Bushfire Assessment Report

Residential Subdivision

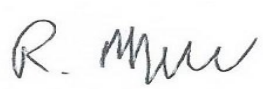
Lot 1 / DP 32236
2155 Sutton Rd
Sutton

Prepared for PHL Surveyors (Bungendore)
1 November 2017
Ref: JD.47.17

EMBER Bushfire Consulting

Planning and Design for Bushfire Protection

AMENDMENT SCHEDULE

VERSION	DATE	INFORMATION RELATING TO REPORT			
1.0	1.11.17	Final Draft			
			Prepared by	**Verified by**	**Approved by**
		Name	Jeffrey Dau BPAD 33128	Rob McGregor BPAD 31130	Jeffrey Dau BPAD 33128
		Signature			

EXECUTIVE SUMMARY

EMBER Bushfire Consulting has been engaged by PHL Surveyors to prepare a bushfire assessment report for a proposed residential subdivision at 2155 Sutton Rd, Sutton. The proposed subdivision is located on bushfire prone land as declared by the Yass Valley Council. This assessment adopts a methodology provided under the requirements of Section 100B of the Rural Fires Act and the Rural Fire Regulations 2013 to assess the adequacy for bushfire protection of the subdivision as planned.

The development proposal is to divide what is currently a single 72 Ha rural lifestyle block into 20 sub lots of varying sizes and land uses. There will be 16 residential lots in total and 2 of the lots including the existing residence will be retained by the current owners.

This report establishes the level of bushfire threat to the development and examines bushfire protection for the existing residence on Lot 18 and future residences for measures such as asset protection, access, services and construction requirements.

Given the quality of the existing property in terms of its infrastructure and well-maintained land the proposed subdivision is considered to possess a low bushfire risk. The existing residence possess adequate and well maintained APZs and the proposed residential lots have ample room to provide and maintain a future APZ.

Access throughout the subdivision will largely comply with the acceptable solutions set out in PBP (2006) with the exception that access to some of the lots utilise a "right of carriageway" in lieu of dedicate road. A rationalization of the access arrangements is made.

2155 Sutton Rd has existing services including water supplies to many parts of the property providing sufficient supplies for the existing residence. The new lot will require its own firefighting water supply to serve the future residences.

To improve the level of protection for the existing residence it is recommended that bushfire construction enhancements be made to improve the overall resilience of these dwellings.

Based on the bushfire assessment and the recommendations contained in this report the proposed development is deemed to comply with the specific and broad objectives of PBP (2006) the requirements of the Rural Fire regulations (2013) and therefore suitable for submission to the NSWRFS for the issuing of a bush fire safety authority.

TABLE 1 SUMMARY OF DEVELOPMENT

INFORMATION REQUIRED	DETAIL
LOT NO & DP	Lot 1 DP 556417
STREET ADDRESS	2155 Sutton Rd Sutton
LOCAL GOVERNMENT AREA	Yass Valley Council
ZONING OF SUBJECT LAND	RU1 – Primary Production
ZONING OF ADJOINING LANDS	R5 - Large Lot Residential, RU5 - Village, RE1 -Public Recreation
PROPOSED LOT SIZES	5000 m^2 to 17000 m^2
STAGING ISSUES	Nil
DEVELOPMENT CLASSIFICATION	Residential Subdivision
TYPE OF ASSESSMENT	100B for Bush Fire Safety Authority
FIRE WEATHER AREA	Southern Ranges
FIRE DANGER INDEX	100
PREDOMINANT VEGETATION	Grassland / Remnant Vegetation
GENERAL SLOPE RANGE	From flat to 0° - 5° downslope
ENVIRONMENTAL CONSTRAINTS	Nil Known
CULTURAL CONSTRAINTS	Nil Known
PBP COMPLIANCE	Yes with a mix acceptable and alternative solutions

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1. INTRODUCTION

1.1. BACKGROUND AND BRIEF

EMBER Bushfire Consulting has been engaged by PHL Surveyors to prepare a bushfire assessment report for a proposed residential subdivision at 2155 Sutton Rd, Sutton. The proposed subdivision is located on bushfire prone land as declared by the Yass Valley Council.

This bushfire assessment will be conducted in accordance with the Environmental Planning and Assessment Act (1979), where the development proposal is considered "integrated development".

The aim of this bushfire assessment report is to document the potential bushfire impact to the development and where necessary propose a range of bushfire protection measures which address life safety, improve property protection and facilitate fire service intervention.

1.2. OBJECTIVES AND SCOPE OF THIS BUSHFIRE ASSESSMENT

The objectives of this report are to determine the bushfire threat to the subject site/s and assess the capacity of the development proposal to provide the necessary protection measures. In doing so it is intended to demonstrate the proposed development can satisfy the following statutory requirements;

- Section 100B (bush fire safety authorities) of the Rural Fires Act (1997),
- Section 91 (integrated development) Environmental Planning and Assessment Act (1979),
- the information requirements of Regulation 44 (Application for bushfire safety authority) of the Rural Fires Regulations (2013)
- the performance requirements set out in chapter 4.1.3 of PBP (2006)

The scope of this report is defined by the information requirements set out in Regulation 44 of the Rural Fire Regulations (2013) and the *Standards for bushfire protection measures for residential and rural residential subdivisions* set out in Chapter 4.1.3 of PBP (2006). The elements assessed are:

- Overall bushfire threat to existing and proposed structures,
- Asset Protection Zones,
- Access (public roads, property access and fire trails)
- Services (Water, electricity and gas),
- Construction standards & other bushfire protection measures, and
- Known environmental & cultural values of the subject site.

1.3. LIMITATIONS AND DISCLAIMER

This report is primarily concerned with assessing the capacity of the proposed development to withstand the impacts of a bushfire including, ember attack, radiant heat and flame contact. Where necessary, protection measures will be recommended to provide a minimum level of protection to the occupants and the structures themselves.

It should be kept in mind that the measures prescribed cannot guarantee that the proposed development will survive a bushfire event on every occasion. This is primarily due to a dependency on adequate vegetation management, the unpredictable behavior of fire, and extreme weather conditions.

EMBER Bushfire Consulting has prepared this report with all reasonable diligence for PHL Surveyors (Bungendore). The information contained in this report has been gathered from field investigations of the site as well as plans provided by and discussions held with PHL Surveyors (Bungendore).

1.4. RELEVANT PRINCIPAL STAKEHOLDERS

Stakeholder	Role	Contact Person	Contact Detail
PHL Surveyors	Planning consultant	Alan Longhurst	0428624597
Paul Keir	Property Owner	Paul Keir	0412949720
Yass Valley Council	Consent Authority	Not Given	62261477
NSW RFS	Consent Authority	Not Given	02 4475 1300

1.5. SITE LOCATION & DESCRIPTION

The subject rural property, 2155 Sutton Rd, Sutton is in southeastern NSW, 5 km northeast of the ACT / NSW border and due south of the village of Sutton (Map 1). The property is set amongst open grassland with some pockets of remnant vegetation and is situated on slightly undulating terrain.

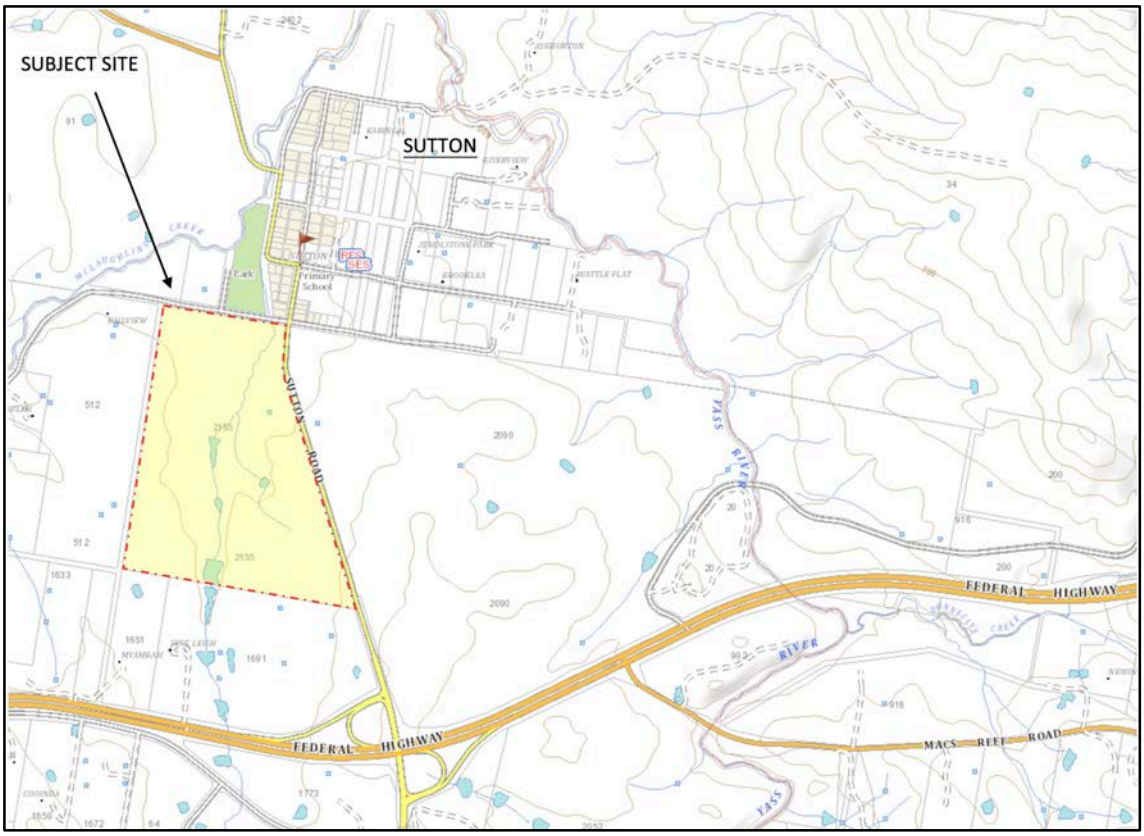
The property is bounded by the village of Sutton to the North and Sutton Rd to the east. Running through the centre of the property is an intermittent flowing creek which flows into McLaughlins Creek forming the upper reaches of the Yass River. Surrounding the property to the east, west and south are similar sized rural lifestyle properties typical of the area (Map 2). The approx. 72 ha lot falls within the administration area of the Yass Valley Council.

