

Bushfire

Services

Bushfire Protection Assessment

Vincentia Coastal Village and District
Centre

City of Shoalhaven

January 2006

Our Reference: 5531



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Vincentia Coastal Village and District Centre

Prepared January 2006

for

Stockland

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SUMMARY

The development site is bushfire prone and has been mapped as such by Shoalhaven City Council. Bushfire protection provisions appropriate to the bushfire risk will be established, maintained and designed consistent with the NSW Rural Fire Service (2001) *Planning for Bushfire Protection, A guide for Councils, Planners, Fire Authorities, Developers and Home Owners* (PBP Guidelines).

Asset Protection Zones (APZs): APZs of varying dimensions (depending on slopes, development type, and vegetation) will be created and maintained in perpetuity. Dimensions comply with PBP Guideline's Tables A2.2 for residential areas and are out of the 'flame zone' for non-residential buildings. Fuel loadings within the APZ will be as described in PBP Guidelines.

Stormwater quality control measures will also be contained within the APZ. Vegetation management for the establishment and maintenance of these systems is compatible with the maintenance of the APZ.

Construction Standards: AS3959 will be applied to Class 1, 2, and 3 buildings (Building Code of Australia) within the development. The construction standards applied will comply with Appendix 3 and Table A3.3 of PBP Guidelines and NSW RFS policies.

Access: The development will have 3 public access roads along Naval College (Jervis Bay) Road; and 2 along The Wool Road. Perimeter roads with an 8 m trafficable surface will be provided around all development areas. The perimeter roads will link with internal roads at frequent intervals. Numerous alternative access and egress roads will be provided to ensure at least one safe evacuation and access route. Access provisions comply with general specifications (Section 4.3.4 of PBP Guidelines) for access and the design criteria for public roads, fire trails, and perimeter roads.

Water supply: Reticulated mains and static water supplies will be available throughout the development. Hydrants will be made accessible and located such that a tanker can park within a distance serviceable by a 20 m hose and hydrants will be located such that all habitable buildings are within 70 m of a hydrant. Large water features and settling ponds will also be accessible to fire fighting appliances (*i.e.* within 20 m) and residents along the bushland interface will be encouraged to adapt their watertanks for firefighting purposes. Water supplies will exceed recommendations outlined in Section 6.4 of PBP Guidelines

Staging: The development will proceed in 'blocks' and not as scattered development. New 'blocks' will be created from the perimeters of existing development (*i.e.* developed 'blocks'). APZs will be established around all new blocks and this will be maintained by Stockland until such time that the adjoining area comprising the APZ is developed for residential/commercial purposes. The staging process complies with Section 4.4 of the PBP Guidelines.

The bushfire protection measures described above and detailed throughout the report will provide an appropriate standard of bushfire protection for the proposed development which is consistent with current state guidelines for development within bushfire prone lands.

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1. Introduction and background

Stockland commissioned Bushfire and Environmental Services Pty Ltd (BES) to prepare a Bushfire Protection Assessment for the proposed Vincentia Coastal Village and District Centre.

This Bushfire Protection Assessment has been prepared to accompany an application under Part 3A of the *Environmental Planning and Assessment Act 1979* (EPA Act 1979).

Although the project will be assessed under Part 3A of the EPA Act, this bushfire assessment has been prepared using current state-wide guidelines to ensure consistent bushfire protection outcomes, that is;

- *Section 79BA of the Environment Planning and Assessment Act 1979;*
- *Section 100B of the Rural Fires Act 1997;*
- *Clause 46 of the Rural Fires Regulation 2002, and;*
- *NSW Rural Fire Service (2001) Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners” (herein called PBP Guidelines).*

1.1 Project description

Stockland is seeking project approval for a residential subdivision and concept approval for a district centre in the south east corner of the site and an adaptable housing area adjacent to the Bay and Basin Leisure Centre. A description is summarised below.

The residential subdivision includes:

- a total of 604 lots;
- approximately 60 hectares (47 percent of the site) of open space area, which would be comprised of environmental conservation areas, asset protect zones (APZs) and urban parks;
- an internal road network with three access points to Naval College Road;
- construction works related to providing physical infrastructure and services including some vegetation clearing.

Refer to Figure 2.

The concept plan for the district centre includes:

- building footprints;

- an indicative total floor area of 32,000 square metres with approximately 20,000 square metres proposed in Stage 1 and 12,000 square metres proposed in Stage 2;
- a range of uses including a discount department store, supermarket, medical centre, child care centre, restaurants, bulky goods, potential housing and specialty retail;
- a site (Stage 3) for future bulky goods development;
- a road network that includes a main street, access to The Wool Road and access to a proposed road in the subdivision;
- an indicative total of 1,399 car parking spaces to be provided in two car parking areas and at the upper level of future buildings;
- a water feature and open space areas.

Refer to Figure 2.

The concept plan for the Village East being the adaptable housing area adjacent to the Bay and Basin Leisure Centre includes an internal road network, indicative residential lot layout and access to The Wool Road. Refer to Figure 2.

Open space to be retained over the site is 59.8 hectares or 47% of the site area. The majority of the open space (approximately 47.5 ha) is proposed to be gifted to NSW Department of Environment and Conservation (DEC) for inclusion into the Jervis Bay National Park.

1.2 Location and description of site

The subject site is located on the northern corner of the intersection of Naval College (Jervis Bay) Road and The Wool Road, Vincentia, Shoalhaven City (Figure 1). The site comprises Lots 801 and 802 in DP 1022286, Lots 72 – 75 in DP 874040 and all public roads within these lots.

The site is bounded to the;

- southeast by The Wool Road,
- southwest by Naval College (Jervis Bay) Road and existing rural residential development,
- northwest by Jervis Bay National Park, and
- northeast by Jervis Bay National Park and the existing Council operated Bay and Basin Leisure Centre.

The topography of the site is dominated by two northeast trending ridgelines dissected by three ephemeral watercourses flowing north to northeast to adjacent wetlands within Jervis Bay National Park. The terrain is flat to gently undulating with slopes being less than 5 degrees (Figure 3). Vegetation varieties which currently cover the site include sedgeland, heathland, woodland and open forest (Figure 4).

The subject land has been identified in the Jervis Bay Settlement Strategy (DIPNR 2003) as an area for urban expansion and a district level shopping centre.

1.3 General comment on fire risk

The development site has been mapped as bushfire prone land by Shoalhaven City Council.

The Shoalhaven area has one of the highest incidences of bushfires in NSW, accounting for approximately half of the unplanned fires in the southern region. Major bushfire events occur frequently in the locality of the subject land, and four significant bushfires have occurred in the area over the past decade. Many recent fires have had periods of high intensity fire behaviour with the potential to cause loss of property. Many residential buildings and sheds were damaged or destroyed in nearby villages of Huskisson, Falls Creek and Woollamia by bushfires in 2001.

Extensive areas of bushland are reserved in adjoining National Park and Nature Reserves. The risk of bushfire impact will therefore be an ongoing threat to the proposed development.

Bushfire protection provisions appropriate to the bushfire risk described above will be established and maintained. These are outlined in Section 3 and summarised in Table 4 (p.22).

1.3.1 Bushfire Behaviour Potential

A GIS model has been used to prepare a bushfire behaviour potential (BBP) map based upon slope (Figure 3), aspect and vegetation (see Figure 4). BBP describes the potential behaviour of a fire under specific conditions at specific locations. The mapping of BBP (Figure 5) areas does not indicate how often an area will receive potentially damaging fires, or the actual intensity of a fire. It does, however, comparatively rank sites of higher / lower risk of high intensity fires. It should be noted that uncontrollable fire intensities could still occur in areas with lower ranked bushfire behaviour potential. However, in greater risk areas, fires that are difficult to control are likely to occur more often and with potentially higher intensities.

