

BUSHFIRE HAZARD ASSESSMENT

**79, 95, 100 Bells Lane & 457 Bells Line of Road,
Kurmond NSW**

PREPARED FOR:

Mr I & Mrs J Hopkins & Mr W and Mrs L Attard

OUR REFERENCE:

REP-168814

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Executive summary.

EnviroTech Pty. Ltd. was engaged by Mr I & Mrs J Hopkins & Mr W and Mrs L Attard, to conduct a Bushfire Hazard Assessment at properties 79, 95, 100 Bells Lane & 457 Bells Line of Road, Kurmond NSW to address the restraints and requirements in the context of potential bushfire risk. The report is to accompany a submission to the Hawkesbury City Council for the re-zoning and sub-division of the above mentioned properties into a total of twenty five (25) residential blocks of varying sizes.

The properties are situated off Bells Lane approximately 2.5 km north of North Richmond in the suburb of Kurmond. The area is rural residential with much of the surrounding areas made up of large predominantly cleared blocks. A site inspection was carried out on the Thursday the 13th of November 2014 and Friday the 5th of December. The inspection involved a walkover inspection of the site and surrounding areas. Vegetation was assessed out to 140m in each direction from the edge of the property and slope to 100m. The findings have been summarised below.

The sites are identified as bushfire prone land as per the Hawkesbury Bushfire prone land map (see figure 3. below). As such the following report addresses the requirements of section 100B of the *Rural Fires Act 1997* and the planning provisions of *Planning for Bushfire Protection (PBP) 2006*.

A desktop review of the Vegetation community maps prepared by Tozer et al was undertaken and revealed the potential presence of shale/sandstone transition forest which is considered as Endangered Ecological Community (EEC). Minimal clearing has been incorporated into the design. The nature, extent and validity of this mapping has not been undertaken for the purpose of this assessment.

A search of the NSW OEH database for Archaeological, Heritage and Aboriginal Significant sites was undertaken in relation to the site. No features were identified. The client is unaware of any Aboriginal items on the site.

Findings of the report conclude that the proposal is capable of achieving the APZ requirements and a maximum of BAL 29 by utilizing on site APZs and or existing cleared areas to meet the current lot yield proposed below. Buildings are to be constructed outside of the identified APZ and vegetation buffer area to achieve this.

APZs are to be constructed as per the requirements of PBP 2006, and the *Standards for Asset Protection Zones* documentation (RFS 2005).

Landscaping of each individual property is to adhere to the requirements of Appendix 5 of *Planning for Bushfire Protection 2006* in both landscape design and maintenance. At least 1m clearance of all vegetation with the exception of maintained grasses is to be maintained around all buildings.

It has been noted that the proposed development is situated in an area established prior to the requirements of PBP being introduced and as such some areas of the design do not comply with the requirements set out in PBP 2006 including road width requirements and the utilisation of perimeter roads. The requirements in relation to fire fighter access, water supply, APZ requirements and maximum BAL of BAL29 are capable of being satisfied within the boundary of the proposed development.

It is the opinion of Envirotech that the overall principles and requirements outlined in both *Planning for Bushfire Protection* (2006) and Section 100B of the *Rural Fires Act 1997* can be adhered to and as such the proposal can be accepted by council.

Further bushfire assessment specific to individual lots will need to be undertaken for the purpose of determining individual BAL levels prior to the construction of housing.

The following recommendations are to be prescribed as compliance requirements to ensure that the design provides the most suitable outcome to achieve as close to compliance as is possible in relation to the design of the re-zoning and subdivision:

1. The addition of access roads including driveways are to be two-wheel drive and accessible in all weather conditions
2. Any access roads including the driveway to the proposed south-eastern lot are to:
 - Provide adequate width and turning circle as per requirements of PBP 2006;
 - The crossfall of the road is not to be more than 10 degrees.
 - The maximum gradient of the roads shall not exceed 15 degrees.
3. Designated 10,000L water tanks are to be installed. The following requirements are to be incorporated into the design;
 - 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 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.
4. Any proposed fire hydrant spacing, sizing and pressures are to be compliant with AS 2419.1 – 2005.
5. Any proposed hydrants are not to be located in any road carriage way
6. All above ground water and gas service pipes external to the building are metal, including and up to any taps.
7. All electrical transmission lines are to be installed underground.
8. 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.
9. 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.
10. 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.

11. polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used. APZs are to be constructed in accordance with Appendix 1 – APZ IPA requirements
12. Each individual property is to adhere to the requirements of Appendix 5 for both Landscape design and maintenance.
13. At least 1m clearance of all vegetation with the exception of maintained grasses is to be maintained around all buildings.

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1. Introduction

1.1 Background

EnviroTech Pty. Ltd. was engaged by Mr I & Mrs J Hopkins & Mr W and Mrs L Attard, to conduct a Bushfire Hazard Assessment at properties 79, 95, 100 Bells Lane & 457 Bells Line of Road, Kurmond NSW to address the restraints and requirements in the context of potential bushfire risk. The report is to accompany a submission to the Hawkesbury City Council for the re-zoning and sub-division of the above mentioned properties into a total of twenty five (25) residential blocks of varying sizes.

The properties are situated off Bells Lane approximately 2.5 km north of North Richmond in the suburb of Kurmond. The area is rural residential with much of the surrounding areas made up of large predominantly cleared blocks. The properties comprise single or dual occupancy residential dwellings on site with a large area of predominantly cleared grassland surrounding most of the houses.

A site inspection was carried out on the Thursday the 13th of November 2014 and Friday the 5th of December. The inspection involved a walkover inspection of the site and surrounding areas. Vegetation was assessed out to 140m in each direction from the edge of the property and slope to 100m. The findings have been summarised below.

The sites are identified as bushfire prone land as per the Hawkesbury Bushfire prone land map (see figure 3. Below). As such the following report addresses the requirements of section 100B of the *Rural Fires Act 1997* and the planning provisions of *Planning for Bushfire Protection (PBP) 2006*.

Site design, bushfire risks and the APZ requirements have been assessed against the requirements of PBP 2006, in particular 4.3.3 (Sub-division).

1.2 Objectives

The objectives of the Bushfire Hazard Assessment were to:

- Assess the site and surrounds as Appendix 3 of *Planning for Bushfire Protection 2006*;
- Review the proposal in the context of the requirements outlined within PBP 2006;
- Provide an assessment of the current design against the requirements outlined in PBP 2006; and
- Give recommendations on preferred locations of dwellings, necessary APZs and any necessary alterations to current plans to satisfy the requirements of PBP 2006.

