

ABN 47 857 816 658

Building Construction in Bush Fire Prone Areas

Rezoning Bushfire Hazard Assessment Report

REF No. 14.03.51

Address

Lot 2 DP 805023
1420 Kurmond Road,
Kurmond. NSW 2757

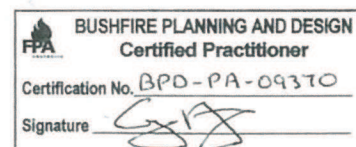
For

E. Bennett

The site was inspected on 18th March, 2014

Report Preparation

Craig Burley

Grad Dip Design for Bushfire Prone Areas
FPAA Certified BPAD-A Practitioner

Executive Summary

We have been engaged by E. Bennett the owner of the subject land to prepare a preliminary bush fire hazard assessment report to be a supplement for inclusion in a Rezoning Application to Hawkesbury City Council.

The site has been identified as being bushfire prone land and therefore the legislative requirements for any future proposed development would be applicable.

The purpose of this report was establish if there are any major constraints from a bushfire regulatory perspective for the subdivision of lands (subject to rezoning) and then the construction of residential dwellings upon the created allotments.

This report has found that whilst there would be bushfire related consent conditions applied to the lands at both subdivision and construction phases of development none of these should ultimately be overly restrictive or prohibit development approval by bushfire regulatory provisions.

1.0 Introduction

We have been engaged by E. Bennett the owner of the subject land to prepare a preliminary bush fire hazard assessment report to be a supplement for inclusion in a Rezoning Application to Hawkesbury City Council over the subject land.

The site has been identified as being bushfire prone land and therefore the legislative requirements for the proposed development would be applicable at the time of development application for both subdivision and any future construction.

1.1 Purpose of Report

- To determine the vegetation type, the expected fire behaviour and the threat to the subject lands; and
- To assess the proposal with reference to *Planning for Bush Fire Protection* 2006; and
- To assess the proposed construction with reference to the Building Code of Australia Volume 2; and
- To determine the level of construction with reference to AS 3959-2009 *Construction of buildings in bushfire prone areas*; and
- To identify any other such measures as to improve the chances of building survival during a bushfire event; and
- To assist the consent authority Hawkesbury City Council in the determination of the rezoning application subject to this proposal.

1.2 Scope of Report

The scope of this report is limited to the Bushfire Hazard Assessment for the proposed development site and only contains recommendations for the subject property. Where reference is made to adjacent or adjoining lands, this report does not purport to assess those lands; rather it may discuss bushfire progression on and through those lands with the possible bushfire impact to the subject property and the proposed rezoning.

1.3 Regulatory Controls

The preparation of this report has given consideration to the various legislative and regulatory requirements including the *Rural Fires Act 1997*, *Environmental Planning and Assessment Act 1979*, the Building Code of Australia, *Planning for Bush Fire Protection* 2006 and AS 3959-2009 *Construction of buildings in bushfire prone areas*.

1.4 Methodology

A site inspection for the purpose of assessing bushfire related matters affecting this site was conducted on the 18th March, 2014 and a review of the proposed Subdivision Plan as supplied and prepared by McKinlay Morgan & Associates Pty Ltd.

An assessment of slope was conducted out to a distance of 100 metres and assessment of vegetation to a distance of 140 metres from the proposed rezoning land.

The findings were related and assessed with reference to *Planning for Bush Fire Protection* 2006 Addendum to Appendix 3 and section 2 of AS 3959-2009 *Construction of buildings in bushfire prone areas* for the formulation of the preliminary bushfire hazard assessment.

1.5 The Proposal

The concept proposal has been identified on the plans supplied and this shows the subject land to be subdivided into 12 individual rural/residential allotments of varying dimensions as depicted upon the subdivision plan supplied by McKinlay Morgan & Associates.

As shown these parcels shall be accessed by a proposed private road for Lots 1, 2, 3, 4, 5, 6, 7 & 8 and Lots 9, 10, 11 & 12 direct from the north western side of Kurmond Road.

Potential building envelopes have been positioned on the plans supplied for each allotment apart from Lot 1 which is to be an association allotment for community estate purposes and usages.

