Our Ref: A10031:JT/NVD

27th August 2010

Worley Parsons Services
PO Box 1812
NORTH SYDNEY NSW 2059

Attention: Mr Chris Moon

Dear Chris

Re: Bushfire Constraints Advice for the proposed rezoning at Bundeena Road, Glenning Valley

A preliminary assessment of bushfire constraints has been undertaken in support of the proposed rezoning of land at the above address and assists in defining a developable area in accordance with the requirements of *Planning for Bushfire Protection* 2006.

The assessment has identified the minimum required asset protection zones as well as providing a general overview of the building construction standards that will be required for future development.

Reference has been made to the Ecological Constraints Analysis prepared by *Travers bushfire & ecology (2010) that* accompanies this assessment.

The Ecological Constraints Analysis provides an assessment and determines the extent of the following endangered ecological communities

- Apple / Mahogany Woodland
- Swamp Mahogany Woodland
- Swamp Mahogany Open Woodland
- SEPP 14 Wetland located adjacent to the site.

The ecological assessment also provides for a 60 metre wide wildlife corridor and recommends a 25 metre vegetated buffer for the White-bellied Sea Eagle (refer Schedule 1).

The asset protection zones required to be incorporated for future development proposals have therefore taken into consideration these ecological constraints.

Yours faithfully

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BUSHFIRE CONSTRAINTS
BUNDEENA ROAD, GLENNING VALLEY

A bushfire assessment has been undertaken in support of the future rezoning of the land at Bundeena Road, Glenning Valley. This assessment assists in defining a developable area in accordance with the requirements of *Planning for Bushfire Protection* 2006.

As the site is located in a bushfire prone area future development is required to be considered under Section 100B of the *Rural Fires Act.* Development applications for future subdivision requires the Rural Fire Service to issue a *Bushfire Safety Authority* (BSA) in accordance with *Planning for Bush Fire Protection 2006* (PBP).

PBP dictates that the subsequent extent of bushfire attack that can potentially emanate from a bushfire must not exceed a radiant heat flux of 29 kW/m^2 for *residential subdivision* developments. This rating assists in determining the size of the *asset protection zone* (APZ) in compliance with Appendix 2 of PBP to provide the necessary *defendable space* between hazardous vegetation and habitable dwellings.

The following assessment found that bushfire can potentially affect the proposed development from the forested wetland and forest vegetation in the adjoining lands to the west and within the retained communities within the northern portion of the site resulting in possible ember attack, radiant heat and flame attack.

Environmental constraints

Constraints in terms of the available land for future subdivision include areas identified as an endangered ecological community, the 25m buffer to White-bellied Sea Eagle habitat and the 60 metre wide wildlife corridor. These environmental constraints are discussed in further detail within the Ecological Constraints Analysis prepared by *Travers bushfire & ecology (2010).*

An additional constraint is the steep land in excess of 18 degrees. PBP 2006 dictates that the location of APZ's on slopes greater than 18 degrees are not supported for new developments on wooded vegetation. This is due to environmental slope constraints and difficulties in the management of vegetation on those steeper slopes.

The asset protection zones (depicted in Schedule 1 attached) have been excluded, for the most part, from these environmental constraints.

Bushfire attack assessment

The RFS (PBP 2006) requires that a development assessment must include a bushfire attack assessment to determine the possible impact or vulnerability of a habitable structure from the impacts of a bushfire. The assessment for subdivision must be undertaken using a 'deemed to satisfy' approach in accordance with the *Building Code of Australia* and must comply with the Tables provided within Appendix 2 of PBP 2006.

PBP provides a methodology to determine the size of any APZ that may be required to offset possible bushfire attack. The assessment uses the vegetation type, fire danger index (by region) and slope gradient to determine the size of the APZ and the accompanying building construction level. Vegetation type is assessed for a distance of 140 metres external to the proposed development. Our assessment of slope and vegetation is provided below.