1.3 Scope of Works

The scope of works included the following:

- Assess the site against all necessary components of *Planning for Bushfire Protection 2006*;
- Address the requirements of section 100B of the Rural Fires Act & Section 44 the Rural Fires Regulation 2013;
- Provide advice on any necessary Asset Protection Zones as per PBP 2006.

1.4 Legislative Requirements

Acts

- *Rural Fires Act 1997*
- *Environmental Planning and Assessment (EPA) Act 1979*
- *Threatened Species Conservation Act 1995*

Regulations

- *Rural Fires regulation 2013*

Environmental Planning instruments and Planning documents

- *Planning for Bushfire Protection 2006*

1.5 Context of report

This report is to be read in its entirety. Individual sections should not be read in isolation from the entire report. Each section of the report relates to the rest of the document and as such is to be read in conjunction, including its appendices and attachments.

The below Figures provide a concept plan of the subdivision and details of the surrounding area of the site, location of the site in relation to surrounding land and topography, the bushfire prone land, and the aerial map of the site respectively.



Figure 1. Potential lot layout at 79 Bells Lane, Kurmond NSW



Figure 2. Potential lot layout at 95 Bells Lane, Kurmond NSW

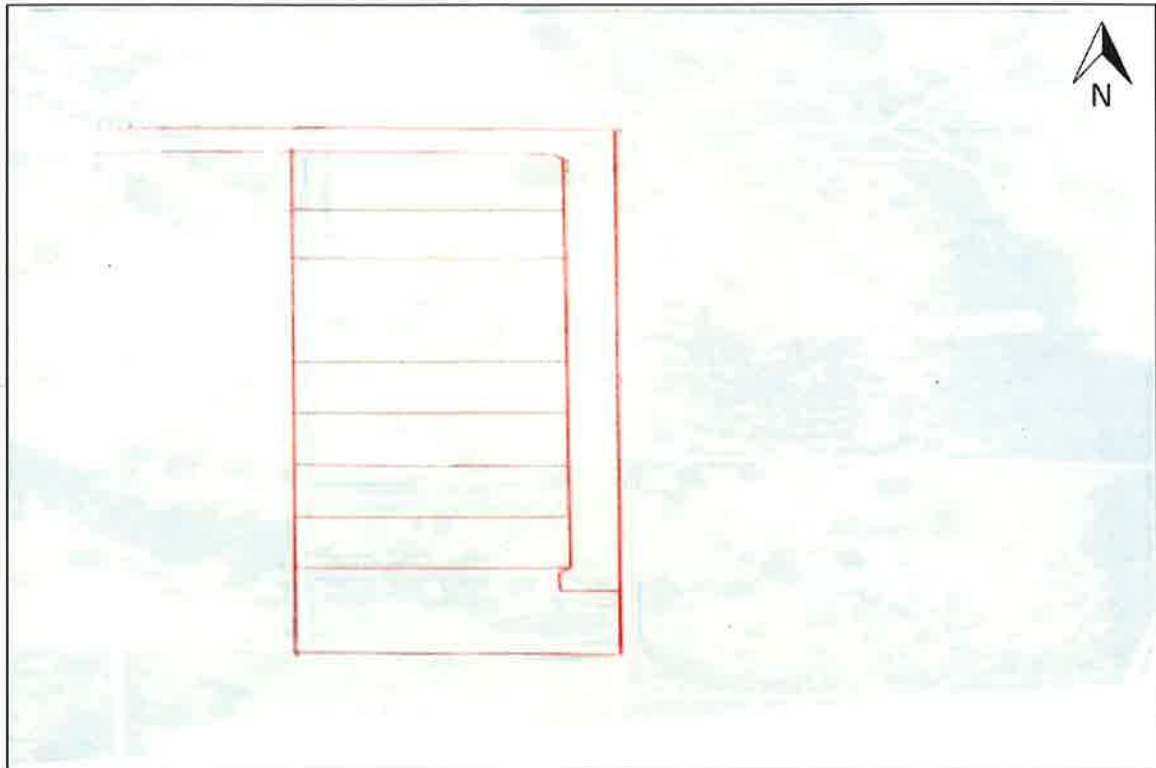


Figure 3. Potential lot layout for 100 Bells Lane, Kurmond NSW



Figure 4. Potential lot layout for 457 Bells Line of Road, Kurmond NSW

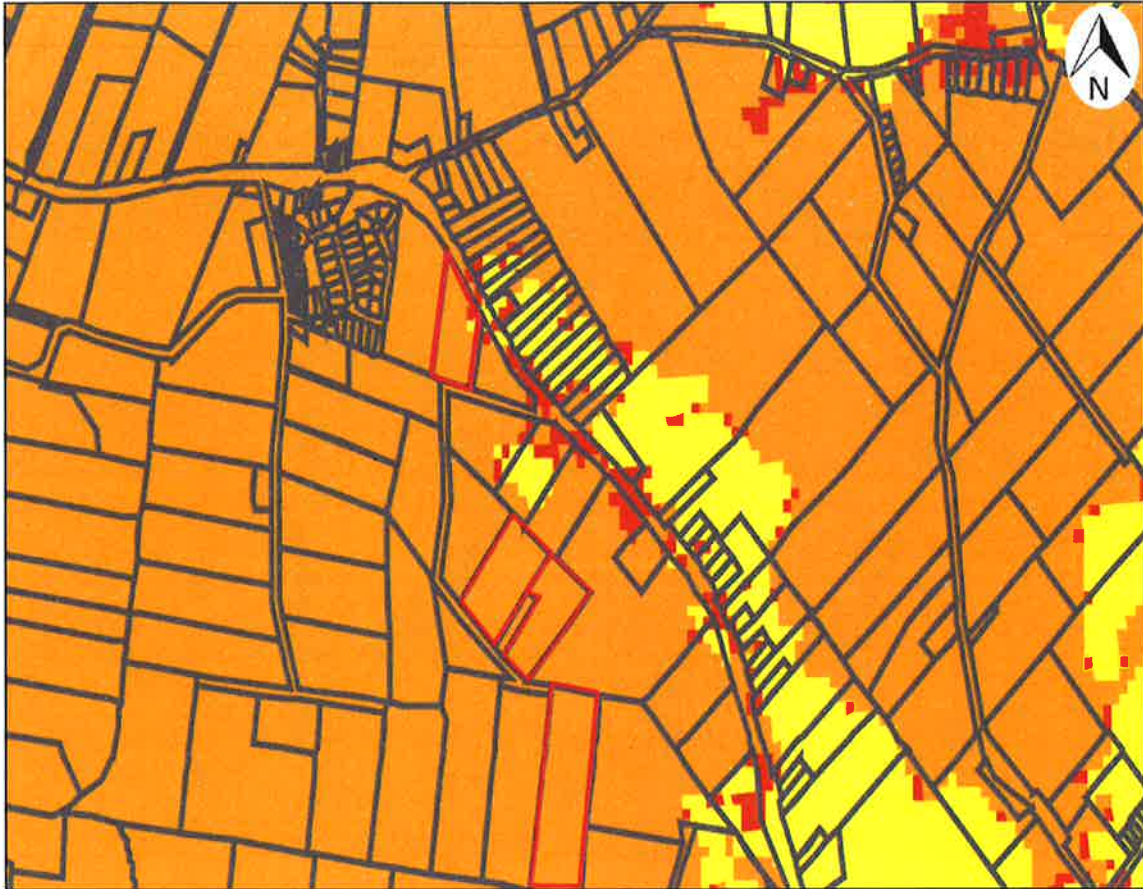


Figure 6. Hawkesbury LGA Bush Fire Prone Land map

-  Subject sites
-  Bush Fire Prone Land – Vegetation Category 1
-  Bush Fire Prone Land – Vegetation Category 2
-  Bush Fire Prone Land – Vegetation Buffer 30 m and 100 m



Figure 7. Aerial photograph of the sites (Accessed via www.NearMap.com on the 2/12/2014)

2. 79 Bells Lane, Kurmond

2.1.1 Existing site description

The site is identified as Lot 38 of Deposited Plan 7565. The site currently consists of an attached dual occupancy house situated in the southern portion of the site adjacent to Bells Lane. Three (3) sheds are also located with close proximity to the houses. The site is approximately 2.7 Ha in size.

On site topography slopes down to the north-east of the current dwellings sloping down towards a watercourse lined with mature trees, a thin portion of vegetation associated with the embankment of the watercourse occurs down slope of the proposed subdivision. A patch of forested vegetation occurs to the west of the site. Much of the site is cleared and is currently managed grassland.

2.1.2 Surrounding properties

A creek line / watercourse runs adjacent to the northern boundary of the site. Rural residential properties are located north of the property and consist most of grazing lands. Surrounding properties in all directions consist of rural residential blocks with predominantly cleared pastures.

The neighboring property to the east (95 Bells Line of Rd) consists of a cleared block with a dwelling and a shed. A creek line continues along the northern boundary. This property is proposed to be rezoned for the purpose of subdivision. It is proposed that 6 blocks be constructed on this block.

The block to the south (74 Bells Lane) of the site has is a rural property sloping down in relation to the proposed development however no significant vegetation has been identified on the block within 140 m.

The rural residential block to the west consists of a mixture of woodlands and forest on site. The vegetation occurring directly adjacent the western border of the site is considered forest for the purpose of this bushfire assessment with an effective down slope in relation to the proposed development.

The land is identified as Bushfire prone land, containing predominantly Bushfire prone land – category 1 vegetation over the entire site (see Figure 3).