The rural lot currently has an existing residence and up to two (2) Class 10a buildings (sheds / ancillary buildings) situated at various locations across the lot. The main Class 10a building is greater than 10 m of the residences and are therefore beyond the scope

of this report. The ancillary building, connected and south of the main residence is closer than 10 m and therefore is in the scope of this report.

The existing residence is constructed on concrete slab with timber / ceramic façade and sheeted metal roof. For this assessment, it is anticipated that all residences are not constructed in accordance with AS3959-2009 Construction of building in bushfire prone areas.

It should be noted that the subject site, including residence, garden, grounds and sheds are in exceptionally well-kept order. The majority of vegetation across the property can be classified as grassland with no understory or fuel load was present due to grazing and good property maintenance. A vegetation classification of grassland has been adopted for the assessment.



MAP 1 SUBJECT SITE LOCATION (SIX MAPS, 2017)

The site is currently zoned as Zoned as RU1 – Primary Production, with the surrounding blocks a mix of R5 - Large Lot Residential, RU5 – Village and RE1 -Public Recreation E2. The relief of the block is slightly undulating with slope ranging up to 5°. The property has 5 dams of various sizes and locations throughout the property. Access to the existing residence is provided by a single, all weather road connecting directly to Sutton Rd.

AIR PHOTO 1 SUBJECT SITE DETAIL (SIX MAPS, 2017)

1.6. THE DEVELOPMENT PROPOSAL

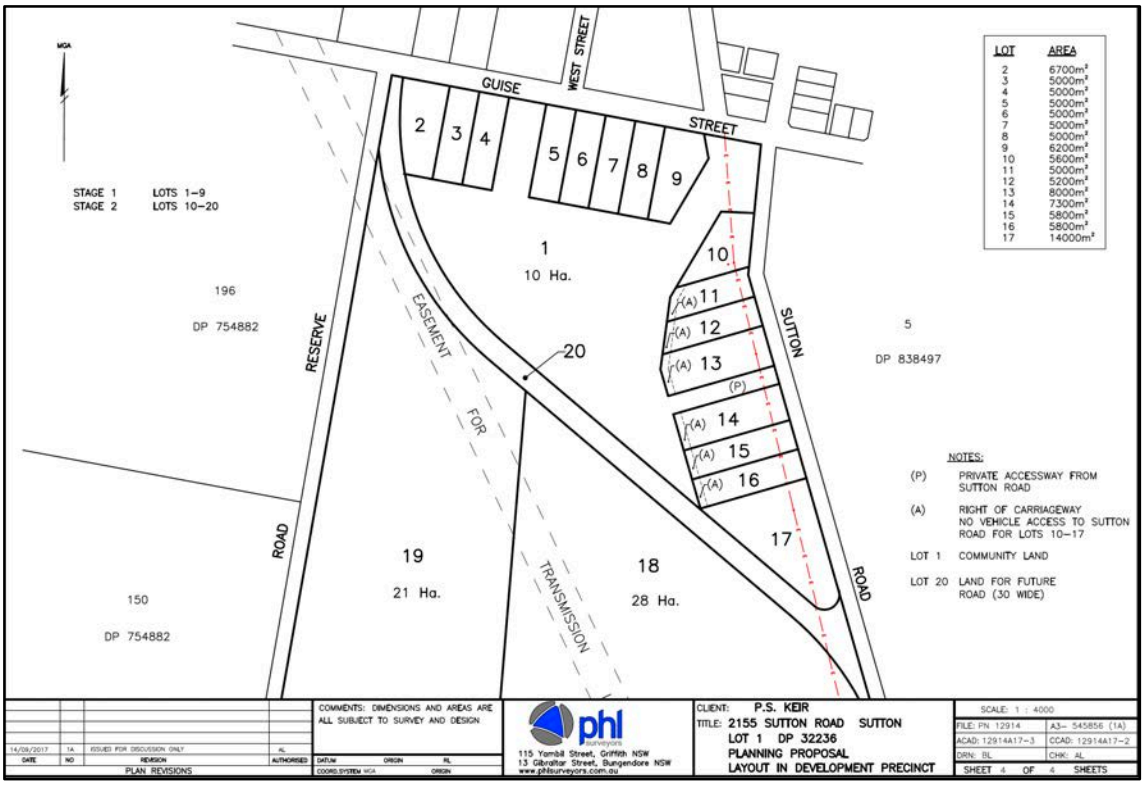
The development proposal is to divide what is currently a single 72 Ha rural lifestyle block into 20 sub lots of varying sizes and land uses (Table 2 & Drawing 1). Two lots will be retained by the current owners. As there is no development of Lot 19 at this time it is deemed outside the scope of this report. Lot 20 is a proposed road which divides the existing property. Apart from separating and reducing the area of grassland adjacent the proposed residential areas Lot 20 has limited baring on the development and is also not included in this assessment.

By separating the title, the current landowners can sell off the surplus lots. It is intended that the landowner will retain the southernmost lot and master residence. Land is to be released in 2 stages being with Lots 1 – 9 Stage 1 and Lots 10 – 20 as Stage 2.

To enable access to the public road system a number of internal roads are proposed serving the residential lots in various ways dependent on their location.

The development proposal is limited to the formal subdivision of the lot, the construction of a new roads and fencing as required. Other than the addition of required bushfire

protection measures to existing dwelling (Lot 18) it is not intended for the proposal to include any further subdivision or the erection of any new structures, water tanks, gas or electricity supplies.



DRAWING 1 PROPOSED LAYOUT OF SUBDIVISION (TSD SURVEYING, 2017)

TABLE 2 SUBDIVISION SUMMARY

LOTS	SIZE	LAND USE	LOTS	SIZE	LAND USE
1	10 Ha.	Community Title	13	8000 m²	Residential lot
2	6700 m²	Residential lot	14	7300 m²	Residential lot
3 to 8	5000 m²	Residential lots	15	5800 m²	Residential lot
9	6200 m²	Residential lot	16	5800 m²	Residential lot
10	5600 m²	Residential lot	17	14000	Residential lot
11	5000 m²	Residential lot	18 & 19	28 Ha. & 21 Ha.	Existing residence & retained land
12	5200 m²	Residential lot	20	n/a	Future road

2. BUSHFIRE THREAT ASSESSMENT

2.1. METHODOLOGY

This report followed the approach summarised in Table 3.

TABLE 3 METHODOLOGY

METHODOLOGY	TASK	CONSIDERATIONS
DESKTOP ANALYSIS	Review available mapping resources, relevant policy documents and development plans	Google Maps NSW SIX Maps Development Plans Yass Local Environmental Plan
SITE INSPECTION	Overview of site, conduct bushfire threat assessment, options for asset protection zones, access roads and infrastructure.	Site inspection enables verification of mapping data and classification of the surrounding vegetation, slope, Asset Protection Zones and environmental constraints.
PLANNING FOR BUSHFIRE PROTECTION AND AS3959-2009 CONSTRUCTION OF BUILDINGS IN BUSHFIRE PRONE AREAS ASSESSMENT	Perform assessment of the development proposal adhering to methodology within PBP (2006) and AS3959-2009.	Ability for the proposal to meet the intent and performance criteria of the relevant sections of PBP (2006).
REPORT	Preparation of bushfire assessment report	Produce necessary documentation to demonstrate the proposals ability to achieve the aims and objectives of PBP (2006) and meet the application requirements for issue of Bush Fire Safety Authority from NSW RFS.

2.2. BUSHFIRE ENVIRONMENT

To determine the bushfire threat posed to the overall development and to establish a basis by which bushfire protection measures are required, an assessment of the environmental factors that determine bushfire behavior is conducted. Specific lot assessments are provided in section 4.

