Bush Fire Assessment

Kooyong Park
Sustainable Development - Stage 2
Local Environment Plan Rezoning

(LEP amendment under the "gateway system" of DoP)

Moama Street

Moama

NSW

Prepared for

Perpetual Green Developments Pty Ltd

November 2011

Advanced Environmental Systems

Creating a Sustainable Future

FIRE ENERGY SOILS WATER

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ASSSESSOR DETAILS	
Name of Assessor	Advanced Environmental Systems
Nominated Individual	Mr Peter Clinnick (B. Ag. Sci. Hons RPF)
	Mrs Monique Aarts M.Sc. B. Ed.
Date of Assessment Commencement	24th November 2011
Phone Number	(03) 5482 5882

OWNER-SITE DETAILS	
Name of Site	Kooyong Park
Address of Site	Moama Street, Moama, NSW 2731
Name of land owner:	Ulamba Pty Ltd
Project Manager	Mr. Matthew O'Farrell (Perpetual Green Developments Pty Ltd)
Phone Number	0407 347 768
County	Cadell
Parish	Moama
Title details	Lot 1 DP 1098204; Lots 1& 2 DP1078090
Planning Instrument	LEP Gateway Application

Bush Fire Assessment
Kooyong Park Sustainable Development Stage 2

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Integrated Development in Bush Fire Prone Areas

section 100B

Development Referral to NSW Rural Fire Service (Headquarters)

Once ALL boxes have been checked YES send the package to RFS Headquarters

Council:	Council reference No:
Council referral date:	
Council assessing officer:	Phone Contact:

Send to:
Development Control Services
NSW Rural Fire Service
Locked Mail Bag 17
Granville NSW 2142

1. Is the proposed development site located within a bush fire prone area? ☑ YES ☐ NO

If the development is not mapped as bushfire prone and Council has concerns regarding bushfire, the development application should be referred to the RFS District under section 79C of the EP & A Act.

2. Proposed Development Type:

☑ Residential Subdivision	☐ Child Care	☐ Retirement Village
☐ School	☐ Group Home	☐ Tourist
☐ SEPP (SL)	☐ Respite Care	☐ Sheltered Workshop
☐ Hospital	☐ Strata Subdivision	☐ Boundary Adjustment/Lot Consolidation
☐ Student Accommodation	☐ Manufact'd Home Estate	☐ Subdivision with Dual Occupancy
☐ Other		

If you replied YES to any of the above and to 1. the DA is 'integrated development' for the purposes of section 100B of the Rural Fires Act, 1997 and is required to be assessed by the RFS HQ.

Has payment ($250) been included with this referral? ☑ YES ☐ NO

The following information must be sent with this referral. Referrals that are received by the RFS with inadequate information may be returned to Council for additional information.

3. A copy of the Statement of Environmental Effects. ☑ YES ☐ NO

4. Set of plans including site and subdivision plan. ☑ YES ☐ NO

If Applicants Kit used to assess the development application.

5. Has the Applicants Kit been completed in full? Not Applicable ☐ YES ☑ NO

If applicant provides a bush fire assessment report, has the following been provided by the applicant or consultant (original colour report) ?

6. A description of the property: ☑ YES ☐ NO

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

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7. The classification of vegetation out to 140 metres from the development consistent with the identification key in PBP 2006 (page 54-55).	☑ YES	☐ NO
8. An assessment of the effective slope to a distance of 100 metres: - the effective slope is the slope under the vegetation assessed as being a hazard in relation to the development and not the slope within the asset protection zone.	☑ YES	☐ NO
9. Identification of any significant environmental features.	☑ YES	☐ NO
10. Details of threatened species populations, endangered ecological communities and critical habitat known to the applicant: - documentation supplied to council in relation to flora and fauna.	☑ YES	☐ NO
11. Details of aboriginal heritage known to the applicant.	☑ YES	☐ NO
12. A bush fire assessment that addresses: - asset protection zones (including any management arrangements, any easements including those proposed on adjoining lands), - siting and adequacy of water (in relation to reticulation rates or where dedicated water storage will be required), and - adequacy of access and egress	☑ YES	☐ NO
13. An assessment of how the development complies with the acceptable solutions, performance requirements and relevant specific objectives within Chapter 4 of PBP 2006.	☑ YES	☐ NO

APZs should be identified on plans for interface allotments by either a building line or building footprint. In some cases building envelopes are identified which include other building constraints. Unless otherwise specified, a building envelope will be taken as the building footprint.

Where an applicant proposes not to follow the acceptable solutions for particular bush fire protection measures, detailed evidence must be provided demonstrating compliance with performance criteria and intent of the measures proposed.

Consultant/Applicant name:	Advanced Environmental Systems P/L
Contact telephone:	(03) 5482 5882
Are there any restrictions to a site inspection (e.g. locked gate, dogs, contact owner prior to inspection etc.)	No

Any other applicable comment from applicant regarding DA or Site Inspections

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.....

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Any other concerns / comments regarding bush fire that council may have for the development application (e.g. environmental impact, revegetation works etc.)

.....

.....

.....

Council assessing officer: *signature:*

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Bush Fire Assessment
Kooyong Park Sustainable Development Stage 2

Executive Summary

This report has been prepared as an addendum to an earlier Local Environment Study (LES; Coomes Consulting Group 2008) and is submitted as part of the Department of Planning "Gateway Planning Process" for consideration of rezoning of the site by Murray Shire Council and incorporation in their Local Environment Plan (LEP).

The proposed Kooyong Park development is located approximately 1.5 km north east of the centre of Moama township. Dwelling entitlements (16) previously existed over the 17.92 ha area and Stage 2 of the development encompasses the remaining potion of the total 47 ha area, except for about 6.7 ha in the north east corner which will remain as a part of the "homestead" lot for the foreseeable future.

Under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) bush fire protection measures need to be assessed at the development application stage for developments on such land.

Bushfire risk has been mapped by the Rural Fire Service and indicates that the south-western and eastern section and of the proposed development area has a high bushfire risk due to the woodland on the roadside reserves and adjacent properties. The required 10 m Asset Protection Zone (APZ) can be easily achieved, given that there is a 14 m buffer between the roadside boundary and all lot boundaries, with the closest dwelling being more than 20 m from any hazard (determined by pad location).

In terms of significant environmental attributes the key findings with regard to flora and fauna are that there is extremely limited floristic diversity in the proposed consolidation area and associated farmland. The key findings with regard to fauna are that there were no threatened fauna species found within the larger (47 ha) farm area, or the roadsides. In relation to SEPP No. 44 Koala Habitat Protection, no sightings of Koalas were recorded for the roadside or farm areas. The proposed development site does not support “core Koala habitat”.

Although the area has a high hazard flood storage overlay, the site is not readily subject to flooding in low to moderate floods (<1:100 ARI). The greenfield situation makes it possible to engineer the development so that potential costs arising from flood storage hazards and risks are eliminated. A detailed Flood Management Plan will be prepared following approval of the development.

Aboriginal or European cultural significance field assessment and database searches did not reveal any evidence of artefacts or other items.

The rural water and fire fighting storage supplied from the Murray River will have a minimum maintained capacity of 1.0 ML with electric pump (generator back-up) to maintain pressure to hydrants. In addition, 20,000 L water holding tanks with an equivalent minimum fire fighting capacity of 10,000 L per home on blocks greater than 2,000m^2 will be used to store roof runoff.

The Bushfire Attack Level (BAL) is 19 and as such the bush fire construction requirements apply to any building located less than 100 m from the bush fire hazard will need to meet minimum construction standard used for buildings within BAL 19. Access for emergency vehicles will be provided as recommended in the Planning for

Bush Fire Protection Guidelines. Emergency egress is also provided at the southern, eastern and western end of the development area.

Bush Fire Assessment Overview

Factor	Characteristic	
Adjoining land use and fire mitigation factors	Land use North - Grazed pasture. East - Bushland on road reserve. Grazing pastures. West - Bushland on road reserve. Hobby farm- grazing. South - Bushland on road reserve. Hobby farm- grazing. Mitigating factors include 8-10 m roadways on three sides of the development and sparse understorey with low fuel loads on private land.	
Vegetation	Red gum/Box Woodland.	
Slope	Flat (0^0)	
Distance to bush fire threat	>20 m between buildings and hazardous vegetation.	
Asset Protection Zone and maintenance	10 m to any aspect facing bushland. Maintenance of gardens as an inner protection zone in accordance with PBP (RFS 2006).	
Bush Fire Attack Level (BAL) & Level of Construction required	BAL 19	
Specific protection requirements	Specialised construction requirements will apply to: ➢ Sarking; ➢ Sub-floor screening where applicable; ➢ Floors; and ➢ Verandas, decks, ramps and landings. In addition the NSW RFS will recommend additional construction requirements beyond those in AS3959-2009 as deemed appropriate (Appendix 1).	
Access	Roads sealed two way minimum 8 m pavement on 20 m road reserve as per AS 2890.2-2002.	
Water Services	Domestic treated water supply to dwellings Rural water supply for gardens and fire fighting	
Environmental considerations	Retention and management of remnant trees in accord with the objectives of the Murray Endangered Ecological Community Policy.	
Heritage issues	Nil established but contingencies in place if any remains/artefacts are unearthed.	
Aims & objectives	Deemed to comply	Comment
Defendable space around buildings	Yes	Minimum 10 m defendable space established and maintained
Adequate protection from bushfire	Yes	Fire resistant construction as per AS 3959-2009
On-going maintenance of APZ	Yes	Landowners Management Committee
Ensure safe operational access and egress	Yes	Internal roads constructed as per AS2890.2-2002 or better.
Adequate water services	Yes	Fire hydrant spacing, sizing and pressures comply wit AS 2419.1 and other requirements relating to tank sizing and specification as per Section 4.3.1 of the PBP Guidelines (RFS 2006).