2.1.3 Existing vegetation description and slope

Onsite

The patch of five (5) trees are present in the northern portion of the site which are not considered significant vegetation and will likely be incorporated within the asset protection zone and or removed for the purpose of the development. Vegetation occurring adjacent the northern boundary has an effective slope of downslope in relation to the development. As the width of the vegetation is greater than 20m it is considered forest. The effective slope beneath the vegetation of the creekline was observed to be 5-10°.

Adjacent Properties

North – The vegetation to the north of the site is considered forest. The vegetation is situated downslope with a gradient between 5-10° on the southern embankment with an effective fire run of approximately 20m before reverting to upslope. The vegetation is contained within fencing and does not encroach on to the subject property.

East - To the east of the site occurs forested vegetation with a separation from the border to the edge of the vegetation of 34m. The effective slope is 8° downslope placing it within the 0-5° category for the purpose of the bushfire assessment.

South - There is no significant vegetation to the south of the property within 140 m. The slope is downslope.

West – The predominant vegetation to the west is considered forest with an effective slope of 6° placing it within the 5-10°.



Figure 8. Vegetation considered as a bushfire risk identified within 140m of the site (Accessed via www.NearMap.com on the 2/12/2014)



Figure 9. Vegetation to the north –forest immediately adjacent northern boundary



Figure 10. Vegetation to the west, forest with an effective slope of 5-10°

2.1.4 The proposal

The proposal involves the subdivision of the property into 6 lots which will result in an additional 3 properties to be constructed on the site (refer for Figure 1).

2.1.5 Significant environmental features

A dam is present on site however it is proposed that the dam will be infilled. At the time of the inspection the Dam was dry. A watercourse runs along the northern boundary (partially within the subject land and partially within the adjoining land). Clearing within 20m of the waterway has been restricted allowing a 20m buffer zone from the watercourse.

2.1.6 Threatened Flora and Fauna

A desktop review of the Vegetation community maps prepared by Tozer et al was undertaken and revealed the potential presence of shale/sandstone transition as Endangered Ecological Community (EEC). This has been considered in the concept design and as such minimal clearing is required. The

nature, extent and validity of this mapping has not been undertaken for the purpose of this assessment

2.1.7 Aboriginal and Heritage Significant sites

A search of the NSW OEH database for Archaeological, Heritage and Aboriginal Significant sites was undertaken in relation to the site. No features were identified. The client is unaware of any Aboriginal items on the site.

2.2 Survey methodology

This survey has been carried out in accordance with the methodology of AS3959-2009 and Appendix 3 of *Planning for Bushfire Protection* 2006 and those of Appendix 2 for the determination of the relevant asset protection zones.

A brief outline of the relevant steps from Appendix 3 (PBP 2006) has been listed below:

Assessment of Bushfire Hazard

Step 1: Determine vegetation formation types and sub-formations around the building, as follows:

- (i) Identify all the vegetation types within 140 metres of the site using Keith (2004);
- (ii) Classify the vegetation formations as set out in Table A2.1 in Appendix 2; and
- (iii) Convert Keith to Specht classifications using Table A3.5.1 below. *The BCA (2010) uses Specht vegetation classifications while PBP uses Keith.*

Step 2: Determine the distance between each vegetation formation identified (from the edge of the foliage cover) and the proposal.