2.2.1. FIRE WEATHER

In accordance with PBP (2006) the fire weather area is classified as:

- **SOUTHERN RANGES**

For the purposes of calculating Asset Protection Zones (APZs) the assumed Fire Danger Index (FDI) rating for the area is:

- **100**

2.2.2. PREDOMINANT VEGETATION COMMUNITY

The classification of vegetation across the subdivision has been conducted in accordance with PBP (2006). A detailed vegetation (hazard) analysis for each lot is provided in section 4.

Vegetation classification (Table 4) has been validated using the NSW Office of Environment and Heritage (OEH) Vegetation Information System and field assessment cross referenced to Keith (2004). An example of the predominant vegetation typical of the subject property is provided in Photo 1 & 2.

TABLE 2 VEGETATION CLASSIFICATION

SOURCE	CLASSIFICATION
FORMATION PER KEITH (2004)	Modified Grassland
FORMATION ADOPTED FOR ASSESSMENT	Grassland / remnant vegetation

For the purposes of calculating APZs, the predominant vegetation classes are:

- **GRASSLAND**
- **REMNANT VEGETATION**

PHOTO 1 TYPICAL UNMANAGED GRASSLAND (FORE GROUND) ACROSS EXISTING LOT (DAU, 2017)

PHOTO 2 TYPICAL POCKETS OF REMNANT VEGETATION ACROSS EXISTING LOT (DAU, 2017)

DRAWING 2 SUBDIVISION VEGETAION CLASSIFICATION AND HAZARD ASSESSMENT (DAU, 2017)

2.2.3. EFFECTIVE SLOPE

Effective slope is an important factor when determining potential fire behavior and the subsequent threat level to a structure/s. To determine the dimensions of future APZs as well as the effectiveness of existing APZs, slope is determined by measuring the slope under the predominant vegetation type for at least 100 m out from the proposed building envelopes to be protected. Effective slope was calculated on site using a Tru-Pulse 200b laser range finder and is provided in the individual site assessments below.

2.2.4. SUMMARY OF BUSHFIRE THREAT

Bushfire threat can be described as the level or severity for a site to be impacted by bushfire with destructive forces such as ember attack, radiant heat and flame. Where ever a substantial area of unmanaged vegetation exists within proximity of a site it is inevitable that bushfire threat exists. It is the level of threat however, that will change with factors such as site opportunities and constraints, topography, vegetation type and distance separating the site.

Given the grassland setting of the property, the gentle topography and good opportunity to provide significant setbacks for existing and future residences the overall threat potential to the subdivision can be described as ranging from LOW. Section 3 details the protection measures used to address this level of threat.

3. BUSHFIRE PROTECTION ASSESSMENT CRITERIA.

This section details how the subdivision is to be assessed. The NSW Rural Fire Service (NSWRFS) requires that the bushfire protection of the proposed subdivision be assessed against specific objectives set out in PBP (2006). The objectives are as follows:

- Minimise perimeters of the subdivision exposed to the bush fire threat.
- Minimise bushland corridors that permit the passage of bush fire.
- Provide for the siting of future dwellings away from ridge-tops and steep slopes.
- Ensure that separation distances (APZs) between a bush fire threat and future dwellings enable conformity with the deemed-to-satisfy requirements of the BCA.
- Provide and locate, where the scale of development permits, open space and public recreation areas as accessible public refuge areas or buffers (APZs).
- Ensure the ongoing maintenance of asset protection zones.
- Provide clear and ready access from all properties to the public road system for residents and emergency services.
- Ensure the provision of and adequate supply of water and other services to facilitate effective fire fighting

In order to meet these objectives, PBP (2006) offers a range of protection measures which together aim to provide the existing and future dwellings with protection against bushfire impact. These measures include:

- Asset Protection Zones (APZ)
- Access requirements
- Water and utility services
- Construction standards

Each of the above measures offered as part of the subdivision will be assessed against the performance criteria of PBP (2006) to ensure the subdivision provides a satisfactory level of protection.

These protection measures and the associated performance requirements are detailed in Appendix A – Protection measures and performance requirements for subdivisions.

3.1. SPRINKLER SYSTEMS AND OTHER FIRE PROTECTION MEASURES.

It is not proposed to including bush fire sprinkler systems or other fire protection measures to the development.

3.2. BUSHFIRE EMERGENCY PLANNING

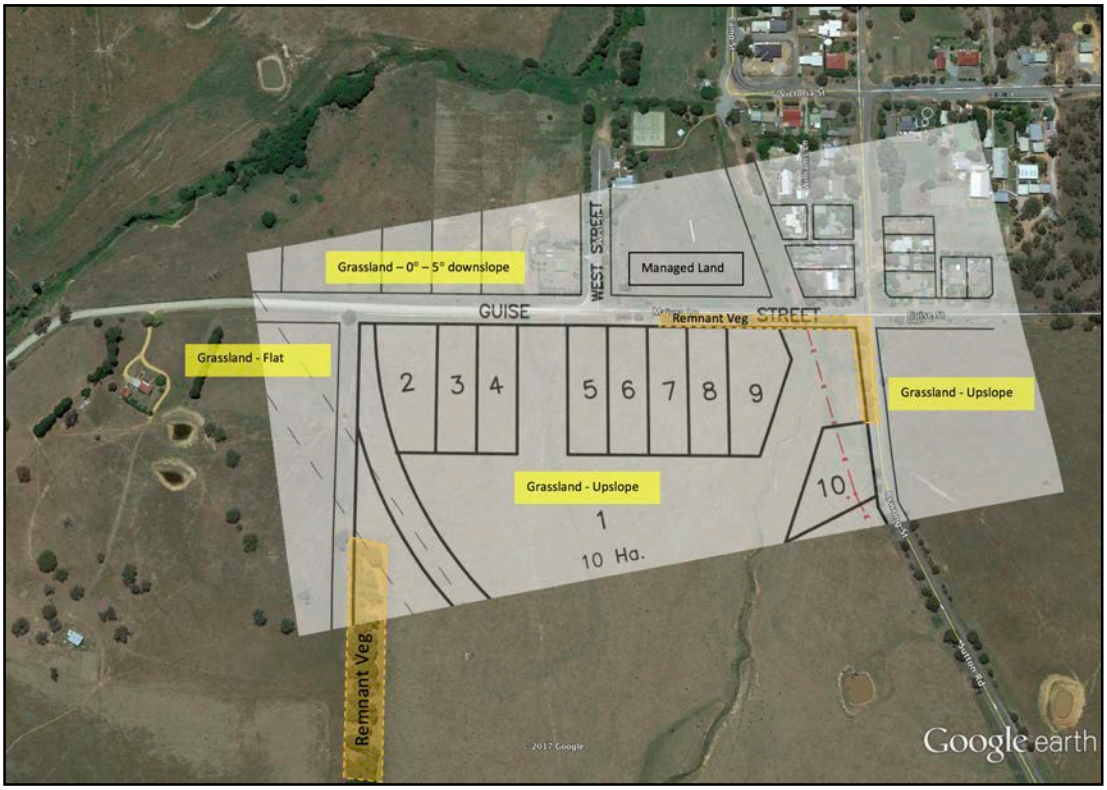
EMBER Bushfire Consulting always recommends a "prepare and leave early" approach to bushfire emergencies. Although the threat level to existing residences is viewed as acceptable (after improvements have been made) the nature of bushfires in extreme condition is very unpredictable and extremely dangerous for even the safest of properties. Any decision to "stay and defend" should be fully evaluated and well planned. It is highly recommended that the existing residents as well as any future residents prepare a NSWRFS Bushfire Survival Plan prior to the onset of the bushfire season.

4. ASSESSMENT OF PROPOSED LOTS

This section documents the assessment of the existing and proposed lots against the protection requirements of PBP.

4.1. STAGE 1 (LOTS 1 TO 9)

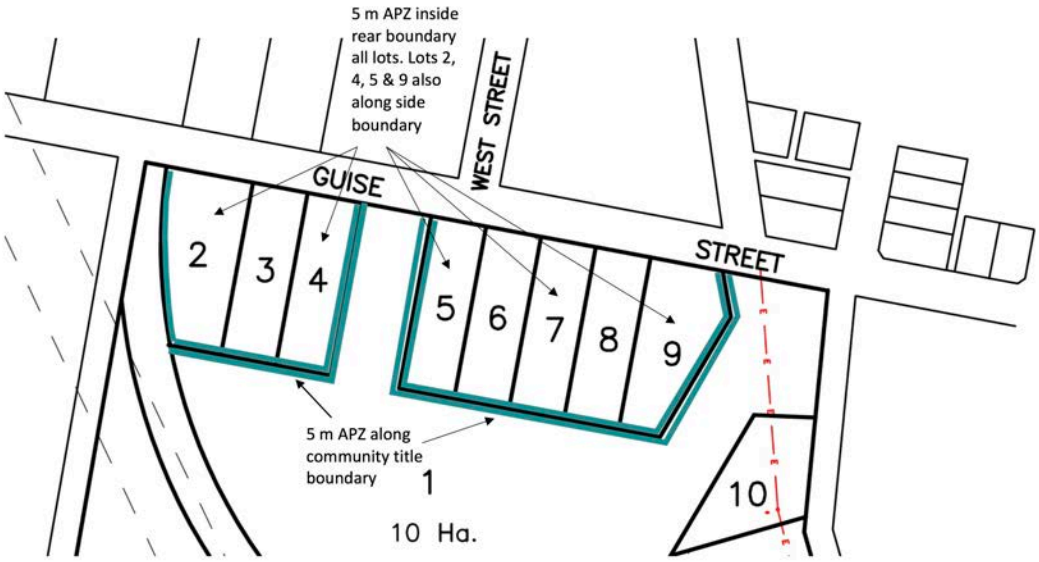
Stage 1 encompasses 9 new residential lots along the northern boundary of the property and adjoining the village of Sutton. Lot sizes range from 5000 m^2 to 6700 m^2. All lots will be provided with direct access to Guise St, Sutton.