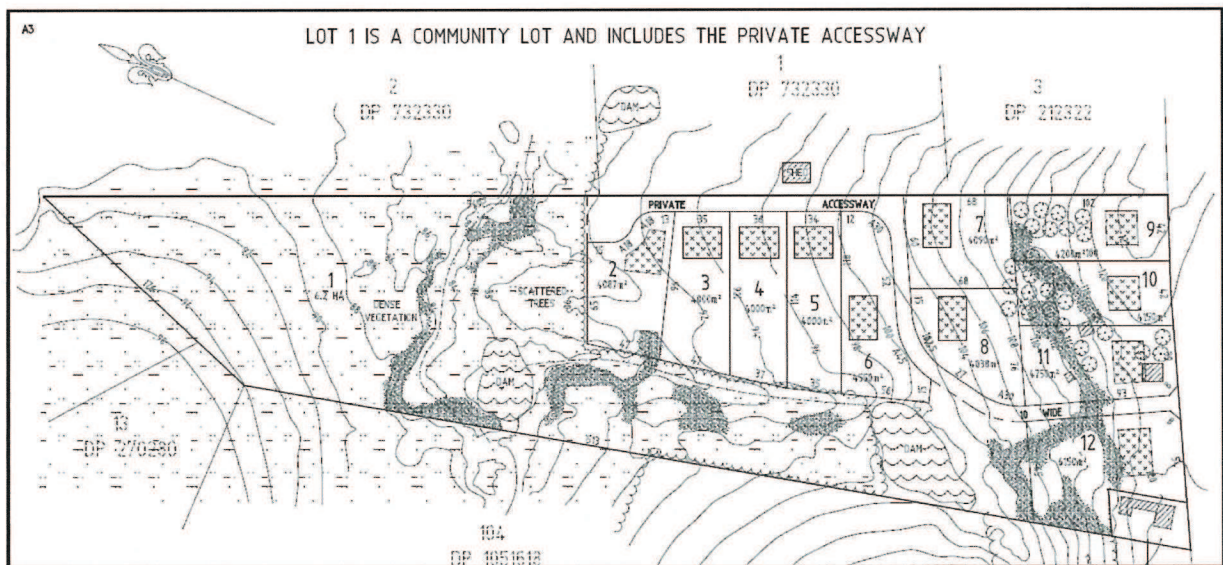


Figure 1; Extract of Proposed Subdivision Plan ex McKinlay Morgan & Associates

2.0 Site and Adjacent Developments

The following seeks to describe the site, the adjoining lands and land uses effective upon the development proposal.

2.1 Site Description

The site is identified as Lot 2 DP 805023
1420 Kurmond Road,
Kurmond. NSW 2757
LGA Hawkesbury City Council

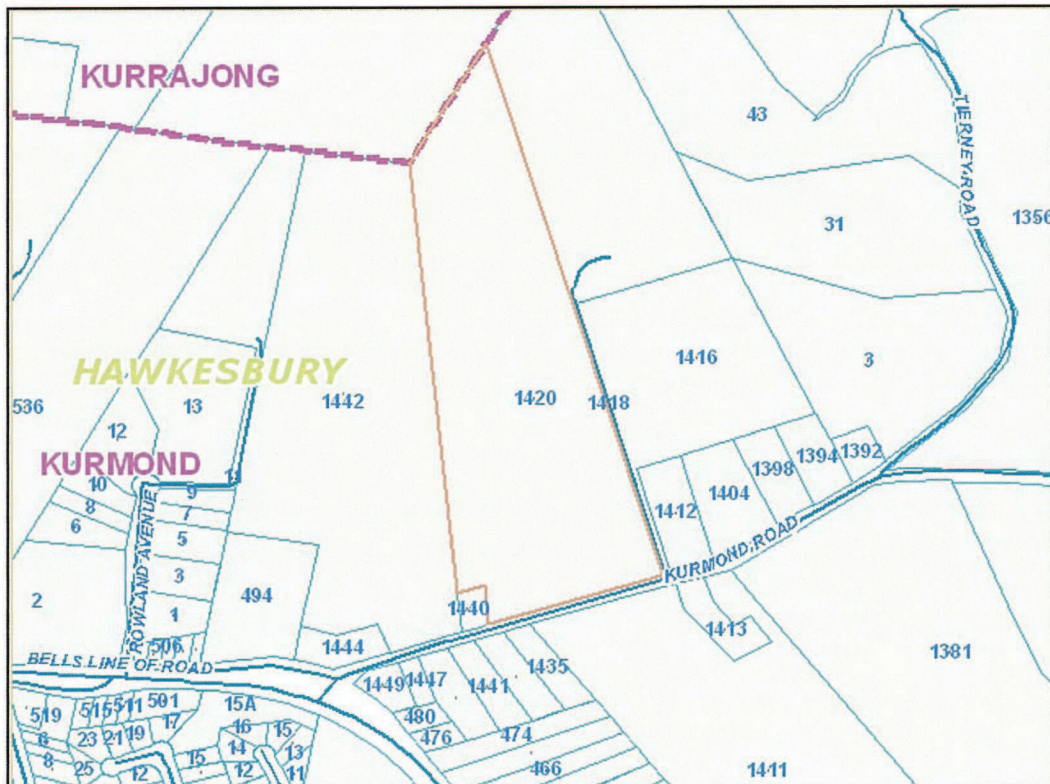


Figure 2: Address validation ex Dept of Lands

The site is at present a rural allotment of approximately 11.0 hectares located on the northern side of Kurmond Road approximately 400 metres to the east of the Kurmond shopping centre.

The area in which the proposal is located is generally rural/residential lifestyle hobby farms that have been established for many years.

Provision of mains reticulated water supply, electricity and phone is available to the proposed area of development from services located within Kurmond Road.