Step 3: Determine the effective slope of the ground for each vegetation group (see Appendix 2) using the classes provided below. Slopes are classified as follows:

- (i) Upslope is considered to be 0°.
- (ii) Greater than 0° but not greater than 5° downslope.
- (iii) Greater than 5° but not greater than 10° downslope.
- (iv) Greater than 10° but not greater than 15° downslope.
- (v) Greater than 15° but not greater than 20° downslope.

Step 4: Determine the relevant FDI for the council area in which the development is to take place from Table 2.3 in Appendix 2.

Step 5: Match the relevant FDI, appropriate vegetation, distance and effective slope classes to determine the bush fire attack levels using the relevant tables of AS3959-2009 as indicated below as well as the required APZ within PBP 2006 – Appendix 2:

- FDI 100 -Table A2.4.2
- FDI 80 - Table A2.4.3
- FDI 50 - Table A2.4.4

2.3 Bushfire hazard assessment

Table 1. BAL Assessment to North

Aspect	North
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	5-10° downslope
Separation from vegetation hazard	> 39 m
Achievable APZ	Refer to figure 9
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29 (AS3959)	39 m
BAL requirement	Max BAL 29

Table 2. BAL Assessment to East

Aspect	East
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	5-10 ° downslope
Separation from vegetation hazard	> 39 m
Achievable APZ	Refer to figure 9
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29 (AS3959)	39 m
Proposed BAL	MAX BAL 29

Table 3. BAL Assessment to South

Aspect	South
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Managed land
Slope	N/A
Separation from vegetation hazard	N/A
Achievable APZ	Refer to figure 9
Appendix 2 APZ requirement	N/A
Minimum distance required for BAL 29 (AS3959)	N/A

Proposed BAL	BAL 12.5
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Table 4. BAL Assessment to West

Aspect	West
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	5-10°
Separation from vegetation hazard	> 39
Achievable APZ	TBC
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29 (AS3959)	39 m
Proposed BAL	MAX BAL 29

Figure 11 below details the proposed location for a building envelope in regard to the vegetation type and slope to ensure that the BAL does not exceed BAL 29.



Figure 11. Proposed APZ zone on the northern boundary to achieve a maximum BAL of BAL29 (Accessed via www.NearMap.com on the 2/12/2014).

3. 95 Bells Lane, Kurmond

3.1.1 Existing site description

The site is identified as Lot 38 of Deposited Plan 7588. The site currently consists of a residential house and associated garage on the southern boundary of the site, as well as a large shed in the south-west corner. The site is approximately 2.4 hectares in size.

On site topography slopes down to the north-east of the current dwellings sloping down towards a watercourse lined with mature trees and a dam in the north-eastern corner of the property. A patch of forest vegetation occurs with an effective slope of 5-10°. Much of the site is cleared and is currently managed grassland.

2.1.3 Surrounding properties

A creek line / watercourse runs adjacent to the northern boundary of the site. Vacant grassland occurs to the north as well as a number of rural residential properties. Surrounding properties in all directions consist of rural residential block with predominantly cleared blocks.

The rural residential block to the east consists of a small patch of vegetation which will be managed as an APZ for the accompanying subdivision proposed. The vegetation occurring directly adjacent the eastern border of the site is considered forest for the purpose of this bushfire assessment with an effective down slope in relation to the proposed development.

The block to the south (74 & 96 Bells Lane) of the site are rural properties sloping down in relation to the proposed development however no significant vegetation has been identified on the block within 140m.

The land is identified as Bushfire prone land, containing predominantly Bushfire prone land – category 1 vegetation over the entire site (see Figure 3).

2.1.3 Existing vegetation description and slope

Onsite

The forested areas adjacent the creekline will be retained to a distance of 20m without any vegetation clearing. The effective slope surveyed on site was recorded to be 8° placing it within the 0-5° category. Vegetation further south of the creekline is proposed to be managed as an APZ.

Adjacent Properties

North – Offsite to the north, the vegetation to the consists of a small amount of creekline vegetation which is upslope before changing to cleared pasture land.

East - Adjacent the north eastern corner the vegetation is forested vegetation. The effective slope is 5-10°.

South - There is no significant vegetation to the south of the property within 140 m. The slope is downslope.

West – To the west of the site is currently managed land with a small amount of trees, as mentioned above the proposal intends to construct additional houses in this area and vegetation will be managed as an APZ. The effective slope is 6°.



Figure 12. Vegetation considered a bushfire risk identified within 140m of the site (Accessed via www.NearMap.com on the 2/12/2014).



Figure 13. Side profile of the vegetation to the north – forest with an effective downslope of 5-10°.



Figure 14. Vegetation to the north-east, forest with an effective down slope of 5-10°

3.2.2 The proposal

The proposal is for the subdivision of the property into 5 blocks of land. In its current form the proposal is for the rezoning and eventual subdivision with the aim to construct 4 additional dwellings on the site (refer to figure 2).

3.2.3 Significant environmental features

A man made dam was observed on site had water in it at the time of inspection. A watercourse and natural dam is present on the northern boundary of the site. A vegetation retention buffer of 20m from the edge of the creek and natural dam has been incorporated into the design.

3.2.4 Threatened Flora and Fauna

A desktop review of the Vegetation community maps prepared by Tozer et al was undertaken and revealed the potential presence of shale/sandstone transition forest which is considered as Endangered Ecological Community (EEC). Minimal clearing has been incorporated into the design. The nature, extent and validity of this mapping has not been undertaken for the purpose of this assessment.

3.2.5 Aboriginal and Heritage Significant sites

A search of the NSW OEH database for Archaeological, Heritage and Aboriginal Significant sites was undertaken in relation to the site. No features were identified. The client is unaware of any Aboriginal items on the site.

3.3 Survey methodology

This survey has been carried out in accordance with the methodology of AS3959-2009 and Appendix 3 of *Planning for Bushfire Protection 2006* and those of Appendix 2 for the determination of the relevant asset protection zones.

A brief outline of the relevant steps from Appendix 3 (PBP 2006) has been listed below:

Assessment of Bushfire Hazard

Step 1: Determine vegetation formation types and sub-formations around the building, as follows:

- (i) Identify all the vegetation types within 140 metres of the site using Keith (2004);
- (ii) Classify the vegetation formations as set out in Table A2.1 in Appendix 2; and
- (iii) Convert Keith to Specht classifications using Table A3.5.1 below. *The BCA (2010) uses Specht vegetation classifications while PBP uses Keith.*

Step 2: Determine the distance between each vegetation formation identified (from the edge of the foliage cover) and the proposal.

