Attachment 5 - Bushfire Assessment

LAND REZONING

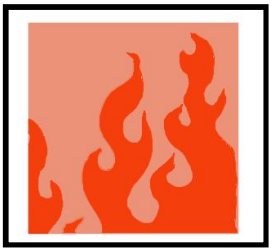
LOT 4 DP834254

510 BEACH ROAD

BERRY. NSW. 2535

BUSHFIRE HAZARD ASSESSMENT






Prepared by SOWDES
10 November 2017

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List of Abbreviations that may be used throughout this report

AA3	Addendum: Appendix 3 - Planning for Bush Fire Protection (2010)
APZ	Asset Protection Zone
AS 3959	AS3959 - 2009 Construction in Bush Fire Prone Area
BAL	Bush Fire Attack Level
BCA	Building Code of Australia
BFSA	Bush Fire Safety Authority
BPMs	Bush Fire Protection Measures
CC	Construction Certificate
DA	Development Application
DCP	Development Control Plan
EP&A ACT	Environmental Planning & Assessment Act (1979)
FDI	Fire Danger Index
IPA	Inner Protection Area
LEP	Local Environmental Plan
OPA	Outer Protection Area
PBP (2006)	Planning for Bush Fire Protection (2006)
PBP (2017)	Planning for Bush Fire Protection (2017) – Draft for Public Consultation (April 2017)
RF Act	NSW Rural Fires Act (1997)
RF Reg	NSW Rural Fires Regulation (2008)
RFS	NSW Rural Fire Service
RHF	Radiant Heat Flux
ROS	Rate of Spread
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose

Executive Summary.

SOWDES has been commissioned by the owners of a portion of land identified as Lot 4 DP834254 - 510 Beach Road, Berry. NSW. 2535 to undertake a 'Bushfire Hazard Assessment' in support of a rezoning application to the Shoalhaven City Council for the rezoning of the land, and then future rural-residential subdivision development. The subject development property contains portions of land that are designated as bush fire prone and therefore this Bushfire Hazard Assessment has been undertaken in accordance with the criteria of both the Shoalhaven City Council and the New South Wales Rural Fire Service's (NSW RFS) 'Submission Information' requirements for a proposed development of land within a bush fire prone mapped area.

This report provides an independent assessment of the proposed development with regard to protection of life and property, the general construction standards within bush fire prone areas and follows the relevant guidelines and information requirements of the NSW RFS's publication "Planning for Bush Fire Protection" (2006) (PBP 2006), "Addendum: Appendix 3 Planning for Bushfire Protection (2010)", Clause 44 of the Rural Fires Regulation (2008) (RF Reg), Section 91 of the Environmental Planning and Assessment Act (1979) (EP&A Act), Section 100B of the Rural Fires Act (1997) (RF Act), and AS 3959-2009 Construction of Building in Bush Fire Prone Area (as amended in February 2011) (AS3959). Consideration has also been given to the provisions within the draft version of 'Planning for Bush Fire Protection' (April 2017) as it is most likely that any future developments undertaken within the subject property will be done so after the new guidelines are gazetted and become effective. The draft 'Flora and Fauna Assessment' prepared by Biosis (dated 27th October 2017), and the draft 'Conceptual Water Cycle Management Study' prepared by SEEC (dated 25th October) have also been referenced in the preparation of this Bushfire Hazard Assessment. It is noted that both of the aforementioned reports do not identify any particular constraints to the proposed rezoning or subdivision development that would adversely impact or alter the recommendations of this Bushfire Hazard Assessment.

This Bushfire Hazard Assessment has also referenced previous considerations of the proposed rezoning and subdivision development that have been addressed within the 'Joint Regional Planning Panel – Pre-Gateway Review' undertaken in September 2016 and the subsequent gateway determination. The recommendations with regard to the preservation of the Jim's Forest vegetation formation within a single allotment, and the determination of building envelopes within Lots around Jim's Forest that can satisfy the requirements for developments within bushfire prone lands which includes the establishment of suitable asset protection zones has been incorporated into the design.

The approach adopted in the presentation of this report is to assess a future subdivision development based on the provisions of Direction 4.4 of Section 117 (2) of the Environmental Planning Assessment Act 1979, and the conceptual subdivision plan prepared by JMD Development Consultants (Ref: 14141PS, dated 15th March 2017). The assessment will be undertaken in accordance with the 'performance criteria' and 'acceptable solutions' measures as prescribed in Chapter 4.1.3 of Planning for Bushfire protection (2006). In addressing the specific requirements of Chapter 4.1.3 of Planning for Bushfire Protection (2006) at the rezoning stage of the development, any subsequent subdivision development of the site should be able to be undertaken that minimises the risk to human life, property, the environment, and emergency services personnel.

It is noted that the preparation of a conceptual subdivision plan has been undertaken with knowledge and consideration of potential bushfire related constraints thereby minimising the risk to future residential developments by designing the proposed allotments and internal road network in accordance with the specific requirements of Chapter 4.1.3 of Planning for Bushfire Protection (2006). A site plan has been prepared to accompany this Bushfire Hazard assessment which is based on the conceptual subdivision plan and includes mapped bushfire prone vegetation for the subject development property, Ref: 0120818BF-01.

It is considered that the proposed development to re-zone the existing portion of land to enable a future subdivision development that will create a large number of rural-residential allotments will be able to satisfy the requirements of Planning for Bush Fire protection (2006) (and any future release of the guidelines), in particular the 'acceptable solutions', 'performance requirements' and 'specific objectives' contained in Chapter 4.1.3 of the publication, and that all newly created Lots will be able to support a 'complying development' for developments undertaken in bushfire prone land.

It is further considered that the adoption of revised guidelines in the form of Planning for Bushfire Protection (2017), or any variation to that draft document will not have a significant or contradictory effect on the recommendations or summaries contained within this assessment.

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10 November 2017

A. Legislation.

The proposed development includes the subdivision of residential land and is therefore designated as 'integrated development' in accordance with Section 91 of the EP&A Act. As integrated development, a formal application must be submitted to the NSW Rural Fire Service under Section 100B of the RF Act seeking a 'Bush Fire Safety Authority' for the proposed development which will assess the proposal for compliance with PBP and the combined bush fire protection measures aimed at the protection of life and property. A 'Bush Fire Safety Authority' (BFSA) requires assessment of the development against set criteria as set out in Clause 44 of the Rural Fires Regulation (2008) which forms the basis of the assessment process adopted within this report. The relevant policies and guidelines that have been considered in the development assessment include:

- "Planning for Bushfire Protection (2006)" and "Addendum: Appendix 3 Planning for Bushfire Protection (2010)" (NSW Rural Fire Service)
- "AS3959 - 2009 Construction in Bushfire Prone Areas"
- Environmental Planning and Assessment Act (1979) - Sections 91 and 79BA
- NSW Rural Fires Act (1997) - Section 100B
- NSW Rural Fires Regulation (2008) - Clause 44
- Shoalhaven Local Environmental Plan (2014)
- Shoalhaven City Council Development Control Plan (2014)

B. Assessment Methodology.

The methodology employed to undertake a site assessment of the proposed development is consistent with that required for integrated development applications as defined in Section 91 of the EP&A Act and Section 100B of the RF Act, and contains the following detailed information as set out in Clause 44 of the RF Reg (as applicable):

1. A description of the property

- provide Lot No., DP of subject land
- street address with locality map
- zoning of subject land and any adjoining lands
- staging issues, if relevant, and description of the whole proposal
- aerial or ground photographs of subject land including contours and existing and proposed cadastre

2. Identification of any significant environmental features - these could include the presence of:

- riparian corridors
- SEPP 14 – Coastal Wetlands, SEPP 26 Littoral rainforests, SEPP 44 – Koala Habitat
- areas of geological interest
- environmental protection zones or steep lands (>18°)
- land slip or flood prone areas
- national parks estate or various other reserves.