The subject allotment is located within an area that should be considered as having a direct interface to bushfire hazardous vegetation located within the western and central areas of the site and on adjoining lands to the northwest and northeast.

The subject allotment is predominantly located on the northerly aspect slopes above Howes Creek which crosses the allotment from west to east and then a smaller portion (approximately 25%) with a southerly aspect on the gentle slopes to the north of the creek line.

At present the site has a limited number of structural improvements being an existing residential dwelling and Class 10a building (farm shed) on the proposed Lot 2, a Class 10a building (farm shed) on the proposed Lot 3 and an underground residential dwelling on the proposed Lot 5.

In terms of vegetation the overall site can be described as having three quite distinct sections being;

- Approximately 4.5 hectares of open grasslands with scattered shade trees;
- Approximately 4.5 hectares of relatively undisturbed forest vegetation adjacent to Howes Creek and along the south western section of allotment boundary; and
- Approximately 2.5 hectares of relatively recent regrowth vegetation within the northern most section of the subject allotment.

Additionally there are two relatively large dams positioned near the western boundary of the subject allotment. One would be located approximately mid slope on the northerly aspect of the site and within the proposed Lot 9. The second dam is located slightly north of Howes Creek and would be positioned within the proposed Lot 12.



Figure 3; Section Hawkesbury LGA Bushfire Prone Land Map

The site is shown upon the Hawkesbury Bushfire Prone Land Map (Figure 2) to be wholly within category 1 vegetation (shown orange).

However the site inspection and interpretation of aerial photography for the allotment confirms that the area of category 1 vegetation is significantly overstated and this vegetation is actually limited to the northern extent of the allotment and an area adjacent to the western boundary. The southeast section of the subject allotment would also be more accurately depicted as being category 2 vegetation over the area of grasslands previously noted.

2.2 Description of Adjoining Lands

The lands to the north of the subject allotment are open grasslands with scattered shade trees.

Adjacent to the eastern boundary of the subject allotment is a combination of modified forest and open grassland paddocks.

The areas of modified forest are located beside the northern and southern most sections of the eastern subject allotment boundary. These areas are highly disturbed with a notable absence of shrub layer or elevated fuel layer. These sections would be quite close in structure to an outer protection area (OPA) of an asset protection zone albeit that some sections of tree canopy would exceed OPA requirements.

Within these above noted sections of adjacent lands are residential dwellings and other Class 10a buildings.

The grasslands are located to be over the central most section of the neighbouring lands adjacent to the eastern boundary.

It must also be noted that adjacent to a large section of the subject allotment is an existing all-weather driveway which currently provides access to the adjoining allotments to the northeast of the subject allotment.

To the south of the subject allotment is the carriageway of Kurmond Road. Beyond this is a combination of open grasslands and rural residential allotments. Some the rural residential allotments may not have areas around the individual dwellings fully compliant with the provisions for an asset protection zone as required by *Planning for Bush Fire Protection* 2006 in terms of vegetation management. However the actual separation distances would appear to have little (if any) implications for the proposed new allotments subject of this report.

To the west of the subject allotment is again a combination of relatively small sections of forest together with an area of open grasslands.

The first section of forest vegetation is located within a topographical drainage feature adjacent to the south west section of the allotment boundary. The second section is slightly larger and is located against the northwest section of the allotment boundary. This area is located on either side of Howes Creek and is contiguous with the forest previously noted to be on the subject allotment.

