained asset.

Alternative access to the site is proposed from Hill Street which is a Council/Crown Road. The development proposal would see Hill Street between Evans Street and the connection to the development perimeter road upgraded to a 5.5 m wide gravel road. The remainder of the Hill Street connection to Ford Street and the local road network is two way and capable of safely taking emergency service vehicles and if required, evacuation traffic during a bushfire emergency.

All roads within the proposed community title subdivision and providing access to the subdivision are capable of (or can be upgraded to) carrying fully loaded firefighting vehicles (up to 23 tonnes).

2.3.2 The location of key access routes and direction of travel

The site can currently be accessed by two streets; Endeavour Drive and Hill Street. Both of these roads connect with the northern or north-western boundaries of the site.

In the initial lot layout design phase, the main traffic access route to the site was to be along Endeavour Drive. Endeavour Drive links with Crown Street which leads traffic away in two directions; west towards the town centre, or east and north to Waterfall Way.

Endeavour Drive connects with the subject site approximately mid-way along the northern boundary of the site. It is from here where the internal road network branches out to create perimeter-, and non-perimeter roads.

The secondary access route to the site is provided off Hill Street. Hill Street leads away from the site in a generally-northern direction, intersecting with Crown Street (amongst others) along the way, to provide access to the town centre.

Nobles Lane
Nobles Lane is a minor road that intersects with Crown Street to the north-east of the site. For the initial kilometre of Nobles Lane, the lane is formed and provides access from Crown Street to the farms in the vicinity. Further south from this point the lane is unformed, however the road reserve continues south, west and north to create the southern boundary of the property. This road reserve intersects with the extension of the Hill Street road reserve, which forms the western boundary of the property.

Endeavour Drive
Endeavour Drive has a length of approximately 650 m and extends from the northern boundary of the development site to Crown Street. From the intersection of Crown Street, travel in two directions can occur – east to Waterfall Way; or west to the centre of Bellingen.

Endeavour Drive is intended to be the main access route to-and-from the development site.

Hill Street
Hill Street is located along the western boundary of the site. Hill Street currently forms a dead-end street providing access to the north to the centre of Bellingen. The length of Hill Street to the Crown Street intersection is approximately 670 m.

An extension to Hill Street is proposed following consultation with the NSW Rural Fire Service. The RFS has indicated that the augmentation to Hill Street should comply with the two-way road provisions of *PBP-2019*.

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

Of the two potential egress routes from the site, the route along Endeavour Drive is the safer of the two options.

Traffic leaving the site along Hill Street, in the event of a wildfire emergency event impacting on the site, is exposed to unmanaged bushfire hazard vegetation on the western side of the road for a significant length of the route. As discussed in Section 2.1, the most credible wildfire scenarios likely to impact on the site are from the west (hot, dry winds) or south-west (weather change associated with a southerly change). Under

these conditions, the Hill Street route would not be a safe egress route for residents, and should not be used by responding fire services seeking to enter the site. The Endeavour Drive route provides a much safer alternative under those conditions.

Under all other wildfire scenarios likely to impact on the site (from the south and east), the safest egress route from the site is via the Endeavour Drive route. Traffic leaving the site to the north along Endeavour Drive immediately enter an area of the township that is already occupied by established residential development. There are no areas along this route, either towards town or Waterfall Way, that is exposed to unmanaged bushfire hazard vegetation that would likely cause a traffic *pinch-point*.

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

Although not within a Fire & Rescue NSW fire district at this point in time, the proposed development site will eventually transition from a Rural Fire District to a FRNSW Fire District. This would occur when representatives from both of the fire services routinely meet to negotiate on Fire District boundary changes.

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 town, the development would be more bushfire-resilient than the existing development on the same interface 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 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.

If the perception is that approximately 80 new lots are created in a bushfire-prone area, then it follows that much of the adjacent urban development is no longer situated on bushfire-prone land, as the development site creates a buffer between the bushfire hazard and the existing urban development.

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.

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

The following is an extract provided by the project Engineer.

The site benefits from a 100mm diameter Bellingen Shire Council water main on Hill Street terminating at Wattle Close and a 200mm diameter Council water main terminating adjacent the property boundary on Endeavour Drive.