3. Details of threatened species, populations, endangered ecological communities and critical habitat known to the applicant

- details of some threatened species can be found on the web (www.environment.nsw. gov.au)
- past and/or present studies or surveys for the area (eg local environment studies)
- documentation supplied to council in relation to flora and fauna

4. Details of Aboriginal heritage known to the applicant

- past surveys and information held by the DEC.

5. A bushfire assessment for the individual Lots that addresses –

- the classification of vegetation out to 140 metres from the development
    - provide a structural description consistent with the identification key in Keith D (2004) and PBP.
    - identify any past disturbance factors and any future intended land uses that could alter the vegetation classification in the future.
- an assessment of the effective slope to a distance of 100 metres
    - usually 5m contours will suffice for subdivisions, 10 metres should be used only if there has not been a survey undertaken by a registered land surveyor.
    - the effective slope is the slope under the vegetation assessed as being a hazard in relation to the development and not the slope within the asset protection zone.
- asset protection zones (including any management arrangements, any easements including those contained on adjoining lands)
- siting and adequacy of water (in relation to reticulation rates or where dedicated water storage will be required)
- capacity of public roads (especially perimeter roads and traffic management treatments)
- whether public roads link to fire trails and have two way access
- adequacy of access and egress
- adequacy of maintenance plans (eg landscaping) and emergency procedures (especially SFPP developments)
- construction standards to be used (where non-conformity to the deemed-to-satisfy arrangement is envisaged, which aspects are not intended to conform)
- adequacy of sprinkler systems (only as an adjunct to other passive controls).

6. An assessment of how the development complies with the acceptable solutions, performance requirements and relevant specific objectives within Chapter 4 of PBP.

Detailed responses to each of the above listed assessment criteria, and where deemed appropriate, an individual assessment of each Lot may be included:

1. A description of the proposed development and property

The development property which has an area of approximately 75 hectares is identified as Lot 4 DP834254 - 510 Beach Road, Berry. NSW. 2535 and is located approximately 5.3 kilometres to the east of the village of Berry, and 2.2 kilometres west of the popular 'Seven Mile Beach'.

The proposed development will be undertaken over two stages; the first being the rezoning of existing 49.3 hectares of RU1 (Primary Production) zoned land to R5 (Large Lot Residential) and 25.6 hectares of E1 (National Parks and Nature Reserves), and the second stage being the subdivision of the R5 zoned land into rural-residential properties plus supporting road network. The first stage of works will seek to re-zone the existing RU1 zoned land that occupies the northern portion of the property to a R5 zoning and the remaining 25.6 hectares in the southern third of the site of E1 zoning. It is anticipated that following rezoning of the land a separate application will be lodged for the rural-residential subdivision to progress.

A conceptual design plan for the rural-residential subdivision creates several 'finger' allotments on the southern end of the site (Lots 12 to 18) of varying size that will back onto the E1 zoned land, however there will be a vegetation buffer zone of variable width around the margins of the Coomonderry Swamp and the southern boundaries, and it is further recommended that a 100 metre development exclusion zone from the southern boundary be established within each of the burdened blocks to minimise the risk associated with bushfire.

The subject property has historically been used as a dairy operation, and more recently as a viable rural enterprise concentrating on the grazing cattle and beef production. The current land holders have owned and operated the property since the mid-1960's with small portions of land on the eastern aspect of the property separated-off over the years and now set to neighbouring residential developments. There is an existing residential dwelling, supporting sheds and several outbuildings within a defined curtilage in the northwest quarter of the property which is accessed via an unsealed carriageway formed off the Beach Road traffic corridor.

The property comprises a blend of vegetation types which are dominated by three distinct formations;

- Coomonderry Swamp that occupies the southern portion of the property covering an area of approximately 20.9 hectares and listed as 'High Biodiversity Value' ('SEPP 14 Wetland),
- Jim's Forest (also referred to as Jim's Bush within the site Flora and Fauna Assessment prepared by Biosis) covering an area of approximately 3 hectares centrally along the eastern boundary, and
- improved pastures with a mix of exotic and native grass species occupying the majority of the property north of the Coomonderry Swamp.

Several other vegetation formations have been identified, particularly along the northern roadside boundary that adjoins the Beach Road traffic corridor, and a few smaller areas within and surrounding the existing dwelling and curtilage.

The property is essentially divided into two drainage regimes that are separated by an east Ÿ west aligned ridge that runs through the centre of the property. The northern side of the ridge falls toward the Beach Road aspect and has an average grade of 10°, whilst the southern side of the ridge slopes toward the catchment of the Coomonderry Swamp and has an average grade of 10° to 15° in the higher elevations before transitioning into a plateau of less than 5° slope nearing the margins of the swamp. The terrain on the northern side of the ridge has a slight cross-fall toward the northwest in the lower elevations of the site and is highlighted by a series of small dams that are utilise by the grazing stock for drinking water. There is a small exception to the aforementioned drainage regimes with the land area under the Jim's Forest precinct falling away from the main portion of the property toward the east at variable grades that average 10°.

With reference to the existing bushfire vegetation mapping for the subject property and the conceptual subdivision plan it is noted that only one of the proposed Lots seeking residential dwelling permissibility would in fact be burdened by designated bushfire prone vegetation. The proposed Lot 30 in the eastern part of the development which also contains the Jim's Forest vegetation formation would be the only Lot actually burdened by mapped bushfire prone vegetation and therefore all other Lots would not be obligated to comply with the provisions of 'Planning for Bush Fire Protection' (2006). It is worth noting however that any variation of the current version of the conceptual subdivision plan or to the existing bushfire mapping instruments for the site might ultimately change the number of allotments that are eventually burdened. For this reason, the accompanying site plan has shown the 'potential' Bushfire Attack Level rating (BAL) for a nominal building envelope of 500m² for all proposed Lots immediately adjacent to Jim's Forest, including Lot 30 which contains Jim's Forest. Section 5 of this assessment which address how each burdened Lot meets the relevant bushfire design criteria and hazard protection measures has only provided a summary of the proposed Lot 30.

The proposed road design within the conceptual subdivision plan has a 'looped' formation with entrance and exit provisions on both the western and eastern ends of the site that adjoin the Beach Road traffic corridor. The internal road formations will be new and can therefore be readily designed and constructed to meet the requirements of Council engineering standards, and those of the NSW Rural Fire Service. All internal road formation will have a sealed width of at least 8 metres, and there will be clearances in the vertical plane of at least 4 metres along all carriageways without the need to remove any significant trees. The Lot configuration throughout the majority of the site, and the designated R5 zoning at the northern end of the longer 'finger' Lots 12 to 18 to the south will ensure that all building envelopes will be within 200 metres of the internal 'through road' network.

The development property is not serviced by a Council maintained reticulated water supply and therefore each Lot within a future subdivision if deemed to be in a designated bushfire prone area will be required to provide a dedicated water supply for firefighting purposes in accordance with Table 4.2 *'Dedicated Water Supply Requirements for Various Non-Reticulated Subdivision Development'*, Planning for Bushfire Protection (2006), page 26.
With reference to the conceptual subdivision plan for the site it is noted that each of the proposed Lots will be equal to or greater than 10,000m² in area and therefore in accordance with Table 4.2 of PBP (2006) will require a minimum dedicated water storage provision of 20,000 litres.

Whilst the majority of the Lots will not be within designated bushfire prone areas and therefore not obligated under existing provisions to comply with the provisions of PBP, there may be a development consideration due to the isolated nature of the site from a Council maintained water supply that all Lots do provide a static water supply of at least 20,000 litres as part of a community based approach to bushfire protection measures. If adopted, the requirements for dedicated firefighting water supply would be in excess of any storage provisions required for potable purposes.

Figure 1. Portion of the Shoalhaven City Council 'Bushfire Mapping' showing Category 2 vegetation formations within and surrounding the development property.