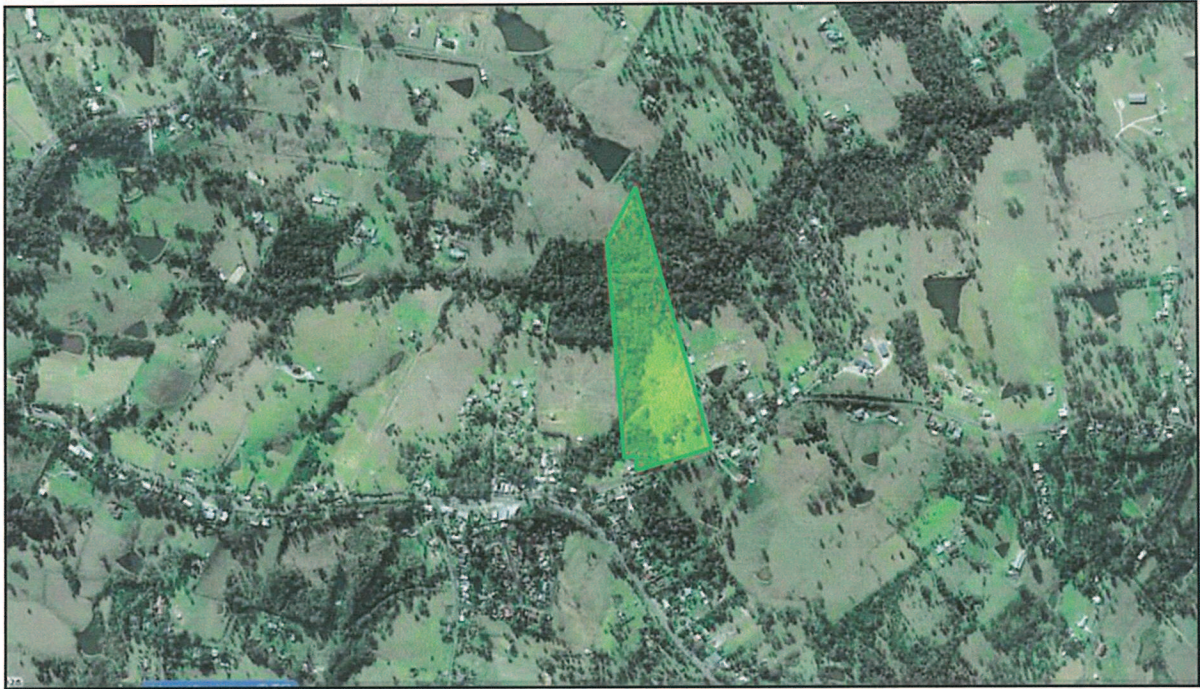


Figure 3: Aerial photo depicting localised terrain and adjoining allotments

3.0 Environmental Considerations

The scope of this report has not been to provide an environmental survey.

However the establishment of asset protection zones requires consideration if there is potential to require the removal of standing vegetation.

It would appear from this initial analysis that for the building envelopes proposed on the allotments the requirement for an asset protection zone will be achieved by mowing of grasslands and that the removal of standing vegetation is not required.

In regards to other environmental matters of required consideration arising from Clause 44 of the *Rural Fires Regulation* 2006 being threatened flora and fauna, and location of Aboriginal relic these would be clearly studied in more detail by others subsequent to a successful rezoning application and as a component of a future development application.

4.0 Bushfire Hazard Assessment

The bushfire hazard assessment was conducted for the proposed development, using the procedures as outlined in *Planning for Bush Fire Protection 2006*, Addendum to Appendix 3 and section 2 of AS 3959-2009 *Construction of buildings in bushfire prone areas* procedure to determine the bushfire attack level (BAL) likely upon the development.

The assessment was conducted on the assumption of the allotments being positioned as described in section 1.5 The Proposal of this report and the site plan.

4.1 Classification of Vegetation

The vegetation was assessed for a distance of 140 metres from the proposed development in each of the following directions. To the northwest, northeast, southeast and southwest being the general direction adjacent and away from the proposed development site.