The map assists in understanding the potential bushfire behaviour and fire pathways in the study area. For example, locations with an expanse of higher BBP extending in a west to east direction may represent a potential wildfire path. On the other hand, sites of negligible or lower BBP are usually reliable inhibitors of wildfire spread and if broad enough may stop, reduce the intensity and/or slow the spread of fire or offer a control area for firefighters.

Figure 5 displays the BBP for the proposed Vincentia Village and District Centre and surrounding region. Notable features of the BBP analyses for the development include;

- a relatively high percentage of the lower risk classification in the local region, attributable to the relatively flat topography;
- the absence of large areas that have a greater risk of higher intensity fires; and
- significant areas with lower BBP around the development that may offer potential control lines for firefighters.

The BBP analysis indicates that there are large areas surrounding the proposed development that can potentially be used to stop the spread of lower intensity fires. However, this does not negate the risk of potential fire impact to the development during extreme bushfire conditions.

Bushfire Assessment

2. Classification of predominant vegetation and slope

In accordance with the PBP Guidelines (Section A2.3.2), vegetation classes have been determined within and adjacent to the subject land. This has been mapped and is displayed in Figure 4. A variety of vegetation classes fall across the subject land including sedgeland, heathland, open woodland, and open forest.

Slope classes have also been determined and mapped for the entire subject land. These have been mapped and are displayed as Figure 3 of this report. Slopes are predominantly within the 0 – 5 degree slope class.

The vegetation and slope maps have been used to determine Asset Protection Zone setbacks for the development as explained in Section 3.1 of this report.

3. Provision of Asset Protection Zones and setbacks from bushfire hazard

Asset Protection Zones (APZs) will be established and maintained in perpetuity at the interface between all fire-prone vegetation and built assets vulnerable to bushfire damage.

The primary purpose of the APZs will be to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures within the development. APZs will incorporate;

1. An Outer Protection Area (OPA); and
2. An Inner Protection Area (IPA), which will also include a perimeter road reserve.

The OPA will be located adjacent to the hazard and by reducing fuel in this area, the intensity of an approaching fire will be decreased and the pathways to the crown fuels restricted. The OPA will also reduce the level of direct flame, radiant heat and ember attack on the IPA (NSW RFS 2001 p.16). Stormwater quality control measures including permanent ponds and intermittently inundated wetlands linked by bio-retention swales, will also be contained within the OPA (Forbes Rigby 2006). Vegetation management to establish and maintain performance of both the OPA and the stormwater quality control measures are compatible (refer to Section 3.2).

The IPA will extend from the edge of the OPA to the development. The IPA's purpose is to ensure that the presence of fuels, which could be involved in a fire, are minimised close to the development. Therefore, the impact of direct flame contact and radiant heat is minimised (NSW RFS 2001).

3.1 APZ dimensions

Dimensions of APZs for the development have been determined using consistent methodology identified in Appendix 2 of the PBP Guidelines. Broadly, the procedure used for determining APZ dimensions was as follows;

1. Vegetation distance, type and class were determined.
2. The effective slope of the land between the predominant vegetation class and the site were determined.
3. Appropriate tables within the PBP Guidelines were consulted and the appropriate APZ setback for the assessed land use, vegetation group and effective slopes were determined.

The results of this procedure are displayed as Figure 6 (APZ dimensions).

In determining APZ dimensions throughout the proposed development, consideration was given to the various land uses that will occur on the subject land. For instance;

- APZ setbacks for residential areas were determined using Table A2.2 of PBP 2001 (Minimum Specifications for APZ for Residential Purposes); and
- Non-residential buildings were determined on the basis of advice received from NSWRFs (both local and head office staff) indicating a minimum 20 m APZ or 'out of the flame zone'.

3.1.1 APZ dimensions and compliance with PBP Guidelines

Support from NSWRFs has been sought for a minor reduction to the APZ near the Jervis Bay Leek Orchid site (JBLO). This is supported by the JBLO Recovery Team and the NSW Department of Environment and Conservation. Additional protection measures are proposed that protects the endangered JBLO population while still maintaining bushfire protection to assets along the interface. Section 11.3 of this report outlines the reasons behind the modification and details the additional bushfire protection measures that are proposed.

All other APZs fully comply with PBP Guidelines.

3.2 Fuel management within the APZs

Inner Protection Area (refer to Figure 6)

Fuel management within the IPA will be as follows:

- Existing larger trees (at least 150 mm in diameter measured at chest height) will remain within the APZ provided that;
 - no part of their crown occurs within 5 m of any building (significant habitat trees can remain 2 m out from the building line);
 - canopies are discontinuous, *i.e.*, canopies are separated by at least 2 m;
 - they are smooth barked species or, if rough barked, are maintained free of hanging bark and other ladder fuels; and
 - low branches holding fine fuel (*i.e.* leaves and twigs of <6mm in diameter) are pruned to 2 m from the ground;
- Smaller trees (*i.e.* less than 150 mm in diameter), shrubs, fallen trees and tree-limbs and stumps are to be removed and continually suppressed;
- Any landscaping or plantings should preferably be local endemic mesic species or other low flammability species. The presence of a few shrubs, vegetable gardens or fruit trees is also acceptable provided that all plantings and residual vegetation are well spread out, do not form a contiguous pathway to the dwelling and do not constitute more than 5% of the total APZ area;
- A minimal ground fuel is to be maintained to include either mown grass, paving, concrete, bare ground, or less than 3 tonnes per hectare of fine fuel (*i.e.* material of <6 mm in diameter);
- Any structures (*e.g.* fences, garden sheds, decks, pergolas etc) within the APZ are to be non-combustible (*i.e.* non-combustible under Australian Standard 1530.1 and not deemed combustible pursuant to clause C1.12 of volume 1 of the Building Code of Australia);
- Any structures storing combustible materials such as firewood (*e.g.* sheds) must be sealed to prevent entry of burning debris; and
- Gutters, roofs and roof gullies shall be kept free of leaves and other debris.

Outer Protection Area

The fuel loadings within the OPA will be managed in accordance with PBP Guidelines, *i.e.*:

- Trees and shrubs will be maintained in such a manner that the vegetation is not continuous, and
- Fuel loadings will be kept to below 8 tonnes per hectare.

The OPA for residential areas will contain the proposed stormwater quality control measures, including permanent ponds and intermittently inundated wetlands linked to biofiltration swales (Forbes Rigby 2005). These systems will not impact on the performance of the OPA for the following reasons;

- Vegetation communities within these systems (expected to be dominated by rushes, *Juncus*, *Cyperus* and other macrophytes) are expected to have fuel levels within OPA parameters (*i.e.* below 8 tonnes per hectare); and
- Trees and shrubs surrounding the ponds, wetlands and swales within the OPA will be maintained to ensure canopy discontinuity.

Therefore, vegetation management necessary to establish and maintain performance of both the OPA and the stormwater quality control measures are compatible.

3.3 Vegetation management within the ‘Village Parks’ and ‘Green Wedges’

APZ setbacks are not required adjoining the internal ‘Village Parks’ and ‘Green Wedges’ (Figure 2) as these will be part of formal landscaped and/or playing areas that will be regularly maintained (see also Section 4) consistent with APZ (IPA) specifications outlined above.

3.4 Appropriate uses within APZ setback

APZs will be located across private land, roads and road reserves, managed village parks (refer to Section 3.3), carparks and the area within the buffer area to the core riparian reserves containing the stormwater quality control features such as the ponds, wetlands and swales. Vegetation management within these areas will adhere to the APZ specifications described in Section 3.2.

4. APZ maintenance plans

APZs will be located across private land (*i.e.* residential allotments), perimeter roads and road reserves, bio-filtration areas and the buffer area to the core riparian reserves and the Environment Protection Zones (Figure 6). APZs will also encompass part of the area along Naval College (Jervis Bay) Road zoned as 7(d2) Environment Protection (Special Scenic) and the village parks and green wedges. Arrangements will be made with the succeeding land managers (Shoalhaven City Council) of the road reserves, riparian areas, and parks to manage the APZ within these areas.

