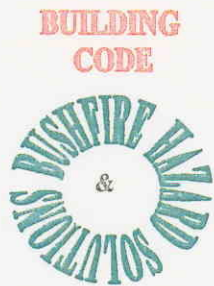


APPENDIX C

PRELIMINARY BUSHFIRE HAZARD ASSESSMENT



Building Code & Bushfire Hazard Solutions

(Pty. Limited) ABN 19057 337 774

PO Box 124 Berowra, NSW 2081

Telephone: 61 02 9456.2288 Facsimile: 61 02 9456.2277

Email: wayne_tucker@zemail.com.au

PLANET WARRIEWOOD
C/o Glendinning Minto and Associates
PO Box 225
Thornleigh NSW 2120

16th December 2005
Our Ref. 60189

Attention: Mr. Andrew Minto,

**Re: INTEGRATED RESIDENTIAL DEVELOPMENT
Lot 1 DP 383009 & Lots 3, 4, 5 DP 124602
BUSHFIRE HAZARD ASSESSMENT PRELIMINARY COMMENT**

We thank you for the opportunity of undertaking this assessment for you.


Properties considered to be affected by possible bushfire impact are determined from the local Bushfire Prone Lands Map as prepared by Council and or the Rural Fire Service that identify properties which contain designated Vegetation Category 1 or 2 or buffer zones associated with those Categories. All property development within affected areas are subject to the conditions detailed in the legislated document 'Planning for Bushfire Protection - 2001' (*PfBP*). Set back distances for the purpose of creating Asset Protection Zones (APZ's) may be required and any buildings must then conform to corresponding constructional requirements detailed in Australian Standard 3959 - 1999 'Construction of buildings in bushfire prone areas'.

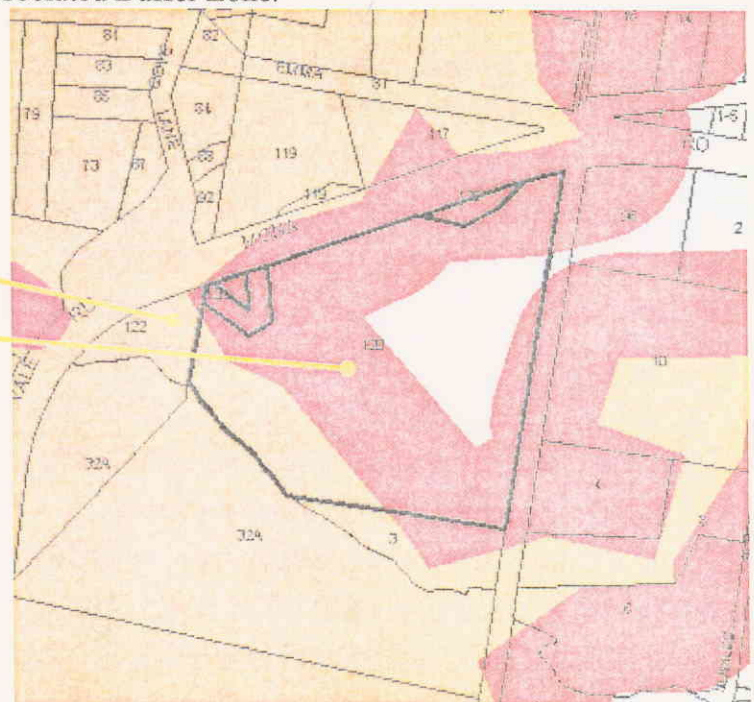
In this instance the subject property is depicted on Councils Bushfire Prone Land Map as containing Category 1 Bushfire Prone Vegetation and its associated Buffer Zone.

Extract from Pittwater
Councils Bushfire
Prone Lands Map.