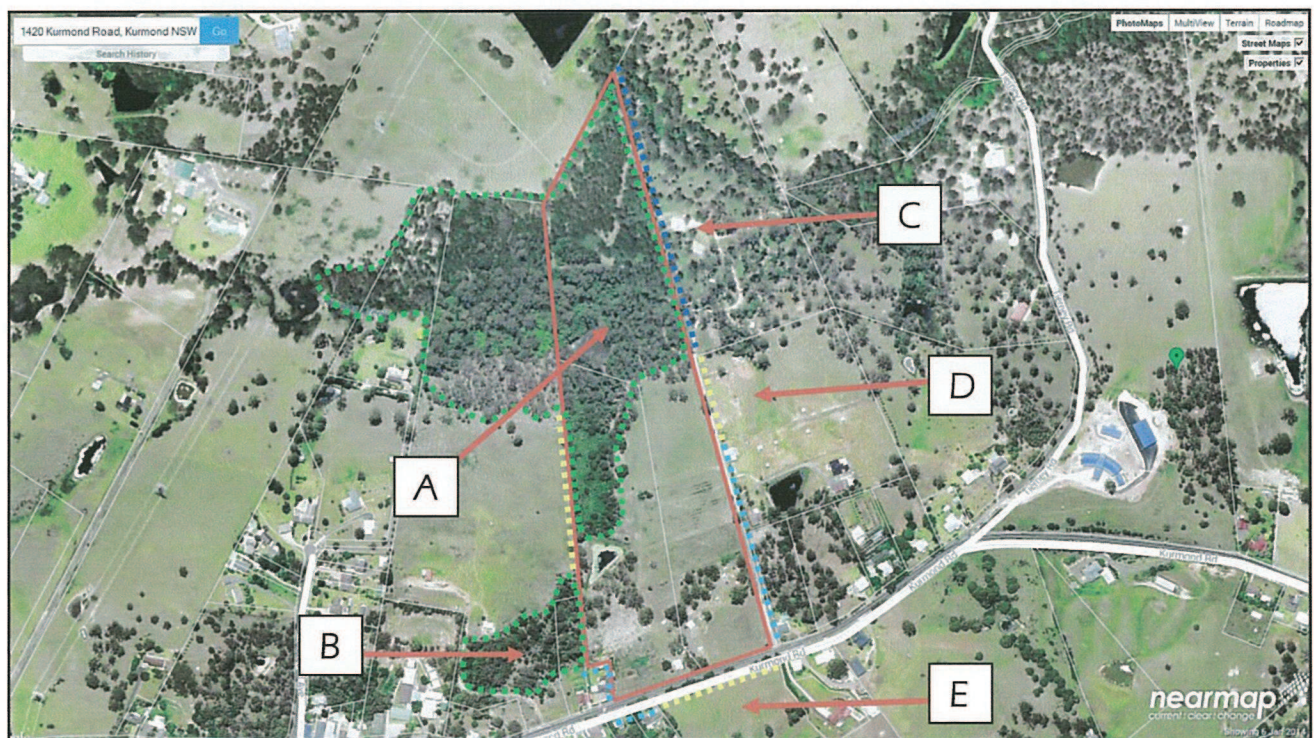


Figure 4: Vegetation study area

Developed lands Grassland Forest Modified Forest

For purposes of this assessment the areas of bushfire hazardous vegetation of influence on any potential building envelopes have been identified on the above image and are summarised as;

Area A is of greatest influence being a substantial area of forest vegetation which is located both within the subject allotment and also on the adjoining allotment to the west.

Area B is an occluded section of forest vegetation entirely on the adjoining allotment to the west of the subject allotment.

Area C is a heavily modified section of forest vegetation which no is more relative to a Woodland vegetation in composition and structure. The understorey is totally managed although there is still some connectivity of tree canopy.

Area D & Area E are both grazing grasslands.

The separation distance as required for the provisions of asset protection zones are detailed within section 4.3 of this report.

4.2 Slope Assessment

The slope was assessed for a distance of 100 meters within the bushfire hazardous vegetation and reference to slope classifications has been undertaken considering the procedure specified within appendix 2 of *Planning for Bush Fire Protection* 2006.

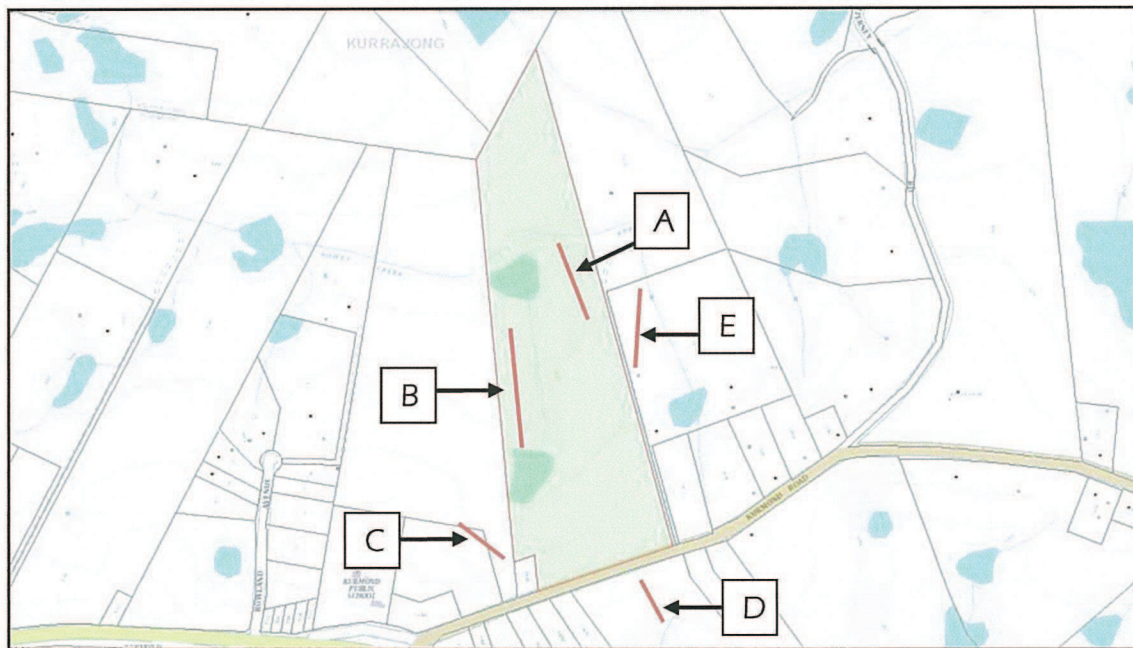


Figure 5; Slope assessment study area Image ex Dept Lands

The **effective slope** of the land, out to a distance of 100 metres from the proposed scope of works (that is, the slope of the land most likely to influence bushfire behaviour for the purposes of calculating the Category of Bushfire Attack and Asset Protection Zones), has been assessed (using a clinometer) and desktop analysis as being;

- Downslope > 0 to 5 degrees– A (Forest)
- Downslope > 5 to 10 degrees – B (Forest)
- Downslope > 0 to 5 degrees – C (Forest)
- Downslope > 10 to 15 degrees – D (Grassland)
- Downslope > 0 to 5 degrees – E (Grassland)

For the areas of grassland vegetation the slope ranges from 0 to 15 degrees downslope however the requirements of *Planning for Bush Fire Protection* 2006 do not alter over the differing slope ranges.