5. Building construction standards (Building Code of Australia and AS3959 – 1999)

The Building Code of Australia (BCA) is a performance based code which obtains its statutory power through the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *EP&A Regulation 2000*. The *EP&A Regulation 2000* (clause 145 (1)(b)) requires a certifying authority to be satisfied that the relevant requirements of the BCA will be met prior to the issuing a construction certificate (or a complying development certificate under clause 136A of the Regulation). Clause 98(1)(a) of the Regulations also states that it is a *prescribed condition of development consent* (s.80A(11) of the EP&A Act) that building work must comply with the BCA. The BCA contains both Performance Requirements and Deemed-to-satisfy Provisions relating to the construction of buildings in bushfire prone areas. These provisions apply to class 1, 2, and 3 buildings that are proposed for construction in “designated bushfire prone areas”.

The construction requirements of *AS 3959 – 1999 Construction of buildings in bushfire-prone areas* are recognised by PBP Guidelines as the Deemed-to-Satisfy construction standard for buildings in designated bushfire prone areas. The BCA has been amended with a NSW variation such that Appendix 3 of PBP Guidelines provides the appropriate site assessment methodology and replaces Section 2 of the AS 3959 – 1999 when determining bushfire attack and the construction levels required to comply with the BCA.

Through the provisions of the EP&A Act, class 1, 2, and 3 buildings (BCA) within the development, and identified in Figure 7, will comply with the *AS 3959 - 1999 - Construction of buildings in bushfire-prone areas*; the BCA, and Appendix 3 of PBP 2001 in regard to construction standards for bushfire protection.

Table 1 and Figure 7 approximately define the AS 3959 construction standards that will be applied to dwellings at the construction stage. As the effective slope for the majority of the site is 0 – 5 degrees, these standards are only differentiated based on the distance from the various unmanaged vegetation classifications.

Table 1: AS3959 building construction standards

Vegetation type (refer to Figure 4)	Distance from unmanaged vegetation (measured from the OPA)	Building construction standard (AS3959)
forest	>20 – 30 m	Level 3
	>30 - 50 m	Level 2
	>50 - 80 m	Level 1
	> 80 m	nil
woodland	>20 -30 m	Level 1

	> 30 m	nil
sedgeland	>20 m	nil
heathland	>20 - 30 m	Level 3
	>30 m - 50 m	Level 2
	>50 m - 80 m	Level 1
	>80 m	nil

6. Roads and access

The proposed development will be accessed from numerous points along Naval College (Jervis Bay) Road (3 access points) and The Wool Road (2 access points).

Perimeter roads have been provided around all development areas (refer Figure 2). These roads will comply with the design criteria outlined within PBP Guidelines (refer Section 6.4). Additional features of the road system specific to this development include (refer to Figure 2);

- a lack of cul-de-sacs,
- numerous alternative access and egress roads, and
- perimeter roads that link into the internal road network at frequent intervals.

These features will increase bushfire protection for the proposed development, increase firefighter safety and allow rapid access to critical locations within the development (*i.e.* the bushland interfaces and hydrants).

6.1 Capacity of public roads

The combination of residential, commercial and retail development within the site will generate additional traffic for the local road network. The capacity of the public roads to handle 'non-bushfire' traffic has been undertaken by *Masson Wilson Twiney*.

An assessment of the public roads' capacity to handle bushfire emergency related traffic is presented in Section 6.2.

6.2 Access and egress

The road network (see Figure 2) has been designed in such a way to;

- ensure frequent access from the perimeter road to the internal road and therefore potential refuge areas,
- avoid the use of cul-de-sacs and dead-ends,

- provide numerous alternative access and egress roads that will ensure at least one safe evacuation and access route is provided at all times, and
- provide short access roads from residential areas to the public through-road systems to facilitate easier and safer evacuation if required.

The proposed road system therefore provides access and egress at a standard that complies with the general road design guidelines outlined in PBP Guidelines (NSW RFS 2001 p.21).

6.3 Perimeter and public roads

Perimeter access will surround all development areas. These will be in the form of formed roads and carpark areas which surround the District Centre (refer Figure 2).

Table 2 provides a summary of roadwidths for roads within the proposal. Table 3 provides an assessment of the proposed development for each of the access design criteria listed within the PBP Guidelines (NSW RFS 2001 p.19 – 20). Table 3 demonstrates that all perimeter and internal public roads comply with the design criteria outlined within PBP Guidelines.

Table 2: Roadwidths

Name	Road reserve	Pavement	Verge	Median	Parking	Concrete footpath
Ridge Road	30	4.2 m divided carriageway	Varies to min 3.0 m	Varies	2.5 m wide parking bays	2.4 m pedestrian/cycle path
Connector Street	20	7.0 m	6.5 m (includes parking bays)	Nil	2.5 m wide parking bays	1.2 wide footpath
Local Street	16	6.0 m	Average 5.0 m verges. Min 3.0 m	Nil	On street	Nil
Local Street (wedge type)	Varies (>16 m)	6.0 m undivided carriageway 4.2 divided carriageway	Varies. Min 3.0 m	Varies	On street	Nil
Park Edge Street	20, 30 , 32, 40 m (depending on WSUD and APZ)	5.5 m undivided	4 m verge lot side. Various riparian side (depending on WSUD/APZ)	Nil	2.5 m overrun for firetruck	Nil
Laneway	7	5 m undivided	1.0 m verges	Nil	Nil	Nil
Mainstreet	20	7.0 m with local narrowing	6.0 m	Nil	2.5 m wide parking bays	1.5 m both sides

Table 3: Perimeter and public road design criteria

PBP guidelines (RFS 2001, page 19 – 21)		Assessment of compliance
section 4.3.1 (b)	Design criteria	
dot point 1	Roads two-wheel drive, all weather.	Yes, although some roads are divided.
dot point 2	Roads two-way, that are at least two traffic lane widths (8m minimum) with shoulders on each side allowing traffic to pass in opposite directions.	Yes – the perimeter road system (Park Edge Street Table 2) will provide 5.5 m of undivided two-way pavement and an additional 2.5 m of hardened and trafficable surface adjacent to the pavement.
dot point 3	The perimeter road should be linked to the internal road system at an interval of no greater than 500 m in urban areas	Yes – the greatest distance is approximately 70 m.
dot point 4	Restricted use of speed humps and chicanes to control traffic	Yes
dot point 5	Roads should be through roads. Dead end roads are not recommended, but if unavoidable, dead ends should be not more than 200 m in length, incorporate a minimum 12m radius turning circle, and should be clearly sign posted as dead ends.	Yes - no dead-end roads are proposed.
dot point 6	The capacity of road surfaces and bridges should be sufficient to carry fully loaded firefighting vehicles (approximately 28 tonnes or 9 tonnes per axle).	Yes
dot point 7	Curves should have a minimum inner radius of 6 m and be minimal in number to allow for rapid access and escape.	Yes
dot point 8	The minimum distance between inner and outer curves should be 6m.	Yes
dot point 9	Maximum grades should not exceed 15° and preferably not more than 10° or gradient specified by road design standards, whichever is the lesser gradient.	Yes
dot point 10	There must be a minimum vertical clearance to a height of 6 m above the road at all times.	Yes – this will be established during the construction phase

PBP guidelines (RFS 2001, page 19 – 21)		Assessment of compliance
section 4.3.1 (b)	Design criteria	
dot point 11	Roads should provide sufficient width to allow firefighting vehicle crews to work with firefighting equipment about the vehicle.	Yes – the proposal will allow off street parking for firefighting appliances.
dot point 12	Roads clearly sign-posted (easily distinguished names) and buildings clearly numbered. Bridges should clearly indicate load rating.	Yes – this will occur during the construction stage of the development.

7. Adequacy of fire emergency procedures for the development site

Although no formal bushfire emergency procedures have yet been developed, the development proposal provides a design that will facilitate an appropriate response to a bushfire emergency.