Subject
property

LEGEND

-  Vegetation Category 1
-  Vegetation Category 2
-  Bush Fire Vegetation Buffer
(100m Category 1)
(30m Category 2)



We understand that the proposal is to rezone the land for residential purposes and will **not** be subject to State Environmental Planning Policy (Seniors Living) 2004. The allotment borders Mona Vale Road to the North and Boundary Road to the East. A private residential property is adjacent part of the southern boundary and Warriewood Escarpment adjoins the remaining boundaries. The vegetation within Warriewood Escarpment and along Narrabeen Creek within the property was identified on site as being the potential bushfire source in this instance.

ASSET PROTECTION ZONES:

The average slope within any hazard and the type of vegetation determine the extent of Asset Protection Zones. The limiting factor will be that the Rural Fire Service does not support Asset Protection Zones on gradients greater than 18 degrees.

In this instance it is difficult to determine the interpretation of slope analysis that will be implied by the assessing officer at the Rural Fire Service. If we were to average the slope for 100 metres (strictly as per P/BP A2.3.3 Paragraph 1) from the ridge line the calculation would indeed indicate that the hazard was greater than 5 degrees upslope. This methodology ignores the 40 metres of vegetation along the slope down to Narrabeen Creek. If we were to assume that the slope for the first 40 metres was that that mostly influences a fires behavior (as per P/BP A2.3.3 Paragraph 2) then a 70 metre Asset Protection Zone would be required. This methodology ignores the short period the fire is traveling upslope and the fact that the majority of the hazard is upslope further west. In our analysis we have therefore assumed that a compromise between the two can put forward as part of any future DA and we recommend the creation of a 40 metre Asset Protection Zones along/from the ridge line and 20 metre Asset Protection Zones along the flanks of the ridge in the southern portion of the property.

Attachment 01 depicts the size and location of the Asset Protection Zones in green.

The requirements of any APZ that will apply to this development will depend heavily on any environmental constraints that may affect the extent to which clearing or management of the vegetation within the property can be undertaken. Should the vegetation within the property be reduced and or the ground fuels managed or removed then the requirements for APZ's could be reduced. If a geotechnical expert can provide supportive evidence that the ground fuels beyond the ridge line (on slopes greater than 18 degrees) can be removed and the area under scrubbed, and if a perimeter fire trail can be constructed below the ridgeline to enable access to this area for future management, then we feel that there may be cause to reduce the proposed Asset Protection Zones. The limiting factor will then be the location of a riparian zone associated with Narrabeen Creek. It is our experience that a 20 metre riparian zone may be enforced in this situation; however this will need to be confirmed with an ecologist and Council as the DA proceeds. Assuming a 20 metre riparian corridor then there will be 20 metres of fuel reduced area between the creek and the ridge line. This area could be considered an "Outer Protection Area" and may enable a reduction of the Asset Protection Zones to 20 metres.

Attachment 02 depicts the size and location of the Asset Protection Zones in green based upon these assumptions.

If, however, environmental constraints such as location of protected species (flora or fauna), larger riparian creek corridors, location of Aboriginal relics, or geotechnical issues due to gradients greater than 18 degrees prohibit vegetation management and or the under scrubbing of the area beyond the ridgeline then any development would be restricted to beyond 40 metres of the ridge line above Narrabeen Creek as detailed in attachment 01.

External to the site and north across Mona Vale Road is another area of forest that is mapped as bushfire prone land and the creation of Asset Protection Zones from this area is also warranted. These APZ would be 20 metres and can include the formed portion of Mona Vale Road and the cleared verge (NB. only 1 clear verge will exist for most of its length on the subject property side of Mona Vale Road). This area totals approximately 15 metres and therefore a 5 metre setback within the allotment along the length of Mona Vale Road is required.