DRAWING 3 - STAGE 1 HAZARD ASSESSMENT

4.1.1. Asset Protection Zones (Stage 1)

Stage 1, incorporating Lots 2 to 9 is a greenfield site at the northern end of the existing property. Stage 1 will have up to 8 potential future residences. Access to public road will be directly to Guise Street via all-weather internal access road.



DRAWING 4 - STAGE 1 APZ ARRANGEMENT

TABLE 4 – MIN APZ DIMENSIONS REQUIRED FOR ALL RESIDENCES

LOTS	ASPECT	VEG CLASS	SLOPE	APZ REQUIRED	EFFECTIVE BAL
All lots	North	Grassland	0°-5° downslope	10 m Provided by road	BAL-29
Lot 4 & Lot 9 All other Lots not applicable	East	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29
All lots	South	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29
Lot 2 & Lot 5 All other Lots not applicable	West	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29

Discussion and recommendations (APZ) –

- Table 4 details the minimum dimensions required for an APZ to be established and maintained for perpetuity for any future residence. These dimensions can easily be achieved for any residence and will ensure radiant heat levels will not exceed 29 kW/m^2 and are deemed to comply with Table A2.4.2 AS3959-2009.
- It is recommended that a subsequent BAL assessment be carried out prior to construction to reevaluate this value, which may have changed based on the proposed building plans. All construction is to comply with AS3959-2009 and PBP (2006) for the relevant BAL level.

4.1.2. ACCESS STAGE 1 (LOTS 2 TO 9)

The public road, property access and fire trail network for Stage 1 has been assessed and found to have the following characteristics:

Guise St (Public Rd):

- Is a sealed two-way road,
- Provides the minimum dimensions and vertical clearances required,
- Has no traffic management devices,
- Is not a dead end.

- Stays within the maximum allowable gradients,
- Is clearly sign posted and buildings are to be clearly numbered,
- Forms a perimeter road to the north of the proposed lots.

Property Access:

- Direct access to public road and will be less than 200 m,
- Will be an all-weather road,
- Has no bridges and does not traverse wetland,
- Provides the necessary widths and vertical clearances required.
- Incorporates a turning circle with a minimum 12 m outer radius, and
- Stays within the maximum allowable gradients.

Fire Trails:

- Fire trail access to the rear of Lots 2 to 9 on community title will be provided as indicated in Drawing 5 to provide access to areas around any future residence for fire management purposes and maintenance of APZs.

Discussion -

With due consideration given to the compliant road dimensions, the internal access arrangements are viewed as providing suitable, low risk access to fire firefighters and offer good egress for evacuating occupants. Furthermore, suitable access is provided for fire management purposes and maintenance of APZs.

Recommendations (Access)–

- Future properties to be clearly sign posted and buildings are to be clearly numbered,
- Property access to incorporate a turning circle with a minimum 12 m outer radius,
- Fire trail access to the rear of Lots 2 to 9 on community title to be provided.

4.1.3. SERVICES STAGE 1 (LOT 2 TO LOT 9

Discussion and Recommendations (Utilities)–

Firefighting Water Supply - (Lot 2 to 9 future residences) –

Lots 2 to 9 future residences are to be provided 5,000 L water supplies. Supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix C of this report.

The water supply for Stage 1 (Lots 2 to 9) is deemed capable of meeting the acceptable solutions under PBP (2006).

Electricity Services –

Existing electricity supply throughout the property is via overhead power lines and during the site inspection, the power lines were found to be well clear of vegetation and were not considered to present a fire risk. It is envisaged that the future residence will be provided with electricity from overhead powerlines and these are to comply with the specifications set out in PBP (2006) which are provided in Appendix C of this report.

The electricity supply for Stage 1 (Lots 2 to 9) is deemed to meet the acceptable solutions under PBP (2006).

Gas Services – It is envisaged that gas supplies to any future residence will be by gas pipeline and therefore supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix C of this report.

4.1.4. Additional protection measures – bushfire construction

In accordance with the assessment carried out in section 4.1.1, the deemed maximum BAL for future residences is:

- BAL-29.

It is recommended that a subsequent BAL assessment be carried out prior to construction of any future residence to reevaluate this value, which may have changed based on the proposed building plans. All construction is to comply with AS3959-2009 and PBP (2006) for the relevant BAL level.

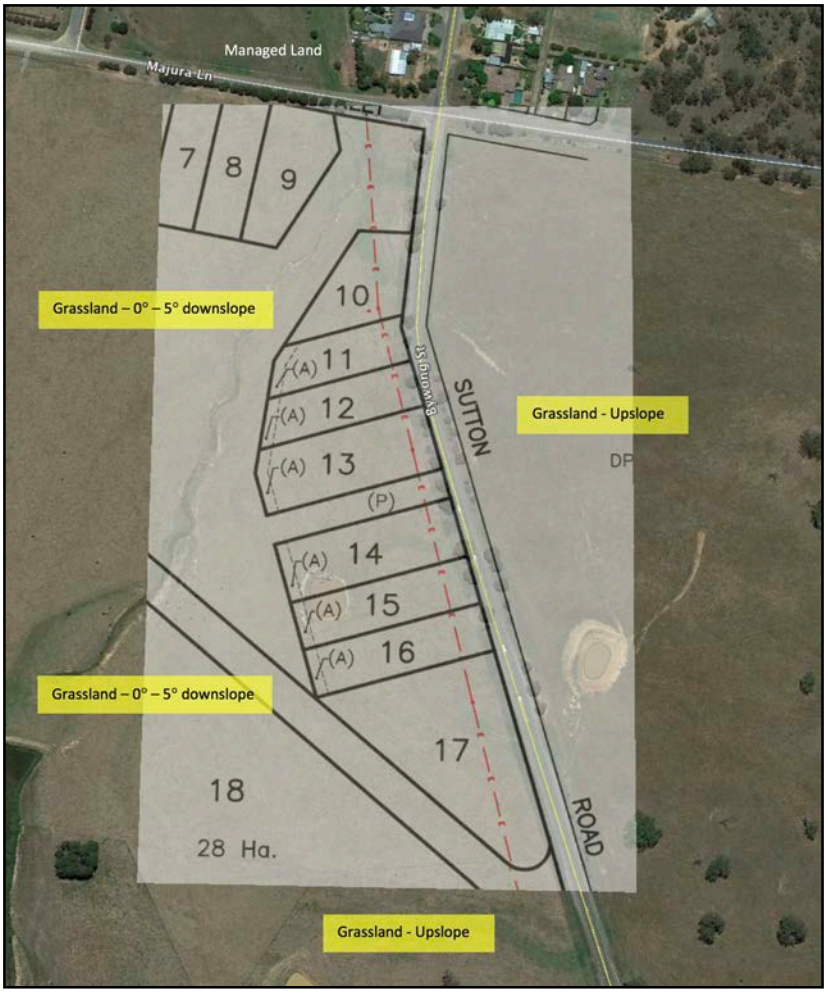
4.1.5. Summary Stage 1 (Lots 1to 9) assessment

Stage 1 (Lots 1 to 9) have been assessed and are considered to meet the intent for bushfire protection based on the following:

- Existing structures are provided with sufficient space and reduced fuel loads such that radiant heat levels are below critical limits and prevent direct flame contact with the buildings.
- Safe operational access is provided to structures and water supplies for emergency services, while providing for evacuating residents and suitable access is provided for fire management and APZ management purposes.
- The provision of adequate and reliable water supplies for the protection of buildings during a bushfire and the location of gas and electricity services do not contribute to the risk of fire to a building.