However it should be noted that at the time of actual construction the requirements for slope consideration for grasslands will apply by the provisions of AS 3959-2009 *Construction of buildings in bushfire prone areas*.

4.3 Category of Bushfire Attack

The bushfire attack level (BAL) for the proposed development was determined by using the information gathered with respect to the separation distances, the classification of the vegetation, the effective slope and provision of asset protection zones specified in this report.

The required separation distances nominated below have been determined by reference to Appendix 2 Table A2.4 of *Planning for Bush Fire Protection* 2006 – Minimum Specifications for Asset Protection Zones for Residential and Rural Residential Subdivision Purposes (for Class 1 and 2 buildings) in Fire Danger Index (FDI) 100 Fire Areas to achieve less than 29kW/m² radiant heat exposure on any building element.

This maximum permissible level of radiant heat exposure is a baseline requirement of the NSW Rural Fire Service within the subdivision approval process. It is also referred to within AS 3959-2009 *Construction of buildings in bushfire prone area* as Bushfire Attack Level (BAL) 29.

For the allotments being effected by the grassland hazard *Planning for Bushfire Protection* 2006 only requires that 10 metres is provided in form of separation irrespective of slope.

Within the brackets and shown as red is the actual achievable separation distances determined by reference to the proposed subdivision plan.

Proposed Allotment	Required Separation and achievable separation shown in red
Lot 1	Not required – association lands
Lot 2	25 m to north (25), 35m to west (50) & 10m to east (11)
Lot 3	25 m to north (60), 35m to west (67) & 10m to east (10)
Lot 4	25 m to north (100), 35m to west (68) & 10m to east (10)
Lot 5	25 m to north (130), 35m to west (85) & 10m to east (10)
Lot 6	35m to northwest (35) & 10m to northeast (85)
Lot 7	35m to northwest (105) & 10 m to northeast (90)
Lot 8	35m to northwest (60) & 10 m to northeast (110)
Lot 9	35m to northwest (180) & 10 m to south (35)
Lot 10	35m to northwest (165) & 10 m to south (35)
Lot 11	35m to the north (165), 25m to the west (95) & 10m to south (35)
Lot 12	35m to the north (150), 25m to the west (38) & 10m to south (35)

Clearly the Subdivision Plan supplied for perusal within the context of formulating this report, shows that these minimum separation distances are quite easily achieved and satisfy the requirements of *Planning for Bush Fire Protection* 2006 appendix 2.

5.0 Assessment of the extent to which the development potentially conforms or deviates from Chapter 4 of *Planning for Bush Fire Protection 2006*

5.1 Asset Protection Zones

The provision of asset protection zones for any future subdivision, subsequent to a rezoning, must be fully provided for onsite to satisfy the requirements of *Planning for Bush Fire Protection 2006*.

The maintenance of some areas upon the subject allotment currently would mostly satisfy the requirements of an inner protection area of an asset protection zone as contained in *Planning for Bush Fire Protection 2006*.

A report formulated for the purposes of subdivision will recommend that the sections of the site where not built upon is maintained to the requirements of an inner protection area and outer protection area of an asset protection zone and managed to these provisions for the lifetime of the development.

As previously noted the subdivision plan does adequately allow for sufficient separation distance (that can be managed as an asset protection zone) for the development site.

The proposed allotments must maintain an asset protection zone from areas of forest of either 35 metres or 25 metres dependant on the relative slope and from any areas of grassland 10 metres irrespective of slope to satisfy *Planning for Bushfire Protection 2006*.

In most cases the likely building footprint locations would actually exceed the required separation distances and areas of possible asset protection zones.

The site inspection undertaken for the purposes of the rezoning application noted the site is primarily dominated by grassland vegetation which by mowing will easily satisfy the provisions for an asset protection zone and that no reduction of the forest area will be proposed.

The following is a summary of the requirements for an asset protection zone inner protection area as described within the documents *Planning for Bush Fire Protection 2006* and NSW RFS *Standards for Asset Protection Zones*.

Inner Protection Area

An IPA should provide a tree canopy cover of less than 15% and the tree canopy should be located greater than 2.0 metres from any part of the roof line of a dwelling. Garden beds of flammable shrubs should not be located under trees and should be located not closer than 10 metres from an exposed window or door. Trees should have lower limbs removed up to a height of 2.0 metres above the ground.

Ground fuels such as fallen leaves, twigs (less than 6mm in diameter) and branches should be removed on a regular basis, and grass needs to be kept closely mown and where possible green.

Outer Protection Areas

An OPA should provide a tree canopy cover of less than 30% and should have understorey managed (mown) to treat all shrubs and grasses on at least an annual basis and in advance of the fire season (usually September).

The creation and continued maintenance of the full asset protection zone is one of the primary factors in bushfire protection measures for developments in bushfire prone areas.