The proposed community title subdivision will include a reticulated water supply connected to either or both existing mains with new mains within the community title subdivision accessible and reliable for firefighting operations.

All reticulation mains and supply infrastructure will be maintained as Bellingen Shire Council assets.

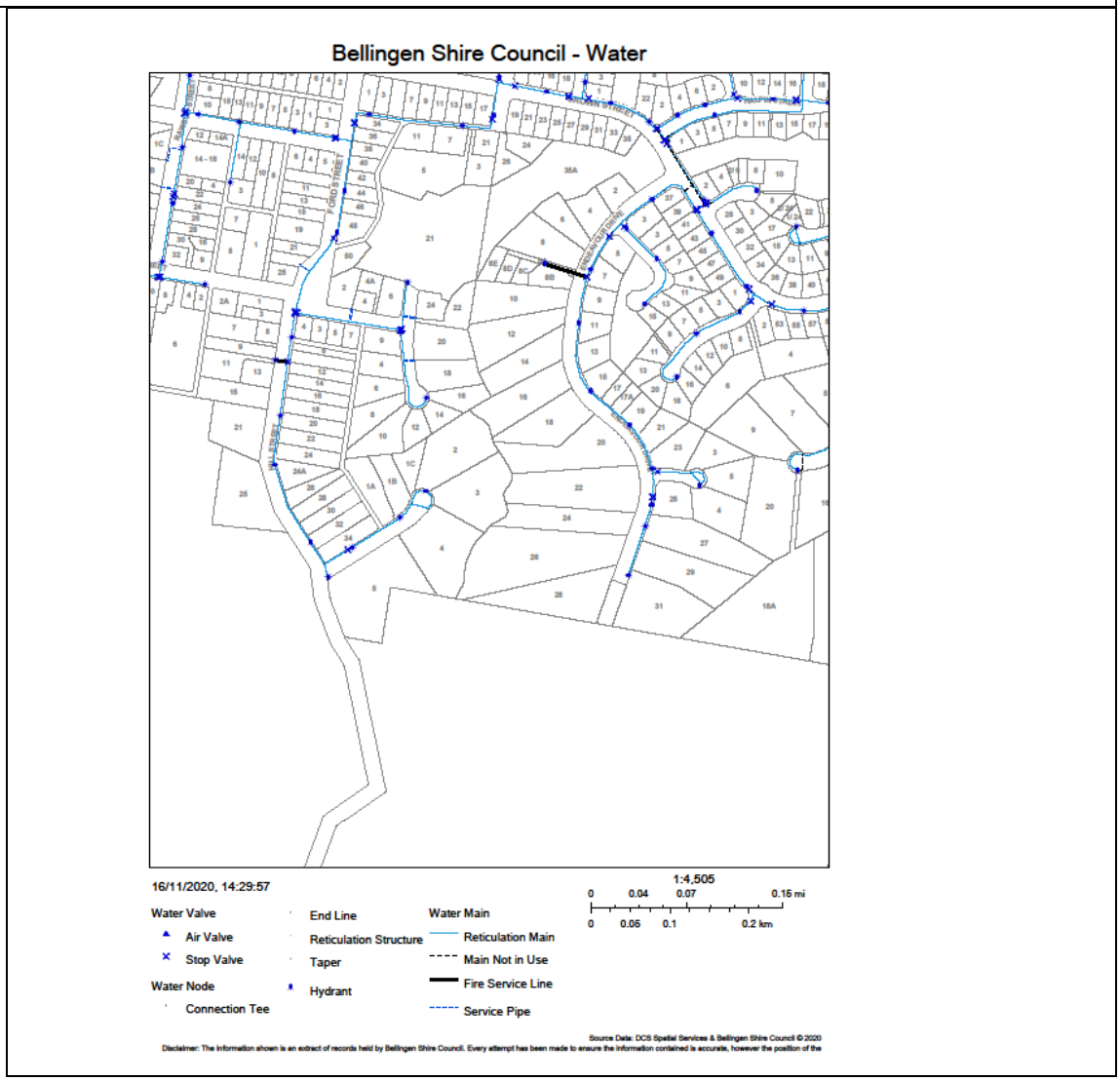

Figure 3: plan showing location of existing water mains

PBP-2019 cites AS 2419.1:2005 in reference to the provision of a reticulated water supply for subdivision developments.

> fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005

There are no provisions in AS 2419.1:2005 that address water mains or fire hydrants for (residential) subdivision developments. There are provisions within the Australian Standard for various types of buildings classified under the BCA / NCC classification system, such as residential apartments, shops, factories, offices, health-care, but nothing relating to Class 1a dwellings.

What **HCBS Pty Ltd** has proposed on several occasions, as an effective alternative to citing AS 2419.1:2005, or until the NSW Rural Fire Service develops an alternative *Acceptable Solution*, is a condition that reads:

> (A) The pressure and flow rate from a hydrant located in a perimeter road reserve must be able to be maintained at 10 L/s at 150 kPa (from Table 2.2 of AS 2419) when 75% of those hydrants on that interface are operating.
>
> And
>
> (B) The pressure and flow rate from a hydrant located in a non-perimeter road reserve must be able to be maintained at 10 L/s at 150 kPa (from Table 2.2 of AS 2419) when 15% of those hydrants (and not less than 1) are operating, in conjunction with (A).

The reason for this approach is due to the expected water usage during a major bushfire event in the vicinity of the site. AS 2419 provisions are designed around the principle that a single fire event has occurred on a single property. Bushfire events potentially place a much greater demand on water supplies over a wider geographic area.

A water usage increase would occur due to a number of reasons, principally the demand placed on the infrastructure by the fire services accessing the hydrants, as well as a large number of residents using their domestic supply (garden hoses and bucket-filling).

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 as the suite of BPMs are provided within the development site. An example of this is the proposed extinguishment of the narrow, arbitrary SFAZ along the northern boundary of the site (providing limited protection to the existing urban development), and replacing it with an APZ that is 95 m wide in most instances and provided within the development site.

This shifts the bushfire-prone land to more than 250 m from the existing urban development in Endeavour Drive.

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

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 3

	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.	Complies
	[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	Complies
		[5.2] Fencing is constructed in accordance with section 7.6.	Complies

In relation to *Acceptable Solution* [1.1], although much of the land to the south of the development footprint has slopes that are in excess of 20°, the actual slopes assessed perpendicular to the development footprint are nearly all <20°. Those areas where the slope exceeds 20° will be within the proposed APZ around the perimeter of the development site, and therefore will not be occupied by unmanaged bushfire hazard vegetation.

A slope summary is provided on the following Figure.