CONSTRUCTIONAL REQUIREMENTS:

The minimum required APZ's determined from Table A2.2 are based upon the need to conform to Level 3 construction. Where the minimum APZ can be exceeded then the category of bushfire impact and the resultant construction Level can be determined from Table A3.3. In this instance and based upon Attachment 01 with 40 metre Asset Protection Zones the following will apply:

- The first row of dwellings adjacent or with direct line of sight to the ridgeline and Mona Vale Road will require Level 3 construction as detailed in AS3959 – 1999.
- Any other dwelling within 80 metres of the ridgeline or 50 metres from Mona Vale Road will require Level 2 construction as detailed in AS3959 – 1999.
- Any dwelling within 80 metres of Mona Vale Road will require Level 1 construction as detailed in AS3959 – 1999.

An abridged list of these construction considerations is attached to this statement. This detail is not critical during the rezoning process and can be addressed when a DA to construct the dwelling is put to Council. We will overlay the areas and construction levels on a plan for submission to Council in our report.

ACCESS PROVISIONS:

Planning for Bushfire Protection also addresses design considerations for access roads for properties determined to be bushfire prone. These restrictions are applicable to properties where the hazard is within or immediately adjacent to the development site.

As the hazard is within the subject property then access roads providing access to more than 4 dwellings should comply with the requirements for Public Roads and all other internal roads with the requirements for Property Access Roads as detailed within section 4.3 P/BP.

The RFS are currently in the process of reviewing these requirements and it is likely that main access roads can be reduced to 5.5 metre internal road infrastructure with passing bays and hardstand areas adjacent the hazard interface for parking fire fighting vehicles. Turning areas should be provided for and dead end roads should be minimised. At the minimum a perimeter road along the hazard interface will be required.

Although we have submitted repeated requests to the RFS for a detailed description of their current assessment process for access provisions they have not as yet released a list of their amended requirements. We have been informed that the release of this information is expected in the near future and will forward this to you as soon as it becomes available. The following lists are for the current information available only.

Public Roads (Providing access to more than 4 dwellings)

- Roads should be two-wheel drive, all weather roads;
- Roads should be two-way, that is, at least two traffic lane widths (8m minimum) with shoulders on each side, allowing traffic to pass in opposite directions;
- The perimeter road should be linked to the internal road system at an interval of no greater than 500 metres in urban areas;
- Restrict the use speed humps and chicanes to control traffic;
- Roads should be **through** roads. Dead end roads are not recommended, but if unavoidable, dead ends should be not more than 200m in length, incorporate a minimum 12m radius turning circle, and should be clearly sign posted as dead ends;
- The capacity of road surfaces and bridges should be sufficient to carry fully loaded firefighting vehicles (approximately 28 tonnes or 9 tonnes per axle);
- Curves should have a minimum inner radius of 6m and be minimal in number to allow for rapid access and escape;
- The minimum distance between inner and outer curves should be 6m;
- Maximum grades should not exceed 15° and preferably not more than 10° or gradient specified by road design standards, whichever is the lesser gradient;
- There must be a minimum vertical clearance to a height of 6 metres above the road at all times;
- Roads should provide sufficient width to allow firefighting vehicle crews to work with firefighting equipment about the vehicle.
- Roads should be clearly sign-posted (with easily distinguished names) and buildings should be clearly numbered. Bridges should clearly indicate load rating;
- Roads should have a minimum total reserve width of 20m where they are a perimeter road as defined in section 4.2.2(c) of this document; and
- Roads should not traverse through a wetland or other land potentially subject to periodic inundation

Property Access Roads (and other internal roads)

- A minimum trafficable width of 4m with an additional 1m wide strip on each side of the road kept clear of bushes and long grass.
- The road should have a passing bay about every 200m where possible, which should be 20m long by 3m wide, making a minimum trafficable width of 7m at the passing bay.
- The capacity of road surfaces and bridges should be sufficient to carry fully loaded firefighting vehicles (approximately 28 tonnes or 9 tonnes per axle).
- A minimum vertical clearance of 6m to any overhanging obstructions, including tree branches.
- Curves should have a minimum inner radius of 6m and be minimal in number to allow for rapid access and escape.
- The minimum distance between inner and outer curves should be 6m.
- Maximum grades should not exceed 15° and preferably not more than 10°.
- Roads should provide sufficient width to allow firefighting vehicle crews to work with firefighting equipment about the vehicle.
- Dwellings not sited within 200m of the road system should have an alternative access road providing emergency egress to the through road system; and
- Roads should be clearly sign-posted. Bridges should clearly indicate load rating.