An on-site assembly and temporary refuge areas for the residential population will be readily provided by the District Centre as it will be surrounded by large carparks and is readily accessible by emergency personnel, evacuees, and support services. It is also located near major roads that lead to the developed areas of Vincentia, Huskisson, and Sanctuary Point.

8. Service supply

PBP Guidelines specifies criteria for the provision of electricity, gas and water supplies in bushfire prone land. The supply of services to the habitable buildings within the proposal will take these criteria into account.

8.1 Water supply

Reticulated mains and static water supplies will be available throughout the development.

Hydrants will be installed in accordance with Section 6.4 of PBP Guidelines, *i.e.*;

- The water supply will be supplied to all perimeter roads via a ring main system.
- Hydrants will be made accessible and located such that a tanker can park within a distance serviceable by a 20 m hose.
- Hydrants will be located such that all habitable buildings are within 70 m of a hydrant.

In addition to the mains water supplies, static water will also be available throughout the proposed development. This will be in the form of water tanks (3,000 L to 5, 000 L depending on roof size) within each residential allotment, and numerous permanent and ephemeral settling ponds and water features. The majority of settling ponds and water features will be located within the APZ and accessible to fire fighting appliances.

All residential allotments will require water tanks to catch runoff from roofs. Although there is no requirement to specifically reserve and adapt these tanks for firefighting purposes, several adaptations will be recommended to residents of allotments near bushland. These are;

- Tanks should be visible or have appropriate signage to notify firefighting personnel (and other residents) of their location;
- Underground tanks should have an access hole of 200 mm to allow tankers to refill direct from the tank;
- Raised tanks should have a suitable connection for RFS purposes. The local RFS will be contacted during construction to confirm local requirements; and
- Raised tanks should have their stands protected.

The proposed water supply for firefighting purposes, as described above, is consistent with PBP Guidelines.

8.2 Electricity

Electricity supply throughout the proposed development area will be underground as far as practicable. Where overhead electrical transmission lines are installed, lines will be installed with short pole spacing, unless crossing gullies, gorges or riparian areas.

During major bushfire events, the protection and preparedness of a dwelling and its occupants may be jeopardised with the loss of basic services including electricity (NSW RFS 2001). Overhead powerlines on wooden poles are particularly susceptible to the impacts of bushfire. The proposed relocation of the existing high voltage powerlines along Naval College (Jervis Bay) Road and Moona Creek Road within the proposed development area to underground or on concrete poles will assist in maintaining power supply.

9. Assessment of Environmental Issues

An assessment of significant environmental features, threatened species and Aboriginal heritage on the subject land will be provided as part of the 3A Application.

9.1 Aboriginal relics and places

Currently there are no known Aboriginal relics and places within the meaning of the *National Parks and Wildlife Act 1974*, within the areas affected by the bushfire protection provisions in this report. Surveys have been carried out by appropriately qualified archaeologists.

9.2 Threatened Species

Numerous threatened species listed under schedules of the *Threatened Species Conservation Act 1995*, are known or are thought to exist on the subject land. The impacts of the development including the development of Asset Protection Zones have been addressed by Species Impact Statements and other environmental impact assessments.

9.3 Other significant environmental features

Three large riparian corridor reserves are incorporated into the design of the development. The creeks within these riparian corridor reserves drain into one of two wetlands within Jervis Bay National Park.

The proposed development will preserve 'core' areas of riparian corridor reserves, the dimensions of which are in accordance with negotiations between Stockland, Department of Planning and the Department of Environment and Conservation. The majority of the riparian corridor is proposed to be gifted to the National Parks and Wildlife Service to provide protection of the riparian area and to form an environmental link between the Stockland Proposal and the existing National Park. In addition, buffer zones of maintained vegetation to the riparian reserves will provide the APZ for the proposed residential and commercial areas. The buffer zones (riparian edge) will also contain the bio-filtration systems and settling ponds necessary to reduce pollutants entering the wetlands downstream.

The conservation of riparian corridors will not affect the bushfire protection provisions outlined in this report as all APZs and other bushfire protection measures will occur outside the 'core' riparian zone.

10. Staging considerations

The development will be staged in 'blocks' rather than as scattered development. This will minimise internal fuel networks and the bushland/development interface.

During development, the property owner/developer (Stockland) will ensure each 'block' will be provided with staged or interim APZs and perimeter access. Interim APZs for individual stages will not be within the newly created lots, but instead in the residue to be maintained by Stockland until the final scheme is developed. These provisions will operate until such time as the next adjoining 'block', containing the interim APZ, is developed. New 'blocks' will be created adjacent to the perimeters of existing development (*i.e.* developed 'blocks').

The staged APZs are to be constructed as Inner Protection Areas (refer to Section 4.2) and are to be greater than 80 m to allow the temporary interface dwellings to be constructed without consideration of AS3959 construction standards.

11. Consultation

11.1 NSW Rural Fire Service

A meeting between Stockland and Danielle Simpson (Development Control Officer – NSW RFS) to discuss the development proposal and the proposed bushfire protection provisions was held on the 27th April 2004. Ms Simpson supported the proposed road network system and the provision of perimeter roads surrounding the development. Ms Simpson reiterated that perimeter roads are to be two-way and have a trafficable surface of 8 metres. The provision of Asset Protection Zones, water supplies and hydrants were also discussed. Ms Simpson supported the application of PBP Guidelines across the entire development.

NSW RFS was also given the opportunity to comment on the draft consultants reports from Planning Focus Meeting No 2 for Vincentia Coastal Village and District Centre. A summary of comments received from NSW RFS (ref PLA/0110 – A04/3269 DS) and subsequent responses are provided as Appendix 1.

11.2 Jervis Bay National Park (NPWS)

Dave Collins (Fire Planner – Southern Division National Parks and Wildlife Service) and Bruce Grey (Ranger – Jervis Bay National Park) have both been consulted with respect to the development and the proposed bushfire protection measures.

During the consultative meeting, there was an undertaking by both Stockland and the National Park staff to cooperatively determine access requirements for tracks within the adjoining National Park. This will ensure that access tracks and roads critical for the management of the Park remain accessible.

11.3 NSW Department of Environment and Conservation (NSWDEC)

During a consultative meeting on the 12th October 2004 several bushfire related concerns were raised by representatives of NSWDEC, including representatives from NPWS who were not present at the previous meeting. Issues raised were:

1. Asset Protection Zones within the Jervis Bay Leek Orchid (JBLO) 'Buffer Zone'.
2. Perceived lack of consultation regarding the development and proposed bushfire protection provisions.
3. Adequacy of Asset Protection Zones.
4. Compliance with PBP guidelines.
5. Perceived inadequacy of APZs and the consequential requirement for NPWS to implement Strategic Fire Advantage Zones (SFAZs).

Responses to their concerns are provided in Appendix 2.

Issue 1 has yet to be finally resolved with NSW DEC and the JBLO Recovery Team. NSW DEC and the recovery team support the reduction of the APZ (from 20 m to 15 m) at the interface between the JBLO sedgeland and the Village East development area and the provision of an appropriately sized masonry wall (approximately 1.2 to 1.5 m high) on the sedgeland side of the development's perimeter road. The wall will be designed and constructed to provide protection to the JBLO populations from development and urban related impacts and be a radiant heat barrier, which will act to absorb and /or deflect radiant heat from a bushfire within the sedgeland. In regard to the use of radiant heat barriers, PBP Guidelines supports their use in these situations, *i.e. "They may be suitable in situations involving some coastal wetland vegetation (e.g. low heaths)"* (NSWRFS 2001 p.35).

The use of a radiant heat barrier and subsequent reduction of the APZ by 5 m (to 15 m) provides a balance / compromise between the level of threat (sedgeland) and the costs (financial and environmental) involved in providing the protection. This concept of balancing environmental costs and protection is supported by PBP Guidelines (NSW RFS 2001 p.3), *i.e.*;

The measures recommended in this document are derived from both scientific theory and practical experience. They are not universally applicable and consideration of individual cases may warrant modification of the recommendation.