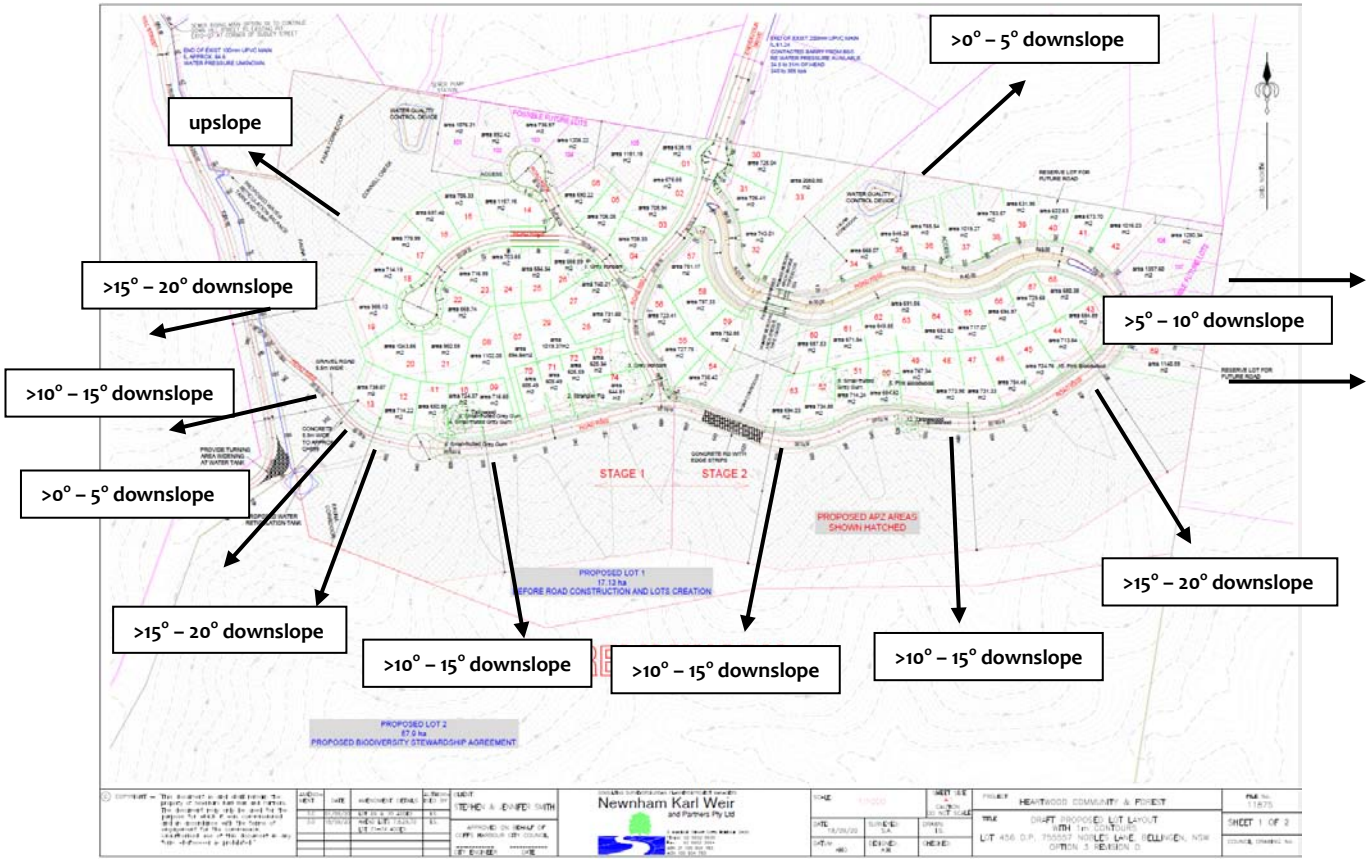

Figure 4: slope summary plan

The following extract from *PBP-2019* identifies the required minimum separation distances for forest vegetation on the effective slope ranges.

Table A1.12.3

Minimum distances for APZs – residential development, FFDI 80 areas (≤29kW/m², 1090K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	9	12	15	20	25
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	20	25	31	39	48
Grassy and Semi-Arid Woodland (including Mallee)	11	13	17	21	27
Forested Wetland (excluding Coastal Swamp Forest)	8	10	13	17	22
Tall Heath	16	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Freshwater Wetlands	5	6	6	7	8
Grassland	10	11	12	14	16

Figure 5: Table A1.12.3 of *PBP-2019*

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 4

	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;	Complies
		[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;	Complies
		[6.8] Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the	Complies

		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	Complies
		[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;	Complies
		[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	Not applicable
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	[9.1] Are two-way sealed roads;	Complies
		[9.2] Minimum 8m carriageway width kerb to kerb;	Complies
		[9.3] Parking is provided outside of	Complies

	during firefighting and emergency management on the interface	the carriageway width; [9.4] Hydrants are located clear of parking areas; [9.5] Are through roads, and these are linked to the internal road system at an interval of no greater than 500m; [9.6] Curves of roads have a minimum inner radius of 6m; [9.7] The maximum grade road is 15 degrees and average grade of not more than 10 degrees; [9.8] The road crossfall does not exceed 3 degrees; and [9.9] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Complies Complies Complies Complies Complies Complies
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; [10.2] Parking is provided outside of the carriageway width; [10.3] Hydrants are located clear of parking areas; [10.4] Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; [10.5] Curves of roads have a minimum inner radius of 6m; [10.6] The road crossfall does not exceed 3 degrees; and [10.7] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Complies Complies Complies Complies Complies Complies Complies
c e s c	[11] Firefighting vehicles can access the dwelling and exit the property	[11.1] There are no specific access requirements in an urban	Complies

	safely.	area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. In circumstances where this cannot occur, the following requirements apply: [11.2] Minimum 4m carriageway width; [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; [11.4] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; [11.5] Provide a suitable turning area in accordance with Appendix 3; [11.6] Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; [11.7] The minimum distance between inner and outer curves is 6m; [11.8] The crossfall is not more than 10 degrees; [11.9] Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and	Not applicable Not applicable Not applicable Not applicable Not applicable Not applicable Not applicable