Fire Trails

- Where a fire trail forms part of the Inner Protection Area it must be constructed to the specifications outlined in section 4.2.2(c) property access roads.
- A minimum trafficable width of 4m with an additional 1m wide strip on each side of the road kept clear of bushes and long grass.
- A maximum grade of 15°.
- A minimum clearance of 6m to any overhanging obstructions, including tree branches.
- The road should have the capacity for passing either by:
 1. reversing bays using the access to properties to reverse fire tankers, which are 6m wide and 8m deep to any gates with an inner minimum radius of 6 m and outer minimum radius of 12m; and/or
 2. a passing bay about every 200m, which is 20m long by 3m wide, making a minimum trafficable width of 7m at the passing bay.
- Appropriate drainage and erosion controls;
- A fire trail system which is connected to the property access road and/or to the through road system at frequent intervals;
- Must be maintained in a serviceable condition by the owner of the land;
- Fire trails should not traverse through a wetlands or other land potentially subject to periodic inundation;
- Must be trafficable under all weather conditions; and
- Trail should be inspected annually by authorities.

At the time of subdivision, if fire trails are part of the development then the fire trails should be under council administration to ensure that maintenance occurs. From time to time this may not be possible in which case they can occur as easements and rights of way over private land.

SERVICES:

Hydrants will be required to be installed throughout the property as part of the supply of services to the site. The installation of hydrants should be in accordance with AS2419. All hydrants must be installed on the pavement side of a road and not in the roadway. Your hydraulic engineer should consider these requirements as part of the future design.

MOVING FORWARD:

In summary it is important for an environmental investigation of this site to be undertaken prior to any definitive requirements on Asset Protection Zones being made along the ridge line. This assessment must be considered along with geotechnical issues and the extent to which cut and fill or management of the area north of the ridge line can occur. Some relaxation of the APZ depicted on Attachment 01 may be applicable to this aspect.

It may be beneficial to undertake pre-lodgment negotiations with the RFS regarding the assessment methodology of slope analysis across Narrabeen Creek as the required APZ are based upon this slope determination. Without an active DA it is difficult to undertake these negotiations however we can pursue this avenue if considered necessary.

Any future survey work should include an accurate marking of the ridge line to enable accurate plotting of the APZ's. We could meet on site with necessary parties and highlight points of interest if necessary. Alternately we could overlay a GPS plot of the ridgeline onto the existing plan using standard GPS equipment and OzeExplore mapping Software and we can provide you with a costing to complete this work if requested. It must be remembered that this technique, while relatively accurate and proven useful in the past, is not as accurate as experienced surveyors work.

CONCLUSION:

Residential development within the property is possible and can comply with the legislated requirements of Planning for Bushfire Protection – 2001 with respect to bushfire mitigation matters. The application for rezoning to allow resident use should therefore receive concurrence from the NSW Rural Fire Service.

Should you have any further questions regarding this project at this stage please do not hesitate to contact myself at this office.