4.2. Stage 2 (Lots 10 to 17)

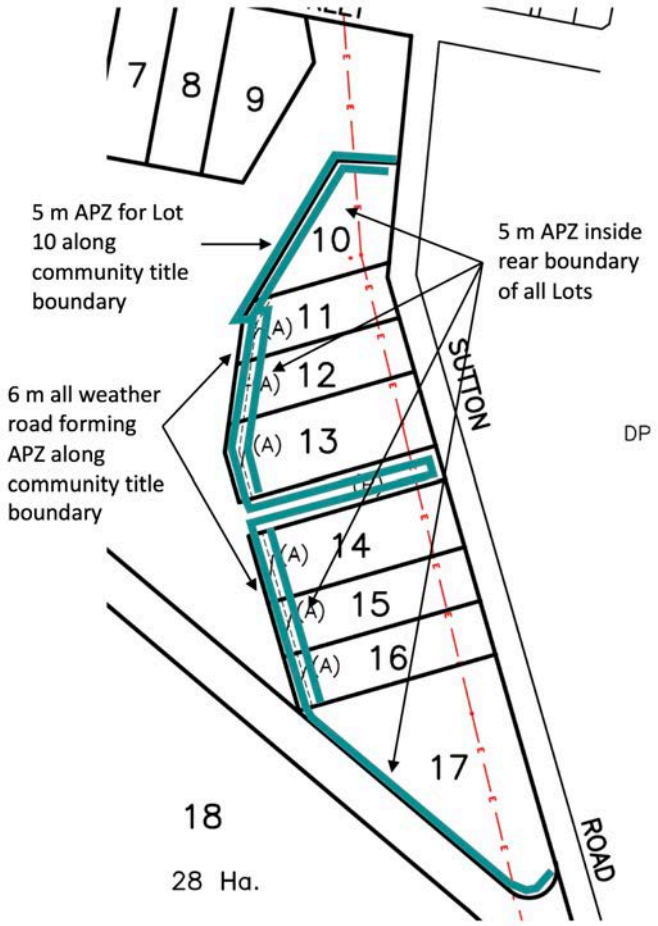
Stage 2 encompasses 8 new residential lots along the eastern boundary of the property abutting Sutton Rd. Lot sizes range from 5000 m^2 to 14000 m^2. All lots will be provided with access to Sutton Rd via a "right of carriageway" at the rear of the lots which also doubles as a perimeter road for this stage of the development.



DRAWING 5 - STAGE 2 HAZARD ASSESSMENT

4.2.1. Asset Protection Zones (Stage 2)

Stage 2, incorporating Lots 10 to 17 is a greenfield site at the eastern end of the existing property. Stage 2 will have up to 8 potential future residences. Access to public road will be via an all-weather "right of carriageway" road running behind the lots then onto a private access way to Sutton Road.



DRAWING 6 - STAGE 2 APZ ARRANGEMENT

TABLE 5 – MIN APZ DIMENSIONS REQUIRED FOR ALL RESIDENCES

LOTS	ASPECT	VEG CLASS	SLOPE	APZ REQUIRED	EFFECTIVE BAL
Lot 10	North	Grassland	0°-5° downslope	10 m (5 m within lot + 5 m on community title)	BAL-29
All Lots	East	Grassland	Upslope	10 m (Provided by Sutton Rd)	BAL-29
Lot 17	South	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29

All lots	West	Grassland	0°-5° downslope	10 m (5 m within lot + 5 m on community title)	BAL-29

Discussion and recommendations (APZ) –

- Table 5 details the minimum dimensions required for an APZ to be established and maintained for perpetuity for any future residence. These dimensions can easily be achieved for any residence and will ensure radiant heat levels will not exceed 29 kW/m^2 and are deemed to comply with Table A2.4.2 AS3959-2009.
- It is recommended that a subsequent BAL assessment be carried out prior to construction to reevaluate this value, which may have changed based on the proposed building plans. All construction is to comply with AS3959-2009 and PBP (2006) for the relevant BAL level.

4.2.2. ACCESS STAGE 2 (LOTS 10 TO 17)

The public road, property access and fire trail network for Stage 2 has been assessed and found to have the following characteristics:

Sutton Rd (Public Rd):

- Is a sealed two-way road,
- Provides the minimum dimensions and vertical clearances required,
- Has no traffic management devices,
- Is not a dead end.
- Stays within the maximum allowable gradients,
- Is clearly sign posted and buildings are to be clearly numbered,
- Forms a perimeter road to the east of the proposed lots.

Property Access:

- Direct access to public road and will be less than 200 m,
- Will be a 6m wide all-weather road,
- Has no bridges and does not traverse wetland,
- Provides the necessary widths and vertical clearances required.
- Incorporates a turning circle with a minimum 12 m outer radius, and
- Stays within the maximum allowable gradients.
- Will not be via dedication of a road, but rather a right of way.

Fire Trails:

- Fire trail access to the rear of Lots 10 to 17 on community title will be provided as indicated in Drawing 8 to provide access to areas around any future residence for fire management purposes and maintenance of APZs.

Discussion (Access)–

- The property access road for Stage 2, will by most measures exceed the specifications of PBP (2006) with the exception that a right of carriageway serving more than 3 dwellings is offered in lieu of a dedicated road. A rationalization of the access arrangements against the performance criteria in PBP (2006) is offered in lieu of an acceptable solution.

The following characteristics should be considered when evaluating the proposed access arrangements and the level of risk to fire fighters and evacuating occupants.

- Property access will be a 6-m all-weather road and therefore have dimensions and clearances greater than those required by PBP providing ease of access and egress.
- The low number of occupant's means that roads will not likely be subject to congestion and therefore not place undue risk of obstruction for evacuating occupants or arriving fire crews.
- The proposed subdivision is planned to provide a formal alternative access route (Lot 20) which is not required but will further ease any likelihood of congestion.
- Low threat vegetation and good opportunity for APZs arrangements affords a high level of protection and therefore reduces the overall risk to future properties.

This above justification is deemed an alternative solution for the purposes of compliance with PBP (2006).

With due consideration given to the compliant road dimensions, the internal access arrangements are viewed as providing suitable, low risk access to fire firefighters and offer good egress for evacuating occupants. Furthermore, suitable access is provided for fire management purposes and maintenance of APZs.

Recommendations –

- Future properties to be clearly sign posted and buildings are to be clearly numbered,
- Property access to incorporate a turning circle with a minimum 12 m outer radius,
- Fire trail access to the rear of Lots 10 to 17 on community title to be provided.
- When the future road is complete access to the right of carriageway is to be provided at the rear of Lot 16 / 17 to enable an alternative access route for this area.

4.2.3. SERVICES STAGE 2 (LOT 10 TO LOT 17)

Discussion and Recommendations (Utilities)–

Firefighting Water Supply - (Lot 2 to 9 future residences) –

Lots 10 to 17 future residences are to be provided 5,000 L water supplies. Supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix C of this report.

The water supply for Stage 1 (Lots 10 to 17) is deemed capable of meeting the acceptable solutions under PBP (2006).

Electricity Services –

Existing electricity supply throughout the property is via overhead power lines and during the site inspection, the power lines were found to be well clear of vegetation and were not considered to present a fire risk. It is envisaged that the future residence will be provided with electricity from overhead powerlines and these are to comply with the specifications set out in PBP (2006) which are provided in Appendix C of this report.

The electricity supply for Stage 1 (Lots 10 to 17) is deemed to meet the acceptable solutions under PBP (2006).

Gas Services –

It is anticipated that future residence will be by gas pipeline and therefore supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix C of this report.

4.2.4. ADDITIONAL PROTECTION MEASURES – BUSHFIRE CONSTRUCTION

In accordance with the assessment carried out in section 4.2.1, the deemed maximum BAL for future residences is:

- BAL-29.

It is recommended that a subsequent BAL assessment be carried out prior to construction of any future residence to reevaluate this value, which may have changed based on the proposed building plans. All construction is to comply with AS3959-2009 and PBP (2006) for the relevant BAL level.

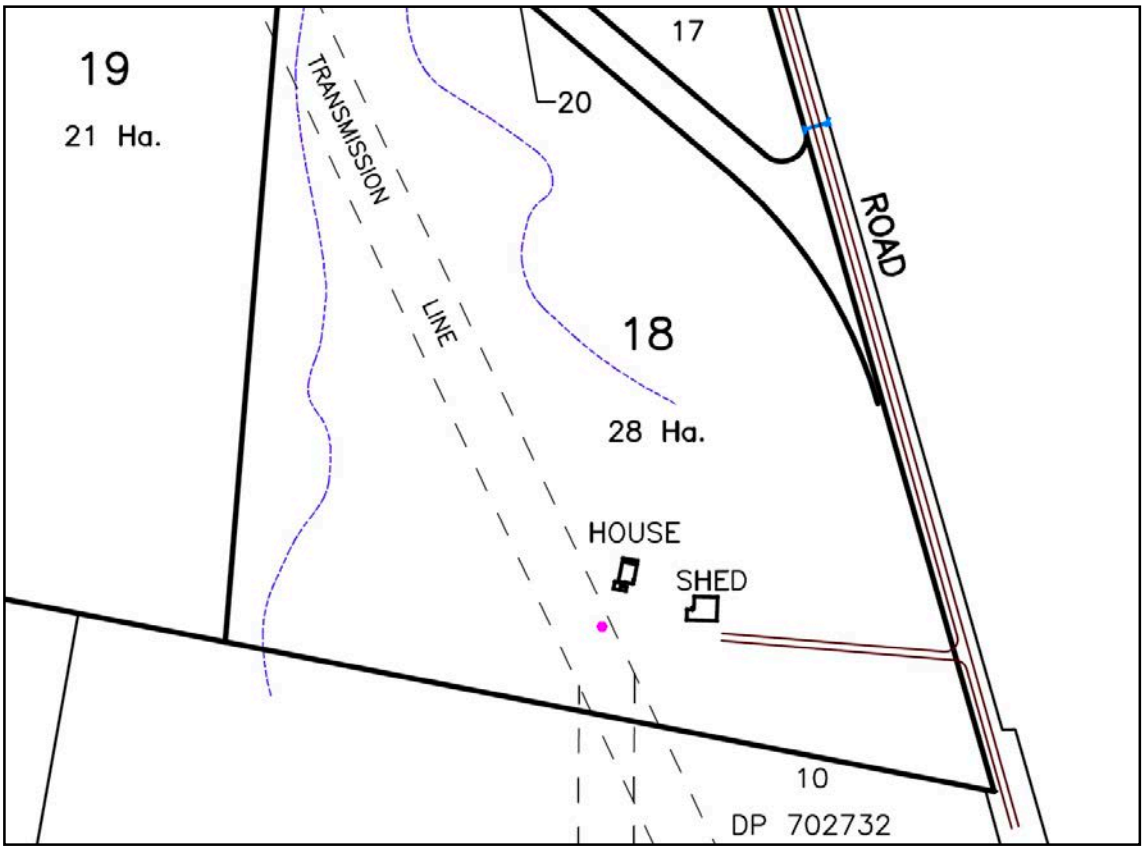
4.2.5. SUMMARY STAGE 2 (LOTS 10 TO 17) ASSESSMENT