		[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.	Not applicable

In relation to *Acceptable Solution* [6.6] & [6.7], the road design incorporates a main perimeter road that provides dual access to Hill Street and Endeavour Drive. Off the perimeter road are two cul-de-sacs which are both less than 200m in length. The turning heads of the cul-de-sacs are 24 m in diameter.

In relation to *Acceptable Solution* [8.2], AS 2419 does not provide fire hydrant requirements for residential subdivisions. As an alternative to complying with AS 2419, a Performance Criteria should be developed to help ensure firefighting water supplies are maintained during a bushfire event in the locality. Therefore, the following is proposed (unless the NSW Rural Fire Service publishes an alternative Performance Criteria):

(A) The pressure and flow rate from a hydrant located in a perimeter road reserve must be able to be maintained at 10 L/s at 150 kPa (from Table 2.2 of AS 2419) when 75% of those hydrants on that interface are operating.

And

(B) The pressure and flow rate from a hydrant located in a non-perimeter road reserve must be able to be maintained at 10 L/s at 150 kPa (from Table 2.2 of AS 2419) when 15% of those hydrants are operating, in conjunction with (A).

In relation to *Acceptable Solution* [9.5] & [10.4], the perimeter road is linked with the internal roads, and existing public roads, at intervals not exceeding 290 m.

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 5

	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;	Complies
		[12.2] A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and	Not applicable
		[12.3] Static water supplies shall comply with Table 5.3d.	Not applicable
	[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	Complies
		[13.3] Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	Complies
	[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	Not applicable

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* [13.1] & [15.1], AS 2419 does not provide fire hydrant requirements for residential subdivisions. As an alternative to complying with AS 2419, a Performance Criteria should be developed to help ensure firefighting water supplies are maintained during a bushfire event in the locality. Therefore, the following is proposed (unless the NSW Rural Fire Service publishes an alternative Performance Criteria):

(A) The pressure and flow rate from a hydrant located in a perimeter road reserve must be able to be maintained at 10 L/s at 150 kPa (from Table 2.2 of AS 2419) when 75% of those hydrants on that interface are operating.

And

(B) The pressure and flow rate from a hydrant located in a non-perimeter road reserve must be able to be maintained at 10 L/s at 150 kPa (from Table 2.2 of AS 2419) when 15% of those hydrants (and not less than 1) are operating, in conjunction with (A).

In relation to the other relevant *Acceptable Solutions*, these matters are able to be addressed via the Plan of Management for the Community Title subdivision or otherwise via 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 6

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.

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.

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.

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 are no existing assets on the subject lot that could be considered infill development.

The proposed subdivision enhances the bushfire protection to the adjacent residential development within Bellingen.

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.

3.8 Contain provisions for adequate water supply for firefighting purposes

This has been discussed in more detail at Section 3.1 above.

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.

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

1. The LEP should prohibit the undesirable developments, listed in Table 6 of this Report, within the bushfire-prone areas (land within 100m of identified bushfire hazard vegetation) of the subject site.

2. 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.

3. 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.

4. The *Vegetation Management Plan* should address temporary APZs for Staged development, ongoing management of non-vegetated areas to ensure bushfire hazard vegetation does not regenerate on the site.

5. The LEP should provide a mechanism to ensure the Fire & Rescue NSW document "*Fire Safety Guideline - Fire Hydrants for Minor Residential Development*" is included as a policy for future development within the site.

6. A Neighbourhood Management Plan for the Community Title development should address the recommendations 2-5 above.

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**)

26/11/2020

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

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