Yours faithfully,
Building Code & Bushfire Hazard Solutions P/L

Wayne Tucker

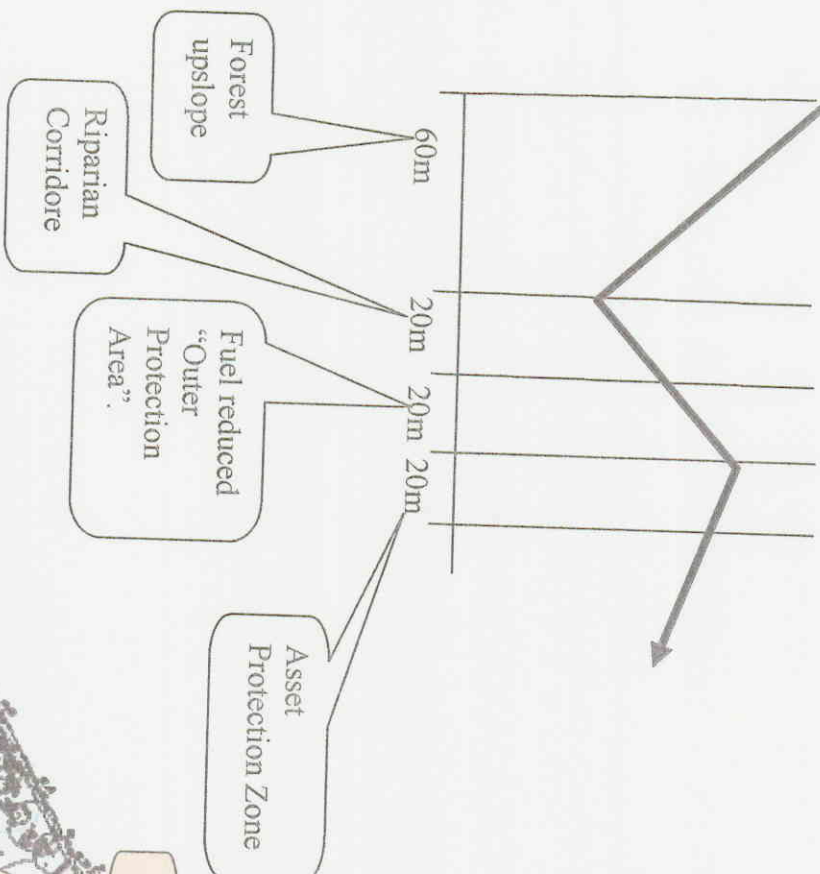
Wayne Tucker for

David McMonnies M. I. Fire E; M Cons Mgt.
C: 60189 Warriewood residential subdivision – Comment