NSWDEC supports the reduction of the APZ and the construction of a masonry wall to provide increased protection to the JBLO. Increasing the AS3959 building construction standards for the buildings along the interface will also increase the level of protection to an acceptable level. NSW Rural Fire Service support has been sought on this issue.

12. Summary of protection provisions and assessment of conformity with PBP Guidelines

As demonstrated in Table 4, the bushfire protection provisions proposed for the development comply with all bushfire protection specifications within PBP Guidelines.

Table 4: Assessment of conformity with PBP Guidelines

Bushfire protection provision	Proposal	Assessment of PBP conformity
Asset Protection Zones	<p>APZs of varying dimensions (depending on slopes, development type, and vegetation) will be created and maintained in perpetuity.</p> <p>Stormwater quality control will also be contained within the APZ (Forbes Rigby 2006) and appropriate vegetation management is to allow compatible functions.</p> <p>Figure 6 shows where APZs will be established.</p>	<p>Dimensions comply with Tables A2.2 for residential areas; and are out of the 'flame zone' for other non-residential buildings.</p> <p>APZ specifications will be consistent with fuel loadings as described by PBP Guidelines (NSWRFS 2001 p.16).</p>
Construction Standards	<p>AS 3959 will be applied to all habitable buildings (as shown in Figure 7) within the development during the construction stage (refer Section 5).</p>	<p>The construction standards that will be applied (see Table 1 and Figure 7) comply with Appendix 3 and Table A3.3 of PBP Guidelines and NSW RFS policies.</p>
Access	<p>The development will have 3 public access roads along Naval College Road and 2 along The Wool Road.</p> <p>Perimeter roads with an 8 m trafficable surface have been provided around all development areas. The perimeter roads will link with internal roads at frequent intervals.</p> <p>Minimal cul-de-sac roads will be constructed.</p> <p>Hardened off-road trafficable surfaces will be created alongside perimeter roads to allow firefighting appliances to be positioned whilst allowing traffic to pass.</p>	<p>Access provisions comply with general specifications (Section 4.3.4 of PBP) for access and the design criteria for;</p> <ol style="list-style-type: none"> 1. public roads (Section 4.3.1 of PBP) 2. fire trails (Section 4.3.3 of PBP) and 3. perimeter roads

Bushfire protection provision	Proposal	Assessment of PBP conformity
	Numerous alternative access and egress roads will be provided to ensure at least one safe evacuation and access route.	(Section 4.3.2),
Water supply	<p>Reticulated mains and static water supplies will be available throughout the development.</p> <p>The water supply will be supplied to all perimeter roads via a ring main system.</p> <p>Hydrants will be made accessible and located such that a tanker can park within a distance serviceable by a 20 m hose.</p> <p>Hydrants will be located such that all habitable buildings are within 70 m of a hydrant.</p> <p>Large water features and settling ponds will be accessible to fire fighting appliances (<i>i.e.</i> within 20 m).</p> <p>Residents along the bushland interface will be encouraged to adapt their water tanks for firefighting purposes.</p>	Water supplies will exceed recommendations outlined in Section 6.4 of PBP Guidelines.
Electricity	<p>Electricity supply will be underground as far as practicable.</p> <p>The proposed relocation of existing high voltage powerlines to underground or on concrete poles will assist in maintaining power supply to the local area.</p>	Complies with Section 6.4.1 of the PBP Guidelines.
Staging	<p>The development will proceed in 'blocks' and not as scattered development.</p> <p>New 'blocks' will be created from the perimeters of existing development (<i>i.e.</i> developed 'blocks').</p> <p>APZ will be established around all new blocks and this will be maintained by the property owner/developer (Stockland) until such time that the adjoining area containing the APZ is developed for residential /retail purposes.</p>	Complies with Section 4.4 of the PBP Guidelines

Bushfire protection provision	Proposal	Assessment of PBP conformity
Other	The vegetation within internal bushland/parkland areas will be managed to APZ (IPA) specifications.	n/a

13. Conclusion

NSW RFS's support has been sought for a minor reduction of APZ and the provision of auxiliary protection measures at the interface between the Village East and the sedgeland (refer to Section 11.3). Notwithstanding this, it is the authors' opinion that the recommendations within this report will provide an appropriate standard of bushfire protection which is at a standard consistent with current state guidelines for development within bushfire prone lands.



Rod Rose
Managing Director



Geoff Young
Project Officer

References

Department of Infrastructure, Planning and Natural Resources (DIPNR) 2003 *Jervis Bay Settlement Strategy*

Forbes Rigby 2006 *Vincentia Coastal Village and District Centre – Water Sensitive Urban Design Study*. Report for Stockland Developments Pty Ltd

NSW Rural Fire Service (RFS). 2001. *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners*. Australian Government Publishing Service, Canberra.

Standards Australia 2000, *Construction of buildings in bushfire-prone areas, AS 3959, Second edition 1999 and Amendment 1, 2000*, Standards Australia International Ltd, Sydney

Appendix 1: Responses to NSW RFS comments (PLA/0110 A04/3269 DS)

Comment received	Response
<i>"The location of residential development adjoining any proposed open spaces, asset Protection zones may be required"</i>	<p>Asset Protection Zones/setbacks in accordance with Tables A2.2 and A2.3 of PBP Guidelines are proposed adjacent to all areas with <u>unmanaged</u> vegetation/bushland.</p> <p>The 'Green Wedges' that adjoin the bushland interface (Figure 2) will also be managed as an APZ (IPA specifications).</p>
<i>"Provide detailed information on the management of Village Parks and Green Wedges and review the need for a Plan of Management"</i>	<p>The vegetation within the Green Wedges and the Village Parks will be managed consistently with the management specifications of an APZ (refer to Section 3.2).</p>
<i>"Establish the management criteria for asset protection zones along the riparian edge"</i>	<p>The vegetation management specifications for the riparian reserve will be consistent with either an IPA or an OPA. The OPA being 10 m from the core riparian zone and the IPA specifications making up the remainder (see Figures 6 and 7).</p>
<i>"Review main access roads into the subject site having regard to potential safety concerns with adjoining vegetation"</i>	<p>Access off Jervis Bay Road represents the safest access and egress as areas on the opposite side of the road have been predominantly cleared for small block rural-residential purposes.</p> <p>In the circumstance where Jervis Bay Road cannot be accessed, 2 alternative access roads area available, i.e. one to the north of the development which passes through the Bay and Basin Leisure Centre area to The Wool Road and another to the south which will access the retail centre and The Wool Road (refer to Figure 2).</p>
<i>"Provide detailed information on the management of fire trails and further review the need for this information as part of a plan of management"</i>	<p>The management of the firetrails will ensure that the trail remains consistent with PBP Guidelines.</p>
<i>"Review the proposed form, content of construction of proposed dwellings against AS3959 – 1999"</i>	<p>The Stockland proposal has established guidelines only. Detailed design regarding housing and other structures will be addressed at building design stage and relevant Australian Standards will be applied.</p> <p>Refer to Table 1 and Figure 7</p>

Appendix 2: Responses to issues raised by NSW Department of Environment and Conservation

Issue 1: Asset Protection Zones (APZs) within the Jervis Bay Leek Orchid 'Buffer Zone'

The two concerns raised were;

- a. The feasibility of establishing and maintaining APZs by manual means, and
- b. Whether the Jervis Bay Leek Orchid 'Buffer Zone' can incorporate part of the APZ.