Stage 2 (Lots 10 to 17) have been assessed and are considered to meet the intent for bushfire protection based on the following:

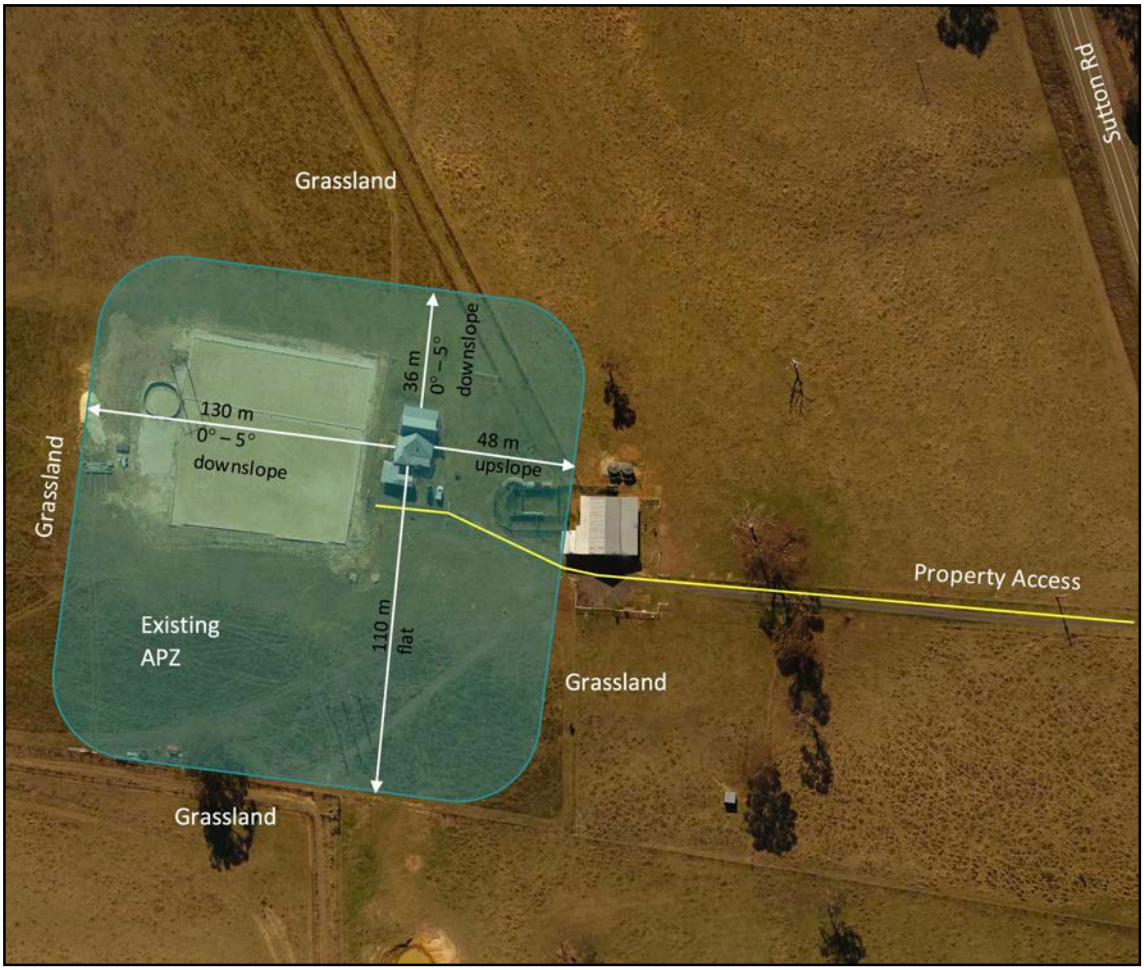
- Existing structures are provided with sufficient space and reduced fuel loads such that radiant heat levels are below critical limits and prevent direct flame contact with the buildings.
- Safe operational access is provided to structures and water supplies for emergency services, while providing for evacuating residents and suitable access is provided for fire management and APZ management purposes.
- The provision of adequate and reliable water supplies for the protection of buildings during a bushfire and the location of gas and electricity services do not contribute to the risk of fire to a building.

4.3. LOT 18 EXISTING RESIDENCE

Lot 18 (28 Ha) encompasses the existing main residence and associated shed (Class 10a building).



DRAWING 7 – LOT 18 OF THE PROPOSED SUBDIVSION (PHL SURVEYORS, 2017)



DRAWING 8 - LOT 18 SITE ASSESSMENT (DAU, 2017)

4.3.1. ASSET PROTECTION ZONES (LOT 18)

Lot 18 residence presents exceptionally well maintained grounds, ample defendable space and minimal work if any to improve what are well established and maintained APZs for the existing residential structure. As existing APZ dimensions are greater than 10 m for the residence, the minimum specifications established in Table A2.4 Minimum Specifications for Asset Protection Zones for subdivision purposes are deemed to be met.

TABLE 6 PHOTOS OF EXISITNG RESIDENCE LOT 1 (DAU, 2017)

Air Photo 2 Main Residence North Aspect

Air Photo 3 Main Residence East Aspect

Air Photo 4 Main Residence South Aspect

Air Photo 5 Main Residence West Aspect

TABLE 7 – MIN APZ DIMENSIONS REQUIRED FOR ALL RESIDENCES

STRUCTURE	ASPECT	VEG CLASS	SLOPE	APZ REQUIRED	EFFECTIVE BAL
Main Residence	North	Grassland	0°-5° downslope	10 m	BAL-29
	East	Grassland	Upslope	10 m	BAL-29
	South	Grassland	Flat	10 m	BAL-29
	West	Grassland	0°-5° downslope	10 m	BAL-29

Discussion and recommendations (APZ) –

- Table 5 details the minimum dimensions required for an APZ to be established and maintained for perpetuity around the existing residence. These dimensions are easily achieved and will ensure radiant heat levels will not exceed 29 kW/m^2 and are deemed to comply with Table A2.4 Min. Specifications for APZ for subdivisions.

4.3.2. ACCESS (LOT 18)

The public road, property access and fire trail network for Lot 18 for the main residence has been assessed and found to have the following characteristics:

Sutton Road (Public Rd):

- Is a sealed two-way road,
- Provides the minimum dimensions and vertical clearances required,
- Has no traffic management devices,
- Is not a dead end.
- Stays within the maximum allowable gradients,
- Is clearly sign posted and buildings clearly numbered

Property Access:

- Direct access to public road and is less than 200 m,
- Is an all-weather road,
- Has no bridges and does not traverse wetland,
- Provides the necessary widths and vertical clearances required.
- Incorporates a turning circle with a minimum 12 m outer radius, and
- Stays within the maximum allowable gradients.

Fire Trails:

- Fire trail access in and around the existing residence (Lot 18) is not currently provided.

Discussion and recommendations (Access)–

- Fire trails are not proposed given the open landscape and highly accessible nature of the site. A rationalization of the existing arrangements against the performance criteria in PBP (2006) is offered below in lieu of an acceptable solution.

The following characteristics should be considered when evaluating the proposed access arrangements and the level of risk to fire fighters and evacuating occupants.

- Well maintained grounds and good APZ arrangements of the existing lot affords a high level of protection and therefore reduces the overall risk to the properties.
- The property access is an all-weather road and has the dimensions and clearances required and therefore provide ease of access and egress.
- Fire trails are not proposed. Access to areas in and around any future residence for fire management purposes and maintenance of APZs will be easily achieved via the open landscape design and the use of extensive driveway access to the buildings.