Bush Fire Assessment
Kooyong Park Sustainable Development - Stage 2
Local Environment Plan Rezoning

Introduction

The proposed Kooyong Park development is located approximately 1.5 km north east of the centre of Moama township (Figure 1) and covers approximately 47 ha.

This report has been provided as an addendum to a Local Environment Study (LES) provided by Coombe's Consulting in 2008 and forma part of the Department of Planning "Gateway Planning Process ". Specifically, this report provides information on environmental considerations and bushfire hazards and management at the site of the proposed Kooyong Park Sustainable Development Stage 2, Part of Lots 1 DP 1098204 (17.79 ha) and Lot 2 DP1078090 (~29.4 ha), as well as Lot 1DP 1078090 was undertaken on March 19th 2010. Council approval and a report for Stage 1 (15 Lots 4.63 ha) on Part of Lot 1 DP 1098204 was provided in 2010.

The report was prepared following field investigations and database research relating to the site. The study area includes:

(i) The farm area (~ 47 ha), the homestead site(~6.7 ha); and

(iii) Roadside Reserve areas and adjacent the agricultural areaS.

Part of the property under consideration is land that is classified as bush fire prone (Figure 5). Under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) bush fire protection measures need to be assessed at the development application stage for developments on such land.

Section 91 of the EP&A Act, in combination with section 100B (4) of the Rural Fires Act 1997 (RF Act), classes the proposed lot consolidation as an “Integrated Development”. For the purposes of section 100B (4) of the Rural Fires Act 1997, an Application for a “Bush Fire Safety Authority” must be made in writing for integrated development on bush fire prone land.

This Bush Fire Assessment Report has been prepared in order to satisfy the above requirement and contains the information set out in the NSW “Rural Fires Regulations 2008. An appropriate combination of Bush Fire Protection Measures to be implemented on the site are outlined in this report. It also shows the extent to which the proposed development conforms or deviates from the specifications set out in “Planning for Bush Fire Protection 2006” as it relates to the following provisions:

a) Provide sufficient space and maintain reduced fuel loads, so as to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with a building;

b) Provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area;

c) Provide safe access to/from the public road system for fire fighters providing property protection during a bush fire and for occupants faced with evacuation;

d) Provide suitable access for fire management purposes and maintenance of Asset Protection Zones (APZ's);

e) Provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

1. Proposed Development Description

The total rezoning area is approximately 47.2 ha, including Stage 1 which is 4.63 ha. The development area is currently used for agricultural purposes, as depicted in Figure 1 and Figure 2. A more detailed plan of the proposed development is provided in Figure 3.

The proposed Kooyong Park Stage 2 development will involve the construction of homes on 213 lots in total (inc 15 in Stage 1).

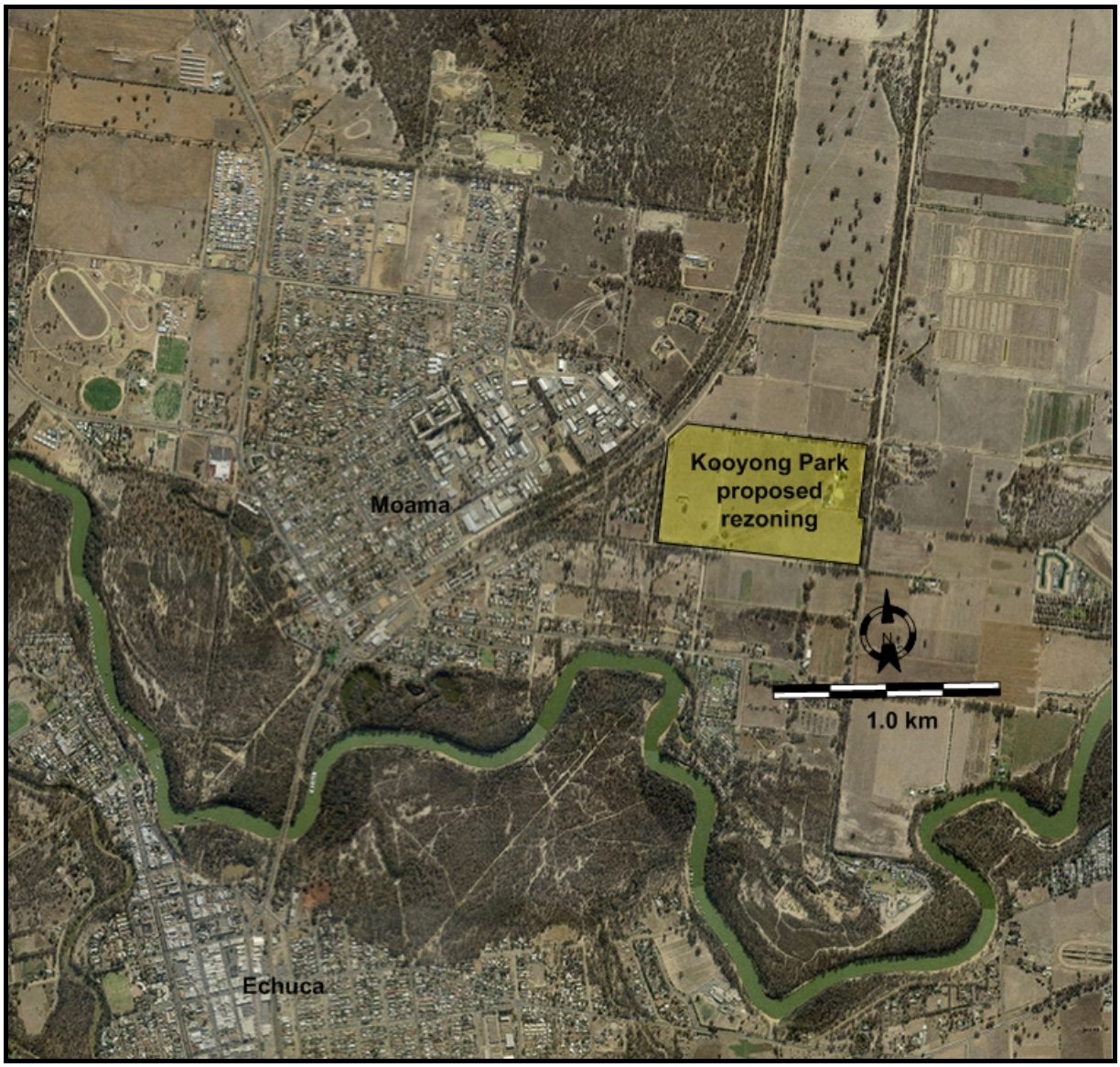

Figure 1. Location of site

The site topography is flat and since having been cleared in the 1870's the land has been used for dryland cereal cropping and irrigated pasture since the late 1950's. The property is surrounded by well vegetated road reserves. Surrounding land use includes hobby farming with grazing and some cropping on larger holdings.

Zoning

The land (Lots 1 DP 1098204 (17.79 ha) and Lot 2 DP1078090 (~29.4 ha), as well as Lot 1DP 1078090, 6.68 ha) is zoned General Rural 1(a) under the Murray Local Environmental Plan (LEP) 1989, as amended. It should also be noted that the site is classed as high hazard flood storage in greater than 1:100 Annual Recurrence Interval (ARI) flood events. The adjacent land on the western side is a low hazard floodway [1] (Moama Street). The development area has a licensed rural levee protecting it from flooding (refer Groundwater and Flooding Report) in most events less than 1:100 ARI.