Step 3: Determine the effective slope of the ground for each vegetation group (see Appendix 2) using the classes provided below. Slopes are classified as follows:

- (i) Upslope is considered to be 0°.
- (ii) Greater than 0° but not greater than 5° downslope.
- (iii) Greater than 5° but not greater than 10° downslope.
- (iv) Greater than 10° but not greater than 15° downslope.
- (v) Greater than 15° but not greater than 20° downslope.

Step 4: Determine the relevant FDI for the council area in which the development is to take place from Table 2.3 in Appendix 2.

Step 5: Match the relevant FDI, appropriate vegetation, distance and effective slope classes to determine the bush fire attack levels using the relevant tables of AS3959-2009 as indicated below as well as the required APZ within PBP 2006 – Appendix 2:

- FDI 100 -Table A2.4.2
- FDI 80 - Table A2.4.3
- FDI 50 - Table A2.4.4

3.4 Bushfire hazard assessment

Table 5. BAL Assessment to North

Aspect	North
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	8°
Separation from vegetation hazard	TBC
Achievable APZ	> 39
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29	39 m
BAL requirement	Max BAL 29

Table 6. BAL Assessment to East

Aspect	North-east
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	8°
Separation from vegetation hazard	TBC
Achievable APZ	> 39
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29	39 m
Proposed BAL	MAX BAL 29

Table 7. BAL Assessment to South

Aspect	South
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Managed land
Slope	Downslope
Separation from vegetation hazard	> 100 m
Achievable APZ	N/A
Appendix 2 APZ requirement	N/A
Minimum distance required for BAL 29	N/A
Proposed BAL	BAL 12.5

Table 8. BAL Assessment to West

Aspect	West
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Managed land
Slope	0-5°
Separation from vegetation hazard	TBC
Achievable APZ	> 50
Appendix 2 APZ requirement	N/A
Minimum distance required for BAL 29	N/A
Proposed BAL	BAL 12.5

Figure 15 below details the proposed clearances for building envelopes in regard to the vegetation type and slope to ensure that the BAL does not exceed BAL 29.



Figure 15. Proposed APZ zone on the northern boundary and set back area surrounding watercourse to achieve a maximum BAL of BAL29.

4. 100 Bells Lane, Kurmond

4.1.1 Existing site description

The site is identified as Lot 50 of Deposited Plan 7565. The site currently consists of a single residential property and associated garage on the northern half of the site. A shed is located to the east of the house. The site is approximately 4.8 hectares in size.

The topography on site varies, the majority of the site slopes to the south / south-east of the current dwelling. To the north of the current dwelling the land is sloped to the north-east. The majority of the site is cleared and is currently managed grassland. A creekline occurs close to the southern boundary of the site with a vegetated corridor occurring adjacent the creekline.

4.1.2 Surrounding properties

The surrounding properties are rural residential blocks with single residential houses.

The land is identified as Bushfire prone land, containing predominantly Bushfire prone land – category 1 vegetation over the entire site (see Figure 3).

4.2 Existing vegetation description and slope

Onsite

A patch of vegetation is present along the watercourse consisting forested vegetation running from west to east across the site.

Adjacent Properties

North – To the north of the site there is a residential property consisting of grassland, forest vegetation approximately 45m north of the site border. A distance of 28m separates the edge of the forest and the northern boundary of the site. The slope is considered down slope

North-east - To the north-east of the property is a patch of forested vegetation with an effective down slope. There is a distance of 20 m from the vegetation to the north-east corner of the site.

East - To the east of the site is a forested area with an effective down slope from the site. A minimum distance of 15 m separates the edge of the vegetation and the eastern boundary.

South - To the south southern boundary is cleared and managed grassland for a distance of greater than 140 m.

South-west – To the south-west of the site is a patch of forest vegetation approximately 55 m from the south-western corner of the site with an effective upslope

West – Vegetation to the west is in the form of forested vegetation adjacent the creekline running east-west. The effective slope is considered down slope.



Figure 16. Vegetation considered as a bushfire risk on and offsite (Accessed via www.NearMap.com on the 2/12/2014).



Figure 17. Vegetation to the north – forest with an effective downslope of 0-5°



Figure 18. Vegetation to the east, forest with an effective slope of 5-10°



Figure 19. On site vegetation occurring on the northern side of the creekline, forest with an effective slope of 5-10°



Figure 20. Up slope view looking south towards the southern boundary of the site

4.2.3 The proposal

The proposal is for the subdivision of the property into 8 blocks of land. Two blocks will be situated to the north of the current dwelling and 5 to the south. In its current form the proposal is for the rezoning and subsequent subdivision with the aim to construct 7 additional dwellings on the site.

4.2.4 Significant environmental features

A riparian corridor including creekline and dam were observed on site close to the southern border of the site.

4.2.5 Threatened Flora and Fauna

A desktop review of the Vegetation community maps prepared by Tozer et al was undertaken and revealed the potential presence of shale/sandstone transition forest and is considered as Endangered Ecological Community (EEC). Minimal clearing has been incorporated into the design. The nature, extent and validity of this mapping has not been undertaken for the purpose of this assessment.

4.2.6 Aboriginal and Heritage Significant sites

A search of the NSW OEH database for Archaeological, Heritage and Aboriginal Significant sites was undertaken in relation to the site. No features were identified. The client is unaware of any Aboriginal items on the site.

4.3 Survey methodology

This survey has been carried out in accordance with the methodology of AS3959-2009 and Appendix 3 of *Planning for Bushfire Protection 2006* and those of Appendix 2 for the determination of the relevant asset protection zones.

A brief outline of the relevant steps from Appendix 3 (PBP 2006) has been listed below:

Assessment of Bushfire Hazard

Step 1: Determine vegetation formation types and sub-formations around the building, as follows:

- (i) Identify all the vegetation types within 140 metres of the site using Keith (2004);
- (ii) Classify the vegetation formations as set out in Table A2.1 in Appendix 2; and

(iii) Convert Keith to Specht classifications using Table A3.5.1 below. *The BCA (2010) uses Specht vegetation classifications while PBP uses Keith.*

Step 2: Determine the distance between each vegetation formation identified (from the edge of the foliage cover) and the proposal.

Step 3: Determine the effective slope of the ground for each vegetation group (see Appendix 2) using the classes provided below. Slopes are classified as follows:

- (i) Upslope is considered to be 0°.
- (ii) Greater than 0° but not greater than 5° downslope.
- (iii) Greater than 5° but not greater than 10° downslope.
- (iv) Greater than 10° but not greater than 15° downslope.
- (v) Greater than 15° but not greater than 20° downslope.

Step 4: Determine the relevant FDI for the council area in which the development is to take place from Table 2.3 in Appendix 2.