2. Identification of any significant environmental features

The Coomonderry Swamp wetland located in the southern portion of the development property is identified as of 'High Biodiversity Value' (Biosis – October 2017) and is deemed a Coastal Wetland under the provisions of SEPP 14. The report prepared by Biosis states that the Coomonderry Swamp will be isolated from any potential future subdivision development and therefore '.... this area will not be directly impacted by the project', (page 23).

Other areas of significant vegetation values such as Jim's Forest in the central eastern portion of the development site will not be modified or changed in association with any future subdivision development and therefore the potential for adverse impacts on any significant environmental features will be mitigated by way of the project design.

For details of the flora and any associated significant environmental considerations refer to the draft Flora and Fauna Assessment prepared by Biosis (dated 2th October 2017).

3. Details of threatened species, populations, endangered ecological communities and critical habitat known to the applicant

For details of the fauna any associated significant environmental considerations refer to the draft Flora and Fauna Assessment prepared by Biosis (dated 2th October 2017).

4. Details of Aboriginal heritage known to the applicant

A search of the NSW Office of Environment and Heritage "*Aboriginal Heritage Information Management System*" (AIHMS) records indicate that there are no known or registered Aboriginal Heritage sites or places within 200 metres of the subject development property. There is however 1 registered Aboriginal Heritage site within 1 kilometre of the subject development property, although its exact location cannot be determined by the search (refer to the search results included as Appendix B).

It is presumed, based on discussions with the property owners that there are no decisions pending regarding possible future listing of Aboriginal Heritage Places within the proposed development area. There is however a separate request from the Shoalhaven City Council for the property owners to undertake a formal assessment of the site by appropriately accredited consultants to further investigate the Aboriginal Heritage values of the site. At the time of preparing this assessment that process was still ongoing.

5. Bushfire Assessment for the Proposed Individual Lots Burdened by Bushfire Prone Land Lot 30

The classification of vegetation out to 140 metres from the development	The vegetation formations surrounding the nominated building envelope is dominated by Jim's Forest to the south and open grasslands and improved pastures on all other aspects to a distance of at least 100 metres. The nominated building envelope will be at least 55 metres from the margins of the forested vegetation to ensure that the BAL rating does not exceed BAL-29.			
An assessment of the effective slope to a distance of 100 metres	**North**	**South**	**East**	**West**
	Downslope 5° to 10°	Downslope 10° to 15°	Downslope 5° to 10	Downslope 5° to 10
Asset protection zones	Any future dwelling within the nominated development envelope will be required to provide an inner asset protection area of at least 25 metres on the northern, eastern and western aspects to maintain a Bushfire Attack Level rating of no greater than BAL-12.5. On the southern aspect the inner asset protection area will need to be 25 metres with an outer asset protection area also of 25 metres.			
Siting and adequacy of water	At the time of a residential dwelling development on the Lot there will be a requirement to provide a dedicated and static water supply of at least 20,000 litres for firefighting purposes which is in addition to any potable storage requirements.			
Capacity of public roads	The proposed Lot 30 will have direct access to the new internal 'through road' network which will be sealed formation of at least 8 metres in width. The internal road network in turn will junction with Beach Road to the north which is a bitumen sealed road that would provide suitable egress options in an emergency situation that required evacuation from the property.			
Whether public roads link to fire trails and have two-way access	Not applicable			
Adequacy of access and egress	The nominated 'potential development envelope' will be located approximately 30 metres from the front western boundary and a new carriageway will need to be formed to provide access to the site. The internal carriageway will need to satisfy Council's engineering standards for access roadways which will include construction of an all-weather surface finish. The proximity of the development site being less than 200 metres from the front entrance will satisfy the requirements for access and egress provisions.			
Adequacy of maintenance plans	To be undertaken at the time of a residential being constructed on the property but in general all landscaping should be undertaken in accordance with the publication "Standards for Asset Protection Zones" (2006) from the NSW Rural Fire Service			

Construction standards to be used	It is anticipated that the final location of a development envelope within Lot 30 will be surrounded by large open areas of native grasslands on the northern, eastern and western aspects, and forested vegetation to the south. With consideration to the size and shape of the proposed Lot it is further anticipated that with appropriate management of the grassland vegetation for a distance of at least 25 metres on all aspects that the site will have a Bushfire Attack Level rating of not greater than '29' (BAL-29). Accordingly, any dwelling development within the proposed Lot 3 will need to comply with the construction requirements of Section 7 of "AS3959 - 2009 Construction in Bushfire Prone Areas" and attention will need to be given to the general site and design considerations as listed in Section 4.3.5 'Specifications and Requirements for Bush Fire Protection Measures for Infill Development' of "Planning for Bushfire Protection" (2006), NSW Rural Fire Service.
Adequacy of sprinkler systems	Not applicable

Partial view of Jim's Forest from the western aspect looking toward the east.

View from the proposed Lot 18 looking toward the north and showing part of the stand of Jim's Forest.

Bushfire Attack Level (BAL) Certificate – Lot 30

Site Address Details	510 Beach Road, Berry. NSW. 2535		
Property Details	Lot 4 DP834254		
Local Council Area	Shoalhaven City Council	FDI	100

Type of Proposal		Land Zoning	
☑	New dwelling / Subdivision	☐	Urban residential / Village
☐	Alterations / additions to existing building	☑	Rural / other

Proximity, Aspect and Vegetative Formation in Relation to the Proposed Development

Category	North Arc NWŸ NŸ NE		South Arc SEŸ SŸ SW		East Arc NEŸ EŸ SE		West Arc NWŸ WŸ SW	
Distance	metres	25	metres	45	metres	25	metres	30
BAL for aspect	BAL	12.5	BAL	29	BAL	12.5	BAL	12.5
Vegetation formation within 140 metres	☐	Forest	☑	Forest	☐	Forest	☐	Forest
	☐	Woodland	☐	Woodland	☐	Woodland	☐	Woodland
	☐	Tall heaths	☐	Tall heaths	☐	Tall heaths	☐	Tall heaths
	☐	Short heaths	☐	Short heaths	☐	Short heaths	☐	Short heaths
	☐	Rainforest	☐	Rainforest	☐	Rainforest	☐	Rainforest
	☑	Grasslands	☐	Grasslands	☑	Grasslands	☑	Grasslands
	☐	Managed land	☐	Managed land	☐	Managed land	☐	Managed land
Slope under the hazard	Downslope >5 to 10		Downslope >10 to 15		Downslope >5 to 10		Downslope >5 to 10	

Overall Bush Fire Attack Level and AS3959 Building Construction Requirements

The highest BAL Rating that this development must achieve is:	BAL	29	AS3959 Requirement	Section	7

*** Specific variations exist in NSW in the application of Sections 5 and 6 of AS3959-2009 Construction of Buildings in Bushfire Prone Areas. Refer to Section A3.7 - *Addendum: Appendix 3 Planning for Bushfire Protection*. NSW Rural Fire Service (2010).**

Dedicated Water Supply

Development Type	Minimum Water Requirement	Planned	Existing
Residential Lot (< 1000m²)	5000 litre / Lot	☐	☐
Rural Residential Lot (1000 – 10,000m²)	10,000 litre / Lot	☐	☐
Large Rural / Lifestyle Lot (> 10,000m²)	20,000 litre / Lot	☑	☐

Asset Protection Zone Requirements

			Asset Protection Area			
			Inner	Outer		
Direction	Vegetation	Slope	(metres)		Planned	Existing
North	Grasslands	Downslope >5 to 10	25	0	☑	☐
South	Forest	Downslope >10 to 15	25	25	☑	☐
East	Grasslands	Downslope >5 to 10	25	0	☑	☐
West	Grasslands	Downslope >5 to 10	25	0	☑	☐

6. Assessment of development against the "Performance Criteria" & "Acceptable Solutions" as prescribed by '*Planning For Bushfire Protection*' (2006).