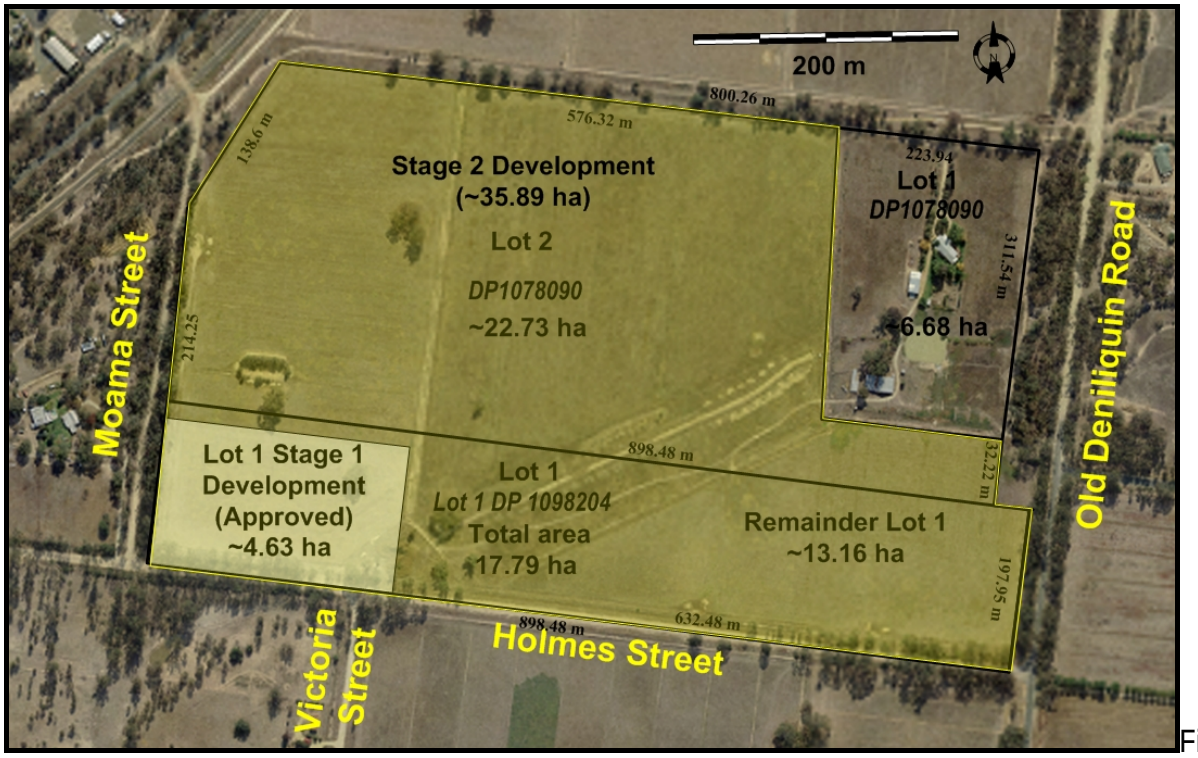

Figure 2. Property overview

Development features

1. Commons 1, 2 and 3 to be approximately 20,000 m^2 (2 ha).
2. Block size range for with some area shaving 500 to 700 m^2, while others will be 1000 to 2,000 m^2. The average size to be 550 m^2.
3. Average frontage of these sites will be 16 m. Average depth of these blocks will be 34 m.
4. Roads are 20 m wide.
5. Interconnected walking tracks sufficient width to carry fire access vehicles link all commons.
6. Restaurant and function site to be approximately 30,000 m^2 (3 ha).
7. Strip around boundary of site is expected to measure an area of up to 40,000 m^2, 14 m wide.

[1] Figure 4. Murray Shire (2004) Moama Development Strategy Final Draft Report 2004. Mathoura NSW.

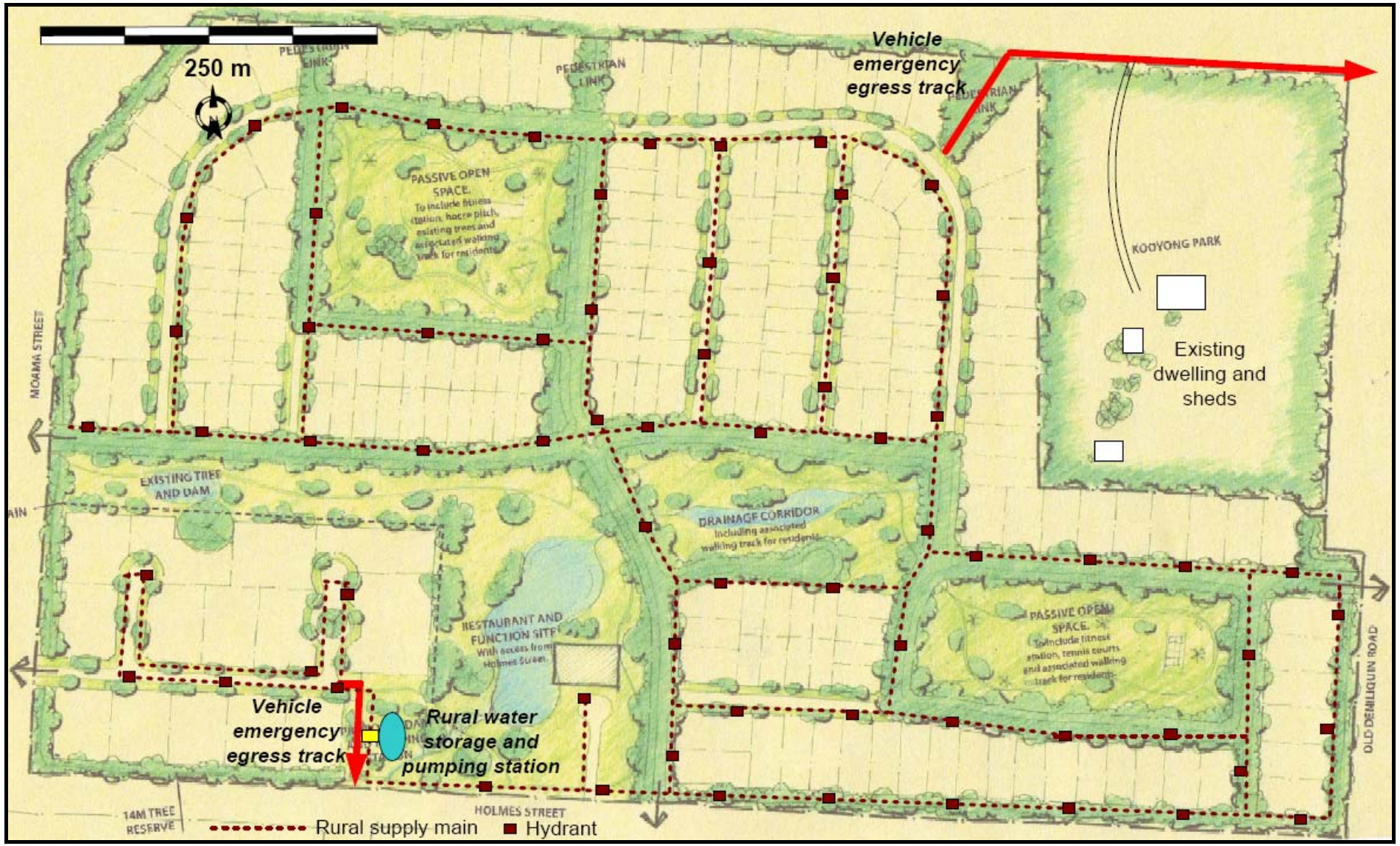

Figure 3. Fire services -rural water reticulation layout and approximate location

2. Significant Environmental Features

2.1 Threatened species - Flora and fauna

The proposed development site is already highly degraded in terms of habitat, the net impacts of the proposal on the flora and fauna utilising the site now and in the future, can be viewed as positive.

No threatened flora, were identified as being present on the footprint area, or on the adjacent roadside reserves (refer Flora and Fauna Report). Within Murray Shire, the Atlas of NSW Wildlife lists ten protected (P13), vulnerable (V), endangered species (E1) or critically endangered flora species (E4A); these are listed below, together with comments relating to the site or geographic proximity of the relevant species. Small scurf pea has also been considered, even though not listed as having been found in Murray Shire.

Thirty one vertebrate species were recorded for the agricultural area, the development site and the roadsides, including two introduced fauna species (Fox - *Vulpes vulpes* and Brown hare - *Lepus capensis*). These are highlighted in the Murray Shire Fauna List (Appendix 3).

No threatened birds or reptiles were recorded on or close to either the agricultural area or the proposed development footprint during the site assessments.

In assessing habitat for vertebrate fauna species recorded within the Shire, none had habitat requirements that were specific to the site. The local area has similar sites nearby for both Open Grassland and Woodland. Vertebrate species recorded are considered ubiquitous, occupying many locations with similar habitat along the Murray corridor.

It is possible that the Yellow-bellied sheathtail bat (*Saccolaimus flaviventris*) is present. However, it generally requires tracts of forest in excess of 100 ha for habitat and foraging. This could be achieved in areas closer to the river and it is possible that both sides of the Murray River are utilized by the bats. The nearest record for this species is from the Milewa Forest some 40 km to the north of the study site. Similarly, the Large-footed myotis (*Myotis adversus*) utilises tree hollows and forages in the open, as well as forested environments. The nearest record of this species is in the Moira Forest some 30 km to the north of the site. A precautionary management approach will involve protection of the existing large Red gum habitat trees for these and other hollow dwelling species.

The Squirrel glider *(Petaurus norfolcensis)* is a potential inhabitant of hollow bearing trees located on road reserves and in paddocks. The large remnant Red gums within the development footprint may house the species, but since the species was not observed on the site its presence or absence could not be confirmed. Since potential habitat trees will be unaffected by the proposal there are not expected to be any adverse effects on the species were they to occur in the area.

Due to the already environmentally degraded nature of the proposed development site, it is not considered to act as a corridor, migratory route, or provide a drought refuge to flora and fauna. The maintenance of the potentially hollow bearing trees on the property will provide a resource for those species dependent on hollows.

The key findings with regard to flora are:

1. There is extremely limited floristic diversity in both the farm area and the proposed consolidation area.
2. The only possibly threatened flora species listed as Vulnerable is the Slender darling pea (*Swainsonia murrayana*). The species was not found on the site and is not recorded within 9 km of the site.

The key findings with regard to fauna are:

1. There were no threatened fauna species found within the larger (46 ha) farm area, or the consolidation site (2.5 ha) or roadsides.

2.2 Endangered ecological community and biocertification

The Murray riverine environment is listed as an endangered ecological community in NSW, meaning that it is likely to become extinct in nature, unless the circumstances and factors threatening its survival and evolutionary development cease to operate. Within the context of the proposal appropriate consideration will be given to the design, so that rather than adverse effects, favourable outcomes are generated for the riverine and floodplain environment.