Step 5: Match the relevant FDI, appropriate vegetation, distance and effective slope classes to determine the bush fire attack levels using the relevant tables of AS3959-2009 as indicated below as well as the required APZ within PBP 2006 – Appendix 2:

- FDI 100 -Table A2.4.2
- FDI 80 - Table A2.4.3
- FDI 50 - Table A2.4.4

4.4 Bushfire hazard assessment

Table 9. BAL Assessment to North

Aspect	North
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	0-5° downslope
Separation from vegetation hazard	TBC
Achievable APZ	> 32
Appendix 2 APZ requirement	25 m
Minimum distance required for BAL 29	32 m
BAL requirement	Max BAL 29

Table 10. BAL Assessment to North-east

Aspect	North-east
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	0-5° downslope
Separation from vegetation hazard	TBC
Achievable APZ	> 32
Appendix 2 APZ requirement	25 m
Minimum distance required for BAL 29	32 m
BAL requirement	Max BAL 29

Table 11. BAL Assessment to East

Aspect	East
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	5-10° downslope
Separation from vegetation hazard	TBC
Achievable APZ	> 39 m
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29	39 m
Proposed BAL	MAX BAL 29

Table 12. BAL Assessment to South

Aspect	South
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	Upslope
Separation from vegetation hazard	TBC
Achievable APZ	> 69m
Appendix 2 APZ requirement	20 m
Minimum distance required for BAL 29	35 m
Proposed BAL	MAX BAL 29

Table 13. BAL Assessment to South-West

Aspect	South-west
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	5-10° downslope
Separation from vegetation hazard	TBC
Achievable APZ	> 39 m
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29	39 m
Proposed BAL	MAX BAL 29

Table 14. BAL Assessment – onsite vegetation, north of creekline

Aspect	North of creekline
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	5-10° downslope
Separation from vegetation hazard	TBC
Achievable APZ	> 39m
Appendix 2 APZ requirement	35 m
Minimum distance required for BAL 29	39 m
Proposed BAL	MAX BAL 29

Table 15. BAL Assessment to south of creekline

Aspect	South of creekline
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Forest
Slope	Upslope
Separation from vegetation hazard	TBC
Achievable APZ	> 25 m
Appendix 2 APZ requirement	20 m
Minimum distance required for BAL 29	25 m
BAL requirement	Max BAL 29

Figure 22 below details the proposed clearances for building envelopes in regard to the vegetation type and slope to ensure that the BAL does not exceed BAL 29.



Figure 21. Proposed APZ zone on the southern boundary and set back area surrounding watercourse to achieve a maximum BAL of BAL29 (Accessed via www.NearMap.com on the 2/12/2014).

5. 457 Bells Line Of Road, Kurmond

5.1.1 Existing site description

The site is identified as Lot 31 of Deposited Plan 7565. The site currently consists of a single residential property and associated shed. The site is approximately 2.1 hectares in size.

On site topography slopes to the south. Much of the site is cleared and is currently managed grassland. The vegetation on site is sparse and considered remnant for the purposes of the bushfire hazard assessment.

5.1.2 Surrounding properties

To the north of the site is Bells Line of Road and then a number of residential properties extending beyond 140m.

The neighboring property to the east (435 Bells Line of Rd) is an occupied residential block with vegetation across the site, the area of the vegetation is less than 1 ha.

The block to the south (3 Bells Lane) of the site has is a rural residential property, a small patch of remnant vegetation is present on site (considered rainforest for Bushfire purposes) approximately 22m south of the edge of the property.

The property to the west is managed grasslands with no significant vegetation present on site.

The land is identified as Bushfire prone land, containing predominantly Bushfire prone land – category 1 vegetation over the entire site (see Figure 3).

5.2.1 Existing vegetation description and slope

Onsite

Most of the vegetation will be proposed to be cleared for the purpose of the subdivision. The separation canopies is such that the vegetation does not constitute a significant hazard and as such has not been assessed.

Adjacent Properties

North – To the north of the site there is managed residential properties. The slope is considered up slope

East - To the east of the site is a residential property with a small vegetation present on site, the size of the vegetation is less than 1 ha and as such is considered rainforest for the purpose of the Bushfire Attach Level Assessment. The effective slope is upslope.

South - To the south of the site is remnant vegetation of less than a hectare with a downslope of 0-5°. A separation of 19m in the form of the road occurs.

West – The predominant vegetation to the west is considered grassland with an effective downslope to the south-west of 0-5°.

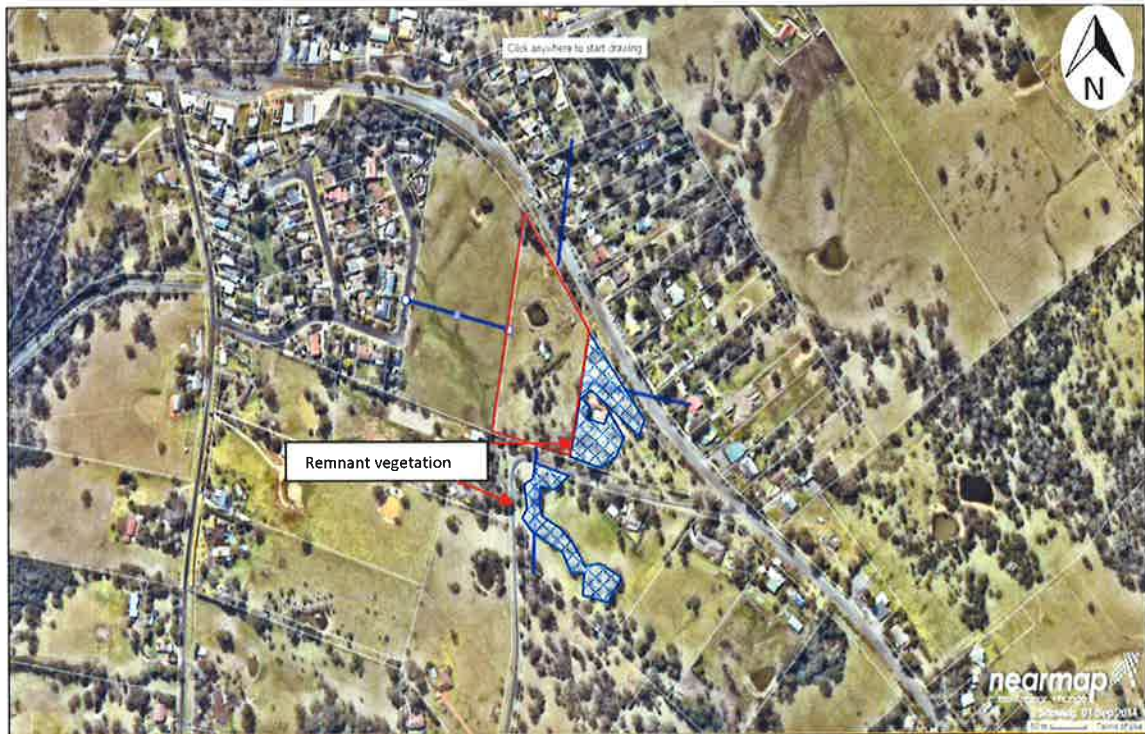


Figure 22. Vegetation considered a bushfire risk identified within 140m of the site (Accessed via www.NearMap.com on the 2/12/2014).