In response to the first matter, Bushfire and Environmental Services (BES), has established and regularly maintained extensive areas of APZs for a variety of developments and for village-wide protection. These works have been completed successfully and cost effectively by manual means over larger areas and on more difficult terrain than that covered by the Leek Orchid site. Examples include the establishment of an APZ;

- o Of approximately 1.5 ha at 'The Landings' at North Turramurra. This occurred among threatened plant species and has included follow up maintenance;
- o Of approximately 1.5 ha for village protection at Stanwell Tops for Wollongong City Council;
- o For Helensburgh village protection at 3 locations, each site being approximately 1 ha in size;
- o For the Peninsula and Lindfield Gardens Retirement Villages over an area of about 5.4 ha in very steep terrain and up to 80 m out from the building lines. Follow-up maintenance has also routinely occurred.

The above cited works were undertaken by manual means only, predominantly with brushcutters and chainsaws. No heavy machinery or vehicles were used in the APZ, although mulcher machines were located nearby. Handsaws and loppers were used where threatened species (or other selected species) were implicated.

In response to the second matter, a number of the APZ works mentioned above involved the presence of threatened species, including *Darwinia biflora* at The Landings and *Pultenea aristata* at Stanwell Tops. The APZs encompassed populations of these species, and BES (Land-care Division) were able to create the APZ with little disturbance to the population and to the design satisfaction of the NSW Land and Environment Court, NSW RFS and NSW NPWS. These manual works also allowed other selected species to remain within the APZ as required. This included the retention of mesic species, fire tolerant species, and/or 'signature' species, such as Gynea Lilies, grass trees, and tree ferns.

Threatened Species and Endangered Ecological Communities are also located within Asset Protection Zones of numerous National Parks. Examples include;

- o Arakwal National Park – *Diuris sp.aff. chrysantha* (one population of 100 plants known for this species) and Byron Bay Dwarf Graminoid Clay Heath,
- o Berowra Valley Regional Park – *Melaleuca deanei*, *Tetratheca glandulosa*, and *Persoonia mollis maxima*, and

- Brisbane Waters National Park – *Prostanthera junonis* and *Tetratheca glandulosa*

Issue 1 Conclusions:

1. The manual establishment and maintenance of APZs has been demonstrated as feasible.
2. The APZ construction works at Stanwell Tops, “The Landings” and within NPWS estate demonstrate that APZs can be established and maintained within populations of threatened species. No difficulty in maintaining APZs in the Jervis Bay Leek Orchid Buffer Zone is expected as the work is anticipated to be only within 6 m of the buffer.

Issue 2: Lack of consultation regarding the development and proposed bushfire protection provisions.

A meeting to discuss the proposed development and the proposed bushfire protection provisions was held on Tuesday the 4th May 2004 at Nowra NPWS Office. Present were Dave Collins (Fire Management Planner - NPWS), Bruce Gray (Jervis Bay Ranger - NPWS), David Maxwell, (The Riverview Group), Geoff Young (BES), Kelly Miller and Neil Hargraves (Stockland). Although there was a general concern regarding urban interface related impacts to Jervis Bay National Park, no comments were received regarding the adequacy or otherwise of the proposed APZs and their potential fire management impacts on Jervis Bay National Park.

Issue 2 Conclusions:

1. Sufficient consultation with NPWS had occurred.
2. There was sufficient time (4 to 5 months) to comment on the proposal.

Issue 3: Adequacy of APZs

The NSW RFS have been presented with the proposed bushfire protection provisions (including APZs) and have not raised any concerns regarding the adequacy of the proposed dimensions and management specifications. Furthermore, the proposed APZs for the development comply with all current legislative requirements regarding building in bushfire prone areas, namely;

- s.100B of the Rural Fires Act 1997
- clause 46 of the Rural Fires Regulations 2002
- s.79BA of the Environment Planning and Assessment Act; and
- NSW Rural Fire Service (2001) “Planning for Bushfire Protection, A guide for Councils, Planners, Fire Authorities, Developers and Home Owners” (herein called PBP guidelines).

The PBP guideline was developed for assessment purposes and recommendations were derived from both recent scientific research and practical experience. The PBP Guideline assumes a 1:50 year worst case scenario where there is no fuel management, fire history or other mitigating factors, using a FDI of 80 and forest fuel loads of 25 - 40 tonnes/hectare. The vegetation surrounding the development is well within these fuel load parameters.

The APZs dimensions in PBP have also been determined assuming other protection provisions have been applied and are adequate, *i.e.* AS3959 construction standards, adequate water supplies, and access. These protection provisions have been met for the proposed development and in some cases exceed that required by PBP guidelines.

NSW RFS acknowledge the limitations of the guidelines and an element of risk will always remain. The Guideline (p.2 - 3) states:

Implementation of planning and construction provisions for developments in bushfire-prone areas provides the most effective way of minimising the effects of bushfire on a development and the people occupying that development. However, no development in a bushfire-prone area can be guaranteed to be entirely safe from bushfires. Providing an acceptable level of protection is to some extent a compromise between the level of threat and the costs (such as financial and environmental) involved in providing the protection.

Applying the provisions outlined in PBP guidelines is no certain guarantee of protection from all fires during all circumstances but is current day best practice. It is my professional opinion that an appropriate level of protection has been met by the development proposal.

Advice received recently also indicates that DEC's position would not be supported by NSW RFS. Larger APZs are accepted only in cases where fuel loads are greater than the parameters by which PBP is based and/or where there are access and evacuation issues. This is not the case for this development.

Issue 3 Conclusion:

The APZ dimensions and management specifications comply with best practice, current legislative requirements and guidelines, and NSW RFS have accepted these APZs.

Issue 4: The bushfire protection provisions proposed for the development do not comply with PBP guidelines

As mentioned above, all the proposed bushfire protection provisions for the development do comply with PBP Guidelines and current legislative requirements and this has not been contradicted by NSW RFS.

This issue is further addressed in Issue 5, and is related to offsetting bushfire protection provisions to neighbouring land managers – more specifically to quote from PBP Guidelines (p.15):

Councils need to ensure that the developments they approve, particularly subdivisions, do not offset bushfire protection measures to neighbouring areas. Bushfire protection measures that are essential to a development must occur on the site of the proposed development unless the most exceptional circumstances apply.

NPWS's assertion that the proposed development does not comply with the guidelines because it may place pressure on the Service to implement Strategic Fire Advantage Zones (SFAZs) (e.g. area for prescribed burning) is incorrect. PBP guidelines lists only APZs, access, design, staging and siting and water supplies as protection

provisions to be applied at the development stage and AS3959 construction standards at the construction stage. There is no mention of a requirement for additional SFAZs as these are not strictly a protection provision and do not protect life and property. SFAZs have a mitigation function only resulting in a reduction in the intensity and frequency of a fire. This is acknowledged in the NPWS fire management manual and supported by NSWRFs.

Furthermore, the APZs and the other bushfire protection provisions required by PBP and applied to the proposed development assume a worst case scenario and in so doing provide a standard of protection and fire control appropriate to this level of bushfire attack without the need for a SFAZ.

NPWS has not insisted other developments place SFAZs within the development boundaries in the past. Insisting SFAZs be placed within the development area (as well as APZs) not only results in this development being unfeasible, but may create a precedence across NSW ruling out any sort of development adjacent to National Parks.

Issue 4 Conclusion:

PBP guidelines and legislation require only protection provision to be placed within property boundaries. SFAZs are not considered a protection provision.

Issue 5: The perceived inadequacy of APZs would require NPWS to implement Strategic Fire Advantage Zones (SFAZ).