Section 4.1.3 – *STANDARDS FOR BUSHFIRE PROTECTION MEASURES FOR RESIDENTIAL & RURAL RESIDENTIAL SUBDIVISIONS*

ASSET PROTECTION ZONES		
Performance Criteria	Acceptable Solutions	How Does the Development Comply
The intent may be achieved where:		
Radiant heat levels at any point on a proposed building will not exceed 29 kW/m2	• an APZ is provided in accordance with the relevant tables and figures in Appendix 2 of this document. • the APZ is wholly within the boundaries of the development site. Exceptional circumstances may apply (see section 3.3)	Each of the proposed allotments will have a minimum area of 1 hectare which will allow for suitable siting of future dwellings centrally within the boundary of the respective Lots. The majority of the proposed allotments will be outside existing mapped bushfire prone areas and therefore not necessarily compelled to comply with the provisions of PBP. For any allotment burdened by bushfire prone land and with consideration to the Shoalhaven Council DCP, Chapter G12: *Dwelling houses, Additions and Ancillary Structures*, it is noted that all proposed allotments will require a 20 to 30 metre setback from the front boundary, 7.5 to 10 metres from the side boundaries, and a minimum of 7.5 metres from the rear boundary. It is considered that all burdened Lots can comply with the Acceptable Solutions for this Performance Criteria
APZs are managed and maintained to prevent the spread of a fire towards the building.	• in accordance with the requirements of 'Standards for Asset Protection Zones (RFS 2005). *Note - a Monitoring and Fuel Management Program should be required as a condition of development consent.*	The majority of allotments will both contain and be surrounded by grassland vegetation formations. Once new dwelling envelopes and associated curtilages are established on each allotment there will be an ongoing requirement for the management and maintenance of vegetation as an asset protection zone to benefit all allotments.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated	• the APZ is not located on lands with a slope exceeding 18 degrees.	All proposed allotments will have development envelopes that are located on lands where the slope does not exceed 15°

ACCESS – PUBLIC ROADS		
Performance Criteria	Acceptable Solutions	How Does the Development Comply
The intent may be achieved where:		
Firefighters are provided with safe all-weather access to structures (thus allowing more efficient use of firefighting resources)	• public roads are two-wheel drive, all weather roads.	All proposed internal roads will comply with Council's engineering requirements which will include formation widths and sealed road construction standards
Public road widths and design that allow safe access for firefighters while residents are evacuating an area.	• urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non-perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle). • the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas. • traffic management devices are constructed to facilitate access by emergency services vehicles. • public roads have a cross fall not exceeding 3 degrees. • all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard. • curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress. • the minimum distance between inner and outer curves is six metres. • maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other	The proposed road design will have suitable widths that allow for vehicle movements in opposing directions. The internal road is designed as a through or 'looped' road formation with two junction locations to allow traffic movements back to the Beach Road traffic corridor. As the internal road network will be new, it can ensure that construction complies with the relevant Acceptable Solutions requirements. It is noted that the Beach Road traffic corridor is existing and already satisfies the requirements for Public Roads as outlined in the Acceptable Solutions requirements.

	gradient specified by road design standards, whichever is the lesser gradient. • there is a minimum vertical clearance to a height of four metres above the road at all times.	
The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles.	• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating.	There are no bridges proposed within the design of the internal road network, however there may be several drainage crossings utilising piped and/or boxed culverts. Any drainage crossing will be constructed to comply with Council's relevant engineering standards and the Acceptable Solutions requirements.
Roads that are clearly sign-posted (with easily distinguishable names) and buildings/properties that are clearly numbered.	• public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression. • public roads between 6.5 metres and 8 metres wide are 'No Parking' on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression.	The development property is not serviced by a reticulated water supply hence there will not be any water hydrants within the road reserve. The Performance Criteria does not apply
There is clear access to reticulated water supply	• public roads up to 6.5 metres wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. • one way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.	The development property is not serviced by a reticulated water supply hence there will not be any water hydrants within the road reserve. The Performance Criteria does not apply
Parking does not obstruct the minimum paved width	• parking bays are a minimum of 2.6 metres wide from kerb edge to road pavement. No services or hydrants are located within the parking bays. • public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road.	There will be no parking bays and all road formations will have a minimum width of 8 metres.

ACCESS – PROPERTY ACCESS		
Performance Criteria	Acceptable Solutions	How Does the Development Comply
The intent may be achieved where:		
Access to properties is provided in recognition of the risk to fire fighters and/ or evacuating occupants.	• at least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 metres from a public through road	All proposed allotment will have building envelopes that are less than 200 metres from the entrance gateways and therefore alternate egress routes are not required
The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. All weather access is provided.	• bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes • roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge).	There are no bridges proposed within the design of the internal road network, however there may be several drainage crossings utilising piped and/or boxed culverts. Any drainage crossing will be constructed to comply with Council's relevant engineering standards and the Acceptable Solutions requirements.
Road widths and design enable safe access for vehicles	• a minimum carriageway width of four metres for rural-residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint). *Note: No specific access requirements apply in a urban area where a 70 metres unobstructed path can be demonstrated 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 (i.e. a hydrant or water supply).* • in forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making a minimum trafficable width of six metres at the passing bay. • a minimum vertical clearance of four metres to any overhanging	The majority of provisions within this performance criteria do not apply as all proposed allotments will have direct access to a sealed through road for egress purposes. All allotments will be large Lots with ample space and turning area for emergency services vehicles around the dwelling envelopes. The subdivision design does not propose to create multiple allotments from a single access or entranceway

	obstructions, including tree branches. • internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius. • curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress. • the minimum distance between inner and outer curves is six metres. • the crossfall is not more than 10 degrees. • maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads. *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), 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.* • access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way.	

FIRE TRAILS		
Performance Criteria	Acceptable Solutions	How Does the Development Comply
The intent may be achieved where:		
The width and design of the fire trails enables safe and ready access for firefighting vehicles	• a minimum carriageway width of four metres with an additional one metre wide strip on each side of the trail (clear of bushes and long grass) is provided. • the trail is a maximum grade of 15 degrees if sealed and not more than 10 degrees if unsealed. • a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches is provided. • the crossfall of the trail is not more than 10 degrees. • the trail has the capacity for passing by: - reversing bays using the access to properties to reverse fire tankers, which are six metres wide and eight metres deep to any gates, with an inner minimum turning radius of six metres and outer minimum radius of 12 metres; and/or - a passing bay every 200 metres, 20 metres long by three metres wide, making a minimum trafficable width of seven metres at the passing bay. *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m) and extend for no more than 30m and where obstruction cannot be reasonably avoided or removed.*	There is no proposal to create fire trails within the subdivision development as there is a large separation distance between the nearest of the any potential development envelope and the existing mapped bushfire prone lands. With the exception of Lot 30 which will contain the mapped Jim's Forest, the nearest of the proposed allotments to any mapped bushfire prone area occurs on the southern end of the development property where several 'finger' allotments will back on to the Coomonderry Swamp. As part of the rezoning development, approximately 25.6 hectares of land will be dedicated back to the environment which will be separated from the residential Lots by a vegetated buffer exclusion zone to the north of the swamp. The buffer zone will be variable in width from the 65 to 100 metres between the existing margins of the swamp and the southern-most boundary of the proposed allotments. The proposed allotments on the southern aspect of the development will not be within designated or mapped bushfire prone area, and there will be a physical separation distance of at least 160 metres between the existing mapped swamp vegetation and the nearest part of any potential building envelope. The majority of the vegetation within the E1 buffer zone will be grassland, and over time, a transition back to natural fringe vegetation formations once anthropogenic influences are removed from these conservation areas

		It is noted that there is existing access to the Coomonderry Swamp wetlands through the adjoin rural-residential subdivision to the immediate west of the subject property with an access handle formed between the two properties identified as Lots 22 and 23 in Deposited Plan 1046162. Additional access for the protection of the dwellings within the southern allotments can be obtained from within those individual properties.
Fire trails are trafficable under all weather conditions. Where the fire trail joins a public road, access shall be controlled to prevent use by non-authorised persons.	• the fire trail is accessible to firefighters and maintained in a serviceable condition by the owner of the land. • appropriate drainage and erosion controls are provided. • the fire trail system is connected to the property access road and/or to the through road system at frequent intervals of 200 metres or less. • fire trails do not traverse a wetlands or other land potentially subject to periodic inundation (other than a flood or storm surge). • gates for fire trails are provided and locked with a key/lock system authorized by the local RFS.	Not applicable
Fire trails designed to prevent weed infestation, soil erosion and other land degradation	• fire trail design does not adversely impact on natural hydrological flows. • fire trail design acts as an effective barrier to the spread of weeds and nutrients. • fire trail construction does not expose acid-sulphate soils.	Not applicable

It is noted that the draft PBP (2017) states that "fire trails are not required for compliance with PBP".