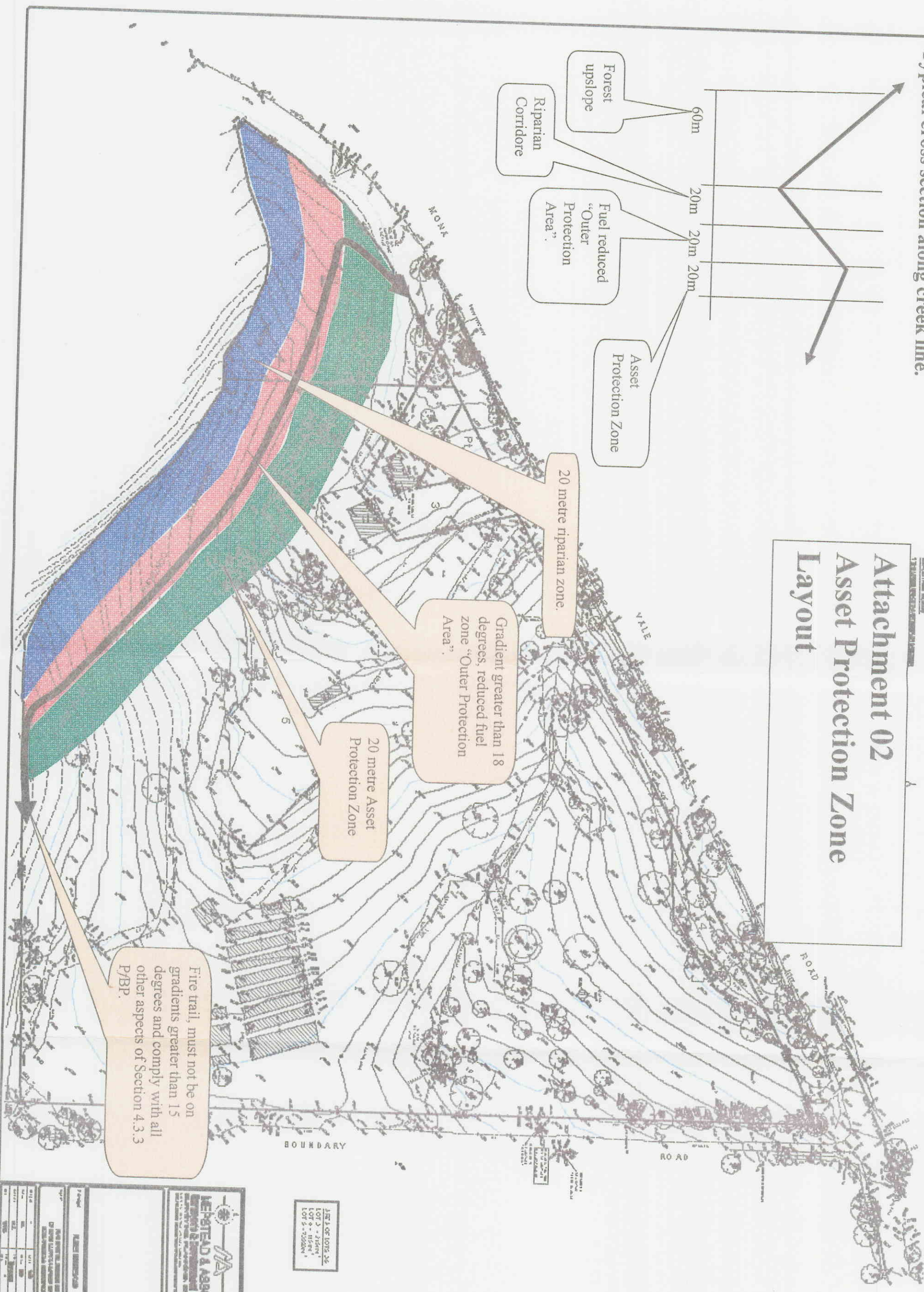
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Typical cross section along creek line.



Attachment 02 Asset Protection Zone Layout



LOT 1 OF LOTS 2/5
LOT 2 - 214m²
LOT 3 - 115m²
LOT 4 - 115m²
LOT 5 - 115m²

NEPTHEAD & ASSOCIATES
SURVEYORS & ENVIRONMENTAL CONSULTANTS
100/102 WILSON STREET, WILSONS CREEK, VIC 3086
TEL: 03 9477 1111
WWW.NEPTHEAD.COM.AU

PROJECT INFORMATION

Client	WILSONS CREEK
Project Name	WILSONS CREEK
Project Address	WILSONS CREEK
Project Date	15/01/2020
Project Status	Final

Attachment 03

AS 3959 Construction of Buildings in Bushfire Prone Areas

This is an abridged version of Australian Standard AS 3959 1999 Construction of Buildings in Bush Fire Prone Areas provided on the Rural Fire Services web site. It provides some detail for developments proposed in bushfire prone areas. Please do not use the abridged version alone.

Flooring

Level 1

Concrete slab on ground. Suspended floor: concrete floor framed floor, underside of bearer to be greater than 600mm above finished ground level. Under space where unenclosed all timber flooring, bearers and joists to be fire retardant treated timber.

Level 2

As per Level 1

Level 3

As per Level 1 except where framed floors have a greater clearance than 600mm above finished ground level and are not fully enclosed – all flooring components are to be fire retardant treated timber.

External Walls

Level 1

Masonry, concrete, pise, rammed earth, stabilised earth or; Framed walls have no restriction to cladding materials but must incorporate breather-type sarking having appropriate flammability index or an insulating material conforming to the appropriate Australian Standard.