With due consideration given to the compliant road dimensions, the internal access arrangements are viewed as providing suitable, low risk access to fire firefighters and offer good egress for evacuating occupants. Furthermore, suitable access is provided for fire management purposes and maintenance of APZs.

This above justification is deemed an alternative solution for the purposes of compliance with PBP (2006).

There are nil recommendations for Lot 18 access.

4.3.3. SERVICES (LOT 18)

The existing site has electricity and gas supplies and water storage capacity through tanks and a number of dams. Lot 18 will require the provision of a firefighting water supply to serve the existing residence and it is proposed to utilise existing water supplies to provide the necessary quantities for firefighting purposes.

Firefighting Water Supplies - (serving Lot 18 residence) –

- A total of 20,000 L of water supply is required for firefighting purposes.
- Static water supply currently provided by a 2 polymer tanks storing rain water from the shed. Up to 4 dams are located on the property in various locations.
- One of the polymer tanks is to be fitted with the appropriate fittings for RFS connection detailed in Appendix C
- A static water supply (SWS) sign to be put in place in a visible location at the entry to the property.
- The water supply for Lot 18 is deemed capable of meeting the acceptable solutions under PBP (2006).

Electricity Services –

The electricity to the existing residences is via overhead power lines. During the site inspection, the power lines were found to be well clear of vegetation and were not considered to present a fire risk.

The electricity supply for Lot 18 is deemed to meet the acceptable solutions under PBP (2006).

Gas Services – Gas is supplied to the existing residences by pipeline. Supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix B of this report.

4.3.4. ADDITIONAL PROTECTION MEASURES – BUSHFIRE CONSTRUCTION

Lot 18 is currently provided with the main residential structure (Class 1a) and auxiliary building used as the laundry and carport (Class 10a buildings).

To improve the level of protection to the existing residence it is recommended that enhancements be made to these buildings, which in combination with other measures will improve the overall resilience of this dwelling. The recommendations made below seek to offer a level of ember protection (only) for the structures.

- Fit Gutter Guard.
- Enclose all openings, including sub floor areas, openable windows, vents, weepholes and eaves (excluding roof tile spaces).
- Cover openings with a non-corrosive metal screen mesh with a maximum aperture of 2mm.
- Fit external doors with draft excluders.

4.3.5. SUMMARY LOT 18 ASSESSMENT

Lot 18 has been assessed and is considered to meet the intent for bushfire protection of based on the following:

- Existing structures are provided with sufficient space and reduced fuel loads such that radiant heat levels are below critical limits and prevent direct flame contact with the buildings.
- Safe operational access is provided to structures and water supplies for emergency services, while providing for evacuating residents and suitable access is provided for fire management and APZ management purposes.
- The provision of adequate and reliable water supplies for the protection of buildings during a bushfire and the location of gas and electricity services do not contribute to the risk of fire to a building.

5. ENVIRONMENTAL CONSIDERATIONS

Information regarding the potential impact that the proposed development may have on environmental and cultural values of the site are required as part of the issuing of the bush fire safety authority by the NSWRFS.

EMBER Bushfire Consulting understands from the proponent that any necessary environmental and cultural investigations are being taken as part of the development application process and will be submitted as part of the Statement of Environmental Effects. Furthermore, if any environmental or culturally sensitive areas of the lot are impacted by the recommended protection measures, consultation will be made to provide alternative protection measures. At the time of this bushfire assessment no known environmental or cultural values or significant environmental features have been identified on the subject site.

6. CONCLUSION

This report documents the findings from a bush fire assessment carried out on a development proposal at 2155 Sutton Rd, Sutton. The development proposal is to divide what is currently a single approx. 72 Ha rural lifestyle block into sixteen (16) separate title residential blocks of varying sizes; one (1) 10 Ha community title lot, a future road easement and two (2) large acreage lots for retention by the owner being 21 Ha and 28 Ha with the existing residence on it. The proposed development is viewed as a simple low threat residential sub-division, which meets the objectives of Planning for Bushfire Protection (2006).

This report establishes the level of bushfire threat to the development and examines bushfire protection for the existing residences on lot 18 and the proposed 16 lot residential subdivision for measures such as asset protection, access, services and construction requirements.

Given the quality of the existing property in terms of its infrastructure such as roads, electricity and water supplies and particularly the well-maintained land the proposed subdivision is considered to possess a general low bushfire risk. The existing residences possess adequate and well maintained APZs and the proposed lots have ample room to provide and maintain a new APZs.

Access throughout the subdivision is well provided for and will largely comply with the acceptable solutions set out in PBP (2006) with the exception that access to Stage 2 Lots 10 to 17 utilise a "right of carriageway" in lieu of dedicate road. A rationalization of this arrangement is made in lieu of compliance with the acceptable solutions.

The subject property has existing services including a number of static water supplies providing sufficient supplies for the existing residence. The new lots will require their own firefighting water supply to serve the future residences at the time of development.

To improve the level of protection for existing residences it is recommended that bushfire construction enhancements be made which in combination with other measures will improve the overall resilience of these dwellings.

At the time of this report the development is not known to have any significant environmental or cultural values requiring consideration as part of this assessment.

Based on the bushfire assessment and the recommendations contained in this report the proposed development is deemed to comply with the specific and broad objectives of PBP (2006) the requirements of the Rural Fire regulations (2013) and therefore suitable for submission to the NSWRFS for the issuing of a bush fire safety authority.

7. RECOMMENDATIONS

To achieve and maintain compliance the following recommendations are made:

7.1. ASSET PROTECTION ZONES

TABLE 9 MIN APZ DIMENSIONS REQUIRED FOR EXISTING AND FUTURE RESIDENCES

STAGE 1 LOTS	ASPECT	VEG CLASS	SLOPE	APZ REQUIRED	EFFECTIVE BAL
All lots	North	Grassland	0°-5° downslope	10 m Provided by road	BAL-29
Lot 4 & Lot 9 All other Lots not applicable	East	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29
All lots	South	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29
Lot 2 & Lot 5 All other Lots not applicable	West	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29
STAGE 2 LOTS	**ASPECT**	**VEG CLASS**	**SLOPE**	**APZ REQUIRED**	**EFFECTIVE BAL**
Lot 10	North	Grassland	0°-5° downslope	10 m (5 m within lot + 5 m on community title)	BAL-29

All Lots	East	Grassland	Upslope	10 m (Provided by Sutton Rd)	BAL-29
Lot 17	South	Grassland	Upslope	10 m (5 m within lot + 5 m on community title)	BAL-29
All lots	West	Grassland	0°-5° downslope	10 m (5 m within lot + 5 m on community title)	BAL-29
LOT 18	ASPECT	VEG CLASS	SLOPE	APZ REQUIRED	EFFECTIVE BAL
Main Residence	North	Grassland	0°-5° downslope	10 m	BAL-29
	East	Grassland	Upslope	10 m	BAL-29
	South	Grassland	Flat	10 m	BAL-29
	West	Grassland	0°-5° downslope	10 m	BAL-29

7.2. ACCESS

STAGE 1 & 2 (LOTS 2 TO 17)

- Property access road to comply with specifications and dimensions provided in Appendix B.
- Future properties to be clearly sign posted and buildings are to be clearly numbered,
- Property access to incorporate a turning circle with a minimum 12 m outer radius,
- Fire trail access to the rear of Lots 2 to 9 on community title to be provided.
- Fire trail access to the rear of Lots 10 to 17 on community title to be provided.
- When the future road (Lot 20) is complete access to the right of carriageway is to be provided at the rear of Lot 16 / 17 to enable an alternative access route for this area.

EXISTING RESIDENCE LOT 18

- Nil recommendations

7.3. SERVICES (WATER, ELECTRICITY, GAS)

STAGE 1 & 2 (LOTS 2 TO 17)

- Future residences are to be provided 5,000 L water supplies. Supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix C of this report.
- Nil recommendations for electricity
- It is anticipated that future residence will be by gas pipeline and therefore supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix C of this report.

EXISTING RESIDENCE (LOT 18)

- One of the polymer tanks is to be fitted with the appropriate fittings for RFS connection detailed in Appendix C
- A static water supply (SWS) sign to be put in place in a visible location at the entry to the property.
- Nil recommendations for electricity
- Gas pipeline supplies and fittings are to comply with specifications set out in PBP (2006) which are provided in Appendix C of this report.

7.4. BUSHFIRE CONSTRUCTION

STAGE 1 & 2 (LOTS 2 TO 17) FUTURE RESIDENCES

- Currently set at BAL-29
- It is recommended that a subsequent BAL assessment be carried out prior to construction to reevaluate this value, which may have changed based on the proposed building plans. All construction is to comply with AS3959-2009 and PBP (2006) for the relevant BAL level.

LOT 18 EXISTING RESIDENCE –

- Fitting metal gutter guard to reduce leaf and debris build up and improve rain harvesting.
- Enclose all openings, including sub floor areas, openable windows, vents, weepholes and eaves (excluding roof tile spaces).
- Cover openings with a non-corrosive metal screen mesh with a maximum aperture of 2mm.
- Fit external doors with draft excluders.