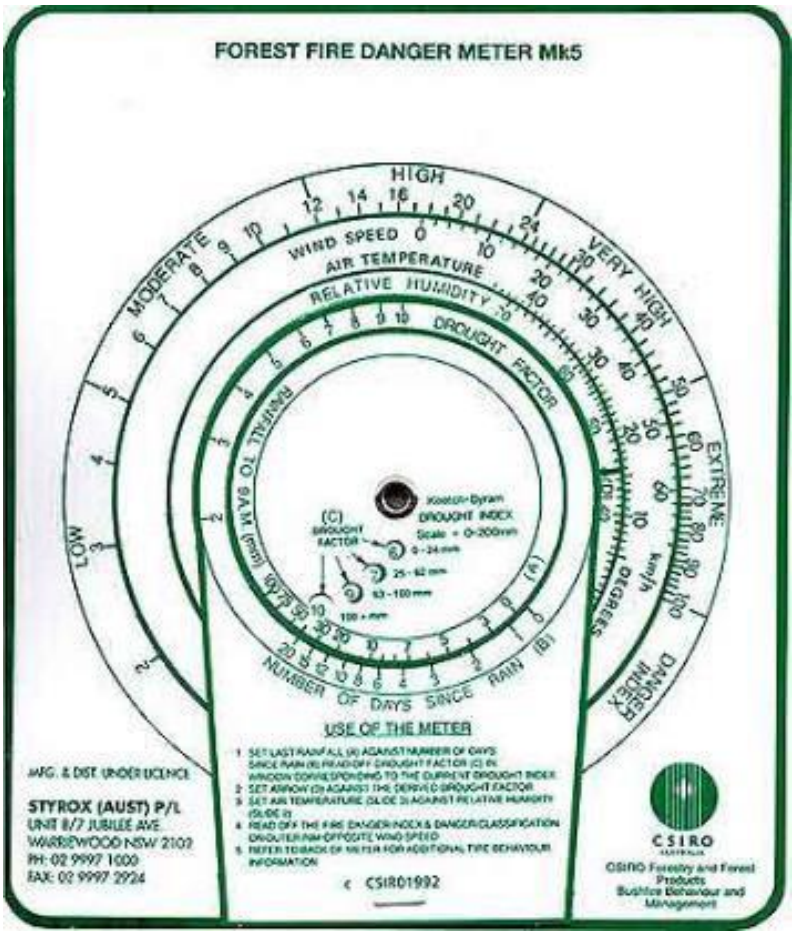
SERVICES – WATER, GAS & ELECTRICITY		
Performance Criteria	Acceptable Solutions	How Does the Development Comply
The intent may be achieved where:		
Reticulated water supplies Water supplies are easily accessible and located at regular intervals.	• reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. • fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. • hyrdrants are not located within any road carriageway • all above ground water and gas service pipes external to the building are metal, including and up to any taps. • the provisions of parking on public roads are met.	Not available
Non-reticulated water supply area. A water supply reserve dedicated to firefighting purposes is installed and maintained. The supply of water can be an amalgam of minimum quantities for each lot in the development and be reticulated within dedicated firefighting lines.	• the minimum dedicated water supply required for firefighting purposes for each occupied building excluding drenching systems, is provided in accordance with Table 4.2. • a suitable connection for firefighting purposes is made available and located within the IPA and away from the structure. A 65mm Storz outlet with a Gate or Ball valve is provided. • Gate or Ball valve and pipes are adequate for water flow and are metal rather than plastic. • underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is supplied within 4 metres of the access hole. • above ground tanks are manufactured of concrete or metal and raised tanks have their stands protected. Plastic tanks	Of the proposed allotments to be created within the subdivision development only one (proposed Lot 30) will be directly burdened by mapped bushfire prone land. In accordance with Table 4.2 this Lot will be required to provide a dedicated water supply of at 20,000 litres for firefighting purposes. All other allotments will not be within mapped bushfire prone area and therefore not obligated to comply with these provisions, however consideration should be given to individual allotments providing static water supply in accordance with Table 4.2 as a 'community' approach to bushfire protection measures. The provision of static water supply for firefighting purposes should be in accordance with the notes under the 'Acceptable Solutions' column

	are not used. Tanks on the hazard side of a building are provided with adequate shielding for the protection of fire fighters. • all above ground water pipes external to the building are metal including and up to any taps. Pumps are shielded.	
Electricity Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings regular inspection of lines is undertaken to ensure they are not fouled by branches.	• where practicable, electrical transmission lines are underground. • where overhead electrical transmission lines are proposed: - lines are installed with short pole spacing (30 metres), 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 accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).	All new electrical cabling installations throughout the development will be undertaken in accordance with the supply authority's standards for developments undertaken within bushfire prone areas. As much as possible and practical underground services will be installed as a preference to overhead installations.
Gas Location of gas services will not lead to ignition of surrounding bush land or the fabric of buildings.	• reticulated or bottled gas is installed and maintained in accordance with AS 1596 and the requirements of relevant authorities. Metal piping is to be used. • all fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation. • if gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal. • polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	The development site is not serviced by a reticulated gas supply therefore any future dwelling will be required to provide bottled gas – if required. Any gas services undertaken within the individual allotments will need be undertaken by a licenced plumber to ensure that these conditions are met. All appliances and/or gas bottle connection points such as regulators should have a certificate of compliance attached.

C. Fire Weather.

The FDI (Fire Danger Index) rating system was developed by McArthur (CSIRO) in the 1960's to help predict the chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression according to the various combinations of air temperature, relative humidity, wind speed and both the long and short term drought effects. An FDI of 100 was considered to be the maximum danger rating given the worst possible combination of fire conditions when the Forest Fire Danger Index was initially introduced, and still stands as the fire weather indicator for all NSW local government areas despite the fact that the maximum potential FDI ratings have been calculated well in excess of 100 in some weather districts. The warning classifications have been updated recently in line with improved knowledge of weather and fire behaviour to the extent that the classification system introduced a new level of danger being "Catastrophic" which reflects conditions in excess of an FDI of 100.