The study area lies within the Shire Planning Scheme Bio-Certification area and the Red gum woodland remnants at the northern side of the agricultural area (Lot 2 DP 1078090, Figure 2) are marked as being of high conservation value. This will be protected by a buffer of 15m. The roadsides along the relevant sections of Holmes and Moama Streets are <u>not</u> mapped as High Conservation Value (refer flora and fauna report).

In this instance there is no area where bio-certification can be sought, but the underlying environmental protection principles will be applied in any landscaping plans.

2.3 SEPP No. 44 Koala Habitat Protection

The proposed consolidation area is located within Murray Shire which is listed on Schedule 1 (Amendment No. 1) of State Environmental Planning Policy (SEPP) No. 44 and is therefore considered to be within the known distribution of the Koala (*Phascolarctos cinereus*) within New South Wales. The proposed development site does not support "core Koala habitat" (i.e. "*an area of land with a resident population of Koalas, evidenced by attributes such as breeding females and recent sightings of and historical records of a Koala populatio*n").

On most of the adjacent roadsides the percentage of River Red gums in the overstorey meet the requirements for potential Koala habitat. "Potential Koala habitat" is defined as "areas of native vegetation where the trees of types

listed in Schedule 2 of SEPP No 44 “constitute 15% of the total number of trees in the upper or lower strata of the tree component”.

No sightings of Koala were recorded for the roadside areas. The NPWS Atlas of NSW Wildlife records one sighting ~15 km to the west of Moama. More commonly, sightings occur in the Moira and Milewa State Forest, 30-40 km to the north of the proposed development.

2.4 Flood impacts

The Strategic Land Use Plan (SLUP) indicates that the property is proximal to an area subject to environmental flooding. In this instance the proposed development site is protected by a licensed levee for events less than 1:100 Annual Recurrence Interval (ARI).

Figure 4. Development area with scattered remnant Red gums

Despite the proximity of the proposed development site to the Murray River, it is not readily subject to flooding in low to moderate level floods (generally <1:100 ARI). The area is identified as being high hazard flood storage in a 1:200 ARI enevent, that is, the water depth may be more than 1.0 m, but velocities are very low. The site would experience a time impact of about one week over eight generations of inhabitants and negligible economic impact.

Floodplain planning and land use allocation has clearly moved away from the pre 2000 sterilisation approach of flood plains being an untouchable area.

The Flood Planning Level (FPL) setting the floor level for new development is the 1% AEP, that is, 95.34 m AHD at the Echuca Gauge. A 300 mm freeboard above this level is set in the Development Control Plan (2002); requiring a floor level of 95.64 m. Because the development is further upstream (~4 km) than the Echuca Gauge, a freeboard of +600 mm above the recommended FPL level is planned for earthen pads Stage 1 of this development. Both Stage 1 and Stage 2 will be protected by a levee catering for the 1:200 ARI event.

The hydrogeology of the area is complex. Watertable depths are currently at 8 to 10 m. Tree planting across the site will assist in reducing recharge.

Flooding conclusions

1. Under current conditions the site is not readily subject to flooding in low to moderate floods (e.g. <1:100 ARI). Although the land may be subject to inundation in events greater than 1:100 ARI until the levee height is increased slightly (~10 cm), the greenfield situation makes it possible to engineer the development so that potential costs arising from flood storage hazards and risks are eliminated.
2. A Flood Management Plan will need to be prepared for the site as a second stage of the approval process.

3. Cultural Heritage

An archaeological survey of the proposed 4.63 ha consolidation area and the surrounding 46 ha (farm area) of Lots 1 DP 1098204 and Lot 2 DP1078090 was undertaken on several occasions, the last of which was March 19th 2011, to determine the potential impact of the proposed land consolidation and related development in relation to Aboriginal and European cultural heritage.

3.1 Aboriginal Heritage

Water courses would have been the foci of Aboriginal occupation in the local area. The property site location is remote from the Murray River and having no permanent water body means that it would not have attracted Aboriginal occupation, but may have been part of a hunting and gathering area. Furthermore the site being situated on uniformly compacted medium clays has little or no potential for stratified cultural material at depth. These materials were deposited long before Aboriginal people arrived in Australia (~45,000 years ago). Consequently, any archaeological potential is limited to the surface.

A search of the DECCW Aboriginal Heritage Information System (AHIMS) indicated that there are no Aboriginal objects or Aboriginal places recorded in or near the study area (refer Appendix 1). The banks and floors of excavations for dams along Holmes Street did not contain any Aboriginal or European cultural heritage material. These exposed sites provide a representative sample of a large part of the area. Even with this extensive exposure in paddocks and along tracks across the site, no stone artefacts or pieces of bone were recorded.

Despite there being numerous old and substantial Grey box (*Euclyptus microcarpa*) and Red gum (*E. camaldulensis*) trees scattered across the survey area there were none that showed scars attributable to human activity.

3.2 European Heritage

The only evidence of earlier European occupation was found in the south west corner of the block near the intersection of Moama Street and Holmes Street. About 10 m form the corner gateway a few broken remnants of kiln fired bricks were found and close by a White cedar (*Melia azadarach*) tree about 30-40 years of age. When one of the current owners (Mrs J. O'Farrell) first moved there in 1982 there were the remnants of a fence enclosing the aforementioned tree. Information supplied Mrs O'Farrell indicated that in a consolidation of roads and titles dating back to 1932 the area was referred to as 'suburban lands' town of Moama. This is supported by information depicted on Parish maps (1890) supplied by the Echuca-Moama Historical Society, which depict the area as being part of the original "Town of Moama". There was no indication from the plans that any special buildings or businesses had been established on the site. In addition, an assessment of aerial photography from 1950 prior to irrigation development and more recent photography (2007), did not reveal that there had been any substantial development of the area, aside from the more modern farm residence and associated infrastructure (circa 1980) located in the north eastern corner of the farm (Figure 2).

There were no historic sites evident in the proposed consolidation area; which is not surprising, as it is not located near any historical centre of activity, such as was the case closer to the river at Maidens and Watt's Punt and the site of the old Moama Telegraph Office.

In summary, the archaeological potential of the Moama consolidation site is low, largely because the site location is remote from permanent fresh water (i.e. the Murray River) which was of importance to both Aboriginal and European occupants of the area. Accordingly, there are no specific appropriate management strategies required for this site.

Heritage conclusions

Extensive field assessment and database search did not reveal any evidence of artefacts or other items of either aboriginal or cultural significance. Based on the results of this investigation and consultation with the Moama Local Aboriginal Land Council it is recommended that:

1. Consolidation should be allowed to proceed at "Kooyong Park" without further archaeological investigation.
2. The property owners should keep the Moama Land Council apprised of any artefacts unearthed during development and ensure that Aboriginal people have open access to any cultural heritage sites should they be uncovered during the course of development.

4. Bush Fire Assessment

The following information details various aspects of fire protection measures required for the site and homes to be constructed on the site. The table at the beginning of this report provides an overview of the Bush Fire Assessment.

4.1 Fire prone areas planning overlay

Murray Shire's Bush Fire Risk Overlay (Figure 5) indicates that part of the proposed development site is classed as having High Bush Fire Risk requiring a determination of appropriate Asset Protection Zone (APZ) and bush fire construction requirements in line with AS3959-2009 as referenced in the Building Code of Australia (BCA) 2011.