REFERENCES

Australian Building Codes Board (ABCB), 2017, *National Construction Code - Building Code of Australia Volume 2,* Canberra

Keith D, 2004, *Ocean Shores to Desert Dunes: the native vegetation of NSW and the ACT,* Dept of Environment and Conservation, NSW Government.

NSW Rural Fire Service, 2006, *Planning for Bushfire Protection*. Sydney

NSW Rural Fire Service, 2010, *Planning for Bushfire Protection, Addendum: Appendix 3*. Sydney

Standards Australia, 2009, AS 3959-2009 *Construction in Bushfire Prone Areas* (amended 2011) SAI Global, Melbourne.

APPENDIX A – PROTECTION MEASURES AND PERFORMANCE REQUIREMENTS FOR SUBDIVISIONS

ASSET PROTECTION ZONES

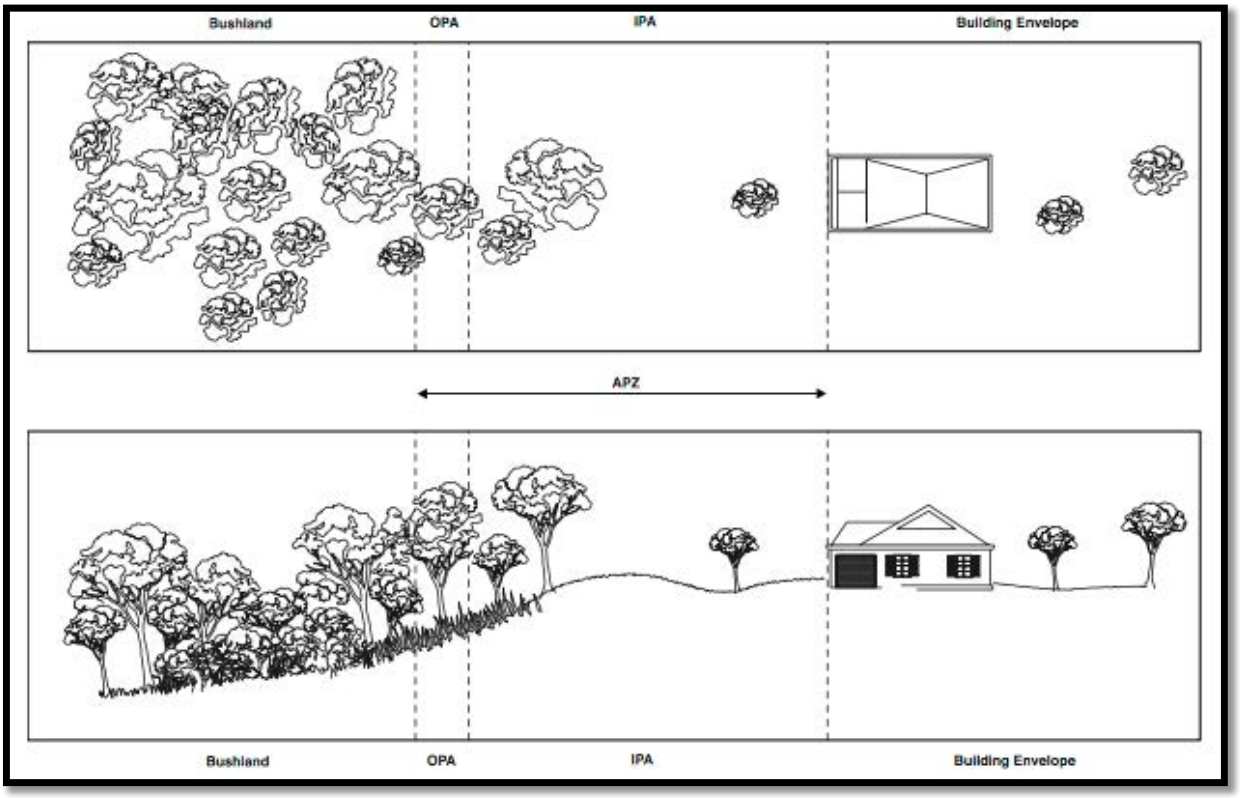
To minimise the potential impact of bushfire on the existing and future dwellings, the NSWRFS calls for mandatory setbacks of structures from vegetation, and the ongoing maintenance of these zones. The setback, or Asset Protection Zone is calculated using Table 2.4.2 of AS3959-2009.

The provision of a sufficient APZ and defendable space for existing and future residences is to be assessed against the requirements of PBP (2006) to ensure adequate protection of these structures.

The APZ components include the Outer Protection Area and the Inner Protection Area. They can be defined as follows:

- Inner Protection Area: closest to buildings incorporating the defendable space and for managing heat intensities at the building surface; and
- Outer Protection Area: for reducing the potential length of flames by slowing the rate of spread, filtering embers and suppressing the crown fire.

A graphical representation of the APZ and its components is provided below.



INTENT OF MEASURE:

"To provide sufficient space and maintain reduced fuel loads, to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with a building." (PBP, 2006)

PERFORMANCE CRITERIA TO BE ACHIEVED:

- Radiant heat levels at any point on a proposed building will not exceed 29 kW/m^2.
- APZs are managed and maintained to prevent the spread of a fire towards the building.
- APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.

ACCESS REQUIREMENTS

NSWRFS requires that egress and access arrangements for the subdivision enables safe evacuation away from an area whilst facilitating adequate emergency and operational response in the event of a bushfire emergency. The design and specification of public roads, access roads and fire trails for the subdivision is to be assessed against the performance requirements of PBP (2006) to ensure adequate access is provided.

PUBLIC ROADS

INTENT OF MEASURE:

"To provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from the area." (PBP, 2006)

PERFORMANCE CRITERIA TO BE ACHIEVED:

- Firefighters are provided with safe all weather access to structures.
- Public road widths and design that allow safe access for firefighters while residents are evacuating the area.
- The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles.
- Roads that are clearly sign-posted and buildings / properties that are clearly numbered.
- There is clear access to reticulated water supply
- Parking does not obstruct the minimum paved width

INTERNAL ROADS

INTENT OF MEASURE:

"To provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupants faced with evacuation." (PBP, 2006)

PERFORMANCE CRITERIA TO BE ACHIEVED:

- Access to properties is provided in recognition of the risk to fire fighters and / or occupants.
- The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles.
- All weather access is provided.
- Road widths and design enable safe access for vehicles

FIRE TRAILS

INTENT OF MEASURE:

"To provide suitable access for fire management purposes and maintenance of APZs." (PBP, 2006).

PERFORMANCE CRITERIA TO BE ACHIEVED:

- The width and design of the fire trails enables safe and ready access for firefighting vehicles.
- 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-authorized persons.
- Fire trails designed to prevent weed infestation, soil erosion and other land degradation.

SERVICES – WATER, ELECTRICITY AND GAS

NSWRFS requires that consideration be given to utility services (gas, water and electricity) and the potential impact of bushfire. A water supply is critical for any firefighting operation, and where appropriate gas and electricity supply require bushfire safety considered. The design and specification of services for the proposed development are to be assessed against the performance requirements of PBP (2006) to ensure that water is available for property protection and that the gas and electricity do not place undue risk to a building.

INTENT OF MEASURE:

"To provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building." (PBP, 2006)

PERFORMANCE CRITERIA TO BE ACHIEVED:

- Water supplies are easily accessible and located at regular intervals.
- Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.
- Regular inspection of power lines is undertaken to ensure they are not fouled by branches.
- Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings

APPENDIX B – ACCESS STANDARDS

- Roads must provide a min. carriageway width of 4 m.
- A min. vertical clearance of 4 m to any overhanging obstructions.
- Roads to have a min. inner radius of 6 m.
- Max. grades for unsealed road is 10 deg. and sealed road is 15 deg.
- Roads to have a cross fall no greater than 10 deg. For unsealed roads.
- Passing bays must be provided every 200 m that are 20 m long and 2 m wide making for a trafficable width of 6 m at the passing bay.
- Bridges must have a min. 15 t load capacity and provided with signage indicating this capacity.
- Roads do not traverse a wetland or other land subject to periodic inundation.
- Internal roads provide a loop road around any dwelling or incorporate a turning circle with a min. 12 m outer radius.

APPENDIX C – SERVICES STANDARDS

Water

- A suitable connection for firefighting purposes made available and located within the Inner Asset Protection Zone and away from the structure. A 65 mm Storz outlet with a Gate or Ball vale 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 200 mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is supplied with in 4 m of the access hole.
- Above ground tanks are manufactured of concrete or metal and raised tanks have their stands supported. 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.

Electricity

- 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)

Gas

- Bottled gas used on any lot to be installed and maintained in accordance with AS1596 LPG Gas storage and handling.
- Gas cylinders to be kept clear of flammable materials to 10 m and shielded on hazard side of vegetation.
- Gas cylinder release valves directed away from the building and separated 2 m from combustible material.
- Polymer sheathed flexible gas supply lines to gas meters not used