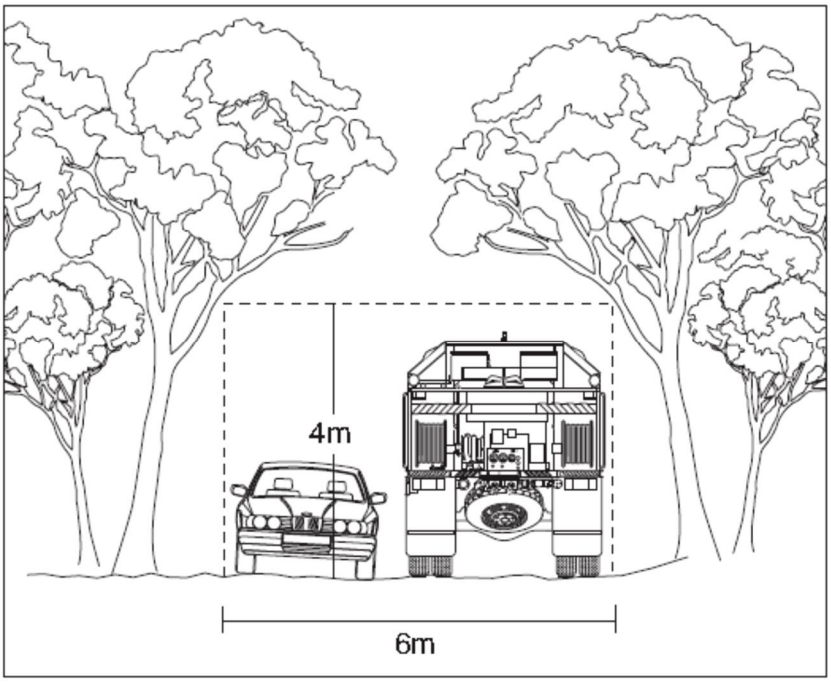
The Shoalhaven City Council is located within the Illawarra/Shoalhaven fire area of NSW and therefore has an FDI rating of 100 assumed as a 1:50 year event.



D. General design and construction considerations for each Lot as 'infill' developments under Section 79BA of the Environmental Planning and Assessment Act 1979.

1. Access and Egress.

Section 4.1.3 (2) of "Planning for Bushfire Protection (2006) - Access (2) - Property Access" requires that an alternate escape route be made available if the distance from the nearest arterial road to the dwelling site is greater than 200 metres, and that the minimum width for internal access roads be four metres plus one metre either side which is maintained to provide a clear opening of four metres between ground level and any overhanging vegetation in accordance with the below Figure. There must also be a turning provision of not less than 12 metres near to the dwelling site which will allow emergency services vehicles clear access to the dwelling.



General construction requirements for internal property access roads in rural areas as prescribed by the NSW Rural Fire Service

2. Water Supply.

In rural areas where the development block is not located within a service area that has access to reticulated water supply, the provision of a dedicated and static water supply is considered essential. The provision of a dedicated waters supply in rural areas provides opportunities for fire fighters to replenish their tanker supplies and also aims to ensure that there is adequate water provisions for the property owners to undertake their own protection activities. As a general rule the capacity of the static water requirement is based on the Lot size and the type of development, with the typical requirements summarised in Table 1.

It should be emphasised that the water requirements listed in Table 1 are a minimum requirement, and where site specific firefighting systems have been installed such as fire hose reels, drencher systems and other fire suppression measures, additional water storage will be required - and the overall capacity of this additional requirement should be based on a site specific design. The minimum water storage requirements applicable for all Lots in this particular development without any site specific fire protection detail is highlighted in Table 1.

Table 1. Water supply requirements (adopted from "Planning for Bush Fire Protection (2006).

Development Type	Residential Lots (<1000m²)	Residential Lots (1000 - 10,000m²)	Large Rural / Lifestyle Lots (>10,000m²)	Dual Occupancy	Townhouses / Unit Style (e.g. Flats)
Water Requirement	5,000 litres / Lot	10,000 litres / Lot	20,000 litres / Lot	2,500 litres / Unit	5,000 litres / Unit up to 20,000 litres maximum

The following items are considered general installation conditions across all development types and are to be applied as applicable:

- a suitable connection for firefighting purposes is made available and located within the IPA (Inner Protection Area) and away from the structure. A 65mm Storz outlet with a gate or ball valve is provided.
- gate or ball valve and pipes are adequate for water flow and are metal rather than plastic.
- underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is supplied within 4 metres of the access hole.
- above ground tanks are manufactured of concrete or metal and raised tanks have their stands protected. Plastic tanks are not used. Tanks on the hazard side of a building are provided with adequate shielding for the protection of fire fighters.
- all above ground water pipes external to the building are metal including and up to any taps. Pumps are shielded.
- tap connections for hand held hoses to be used in firefighting applications should not be connected to the potable water supply as this supply is normally operated with an electric pump which may not be operative during a fire event.
- a petrol operated firefighting pump be connected to the dedicated water supply and regularly checked to ensure proper operation and easy start function.

SWIMMING POOLS, CREEKS AND DAMS SHOULD NOT BE USED AS A SUBSTITUTE FOR A DEDICATED STATIC WATER SUPPLY AS THESE SOURCES OF WATER ARE NOT CONSIDERED RELIABLE DURING DROUGHT CONDITIONS.

It is also important to remember that whilst the protection and defensive measures addressed in this report are principally focused on the requirements for bush fire events, other fires including general household fires can occur at any time and therefore the provisions of this report are intended to extend to all probable fire events. It is for this reason that firefighting measures, such as firefighting pumps being connected to the water supply, should be in place at all times and not simply in the recognised bush fire season.

Example of a storz connection associated with a dedicated water storage tank used for dedicated firefighting purposes

3. Gas Supply.

Gas and other combustible materials should not be stored within the inner protection area of the dwelling or close to significant stands of vegetation formations. In particular, "Planning for Bushfire Protection (2006)" states the following:

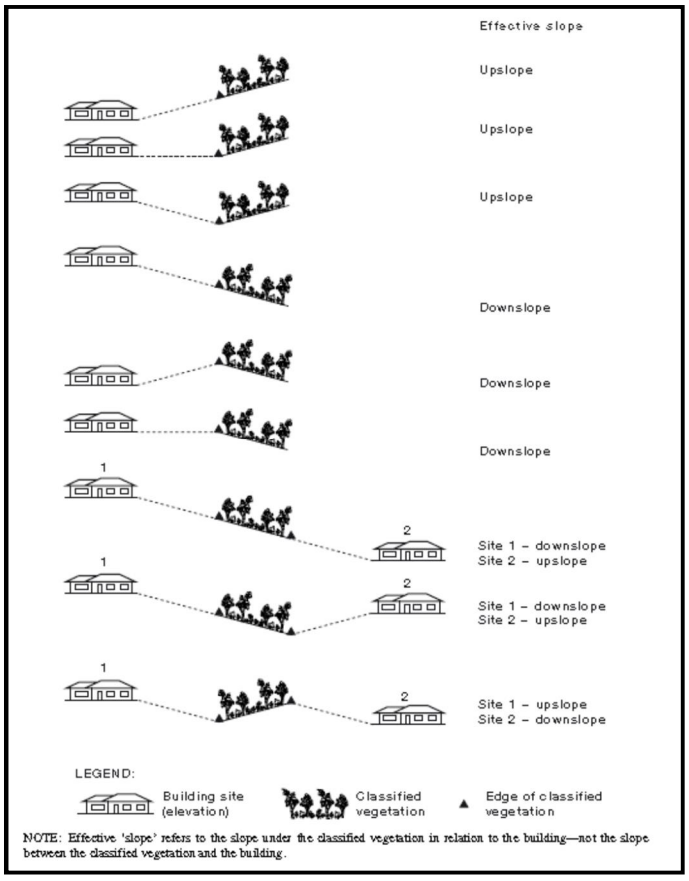
- reticulated or bottled gas is installed and maintained in accordance with AS 1596 and the requirements of relevant authorities. Metal piping is to be used.
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation.
- if gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal.
- polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.

