WARNING
No part of this plan should be used
for critical design dimensions.
Confirmation of critical positions
should be obtained from RPS Newcastle.

LEGEND

- Development Estate
- 100m Slope Buffer
- Upslope / Flat
- 0-5 degrees Downslope

N

0 150 300m

SCALE: 1:3000 AT A3 SIZE

TITLE: FIGURE 3-1 SLOPE CLASS MAP

LOCATION: NORDS WHARF

DATUM: DATUM
PROJECTION: MGA ZONE 56 (GDA 94)

DATE: 5/7/2010
PURPOSE: BTA

LAYOUT REF: 24530-1 NW NEW TEMP FIG 2-1 VEGETATION MAP A-A3.WOR
VERSION (PLAN BY): A-A3 (E.G)

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JOB REF: 24530-1

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
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3.2 Slope by Degrees

A Slope Degree Map has been produced for land within 100m of the Development Estate by using contours of 2 metres, derived from aerial photography. This Slope Degree Map (Figure 3-2) has been created to assist in the determination of APZ's by the slope that will most likely influence bushfire behaviour. The slope of vegetation surrounding the Development Estate to 140m is documented in Table 3-2.

Table 3-2: Slope Degree Assessment

Direction of Vegetation from Development Estate	Slope of Vegetation
North	Cross-slope
South	Cross-slope 2.2^0 downslope 4.1^0 downslope
East	5^0 upslope 8^0 upslope
West	4.8^0 downslope

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LEGEND

- Site Boundary
- Development Estate
- Required APZ

N

0 150 300m

SCALE: 1:3000 AT A3 SIZE

TITLE:	FIGURE 4-1 APZ MAP	LOCATION:	NORDS WHARF	DATUM: PROJECTION:	DATUM MGA ZONE 56 (GDA 94)	DATE: PURPOSE:	5/7/2010 BTA

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4 Asset Protection Zones

4.1 Definitions

4.1.1 APZ's

An APZ is defined as an area surrounding a development zone that is managed to reduce the bushfire hazard to an acceptable level. The required width of the APZ varies with slope and the type of hazard. An APZ can consist of both an Inner Protection Area (IPA) and an Outer Protection Area (OPA). The respective IPA and OPA widths for the APZ's required under this proposal are as detailed in Section 4.2 and Figure 4-1.

An APZ can include the following:

- Lawns;
- discontinuous gardens;
- swimming pools;
- driveways;
- detached garages;
- open space / parkland;
- car parking;
- swales; and
- cycle ways and formed walkways.

4.1.2 Inner Protection Area (IPA)

The IPA extends from the edge of the development to the OPA. The IPA aims to ensure that the presence of fuels which could contribute to a fire event / intensity, are minimised close to the development. The performance of the IPA must be such that:

- there is minimal fine fuel at ground level which could be set alight by a bushfire; and
- any vegetation in the IPA does not provide a path for the transfer of fire to the development – that is, the fuels are discontinuous.

The presence of a few shrubs or trees in the IPA is acceptable provided that they:
do not touch or overhang any buildings;

- are well spread out and do not form a continuous canopy;
- are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and
- are located far enough away from any dwelling so that they will not ignite the dwelling by direct flame contact or radiant heat emission.

Woodpiles, wooden sheds, combustible material storage areas, large areas / quantities of garden mulch, stacked flammable building materials etc. should not be permitted in the IPA.
Refer to Appendix C for further information on the performance requirements of IPA's.

4.1.3 Outer Protection Area (OPA)

The OPA is located adjacent to the hazard. Within the OPA any trees and shrubs should be maintained in a manner such that the vegetation is not continuous. Fine fuel loadings should be kept to a level where the fire intensity expected will not impact on adjacent developments.

4.2 Determining APZs

In accordance with Table A2.4 within PBP (RFS, 2006), the appropriate width setbacks (depicted in Table 4-1 and Figure 4-1) have been calculated based on the topography and the vegetation present in and around the Development Estate. These prescribed distances will be required between neighbouring vegetation and the proposed residential development within the site. It is expected this area will be maintained to an APZ standard with minimal fuel loads and appropriate landscaping.

The Concept Plan indicates that proposed roadways provide a buffer between the adjacent vegetation and the Development Estate and vegetation to be retained within the site, including foreshore parks, riparian buffers and vegetation buffers. The proposed perimeter and public roads within the Development Estate are therefore likely to provide either the entire or majority of the required APZs, with any remaining part of the APZ (if required) being able to be established within the allotments.

Table 4-1: APZ widths for Residential Development

Vegetation Type	Direction from Development Estate	Slope	APZ
Open Forest	North	6^0 upslope	20m
Open Forest	South	2.2^0 downslope	25m
Open Forest	South	4.1^0 downslope	25m
Open Forest	West	4.8^0 downslope	25m
Open Forest	East	5^0 upslope	20m
Open Forest	East	8^0 upslope	20m

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LEGEND

- Development Estate
- Site Boundary
- Required APZ

N

0 150 300m

SCALE: 1:3000 AT A3 SIZE

TITLE: FIGURE 4-1 APZ MAP

LOCATION: NORDS WHARF

DATUM: DATUM
PROJECTION: MGA ZONE 56 (GDA 94)

DATE: 5/7/2010
PURPOSE: BTA REPORT FIGURE

LAYOUT REF: 24530-1 NW NEW TEMP FIG 2-1 VEGETATION MAP A-A3.WOR
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5 Water Supply

Associated with any kind of development upon the land, it is expected that water mains will be extended into the Development Estate. Access to this supply should be provided for fire-crews in the form of readily accessible and easily located fire hydrants. Fire hydrant spacing, sizing and pressure should comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. Hydrants are not to be located within any road carriageway.