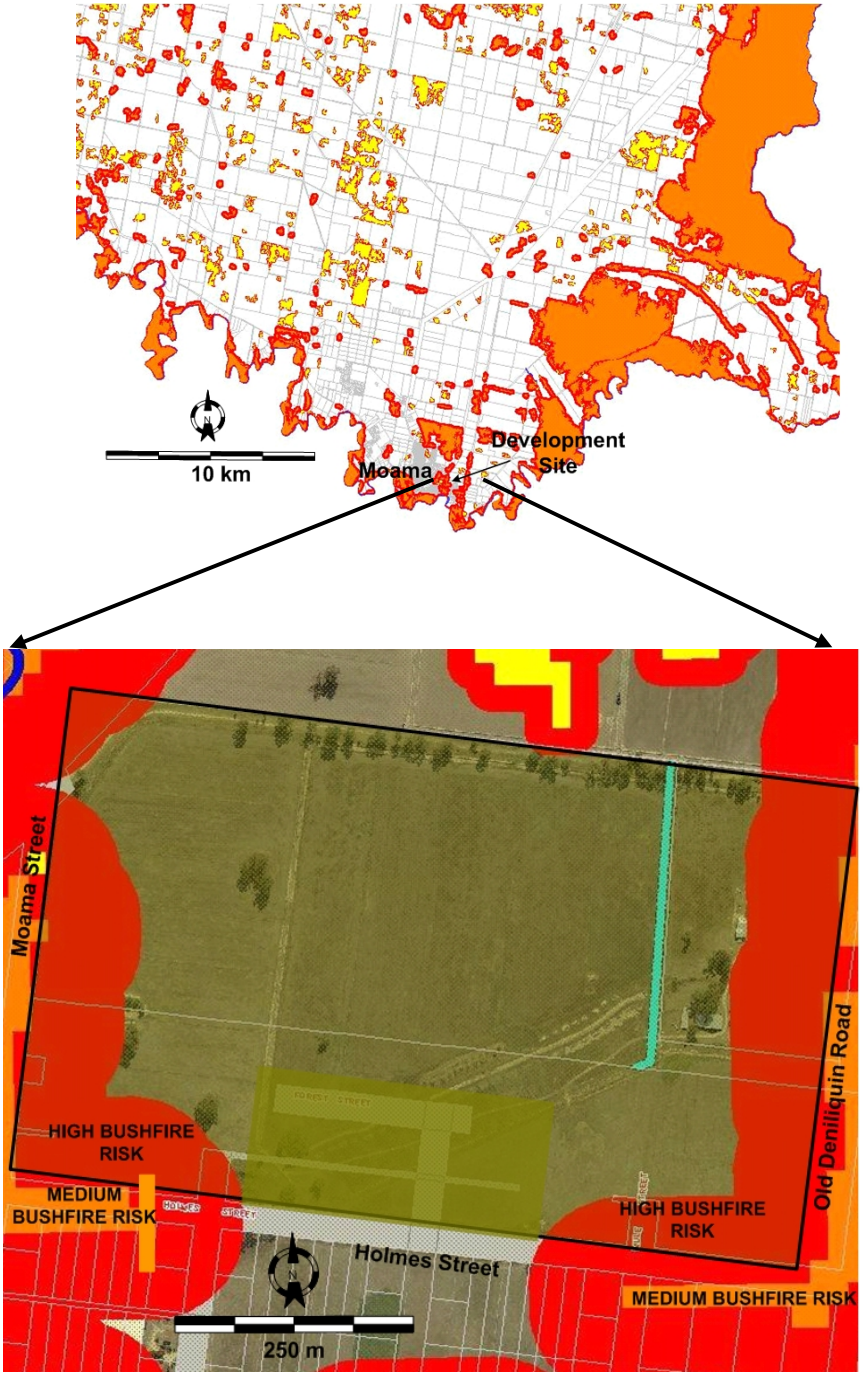

Figure 5. Shire planning Bush Fire Risk Overlay

4.2 Adjoining land use

The development area is cleared with the exception of a few remnant Red gums (Figure 5). Land to the north is grazed pasture while to the east it is bushland on the road reserve with grazing and on some parts irrigated pastures on private land. The west and south west sections of the development area have bushland on the road reserve and hobby farms with sparse Red gum/box overstorey with a heavily grazed understorey.

4.3 Vegetation classification

The vegetation was assessed out to 140 m from the footprint area. The agricultural area to the north and east of the development site is classed as "grassland". Within the footprint of the development there are several (3) large Red gums (*Eucalyptus camaldulensis*) all of which will be retained. The trees are not close enough to bring the area into a woodland classification. Notably, except for the large Red gums, past grazing and cropping has eliminated native flora that might be considered as important habitat for native species.

The irrigation bays and open grazing areas of the agricultural land and proposed development area are dominated by Barley grass (*Hordeum leporinum*), Quena (*Sloanum esuriale*), Perrenial Rye grass (*Lolium perenne*) and Wireweed (*Polygonum avicular*) typical of grazed agricultural sites on the riverine plain.

Prior to settlement it is likely that substantial parts of the property were covered by River Red gum (*Eucalyptus camaldulensis*), Grey box (*E. microcarpa*) and Black box (*E. largiflorens*) woodland with wattles and a grassy understorey. These communities are found on the surrounding floodplain with representative remnants on the roadside.

Figure 6. Roadside woodland and rural levee from inside development area

The condition of the canopy upper stratum Red gum/box vegetation on the roadsides varies with some trees almost bare, while others have relatively healthy canopies with up to 85 percent foliage cover (PFC).

At the mid-storey level, on the roadside areas, there are regenerating Red gums (5-10 years old, PFC ~90%) and Dwarf cherry (*Exocarpos strictus*). Growth of the lower stratum is limited by the dominant eucalypt overstorey, leaf litter fall and summer dry conditions. Stunted rush plants (*Juncus aridicola*), native and introduced grasses (Refer Appendix 3) were evident in exposed areas.

Figure 7. Moama Street and surrounds woodland vegetation

Vegetation on surrounding properties is medium to sparse Red gum and Grey/Black box woodland with varying loads of leaf litter and intensity of ground cover and as previously mentioned dryland and irrigated pasture.

The vegetation type providing the greatest fire hazard is the woodland on the roadside reserves and the adjacent property to the west.

4.4 Effective slope

The effective slope is the slope under the vegetation assessed as being the greatest fire hazard in relation to the development and which most significantly affects fire behaviour on the site.

The slope on this site was assessed over a distance of 140 m from the site footprint towards the vegetation community constituting the hazard (the grassy woodland on the road reserve and adjacent properties). The effective slope for this woodland area and for the agricultural grassland is flat (0^0).

4.5 Provision for setbacks, including asset protection zones

The asset protection zone (APZ) separates buildings from the fire hazard and therefore minimises the impact of direct flame contact, radiant heat and ember attack.

An APZ is to be established on the aspects (western and southern) presenting a hazard to any of the buildings that will be constructed and provides a defendable space between the assets and the fire hazard. For rural residential purposes, the target exposure is 29 kW/m^2 for APZ's on all sides of the building where there are access points. The main fire hazard on this site is from the surrounding woodland with an effective slope of 0^0. The applicable Asset Protection Zone was determined using the methodology outlined in Appendix 2 of "Planning for Bush fire Protection", as depicted in the diagram below (Figure 8)

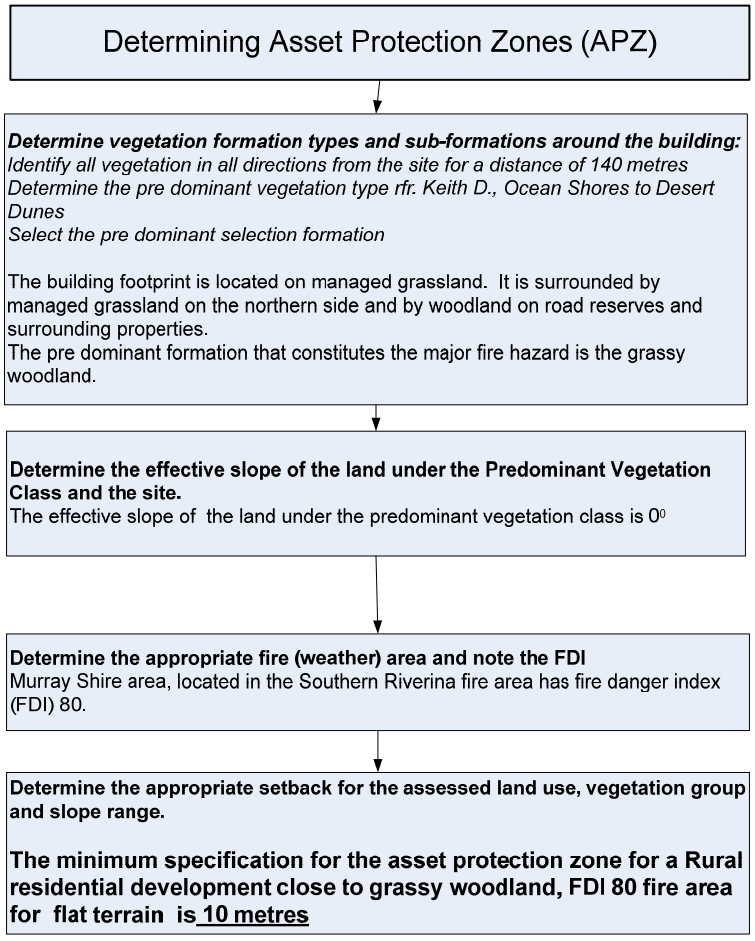

Figure 8. Method for determination of Asset Protection Zone width

The minimum Asset Protection Zone on this development is 10 metres. The bush fire hazard and the asset protection zone is located on land that is classed as flat. The flat terrain dictates that soil stability will not be an issue

on this site. No impediments to maintenance of the APZ were observed on the site. The 10 m APZ requirement can be easily achieved given that there is a 14 m buffer between the roadside boundary and all lot boundaries, with a further 10 m minimum distance to any dwelling.

Table 1. Minimum specifications for APZ for residential and rural residential subdivision (PBP 2006)

Table A2.5 Minimum Specifications for Asset Protection Zones (m) for Residential and Rural Residential Subdivision Purposes (for Class 1 and 2 buildings) in FDI 80 Fire Areas (≤29kW/m²)					
	Effective Slopes				
Vegetation Formation	**Upslope/Flat**	**>0°-5°**	**>5°-10°**	**>10°-15°**	**>15°-18°**
Rainforests	10	10	15	15	20
Forests	20	20	30	40	45
Woodland	10	15	15	20	25
Plantations (Pine)	15	20	25	35	40
Tall Heath (Scrub)	15	15	20	20	20
Short Heath (Open Scrub)	10	10	10	15	15
Freshwater Wetlands	10	10	10	15	15
Forested Wetlands	15	20	20	30	35
Semi-Arid (Woodland)	10	10	10	10	15
Arid Shrubland	10	10	10	15	15

The Asset Protection Zones (APZ's) on this site will be entirely located within the property and 10-14 m landscape buffer boundaries (surrounding the consolidation area) and will be maintained for the life of the development.