4. Vegetation Assessment.

The vegetation around the dwelling site should be classified using recommended references including "Ocean Shores to Desert Dunes" (Keith, 2004), "AS3959 - 2009 Construction of Buildings in Bushfire Prone Areas", and "Planning for Bushfire Protection" (2006). Where applicable, the dominant vegetation types and formations should be identified for each aspect or elevation of the proposed dwelling to a distance of 140 metres, or the nearest distance if the assessable vegetation formation is less than 140 metres from the development site. As a general rule of the assessment process, the vegetation assessment that is deemed manageable by the property owners shall only be conducted to the extents of the boundaries of the subject property if the distance to the property boundary is less than 140 metres as the property owners normally do not have any direct control on the vegetation that lies in adjacent properties. Where the distance from the development site to the property boundary is less than 140 metres and the assessable vegetation formation is immediately on the neighbouring side of that boundary, it is presumed that for the lifetime of the development that this vegetation will be a 'constant' within the assessment process irrespective of any agreement between the two property owners to undertake any clearing or maintenance within the area. An exception applies if the area is to be maintained by a supply authority as part of a service easement - such as overhead power lines.

5. Asset Protection Zone.

Asset protection zones are areas of reduced fuel accumulation between the assessable vegetation classification and the dwelling site. This separation area provides a defendable space whereby persons attempting to combat the fire will have some protection from the radiant heat that the burning fuel might generate in an intense fire event. The establishment and maintenance of the asset protection zone is required to achieve specific bushfire attack level ratings (BAL) which in turn is used to determine the relevant construction requirements. There are two protection areas within an asset protection zone: the inner protection area and the outer protection area, and the following details should be applied as appropriate to the particular development.



Example of the methods used for determining the effective slope under the vegetation formation.

The inner protection area is that area immediately around the building envelope that aims to reduce the combustible fuel levels and thereby reduce the possible impacts of direct flame contact and radiant heat to the building elements. The inner protection area should have a tree canopy of less than 15% with no part of any tree within 2 metres of the roofline of the dwelling. Gardens with shrubs and other woody plant materials should not be located under trees such that they could provide a ladder for fire to reach the tree canopy, and they should also not be planted within 10 metres of any exposed window or door of the defendable structure. All trees should be maintained such that there are no limbs below 2 metres from the ground surface.

The outer protection area should have a tree canopy of less than 30% and should have the lower strata vegetation mowed and managed to reduce the rate of fire spread. The aim of reducing the density of the tree canopy is to reduce the rate of crown fire spread, and to help filter some of the flying embers by the remaining trees.

The asset protection zones should be calculated with reference to 'Table A2.4 Minimum Specifications for Asset Protection Zones (m) for Residential and Rural Residential Subdivision Purposes (for Class 1 and 2 buildings) in FDI 100 Fire Area (≤29kW/m²)' and 'Table A2.7 Determining Allowable Outer Protection Areas for Forest Vegetation Within an APZ', page 58 of "Planning for Bush Fire Protection" (2006).

6. Bushfire Attack Level (BAL)

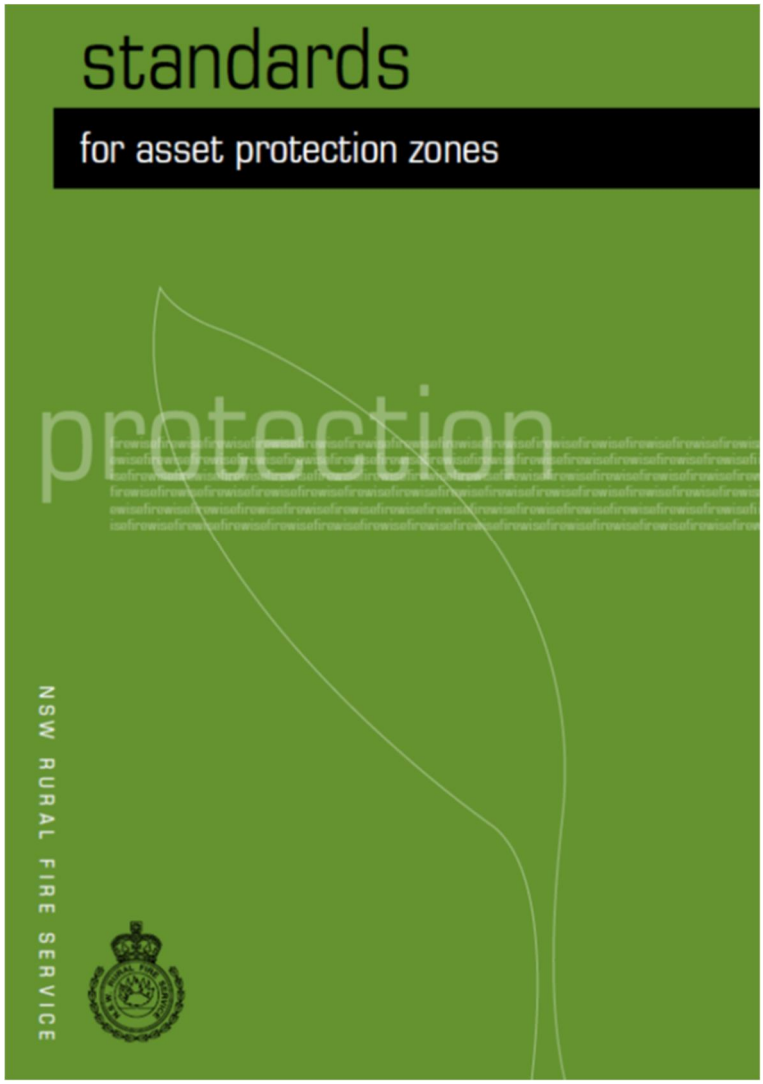
The Bushfire Attack Level (BAL) is defined as "a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire. There are several 'levels' within the range of BAL assessments, each with differing construction standards - and these are explained in 'Appendix B' of this report for reference purposes.

**** It is noted that there are several requirements in New South Wales where the construction standards of Section 5 (BAL 12.5) and Section 6 (BAL 19) of "AS3959 - 2009 Construction in Bushfire Prone Areas" have been superseded and replaced with additional construction standards equal to the construction standards as set out in Section 7 (BAL 29) of "AS3959 - 2009 Construction in Bushfire Prone Areas" (refer to Addendum: Appendix 3 - Planning for Bush Fire Protection (2010), pages 8 to 10). These variations are to be applied to the individual dwelling constructions as applicable based on specific siting and design details at the time of lodging a formal development application to Council.**

8. General Maintenance and Landscaping.

The establishment of gardens and lawns are often a dominant part of the rural lifestyle choice as they help to provide seclusion, shelter and a general beautification of the landscape, however consideration needs to be given to the type and structure of the landscaping components to ensure that they do not form a continuum between the classified vegetation formations and the building elements. Selection of appropriate vegetation types and form for landscaping purposes are important considerations, as is the location and positioning of various plantings. It is important that critical asset protection areas are not compromised by the establishment of landscaping features, and that the longer term maintenance requirements of established gardens do not in fact add to the potential fire fuel loads around the property.

The publication "Standards for Asset Protection Zones" (2006) from the NSW Rural Fire Service provides good advice and guidelines for the establishment of asset protection areas, landscaping and longer term maintenance requirements and should be referenced prior to the design and installation of landscaping features.



E. Conclusion.

It is the formal assessment of this report that the proposed rezoning and subsequent subdivision of land to create rural-residential allotments within a parcel of land identified as Lot 4 DP834254 - 510 Beach Road, Berry. NSW. 2535 will satisfy the requirements of 'Planning of Bush Fire Protection (2006)'.

It is further considered that any potential future residential development undertaken within any of the proposed Lots will be able to comply with the acceptable solutions, performance requirements and specific objectives provisions of "Planning for Bush Fire Protection" (2006) and "AS3959 - 2009 Construction in Bushfire Prone Areas" if applicable.

Following creation of the individual Lots and registration of the subdivision any subsequent developments within the established Lots may be required to provide an independent bushfire hazard assessment that addresses the requirements of the appropriate standards and legislation at the time of a formal development application to Council if it is deemed that the Lots are within mapped bushfire prone lands.