Hazardous Vegetation

The bushfire threat to most aspects of the site is Forested Wetland as defined within PBP 2006. Due to recent changes and the adoption of AS3959 (2009) the NSW RFS have released an Addendum Appendix 3 (PBP) to provide clarification on the use of the AS3959 for the determination of bushfire attack levels (BAL) and the construction standards.

Appendix 2 of PBP is used to determine the APZ for subdivision and the Tables within AS3959 are used to determine the construction standard. While Appendix 2 identifies Forested Wetland as a category of vegetation the new standard (AS3959) does not. The conversion table (pg 8 of the Addendum Appendix 3) effectively converts Forested Wetland vegetation to a Forest category for the determination of construction standards. When using the recommended APZ's provided in PBP for a Forested Wetland it effectively places a building in the Flame Zone when determining building construction (AS2959).

Although a DA submission to the NSW RFS for subdivision will be approved based on the APZ required for Forested Wetland (a lesser APZ) this will place future building construction in the flame zone. This will see a dramatic increase in the cost for building construction.

To avoid costly implications in the future in terms of building construction this assessment has determined the vegetation to be Forest in accordance with AS3959 (2009).

Effective Slope

This effective slope within the hazardous vegetation which most significantly affects fire behavior for future development is identified within Column 3, Table 1 below.

A Fire Danger Index (FDI) of 100 has been used to calculate bushfire behavior on the site using forest vegetation located within the Greater Sydney region. Table 1 below provides a summary of the bushfire attack assessment for the proposed development.

Table 1 – Bushfire attack assessment

Aspect	**Vegetation**	**Slope**	**Minimum Asset Protection Zone Required (PBP 2006)**
North	Forest (wildlife Corridor)	5 - 10^{0D}	35 metres
		0 - 5^{0D}	25 metres
North & East	Forest (internal reserve)	Level	20 metres
		0 - 5^{0D}	25 metres
North	Forest (external to site)	0 - 5^{0D}	25 metres
West	Forest	0 - 5^{0}	25metres
	Grassland		10 metres
South & East	Residential	0 - 5^{0}	N/A

*Notes: * Slope is either 'U' meaning upslope or 'C' meaning cross slope or 'D' meaning downslope*

Level of construction AS3959 - 2009

As a result of the release of the *Australian Standard AS3969 (2009)* as adopted by the *Building Code of Australia* in May 2010, the NSW RFS has released an interim amendment to PBP 2006 in the form of Appendix 3. This appendix, in conjunction with Table 2.4.2 of AS3959 (2009), is now used to determine construction considerations for s79BA (EPA) dwelling applications.

This classification system has been designed for bushfire prone areas and is based on five (5) *bushfire attack levels* (BAL). These are BAL Flame Zone (FZ), BAL 40, BAL 29, BAL 19 and BAL 12.5. (*AS3959 – 2009 – Construction of buildings in bushfire prone areas*). The lowest level, BAL 12.5, has the longest APZ distance while BAL – FZ has the shortest APZ distance.

Although not required for rezoning or subdivision development applications indicative building construction standards have been provided within Table 2 and are depicted within Schedule 1 for information purposes only.

Table 2 – Determination of Bushfire Attack Level (BAL)

Aspect	Vegetation	Slope	Minimum APZ	Bushfire Attack Level (BAL) (Appendix 3 PBP 2006)
North	Forest (Wildlife Corridor)	5 - 10^{0D}	35 metres	BAL 40 (35 – <39m) BAL 29 (39 – <53m) BAL 19 (53 – <69m) BAL 12.5 (69 - <100)
		0 - 5^{0D}	25 metres	BAL 40 (25 – <32m) BAL 29 (32 - <43m) BAL 19 (43 – <57m) BAL 12.5 (57 - <100m)
North & East	Forest (internal reserve)	Level	20 metres	BAL 40 (20 – <25m) BAL 29 (25 – <35m) BAL 19 (35 – <48m) BAL 12.5 (48 - <100)
		0 - 5^{0D}	25 metres	BAL 40 (25 – <32m) BAL 29 (32 - <43m) BAL 19 (43 – <57m) BAL 12.5 (57 - <100m)
North	Forest (external to site)	0 - 5^{0D}	25 metres	BAL 40 (25 – <32m) BAL 29 (32 - <43m) BAL 19 (43 – <57m) BAL 12.5 (57 - <100m)
West	Forest	0 - 5^{0}	25metres	BAL 40 (25 – <32m) BAL 29 (32 - <43m) BAL 19 (43 – <57m) BAL 12.5 (57 - <100m)
	Grassland			N/A
South & East	Residential	0 - 5^{0}	>100 m	N/A