Where combustible sheeting is less than 400mm from ground, cladding shall be protected with a non-combustible material for no less than 400mm.

Level 2

As per Level 1 except PVC claddings not permitted and all external timber wall cladding shall be fire retardant treated timber.

Level 3

As per Level 2

Windows

Level 1

All openable windows shall be fitted with screens

Level 2

As per Level 1 and in addition – timber windows shall be fire retardant treated timber except where protected by non-combustible shutters. Lead light windows shall be protected by a shutter constructed of non-combustible material or toughened glass.

Level 3

As per Level 2 except windows are to be protected by non-combustible shutters or toughened glass.

External Doors

Level 1

Weather strips or draft excluders to be fitted. Tight fitting door screens to be fitted.

Level 2

As per Level 1 except aluminium mesh shall not be used. Leadlight glassing shall be protected by shutters constructed of non-combustible material or toughened glass.

Level 3

As per Level 2 except that timber doors shall be fire retardant treated or covered with non-combustible material on the exterior or doors shall be protected by shutters of non-combustible material or Doors shall be solid core having a thickness of not less than 35mm.

Roofs

Level 1

Timber shakes or shingles are not permitted. Tiled roofs shall be fully sarked. Sarking shall have a flammability index of no more than 5.

Sheeted roofs shall be fibre cement or metal and all gaps under corrugations or ribs where it meets the fascia/wall shall be sealed or protected by either (a) fully sarking roof or (b) corrosion resistant steel, bronze mesh, profiled metal sheet, neoprene seal, compressed mineral wool or similar material.

The use of (b) cannot be used on roofs with valleys. Rib caps and ridge capping shall be sealed using either rib caps, ridge capping or as per prior clause.

Roof wall junctions shall be sealed by the use of fascias and eaves linings or with non-combustible materials.

Level 2

As per Level 1 except that all roofing shall be non-combustible and sarked.

Level 3

As per Level 2 except that no fibre-reinforced cement or aluminium sheet shall be used.

Roof lights

Level 1

All roof lights and associated shafts shall be sealed with a non-combustible sleeve or lining.

A roof light can be constructed from thermoplastic sheet in a metal frame, but diffuser installed at ceiling level shall be wired or toughened glass in a metal frame.

Vented roof lights shall have corrosion resistant steel or bronze mesh.

Level 2

As per Level 1 except roof light glazing shall be wired glass.

Level 3

As per Level 2.

Eaves

Level 1

Eaves shall be enclosed with all fascia or gaps between rafters being sealed.

Level 2

As per Level 1 except all timber eaves lining and joining strips shall be fire retardant-treated timber.

Level 3

As per Level 2 except that aluminium shall not be used.

Fascias

Level 1

No special requirement

Level 2

All material must be either non-combustible or fire-retardant treated timber.

Level 3

As per Level 2 except that no fibre-reinforced cement or aluminium sheet shall be used.

Gutters and Downpipes

Level 1

All leaf guards must have a flammability index no greater than 5 (AS1503.2)

Level 2

As per Level 1

Level 3

As per Level 1

Verandas and Decks

Level 1

Slab-reinforced concrete suspended slab floor, supported by posts or columns. Slab on ground. Sheeted or tongued and grooved solid flooring having:

- where clearance between under side of flooring to ground level is not greater than 400mm, all joints in the flooring shall be covered or sealed.
- decking timbers shall have no less than 5m clearance
- posts and columns shall be non-combustible, fire retardant for a minimum of 400mm above finished ground level or mounted on galvanised metal shoes with a clearance of not less than 75mm
- the external perimeter beneath the decking shall not be enclosed nor have access restricted
- decking timbers shall not connect with the remainder of the building unless measures are used to prevent the spread of fire into the building.

Level 2

As per Level 1 except spaced timber decking shall be fire retardant treated.

Level 3

As per Level 2 except all materials shall be non-combustible or where timber is used it all will be fire retardant treated including balustrades.