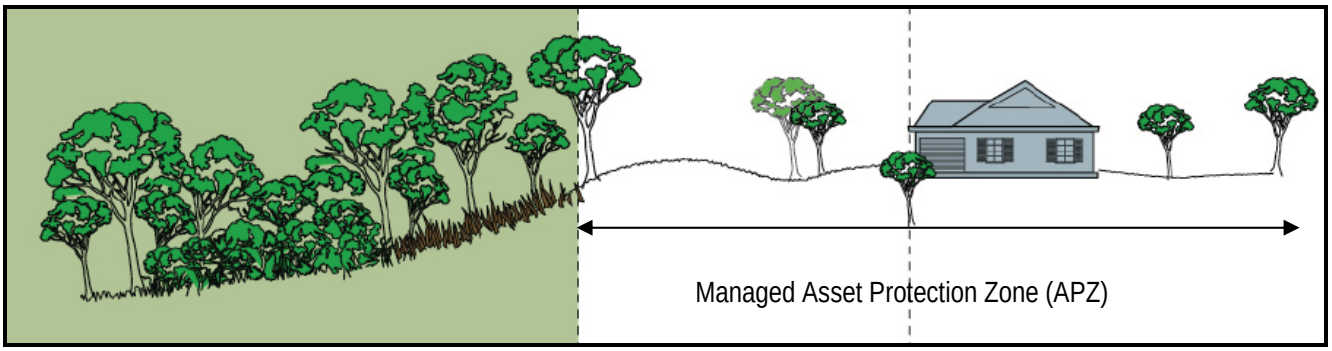

Figure 9. Diagrammatic representation of Asset Protection Zone)
(Source: RFS Single Dwelling DA Kit RFS 2011)

The project manager in conjunction with the property owner will ensure that during the construction period maintenance of the APZ will not be impeded and that the APZ can fulfill its function as a defendable space at all times by:

- Ensuring that building materials including equipment are stored outside the designated APZ zone;
- All reasonable precautions regarding fire hazard and fire safety are taken during construction, including the provision of a water supply sufficient to meet fire fighting needs should an emergency occur before the development is finalised.

Access to the development by emergency services will be provided by the internal roads. (Refer to section 4.8 - Access and egress from the development for the purposes of an emergency response). Vegetation management together with on-going property maintenance and sensible landscaping will be paramount and aim to:

- Prevent flame impingement on the dwellings;
- Provide a defendable space for property protection;
- Reduce fire spread;
- Deflect and filter embers;
- Provide shelter from radiant heat; and
- Reduce wind speed.

Arrangements for property maintenance before the start of each bush fire season will need to be agreed on by the residents committee of management.

When landscaping the site careful attention will be given to:

- Species selection;
- Maintaining clear areas of pavement or low cut lawn adjacent to buildings;
- The use of non combustible fencing;
- The use of non flammable material for mulch;
- Branches of trees and bushes will not overhang the roofs of buildings;

A tree planting schedule will be developed for the site. The trees will function as a windbreak. The plantings will be separated by a sufficient distance from the hazard as to not become a hazard itself. Fire retardant species will be selected.

4.6 The adequacy of water supplies for fire fighting

The rural water and fire fighting storage will have a minimum maintained capacity of 1.0 ML with fire service pump to maintain pressure to hydrants on the estate. Adequate water supply is critical for effective firefighting. As the water supply on this site is non-reticulated an additional on-site stored supply of water for firefighting will be required.[2]

[2] The RFS no longer require water to be solely 'dedicated' for fire fighting purposes and will allow more flexibility in satisfying the water requirements. As such, water holding structures such as tanks, swimming pools and dams can be considered. The onus will be on the property owner to provide suitable water supply arrangements for fire fighting that meet the RFS requirements and ensure that any water sources are maintained at the appropriate capacity.

The main water supply for fire fighting will be derived from the Murray River through an electric pump with diesel generator back-up to fire hydrants. The fire hydrants will meet AS 2419.1 – 2005. Additional water supplies include:

- On lots greater than 2,000 m^2 water holding tanks with a fire fighting equivalent minimum capacity of 10,000 L per building will be used to store roof runoff from buildings. The access opening will be a minimum of 200 mm with a hardened 4 meters area for truck access. Note that this is the minimum for fire fighting and the domestic off-take should be located above the 10,000 L level. Each water source will be clearly marked with dual connections compatible with RFS/CFA firefighting equipment.

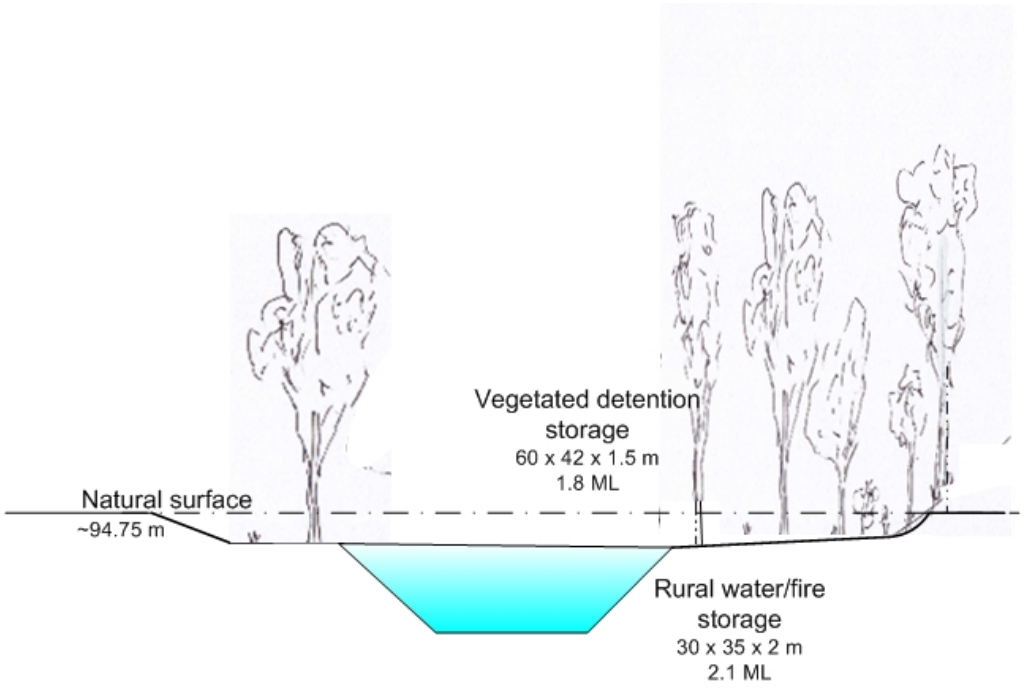

Figure 10. Stage 1 and 2. Fire protection infrastructure, fire fighting water storage layout

4.7 Road capacity and two way access

Old Deniliquin Road, Holmes Street and Moama Street (Figure 2) are all weather two wheel drive roads that have connections to western, eastern and northern egress routes. Other roads in the area are all-weather roads and are two way roads providing a vertical clearance of 4 meters above the road at all times with a carriage width exceeding 8 m.

4.8 Emergency response - access to and egress

The main access from the public road to the site is from Moama Street, Holmes Street and Old Deniliquin Road. An alternative, emergency only access will be provided for the larger blocks in the south west corner (Stage1) to Holmes Street (Appendix 1). Another emergency egress access will be in the north eastern corner of the development with egress to Old Deniliquin Road (Figure 3). The following is proposed for internal roads on this site:

- All internal roads are two-wheel drive, sealed, all-weather roads;

- Internal roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions;
- Emergency access to dead end roads will be provided by an all weather emergency access track off Holmes Street in the south west and off Old Deniliquin Road in the north east sector of the development. These will be clearly marked. Dead end roads are not more than 100 metres in length from a through road (e.g. Holmes Street), incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a "no through road";
- Roundabouts are constructed at intersections to facilitate traffic flow and access by emergency services vehicles;
- A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is to be provided;
- Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress;
- The minimum distance between inner and outer curves is six metres;
- Maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees;
- Roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge);
- Roads are clearly sign-posted and bridges clearly indicate load ratings;
- The internal road surfaces will have a capacity to carry fully-loaded fire fighting vehicles (15 tonnes).

As mentioned previously, access to the development by emergency services will be provided by the internal roads.

4.9 Bush fire maintenance plans and fire emergency procedures

An Emergency and Evacuation Egress Plan will be prepared in accordance with the acceptable solutions for emergency and evacuation planning for the area.

Emergency Assembly Areas are assigned by the Shire and will be clearly displayed.

4.10 Building construction standards

The bush fire construction requirements only apply to any building located less than 100 meters from the bush fire hazard which exits on this site. The minimum construction standard used for buildings within this zone will be BAL 19 (refer table below).

The closest dwelling will be more than 20 m form the woodland hazard as determined and limited by the location of pads for flood protection. From Table 1 it was therefore determined that the BAL is 19, the heat flux exposure is <19 kW/m^2.

Specialised construction requirements will apply to:

- Sarking;
- Sub-floor screening where applicable;
- Floors; and
- Verandas, decks, ramps and landings.

In addition, the NSW RFS will recommend additional construction requirements beyond those in AS 3959-2009 as deemed appropriate (Appendix 1).