Paul Johnson

Paul Johnson (JP)
Bachelor of Science Agriculture/Irrigation (CSU)
Graduate Diploma Bush Fire Protection (UWS)
(FPAA Member - BPAD27823)
Graduate Certificate Engineering – Water (UTS)

10 November 2017

Appendix A
200 Metre Buffer Search

Office of Environment & Heritage
NSW GOVERNMENT

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 0150111701
Client Service ID : 306425

Paul Johnson

Date: 12 October 2017

PO Box 619
Goulburn New South Wales 2580

Attention: Paul Johnson

Email: sowdes@sowdes.com

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 4, DP:DP834254 with a Buffer of 200 meters, conducted by Paul Johnson on 12 October 2017.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Appendix A
1000 Metre Buffer Search

Office of Environment & Heritage
NSW GOVERNMENT

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 0150117
Client Service ID : 306423

Paul Johnson

Date: 12 October 2017

PO Box 619
Goulburn New South Wales 2580

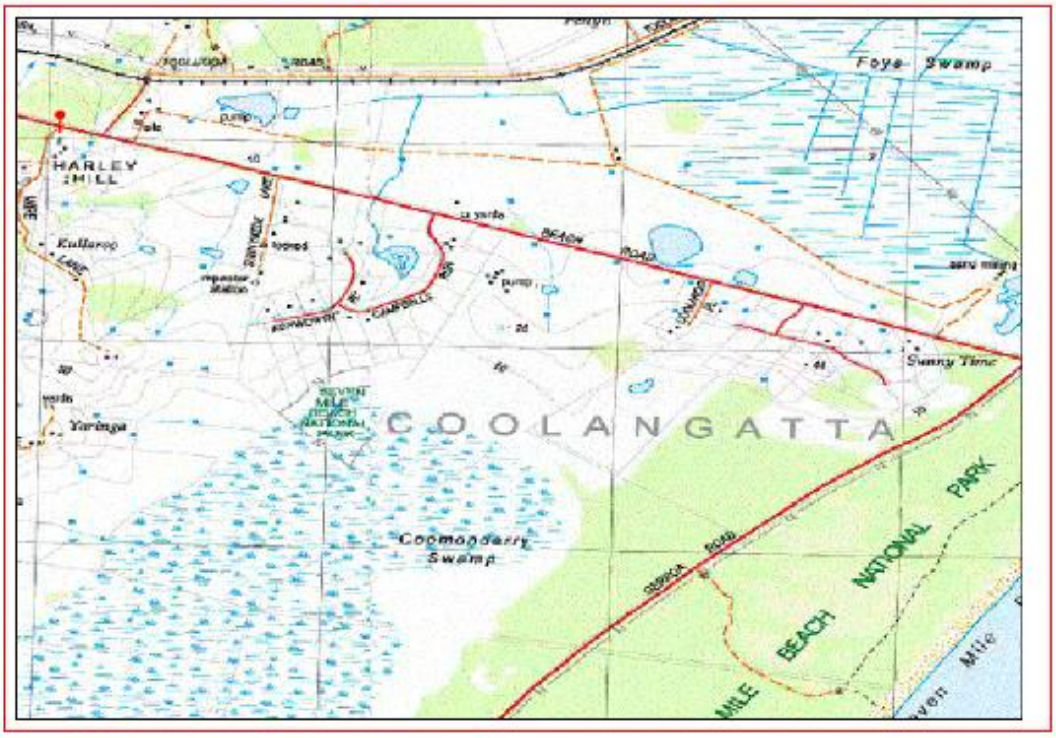
Attention: Paul Johnson

Email: sowdes@sowdes.com

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 4, DP:DP834254 with a Buffer of 1000 meters, conducted by Paul Johnson on 12 October 2017.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Appendix C

BUSHFIRE ATTACK LEVELS (BAL's) EXPLAINED

The 2009 edition of AS 3959 "Construction of Buildings in Bushfire Prone Areas" explains Bushfire Attack Levels (BAL's) as follows:

(a) **BAL—LOW** The risk is considered to be **VERY LOW**.
There is insufficient risk to warrant any specific construction requirements but there is still some risk.

(b) **BAL—12.5** The risk is considered to be **LOW**.
There is a risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m2.

(c) **BAL—19** The risk is considered to be **MODERATE**.
There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m2.

(d) **BAL—29** The risk is considered to be **HIGH**.
There is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m2.

(e) **BAL—40** The risk is considered to be **VERY HIGH**.
There is a much increased risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m2.

(f) **BAL—FZ** The risk is considered to be **EXTREME**.
There is an extremely high risk of ember attack and burning debris ignited by windborne embers, and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40kW/m^2.

SUMMARY OF BUSHFIRE ATTACK LEVEL RATINGS FOR AFFECTED LOTS						
LOT #		**ASPECT**	**VEGETATION**	**DISTANCE (m)**	**SLOPE**	**BAL RATING**
18	A	NORTH	FOREST	90	UPSLOPE / FLAT	12.5
	B	SOUTH	GRASSLAND	>25	DOWNSLOPE 5 - 10°	12.5
	C	EAST	FOREST	90	DOWNSLOPE 5° - 10°	12.5
	D	WEST	GRASSLAND	>25	UPSLOPE / FLAT	12.5
28	A	NORTH	GRASSLAND	>25	DOWNSLOPE 5° - 10°	12.5
	B	SOUTH	GRASSLAND	40	DOWNSLOPE 5° - 10°	12.5
	C	EAST	FOREST	70	DOWNSLOPE 5° - 10°	12.5
	D	WEST	GRASSLAND	>25	DOWNSLOPE 5° - 10°	12.5
29	A	NORTH	GRASSLAND	13	DOWNSLOPE 0 - 5°	29
	B	SOUTH	FOREST	65	DOWNSLOPE 10° - 15°	19
	C	EAST	FOREST	>100	DOWNSLOPE 5° - 10°	LOW
	D	WEST	GRASSLAND	12	DOWNSLOPE 5° - 10°	29
30	A	NORTH	GRASSLAND	>25	DOWNSLOPE 5° - 10°	12.5
	B	SOUTH	FOREST	55	DOWNSLOPE 10° - 15°	29
	C	EAST	GRASSLAND	>25	DOWNSLOPE 5° - 10°	12.5
	D	WEST	GRASSLAND	30	DOWNSLOPE 5° - 10°	12.5

THE BOUNDARIES, DIMENSIONS, CONTOURS AND PROPOSED LOT DESIGN USED IN THIS PLAN HAVE BEEN REPRODUCED WITH PERMISSION FROM *JMD DEVELOPMENT CONSULTANTS*, REF: 14141PS

POTENTIAL BUILDING ENVELOPE OF 500m²

REFER TO THE TABLE AT THE TOP OF THE DRAWING FOR A SUMMARY OF THE BUSHFIRE ATTACK LEVEL RATINGS REPRESENTED BY THE LETTERS IN RED

SOWDES
P.O Box 619
Goulburn. NSW. 2580
E: sowdes@sowdes.com
M: 0428 863 401

DRAWING REFERENCE

AMENDMENT No.:	AMENDMENT DETAILS:	DATE ISSUE DATE:
A	ISSUE FOR SUBMISSION	10/11/2017

PROJECT TITLE:
LAND RE-ZONING
(Incorporating Conceptual Subdivision Layout)

DRAWING TITLE:
BUSHFIRE HAZARD ASSESSMENT
SITE PLAN

TITLE PARTICULARS:
LOT 4 DP834254

STREET ADDRESS:
510 BEACH ROAD
BERRY. NSW. 2535

DRAWING DATE:	SHEET NUMBER:
Nov. 2017	1 of 1
REFERNCE NUMBER:	DRAWN BY:
0120818	PJ
DRAWING SCALE:	SHEET SIZE:
1:2,000	A1
DRAWING REFERENCE NUMBER:	
0120818BF-01	