5.3 Construction Level

The Building Code of Australia contains both the performance requirements and the 'deemed to satisfy' provisions relating to construction of class 1, 2 & 3 buildings that are proposed for *construction in bushfire prone areas*. To satisfy the performance provision P2.3.4 of the Building Code of Australia Vol. 2, a Class 1a building that is constructed in a designated bushfire prone area must be designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes.

Australian Standard 3959-2009 *Construction of buildings in bushfire prone areas* is referenced by the BCA as the deemed to satisfy construction standard for residential dwellings in designated bushfire prone areas with the exception that the requirements shall be varied to comply with the Addendum to Appendix 3 of *Planning for Bushfire Protection 2006*.

As noted previously any construction of dwellings or proposed buildings footprints must not be exposed to greater than BAL 29 and this should be easily achieved within the context of the Concept Layout Plan.

5.4 Access / Egress

5.4.1 To the Proposed Development

The access to the subject site is from Kurmond Road which is a sealed two lane road in a well maintained condition and under most conditions should provide adequate access and egress for both residents and emergency service vehicles.

Kurmond Road links to other through roads which would afford the residents the ability to evacuate the area to a location not being directly implicated by the mechanisms of bushfire attack, although under most bushfire or grassfire conditions this would generally not be required.

5.4.2 Within the Site

The subdivision plan for the subject allotment shows for the construction of a private road system to service the proposed Lots 2 to 8. For Lots 9 to 12 direct access from Kurmond Road is provided.

The acceptable solutions contained within *Planning for Bush Fire Protection 2006* states that a public road shall be provided where access is required for more than 3 individual parcels.

Therefore in terms of the detail shown on the proposed subdivision plan there is a need to enter into consultation with the consent authorities to determine the

ultimate requirement for access although this should not impede the approval of the Rezoning Application and such detail could be conditioned at the time of development application.

Whilst road construction details have not been shown it is envisaged that compliance to relevant section of *Planning for Bush Fire Protection 2006* Access (1) Public Roads can be easily achieved and the site conditions would not constrain the provision for access by either methodology.

5.5 Utility Supplies

5.5.1 Water

This section of Kurradjong is serviced by a mains reticulated water system and the site inspection noted that this system is within the carriageway of Bells Line of Road.

The provisions of *Planning for Bush Fire Protection 2006* will require that if the mains water is integrated within any future development it should be undertaken to satisfy AS 2419 – 2005 *Fire hydrant installations*.

If mains reticulated water to that specification is not achieved individual Static Water Supplies (SWS) will need to be provided at individual residences at the time of future development.

5.5.2 Electricity

Mains electricity supply is currently located within the carriageway of Kurmond Road and it is envisaged that this service would be extended to supply the proposed allotments.

The preferred methodology for the connection of electricity is by underground cabling as stated within *Planning for Bush Fire Protection 2006*.

5.5.3 Gas

At the time of report preparation it was not proposed to connect gas supply to the subject allotments. However any future connection to either mains or portable gas supply should be undertaken and maintained to the provisions of AS 1596-2002 *Storage and handling of LP Gas*. All piping associated with the installation must be metal.

5.6 Landscaping

A formal landscaping plan was not supplied for perusal at the time of formulating this report however this must be undertaken to satisfy Appendix 5 of *Planning for Bushfire Protection 2006*.

6.0 Conclusion

After consideration of the aims and objectives of *Planning for Bush Fire Protection* 2006 in the context of the Rezoning Application and the Concept Layout Plan for future development of the subject allotment it is my professional opinion that the provisions of bushfire regulatory requirements could be achieved and that the consent authorities would be likely to approve the indicated development.



Craig Burley

Grad.Dip. Building in Bushfire Prone Areas (UWS)
FPA Australia Certified BPAD-A Practitioner

Caveat

Quote from *Planning for Bush Fire Protection* 2006, '*notwithstanding the precautions adopted, it should always be remembered that bushfire burn under a wide range of conditions and an element of risk, no matter how small always remains.*'

Quote from Standards Australia, '*Although the standard is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion.*'

References

Planning for Bush Fire Protection 2006 Planning NSW in conjunction with NSW Rural Fire Service

Building Code of Australia Volume 2 2005 Australian Building Codes Board

AS 3959 –2009 Construction of buildings in bushfire prone areas Standards Australia & Australian Building Codes Board

Landscape and building Design for Bushfire Areas Ramsay C. & Rudolph L. CSIRO 2003

Quantifying bushfire penetration into urban areas in Australia Keping Chan & McNery J. Geophysical Research Letters, Volume 31, L12212, doi:10.1029/2004GL020244,2004

Bushfires in Australia Luke R.H. & McArthur CSIRO 1978

Performance of Building Elements in Bushfire Prone Areas Poon S.L. & England J.P. Warrington Fire Research Australia