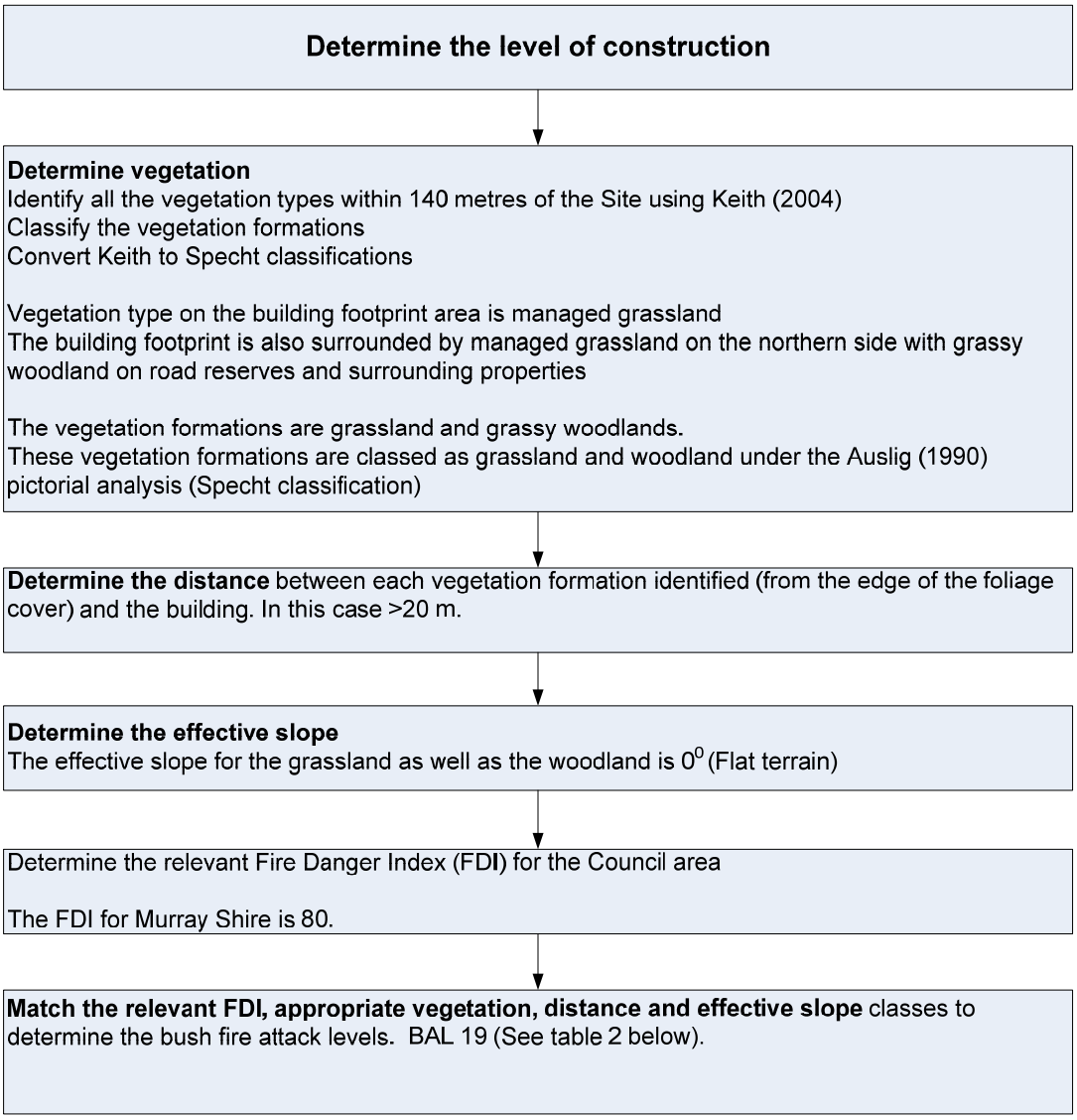

Table 2. Bush Fire Attack Level (BAL) FDI 80

Vegetation Formation (class)	Categories of Bush Fire Attack (AS 3959-2009)				
	BAL- FZ	BAL- 40	BAL- 29	BAL- 19	BAL-12.5
	Distance (m) of the site from the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
Forests	<16	16-<21	21-<31	31-<42	42 - 100
Woodlands	<10	10-<14	14-<20	20-<29	29 - 100
Shrubland	<7	7-<9	9-<13	13-<19	19 - 100
Scrub	<10	10-<13	13-<19	19-<27	27 - 100
Mallee/Mulga	<6	6-<8	8-<12	12-<17	17 - 100
Rainforest	<6	6-<9	9-<13	13-<19	19 - 100

Table 3. Heat flux exposure and Bush Fire Attack Level (BAL)

>12.5 ≤19	Attack by burning debris is significant with radiant heat levels (not greater than 19 kW/m²) threatening some building elements (screened glass). Specific construction requirements for embers and radiant heat are warranted.	Bush Fire Attack Level – 19 (BAL-19)

4.11 Sprinkler systems and other fire protection measures

Sprinkler systems would only be of a domestic nature used for gardens. However, as a precautionary measure, some residents may elect to install roof sprinklers. Other fire protection measures to be incorporated into the development are:

- The electrical transmission lines will be underground.
- Bottled gas, (unlikely because town gas is available) if installed, will be maintained according with AS 1596 – 2002 and the requirements of relevant authorities. Metal piping is to be used. LPG cylinders are located on the non-hazard side of the building with the release valve directed away from the building.

Table 4. Bush fire assessment overview

Factor	Characteristic
Adjoining land use and fire mitigation factors	Land use North - Grazed pasture. East - Bushland on road reserve. Grazed pastures. West - Bushland on road reserve. Hobby farm- grazing. South - Bushland on road reserve. Hobby farm- grazing. Mitigating factors include 8-10 m roadways on three sides of the development and sparse understorey with low fuel loads on private land.
Vegetation	Red gum/Box Woodland.
Slope	Flat (0^0)

Distance to bush fire threat	>20 m between buildings and hazardous vegetation.	
Asset Protection Zone and maintenance	10 m to any aspect facing bushland. Maintenance of gardens as an inner protection zone in accordance with PBP (RFS 2006).	
Bush Fire Attack Level (BAL) & Level of Construction required	BAL 19	
Specific protection requirements	Specialised construction requirements will apply to: ➢ Sarking; ➢ Sub-floor screening where applicable; ➢ Floors; and ➢ Verandas, decks, ramps and landings. In addition the NSW RFS will recommend additional construction requirements beyond those in AS3959-2009 as deemed appropriate (Appendix 1).	
Access	Roads sealed two way minimum 8 m pavement on 20 m road reserve as per AS 2890.2-2002.	
Water Services	Domestic treated water supply to dwellings Rural water supply for gardens and fire fighting	
Environmental considerations	Retention and management of remnant trees in accord with the objectives of the Murray Endangered Ecological Community Policy.	
Heritage issues	Nil established but contingencies in place if any remains/artefacts are unearthed.	
Aims & Objectives	Deemed to comply	Comment
Defendable space around buildings	Yes	Minimum 10 m defendable space established and maintained
Adequate protection from bushfire	Yes	Fire resistant construction as per AS 3959-2009
On-going maintenance of APZ	Yes	Landowners Management Committee
Ensure safe operational access and egress	Yes	Internal roads constructed as per AS2890.2-2002 or better.
Adequate water services	Yes	Fire hydrant spacing, sizing and pressures comply wit AS 2419.1 and other requirements relating to tank sizing and specification as per Section 4.3.1 of the PBP Guidelines (RFS 2006).

4.12 Development conformity with PBP standards, objectives and performance criteria

A brief overview of the extent to which the development complies with Planning for Bush Fire Protection (PBP) standards, specific objectives and performance criteria set out in Chapter 4 (Performance Based Controls) of Planning for Bush Fire Protection (2006) the above, is here provided as more detailed information has already been provided earlier in this report.

The bush fire protection measures, such as the maintenance of the Asset Protection Zone, will have negligible negative impact on environmental features and attributes. The creation of a water storage will enhance wildlife habitat and foraging opportunities.

Asset Protection Zones (APZ's) Performance Criteria	Acceptable solutions
Radiant heat levels at any point on a proposed building will not exceed 29 kW/m^2	An APZ is provided in accordance with the relevant tables/ figures in the Guide for Bush Fire Planning 2006. The APZ (10 m) is wholly within the boundaries of the development site.
APZ are managed and maintained to prevent the spread of a fire towards the building.	In accordance with the requirements of Standards for Asset Protection Zones (RFS, 2005) A Monitoring and Fuel Management Program will be required as a condition of development consent.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	The APZ is located on lands with a slope less than 18 degrees and there will be no continuous canopy cover in the APZ.
Public Roads Performance Criteria The intent may be achieved where:	
Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources).	➢ Public roads are two-wheel drive, all weather roads. Roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge). ➢ Roads are clearly sign-posted and there ar no bridges requiring load ratings. ➢ The internal road surfaces have a capacity to carry fully-loaded fire fighting vehicles (15 tonnes).
Public road widths and design that allow safe access for firefighters while residents are evacuating an area.	➢ All roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. ➢ Traffic management devices are constructed to facilitate access by emergency services vehicles. ➢ Public roads have a cross fall not exceeding 3 degrees. ➢ As per the RFS recommendation although the roads are not through roads emergency egress will be available by way of an all weather gravel access at the eastern end of of the development leading onto Holmes Street. The two courts are short (~70 m) and incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard. ➢ There are no curves for the road.