Figure 23. Vegetation to the east – managed land with remnant vegetation



Figure 24. Vegetation to the South, remnant vegetation across road.

Figure 25. On site vegetation in the form of riparian corridor / remnant vegetation

5.2.3 The proposal

The proposal is for the subdivision of the property into 5 blocks of land. Two of the properties will have frontage to the Bells Line of Road and three will have frontage to Bells Lane. In its current form the proposal is for the rezoning and subdivision with the intention to create 5 lots in total.

5.2.4 Significant environmental features

A man made dam is located on site. No other significant environmental features were identified.

5.2.5 Threatened Flora and Fauna

A desktop review of the Vegetation community maps prepared by Tozer et al was undertaken and revealed the potential presence of shale/sandstone transition forest and is considered as Endangered Ecological Community (EEC). Minimal clearing has been incorporated into the design. The nature, extent and validity of this mapping has not been undertaken for the purpose of this assessment.

5.2.6 Aboriginal and Heritage Significant sites

A search of the NSW OEH database for Archaeological, Heritage and Aboriginal Significant sites was undertaken in relation to the site. No features were identified. The client is unaware of any Aboriginal items on the site.

5.3 Survey methodology

This survey has been carried out in accordance with the methodology of AS3959-2009 and Appendix 3 of *Planning for Bushfire Protection* 2006 and those of Appendix 2 for the determination of the relevant asset protection zones.

A brief outline of the relevant steps from Appendix 3 (PBP 2006) has been listed below:

Assessment of Bushfire Hazard

Step 1: Determine vegetation formation types and sub-formations around the building, as follows:

- (i) Identify all the vegetation types within 140 metres of the site using Keith (2004);
- (ii) Classify the vegetation formations as set out in Table A2.1 in Appendix 2; and
- (iii) Convert Keith to Specht classifications using Table A3.5.1 below. *The BCA (2010) uses Specht vegetation classifications while PBP uses Keith.*

Step 2: Determine the distance between each vegetation formation identified (from the edge of the foliage cover) and the proposal.

Step 3: Determine the effective slope of the ground for each vegetation group (see Appendix 2) using the classes provided below. Slopes are classified as follows:

- (i) Upslope is considered to be 0°.
- (ii) Greater than 0° but not greater than 5° downslope.
- (iii) Greater than 5° but not greater than 10° downslope.
- (iv) Greater than 10° but not greater than 15° downslope.
- (v) Greater than 15° but not greater than 20° downslope.

Step 4: Determine the relevant FDI for the council area in which the development is to take place from Table 2.3 in Appendix 2.

Step 5: Match the relevant FDI, appropriate vegetation, distance and effective slope classes to determine the bush fire attack levels using the relevant tables of AS3959-2009 as indicated below as well as the required APZ within PBP 2006 – Appendix 2:

- FDI 100 -Table A2.4.2
- FDI 80 - Table A2.4.3
- FDI 50 - Table A2.4.4

5.4 Bushfire hazard assessment

Table 16. BAL Assessment to North

Aspect	North
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Managed land
Slope	Upslope
Separation from vegetation hazard	TBC
Achievable APZ	> 50 m
Appendix 2 APZ requirement	10 m
Minimum distance required for BAL 29	9 m
BAL requirement	BAL 12.5

Table 17. BAL Assessment to East

Aspect	East
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Rainforest (remnant vegetation)
Slope	Upslope
Separation from vegetation hazard	TBC
Achievable APZ	>11 m
Appendix 2 APZ requirement	10 m
Minimum distance required for BAL 29	11 m
Proposed BAL	MAX BAL 29

Table 18. BAL Assessment to South

Aspect	South
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Rainforest (remnant vegetation)
Slope	0-5°
Separation from vegetation hazard	TBC
Achievable APZ	Minimum 19m
Appendix 2 APZ requirement	10 m
Minimum distance required for BAL 29	13 m
Proposed BAL	MAX BAL 29

Table 19. BAL Assessment to West

Aspect	West
Assessed by	Evan Webb
Local Government Area	Hawkesbury City Council
Forest Danger Index – (FDI)	100
Vegetation class	Grassland
Slope	0-5°
Separation from vegetation hazard	TBC
Achievable APZ	> 10 m
Appendix 2 APZ requirement	N/A m
Minimum distance required for BAL 29	10 m
Proposed BAL	MAX BAL 29

Figure 27 below details the proposed clearances for building envelopes in regard to the vegetation type and slope to ensure that the BAL does not exceed BAL 29.



Figure 26. Proposed APZ zone on the southern boundary and set back area surrounding watercourse to achieve a maximum BAL of BAL29 (Accessed via www.NearMap.com on the 2/12/2014)

6. Infrastructure and other requirements of 4.1.3 PBP 2006.

PBP 2006 outlines a set of minimum standards for the provision of adequate bushfire protection measures for residential and rural residential subdivisions. These are outlined below and indicate how compliance is to be achieved for the proposed developments. Where possible, the properties have been considered overall in regards to their design, where required individual lots and or properties have been addressed.

6.1 Asset Protection Zone requirements

The proposal is capable of achieving the APZ requirements and a maximum of BAL 29 by utilizing on site APZs and or existing cleared areas both onsite and on adjacent management land. Buildings are to be constructed outside of the identified APZ zones and vegetation buffer areas to achieve this.

APZs are to be constructed as per the requirements of PBP 2006, and the *Standards for Asset Protection Zones* documentation (RFS 2005).

6.2 Access

6.2.1 - Public Roads

Current road access via Bells Lane will provide access and egress from the site. Access and egress for the proposed subdivision will be via Bells Lane which feeds on to Bells Line of Road, Kurmond. It is noted that two proposed lots will have access to Bells Line of Road. As Bells Lane is an existing road, compliance with all aspects of section 4.1.3 may not be possible. Table 6 below summarizes the level of compliance capable of being achieved.