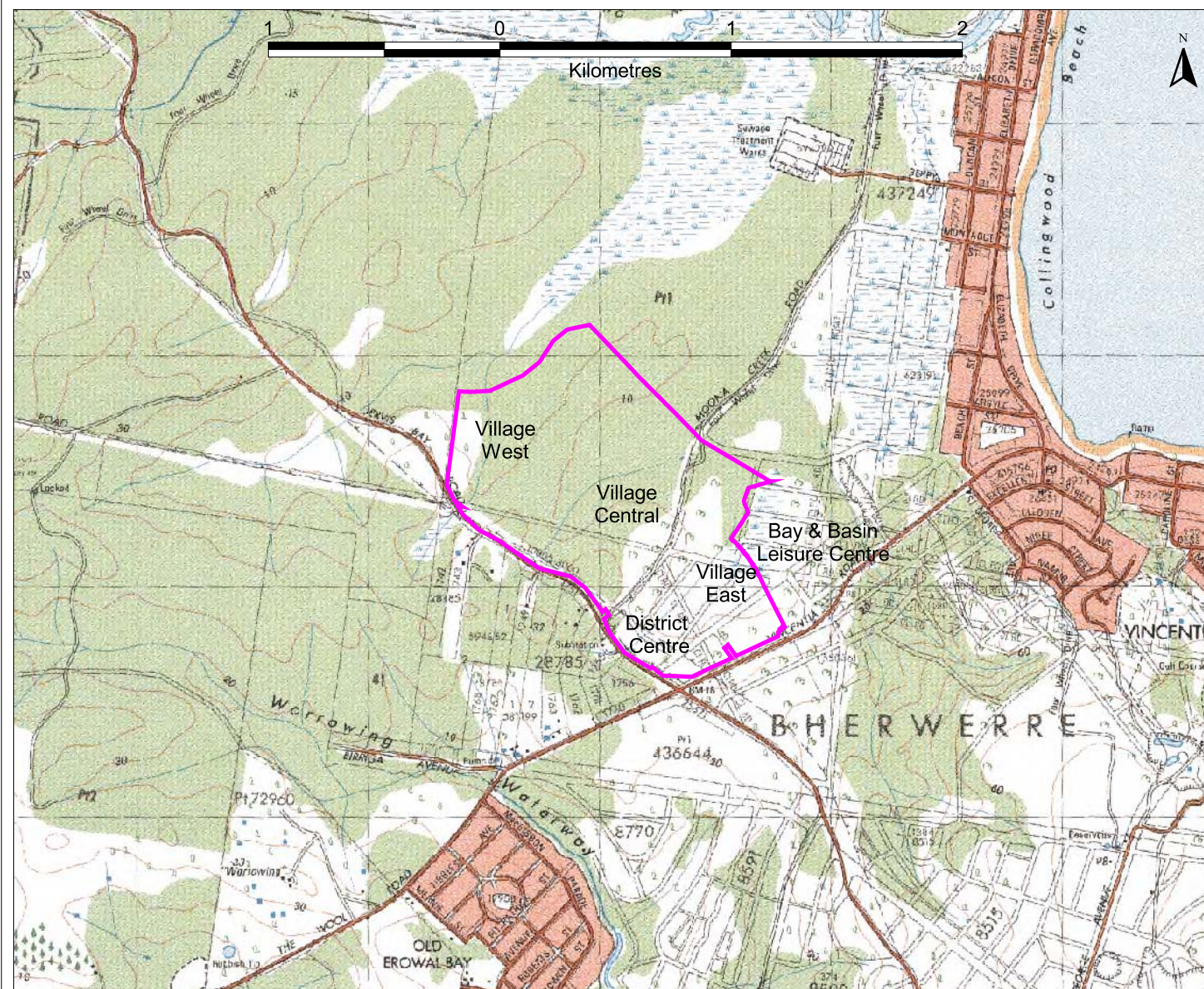
The Shoalhaven Bushfire Risk Management Plan states that SFAZs are to be implemented in areas where the site constraints do not allow a full width APZ to be established, and/or access problems exist and/or existing houses are not built to withstand the bushfire expected. As the provisions proposed for the Vincentia development comply, and in some cases, exceed current legislative requirements and guidelines, there is no obligation under the Risk Management Plan to implement SFAZs, nor is it necessary for adequate life and property protection.

Issue 5 Conclusion:

There is no obligation on NPWS to establish SFAZs around the proposed development. NPWS's fire management decision to implement SFAZ should be based solely on their own risk management and land management requirements such as their obligations under s.63 of the *Rural Fires Act 1997* (NB these are required with or without the proposed development)