	➢ The roads are on flat terrain. that is sealed roads certainly do not exceed 10 degrees. ➢ There is a minimum vertical clearance to a height of four metres above the road at all times.
The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles.	➢ The capacity of road surfaces is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). there are no bridges.
Roads that are clearly sign- posted (with easily distinguishable names) and buildings/properties that are clearly numbered.	➢ Public roads greater than 6.5 metres wide will have hydrants located outside of parking reserves to ensure accessibility to reticulated water for fire suppression. ➢ Public roads 8 metres wide and parking will be only within property boundaries thus ensuring accessibility to hydrants.
There is clear access to reticulated water supply.	➢ Emergency vehicles will be able to access hydrants and an open water supply via public roads and especially prepared drafting areas to ensure accessibility to reticulated and open water for fire suppression.
Parking does not obstruct the minimum paved width	➢ There will be no parking bays to block access to hydrants. ➢ Public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road.
Property Access Performance Criteria The intent may be achieved where:	Acceptable solutions
Access to properties is provided in recognition of the risk to fire fighters and/ or evacuating occupants.	➢ An alternative property access road to Holmes Street is provided for individual dwellings that are located more than 200 metres from a public through road.
The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles and all weather access is provided.	➢ Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge). ➢ There are no bridges.
Road widths and design enable safe access for vehicles	➢ The minimum carriageway width will be 6 m with a distance not greater than 70 metres from the nearest hydrant ➢ A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches. ➢ Internal roads within property boundaries will provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius. ➢ Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress. ➢ The minimum distance between inner and outer curves is six metres. ➢ The crossfall is not more than 10 degrees. ➢ Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.

Fire Trails Performance Criteria The intent may be achieved where:	Acceptable solutions
The width and design of the fire trails enables safe and ready access for firefighting vehicles.	➢ A minimum carriageway width of four metres with an additional one metre wide strip on each side of the trail (clear of bushes and long grass) is provided. ➢ The trail is a maximum grade of 15 degrees if sealed and not more than 10 degrees if unsealed. ➢ A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches is provided.

	➢ The crossfall of the trail is not more than 10 degrees. ➢ The trail has the capacity for passing by: ➢ Reversing bays using the access to properties to reverse fire tankers, which are six metres wide and eight metres deep to any gates, with an inner minimum turning radius of six metres and outer minimum radius of 12 metres.
Fire trails are trafficable under all weather conditions. Where the fire trail joins a public road, access shall be controlled to prevent use by non-authorised persons.	➢ The fire trail is accessible to fire fighters and maintained in a serviceable condition by the owner of the land. ➢ Appropriate drainage and erosion controls are provided. ➢ The fire trail system is connected to the property access road and/or to the through road system at frequent intervals of 200 metres or less. ➢ Fire trails do not traverse a wetlands or other land potentially subject to periodic inundation (other than a flood or storm surge). ➢ Gates for fire trails are provided and locked when appropriate with a key/lock system authorized by the local RFS.
Fire trails designed to prevent weed infestation, soil erosion and other land degradation	➢ Fire trail design does not adversely impact on natural hydrological flows. ➢ Fire trail design acts as an effective barrier to the spread of weeds and nutrients. ➢ Fire trail construction does not expose acid-sulphate soils.
Services – Water, electricity and gas Performance Criteria	Acceptable solutions
Non-reticulated water supply area For rural-residential and rural developments (or settlements) in bush fire prone areas, a water supply reserve dedicated to firefighting purposes is installed and maintained. The supply of water can be an amalgam of minimum quantities for each lot in the subdivision (community titled subdivisions), or held individually on each lot.	➢ More (20kL) than the minimum dedicated water supply will be available for firefighting purposes for each occupied building, excluding drenching systems. ➢ 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 will be adequate for water flow and are metal rather than plastic. ➢ Any underground tanks will 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 will not be used. Tanks on the hazard side of a building will be 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 will be shielded.
Electricity Services Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings and regular inspection of lines is undertaken to ensure they are not fouled by branches.	➢ Electrical transmission lines will be underground. ➢ No part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).
Gas services Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings	➢ Reticulated or bottled gas will be 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. Connections to and from gas cylinders are metal. ➢ Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings will not be used.

Conclusion

An assessment of the environmental issues indicates that there are no flora and fauna or cultural heritage issues. The site has been classed as a flood storage area for events approximating a 1:100 ARI, which is likely to have a time impact of about one week over eight generations of inhabitants and negligible economic impact.

The Bush Fire Assessment indicates that part of the site is bush fire prone and has a High Bush Fire Hazard Rating. Adjacent roadside reserves and private land are classed as woodland with flat terrain (0^0) with an assigned fire danger Index of 80, the heat flux would be 19 kW/m^2, resulting in a Bush Fire Attack Level (BAL) of 19 and a minimum Asset Protection Zone of 10 m. This APZ requirement can be easily achieved given that there is a 14 m buffer between the roadside boundary and all lot boundaries with a further 10 m minimum distance to any dwelling.

Specific construction requirements will be applied as outlined, the PBP Appendix 3 Addendum and in AS 3959-2009 as adopted in the Building Code of Australia 2011.

The development is able to meet all standards, objectives and performance criteria outlined in the PBP Guide (2006).

References

BCA -Building code of Australia (2011)

RFS -Rural Fire Service (2006) Planning for Bushfire Protection.

RFS – Rural fire service (2011) Guidelines for Single Dwelling Development Applications.

measures required to form compliance with *Planning for Bush Fire Protection*.

SARKING
Any sarking used for BAL-12.5, BAL-19, BAL-29 or BAL-40 shall be:

a. Non-combustible; or
b. Breather-type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS1530.2) and sarked on the outside of the frame; or
c. An insulation material conforming to the appropriate Australian Standard for that material.

SUBFLOOR SUPPORTS
For BAL-12.5 and BAL-19, Clause 5.2 and 6.2 shall be replaced by the provisions of Clause 7.2. In this regard, Clause 7.2 states:

"7.2 SUBFLOOR SUPPORTS

This Standard does not provide construction requirements for subfloor supports where the subfloor space is enclosed with—

a. *a wall that complies with .....* **(Clause 5.4 or 6.4 as appropriate)***; or*
b. *a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or*
c. *a combination of Items (a) and (b) above.*

Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles shall be—

(i) *of non-combustible material; or*
(ii) *of bushfire-resisting timber (see Appendix F); or*
(iii) *a combination of Items (i) and (ii) above.*

NOTE: This requirement applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 7.7)."

ELEVATED FLOORS
For BAL-12.5 and BAL-19, Clause 5.3 and 6.3 shall be replaced by the provisions of clause 7.3. In this regard, clause 7.3.2 states:

"7.3.2 Elevated floors
7.3.2.1 Enclosed subfloor space

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with—

a. *a wall that complies with .....* **(Clause 5.4 or 6.4 as appropriate)***; or*
b. *a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or*
c. *a combination of Items (a) and (b) above.*

7.3.2.2 Unenclosed subfloor space

Where the subfloor space is unenclosed, the bearers, joists and flooring, less than 400 mm above finished ground level, shall be one of the following:

a. *Materials that comply with the following:*
   (i) *Bearers and joists shall be—*
      A. non-combustible; or
      B. bushfire-resisting timber (see Appendix F); or
      C. a combination of Items (A) and (B) above.
   (ii) *Flooring shall be—*
      A. non-combustible; or
      B. bushfire-resisting timber (see Appendix F); or
      C. timber (other than bushfire-resisting timber), particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; or
      D. a combination of any of Items (A), (B) or (C) above. or
b. *A system complying with AS 1530.8.1*

This Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400 mm or more above finished ground level."

VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

For BAL-12.5 and BAL-19, Clause 5.7 and 6.7 shall be replaced by the provisions of clause 7.7. In this regard, clause 7.7 states:

"7.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS
7.7.1 General

Decking may be spaced.

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

7.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings
7.7.2.1 Materials to enclose a subfloor space

The subfloor spaces of verandas, decks, steps, ramps and landings are considered to be 'enclosed' when —

a. *the material used to enclose the subfloor space complies with ….* **(Clause 5.4 or 6.4 as appropriate)***; and*
b. *all openings greater than 3 mm are screened with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.*

7.7.2.2 Supports

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

7.7.2.3 Framing

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

7.7.2.4 Decking, stair treads and the trafficable surfaces of ramps and landings

Decking, stair treads and the trafficable surfaces of ramps and landings shall be—

a. *of non-combustible material; or*
b. *of bushfire-resisting timber (see Appendix F); or*
c. *a combination of Items (a) and (b) above.*

7.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings
7.7.3.1 Supports

Support posts, columns, stumps, stringers, piers and poles shall be—

a. *of non-combustible material; or*
b. *of bushfire-resisting timber (see Appendix F); or*
c. *a combination of Items (a) and (b) above.*

7.7.3.2 Framing

Framing of verandas, decks, ramps or landings (i.e., bearers and joists) shall be—

a. *of non-combustible material; or*
b. *of bushfire-resisting timber (see Appendix F); or*
c. *a combination of Items (a) and (b) above.*

7.7.3.3 Decking, stair treads and the trafficable surfaces of ramps and landings

Decking, stair treads and the trafficable surfaces of ramps and landings shall be—

a. *of non-combustible material; or*
b. *of bushfire-resisting timber (see Appendix F); or*
c. *a combination of Items (a) and (b) above.*

7.7.4 Balustrades, handrails or other barriers

Those parts of the handrails and balustrades less than 125 mm from any glazing or any combustible wall shall be—

a. *of non-combustible material; or*
b. *bushfire-resisting timber (see Appendix F); or*
c. *a combination of Items (i) and (ii) above.*

Those parts of the handrails and balustrades that are 125 mm or more from the building have no requirements."