6 Access / Egress (Evacuation)

PBP (RFS, 2006) recommends a perimeter road be designed for any future residential development. A perimeter road forms part of the APZ and will provide a separation between the building and the boundary of the bush fire hazard.

Any perimeter road should be fully sealed and have a minimum road reserve width of 8m minimum kerb to kerb with the following design specifications:

- roads should be two wheel drive, all weather roads;
- roads should be two-way: i.e. at least two traffic lane widths with shoulders on each side, allowing traffic to pass in opposite directions;
- roads should be through roads where possible, any dead end roads should not be more than 200m in length with a 12m radius turning circle and clearly sign posted as such;
- the capacity of road surfaces and bridges should be sufficient to carry fully loaded fire fighting vehicles (approximately 28 tonnes or 8 tonnes per axle); and
- roads should be clearly sign posted and buildings clearly numbered.

The Concept Plan indicates that a perimeter road has been proposed for the majority of the Development Estate. The perimeter road complies with the above requirements. The perimeter road will allow a defendable space between vegetation and housing whilst also acting as an APZ.

According to PBP (2006), the design specifications for **internal public road** require that roads:

- be two-wheel drive all weather roads;
- non perimeter roads comply with Table 6-1 (below) – Road widths for Category 1 Tanker;

Table 6-1: Minimum widths for fire fighting access of non-perimeter public roads

Curve radius (inside edge metres)	Swept Path (metres width)	Single land (metres width)	Two way (metres width)
<40	3.5	4.5	8.0
40 – 69	3.0	3.9	7.5
70 – 100	2.7	3.6	6.9
>100	2.5	3.5	6.5

- the perimeter road is linked to the internal road system at an interval of no greater than 500m in urban areas;
- not be hindered by an overuse of traffic calming devices such as speed humps and chicanes;
- public roads do not have a cross fall exceeding 3 degrees;

- all roads are through roads, but if unavoidable then dead ends should be not more than 200m in length, incorporate a minimum 12m turning circle and should be clearly sign posted as dead ends;
- curves of roads (other than perimeter roads) are a minimum inner radius of 6 metres and minimal in number, to allow for rapid access and egress;
- the minimum distance between inner and outer curves is 6m;
- maximum grade for sealed roads do not exceed 15^{o} and an average grade of not more than 10^{o} or other gradient specified by road design standards, whichever is the lesser gradient;
- there is a minimum vertical clearance to a height of 4m above the road at all times;
- the capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes. Bridges clearly indicate load rating;
- public roads between 6.5m and 8m wide are no parking on one side with the services (hydrants) located on the side to ensure accessibility to reticulated water for suppression;
- one way public access roads are no less than 3.5m wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression;
- parking bays are a minimum of 2.6m wide from kerb edge to road pavement. No services or hydrants are located within the parking bays; and
- public roads directly interfacing the bush fire hazard vegetation should provide roll top kerbing to the hazard side of the road.

The Concept Plan provides for five internal public roads within the Development Estate. Four of the proposed internal public roads are through roads thereby providing two points of access/egress for both fire fighters and residents evacuating their dwelling. A single dead end road is proposed along the northern boundary of the Development Estate. According to PBP 2006 dead end roads should be not more than 200m in length, incorporate a minimum 12m turning circle and should be clearly sign posted as a dead end. The proposed dead end road is less than 200m in length and through incorporation of the required features stated above will comply with public road requirements as per PBP (2006).

According to PBP (2006), the design specifications for **property access roads** require that roads:

- at least one alternative property access is provided for individual dwellings (or group of dwellings) that are located more than 200m from a public through road;
- a minimum carriageway width of four metres for rural-residential areas, rural landholdings or urban area with a distance greater than 70 metres from the nearest hydrant point to the most external part of the proposed building;

Note: No specific access requirements apply in a urban area where a 70m unobstructed path can be demonstrated between the most distant part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency fighting vehicles (i.e. a hydrant or water supply).

- a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches;
- on forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20 metres long by two metres wide;
- internal roads for rural properties have 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 crossfall is not more than 10^{o};
- maximum grades for sealed roads do not exceed 15^{o} and not more than 10^{o} for unsealed roads; and
- access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way.

The above road specifications are the acceptable solutions as detailed within PBP (RFS, 2006). Deviations from the above acceptable solutions for access may be considered (depending on the situation) through a performance-based assessment.

7 Fire Fighting Capability

Any fire within the Development Estate would be attended in the first instance by the Nords Wharf NSW RFS.

Consideration must be given to the provision of adequate turning circles for any fire tanker that services the Development Estate. The proposed perimeter roads and internal public roads within the Concept Plan would satisfactorily serve such a function.

To facilitate quick and efficient action by the Fire Brigade upon arrival, it is recommended that all necessary connections / pumps etc be clearly marked and visible, and in good working order.