FIGURES

Figure 1: Location



Location of proposed
development

Base topographic map
© Land and Property Information NSW, 2000

Figure 2: Stockland proposal



Figure 3: Slopes

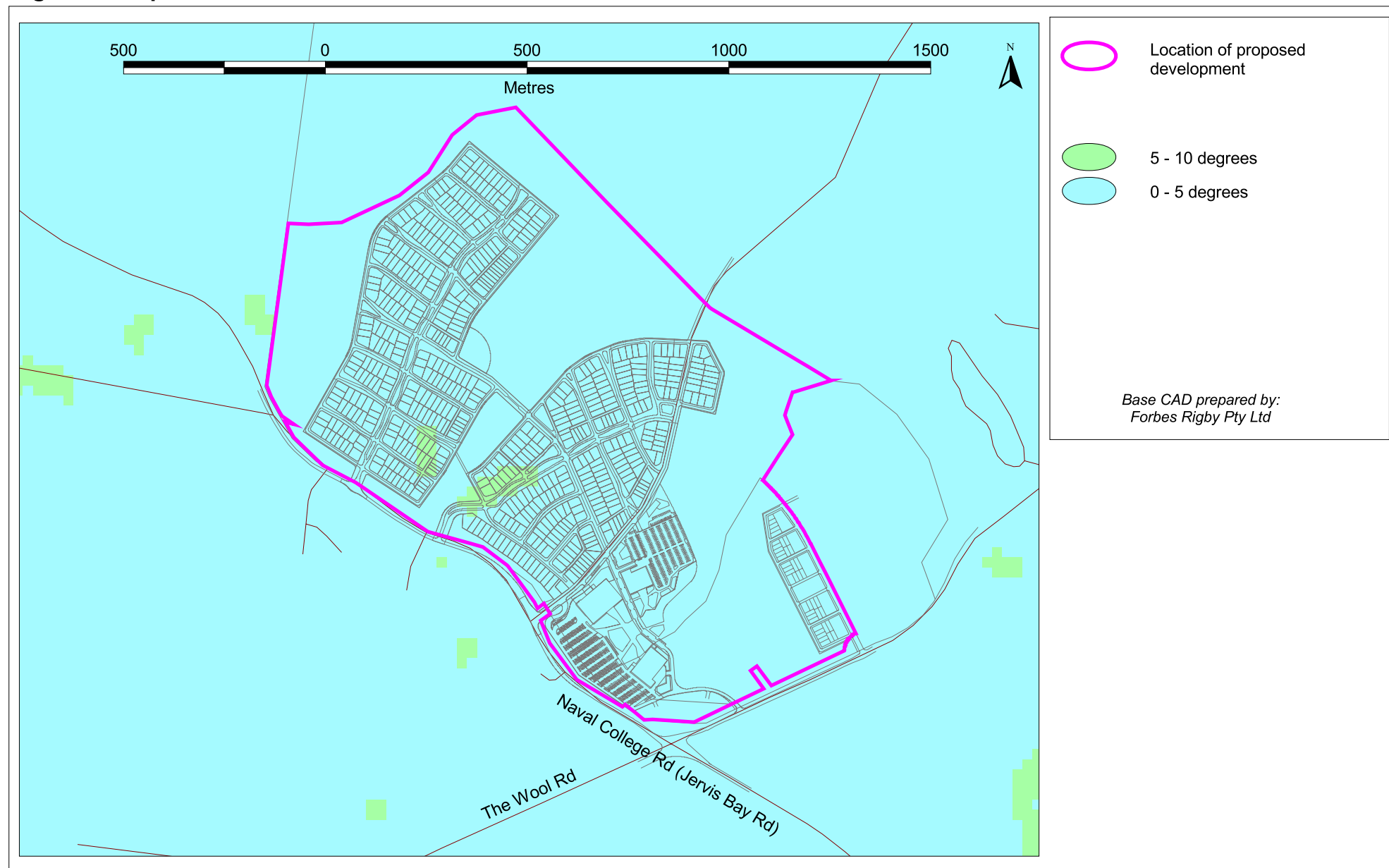


Figure 4: Vegetation



Figure 5: Bushfire behaviour potential

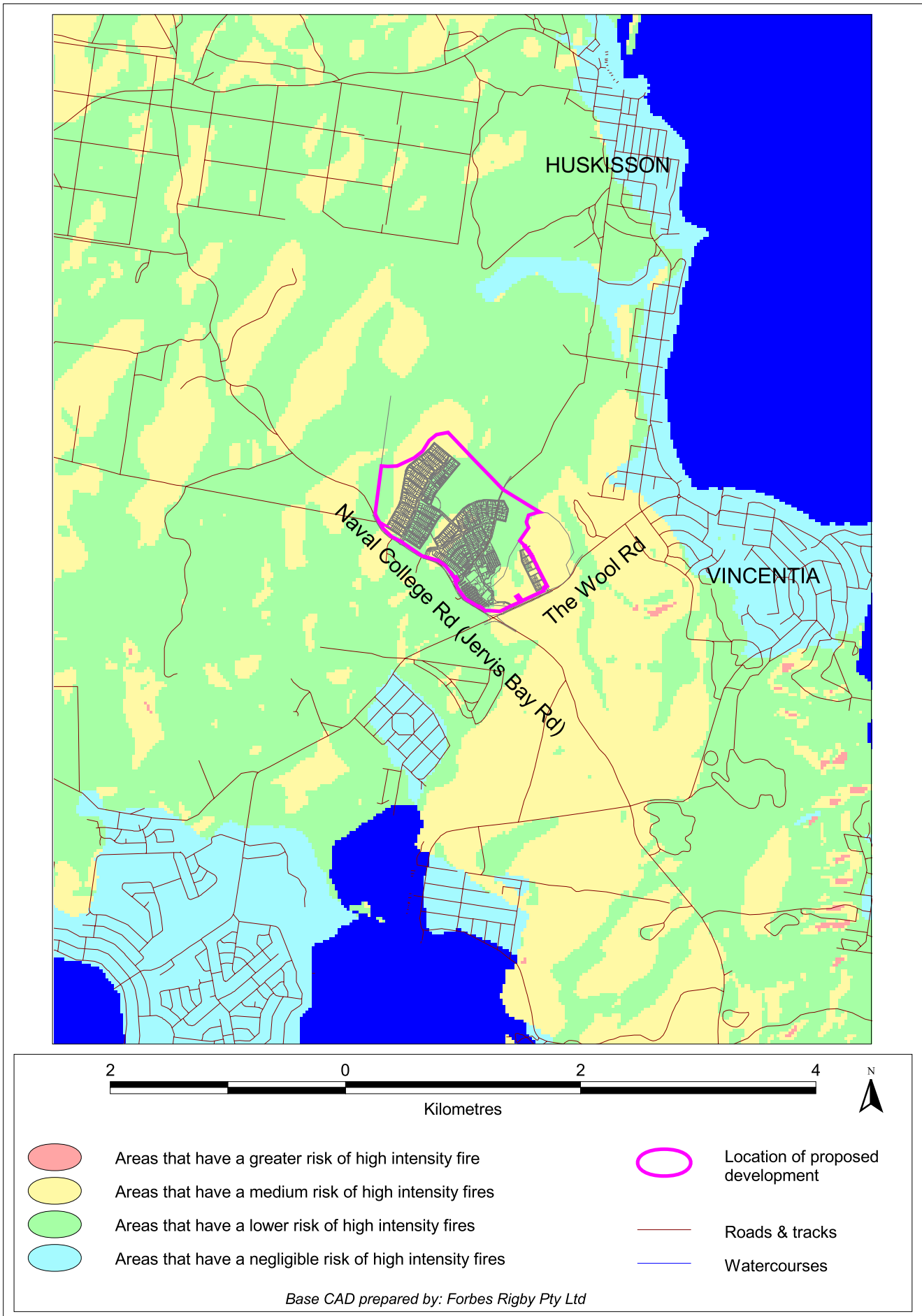


Figure 6: APZ - residential

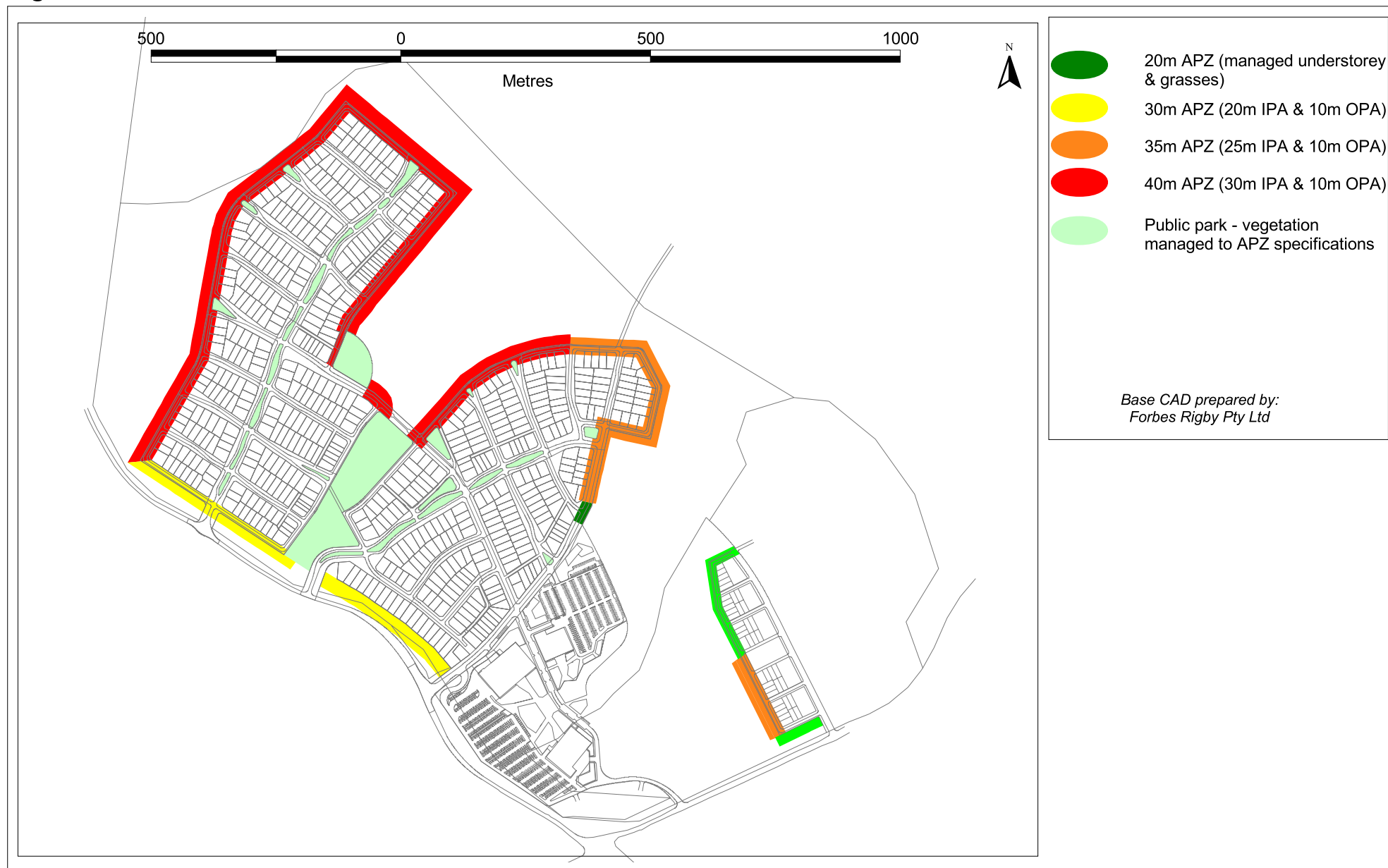


Figure 7: AS3959 Construction Standard