*Notes: * Slope is either 'U' meaning upslope or 'C' meaning cross slope or 'D' meaning downslope*

The above table provides an indication of the dwelling construction standards that will be necessary for buildings within any future subdivision. Schedule 1 depicts these distances, for example buildings located within 25 – 32 metres of the western boundary will require compliance with BAL 40 construction. Buildings within 32 to 43 metres of the western boundary will require BAL 29 construction etc.

All buildings within 100 metres of hazardous vegetation will require construction in accordance with AS3959 (2009).

Access

In terms of future access arrangements for the any future subdivision the following acceptable solutions must be addressed in accordance with Section 4.1.3 of PBP 2006. These are;

Public Roads

The intent of measures is to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from the area.

Acceptable Solutions
Public Roads are two-wheel drive, all weather roads.
Perimeter roads are two way (carriageway 8 m minimum kerb to kerb). Non perimeter roads comply with Table 4.1.
Perimeter road is linked with the internal road system at an interval of no greater than 500 metres in urban areas.
Traffic management devices are constructed to facilitate access by emergency services.
Public roads have a cross fall not exceeding 3 degrees.
All roads are through roads. If unavoidable dead end roads are not more than 200 metres in length, incorporate a minimum 12 m outer radius turning circle, sign posed dead end and direct traffic away from the hazard.
Curves of roads (other than perimeter) have a minimum inner radius of 6 m and are minimal in number.
The minimum distance between inner and outer curves is 6m.
Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees.
Minimum vertical clearance of 4 m above the road.
The capacity of road surfaces and bridges is sufficient.

Acceptable Solutions
To carry fully loaded fire fighting vehicles (15 tonnes for reticulated water and 28 tonnes for all other areas). Bridges clearly indicate load rating.
Public roads >6.5m wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water. Public roads 6.5 - 8 m wide are No Parking on one side with the hydrant located on this side to ensure accessibility to reticulated water. Public roads <6.5 m wide provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water. One way only public access are no less than 3.5 m wide and provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water.
Parking bays are a minimum of 2.6 metres wide from kerb edge to road pavement. No services or hydrants are located within parking bays. Public roads interfacing the bushfire hazard are to provide roll top kerbing to the hazard side of the road.

The challenge for future subdivision is to provide perimeter roads between the subdivision and the hazardous vegetation as well as limiting any dead end roads. If dead end roads are unavoidable they are to be less than 200 metres in length.

Property Access Roads

The intent of measures is to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupants faced with evacuation.

Acceptable Solutions
At least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 m from a public through road.
Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes.
Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge)
A minimum carriageway width of four metres for dwellings with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building. Note: No specific access requirements apply in a urban area where a 70 m unobstructed path can be demonstrated between the most distant external part of a dwelling and the nearest part of the public access road that supports the operational use of fire fighting vehicles (road speed limit <70kph)

Acceptable Solutions
In forest, woodland and heath situations, rural property access roads have passing bays every 200 m that are 20 m long by 2m wide (min. width 6m).
A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches
Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum outer radius of 12m.
Curves have a minimum inner radius of 6 m and are minimal in number to allow rapid access/egress.
The minimum distance between inner and outer curves is 6 metres.
The cross fall 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.
Access to a development comprising more than three dwellings have formalized access by dedication of a road and not by right of way.