Table 20. Criteria and compliance with public roads access requirements.

Performance criteria	Assessment
<ul style="list-style-type: none"> Firefighters are provided with safe all weather access to structures 	Public roads are two-wheel drive and accessible in all weather conditions. Driveways will be need to be constructed to a level capable of 2 wheel access in all weather.
<ul style="list-style-type: none"> Public road widths and design that allow safe access for firefighters while residents are evacuating an areas 	<p>Non compliance: The design of the subdivision lots do not allow for a perimeter road. Current road widths do not meet the requirements as set out in PBP for a 2 way access road. The width of roads is less than 8m. Bells lane is a dead end street which is greater than 200 m. The road access is not compliant with PBP 2006.</p> <p>Compliant: All properties will be accessible via Bells lane with the exception of 1 property which as previously mentioned will have access for fire trucks. The minimum distance between the inner and outer curve is 7.5m which is acceptable.</p>
<ul style="list-style-type: none"> The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles 	The capacity of the road is unknown however it is presumed that all sealed rural roads within the LGA have adequate capacity for bushfire vehicles
<ul style="list-style-type: none"> Roads that are clearly sign-posted and building/properties that are clearly numbered. 	Houses will be adequately numbered and identifiable.
<ul style="list-style-type: none"> There is clear access to reticulated water supply 	Reticulated water supply will not be relied upon, Specifically allocated standing water will be available – refer to 5.3 Services.
<ul style="list-style-type: none"> Parking does not obstruct the minimum paved width 	No additional roads are proposed in the subdivision. It is anticipated that all parking will be encompassed within the properties.

5.2.2 Access – Property Access

Performance criteria	Acceptable Solution
<ul style="list-style-type: none"> Access to properties is provided in recognition of the risk to fire fighters and/or evacuating occupants. 	Access to Bells Lane will be via Bells Line of Rd. The length to the exit for most of the properties will exceed 200m of road with the exception of 457 Bells Line of Road which will have two properties with access to Bells Line of Road.
<ul style="list-style-type: none"> The capacity of road surfaces and bridges is sufficient to carry full loaded firefighting vehicles 	The capacity of Bells Lane is unknown. It is presumed that all sealed rural roads within the

	LGA have adequate capacity for bushfire vehicles
<ul style="list-style-type: none"> Road widths and design enable safe access for vehicles 	<p>Non-compliant: There are areas of the road where the width is less than 4 m however gravel verges or cleared grassland provide a width greater than 4m.</p> <p>Compliant: The crossfall of the road is not more than 10 degrees. The maximum gradient of the roads does not exceed 15 degrees. Where practicable the design shall ensure a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches for the length of the road. The minimum distance between the inner and outer curve is 7.5m which is acceptable.</p>

5.2.3 Access - Fire trails

Performance criteria	Acceptable Solution
<ul style="list-style-type: none"> The width and design of the fire trails enables safe and ready access for firefighting vehicles 	N/A – no fire trails in design
<ul style="list-style-type: none"> 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 person 	N/A – no fire trails in design
<ul style="list-style-type: none"> Fire trails designed to prevent weed infestation, soil erosion and other land degradation 	N/A – no fire trails in design

5.3 Service – Water, electricity and gas

Performance criteria	Acceptable solutions
<ul style="list-style-type: none"> Reticulated water supplies – water supplies are easily accessible and located at regular intervals 	The level of detail available does not specify whether reticulated water supply will be available. As a precautionary measure, it will not be relied upon for the purposes of water supply in regards to bushfire
<ul style="list-style-type: none"> Non-reticulated water supply areas 	<p>Designated 10,000L water tanks per to be installed. The following requirements are to be incorporated into the design;</p> <ul style="list-style-type: none"> a suitable connection for firefighting purposes is made available and located within the IPA and away from the structure.

	<p>A 65mm Storz outlet with a Gate or Ball valve is provided.</p> <ul style="list-style-type: none"> • 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.
<p>Electricity services</p> <ul style="list-style-type: none"> • Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings 	<p>All electrical transmission lines are to be installed underground.</p>
<p>Gas Services</p> <ul style="list-style-type: none"> • Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings 	<ul style="list-style-type: none"> • 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.

7 – Landscaping requirements

Landscaping of each individual property is to adhere to the requirements of Appendix 5 of *Planning for Bushfire Protection 2006* in both landscape design and maintenance. At least 1m clearance of all vegetation with the exception of maintained grasses is to be maintained around all buildings.

Conclusion & Recommendations

The proposed development is situated in an area established prior to the requirements of PBP being introduced and as such some areas of the design do not comply with the requirements set out in PBP 2006 including Road width requirements and the utilisation of perimeter roads.

The requirements in relation to fire fighter access, water supply, APZ requirements and maximum BAL of BAL29 are capable of being satisfied within the boundary of the proposed development.

It is the opinion of Envirotech that the overall principles and requirements outlined in both *Planning for Bushfire Protection* (2006) and Section 100B of the *Rural Fires Act 1997* can be adhered.

Further bushfire assessment specific to individual lots will need to be undertaken for the purpose of determining individual BAL levels prior to the construction of housing.

The following recommendations are to be prescribed as compliance requirements to ensure that the design provides the most suitable outcome to achieve as close to compliance as is possible in relation the design of the re-zoning and subdivision:

14. The addition of access roads including driveways are be two-wheel drive and accessible in all weather conditions

15. Any access roads including the driveway to the proposed south-eastern lot are to:

- Provide adequate width and turning circle as per requirements of PBP 2006;
- The crossfall of the road is not to be more than 10 degrees.
- The maximum gradient of the roads shall not exceed 15 degrees.

16. Designated 10,000L water tanks per to be installed. The following requirements are to be incorporated into the design;

- 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 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.

17. Any proposed fire hydrant spacing, sizing and pressures are to be compliant with AS 2419.1 – 2005.
18. Any proposed hydrants are not to be located in any road carriage way
19. All above ground water and gas service pipes external to the building are metal, including and up to any taps.
20. All electrical transmission lines are to be installed underground.
21. 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.
22. 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.
23. 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.
24. polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used. APZs are to be constructed in accordance with Appendix 1 – APZ IPA requirements
25. Each individual property is to adhere to the requirements of Appendix 5 for both Landscape design and maintenance.
26. At least 1m clearance of all vegetation with the exception of maintained grasses is to be maintained around all buildings.

References

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