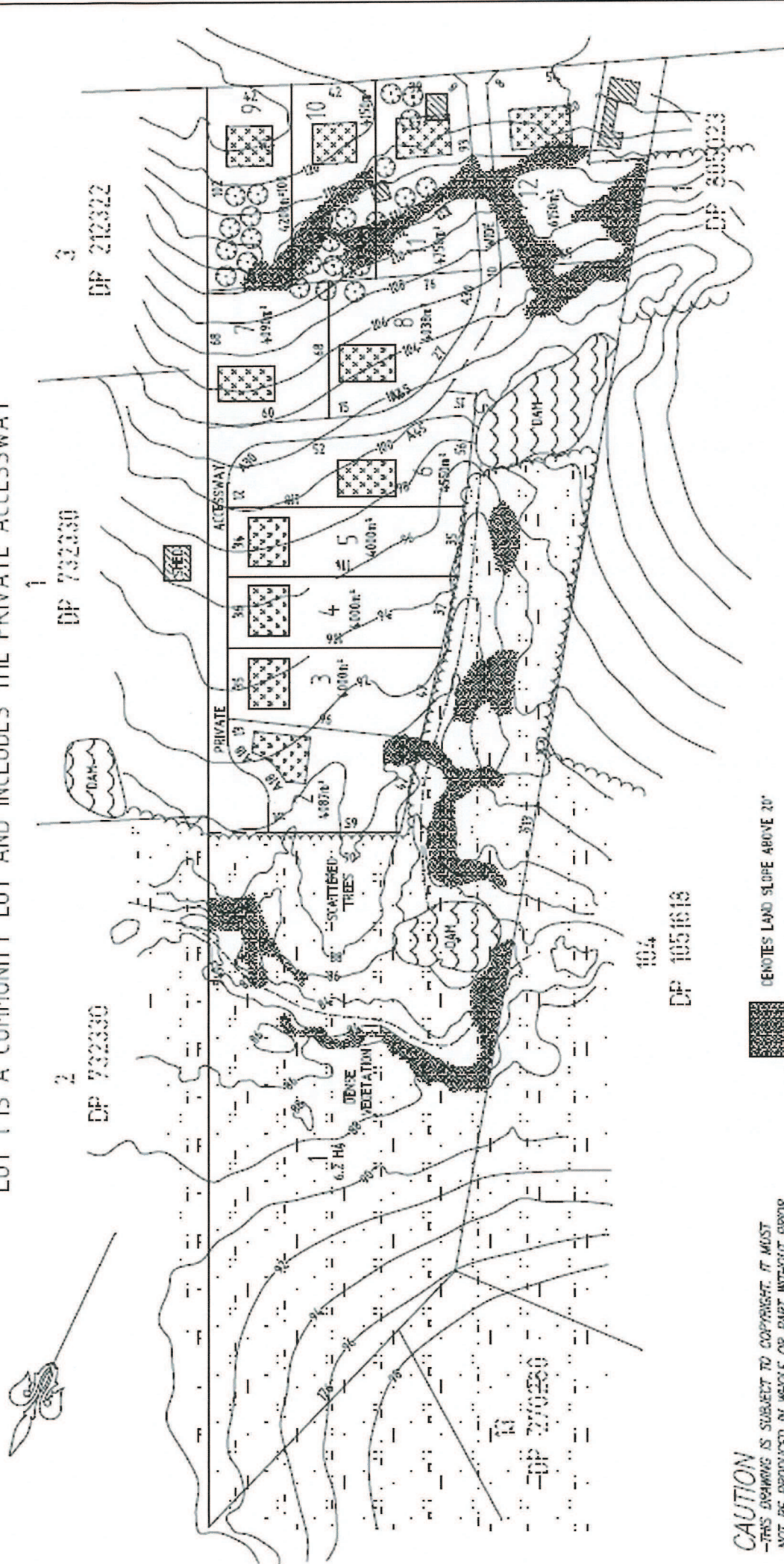
Address Validation Search Department of Lands www.maps.nsw.gov.au

Standards for Asset Protection Zones NSW Rural Fire Service 2005

Ocean Shores to Dessert Dunes Keith D. Department of Environment and Conservation Sydney 2004

Appendix 1 – Subdivision Plan ex McKinlay Morgan & Associates

LOT 1 IS A COMMUNITY LOT AND INCLUDES THE PRIVATE ACCESSWAY



CAUTION

- THIS DRAWING IS SUBJECT TO COPYRIGHT. IT MUST NOT BE PRODUCED IN WHOLE OR PART WITHOUT PRIOR WRITTEN CONSENT OF MCKINLAY MORGAN & ASSOCIATES
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- CONTOURS SHOWN HAVE BEEN DIGITISED FROM TOPOGRAPHIC MAPPING & ARE INDICATIVE ONLY
- THIS PLAN IS FOR DEVELOPMENT APPLICATION PURPOSES ONLY.

■ DENOTES LAND SLOPE ABOVE 20°

--- DENOTES VEGETATION FROM AERIAL PHOTOGRAPHY

■ DENOTES POTENTIAL DWELLING SITE MIN 500m²



MCKINLAY MORGAN & ASSOCIATES Pty Ltd.

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REGISTRATION NO: 40 430 000

NOTES: INTERNAL TO
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