Fern Bay Seaside Village

Annexures L to R

Volume 3

Fern Bay Seaside Village

Environmental Assessment

for Aspen Group Pty Ltd

February 2009

0063154

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Project Manager:	*Amanda Antcliff*
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Date:	*February 2009*
Partner:	*Paul Douglass*
	
Date:	*February 2009*

Environmental Resources Management Australia Pty Ltd Quality System

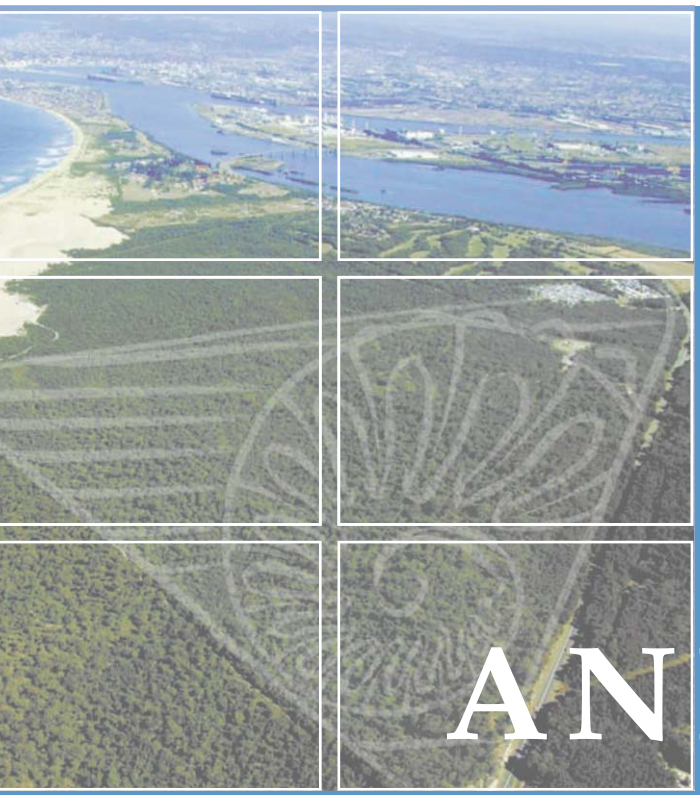
Fern Bay Seaside Village

Environmental Assessment

for
Aspen Group Pty Ltd

February 2009

Project No. 0063154

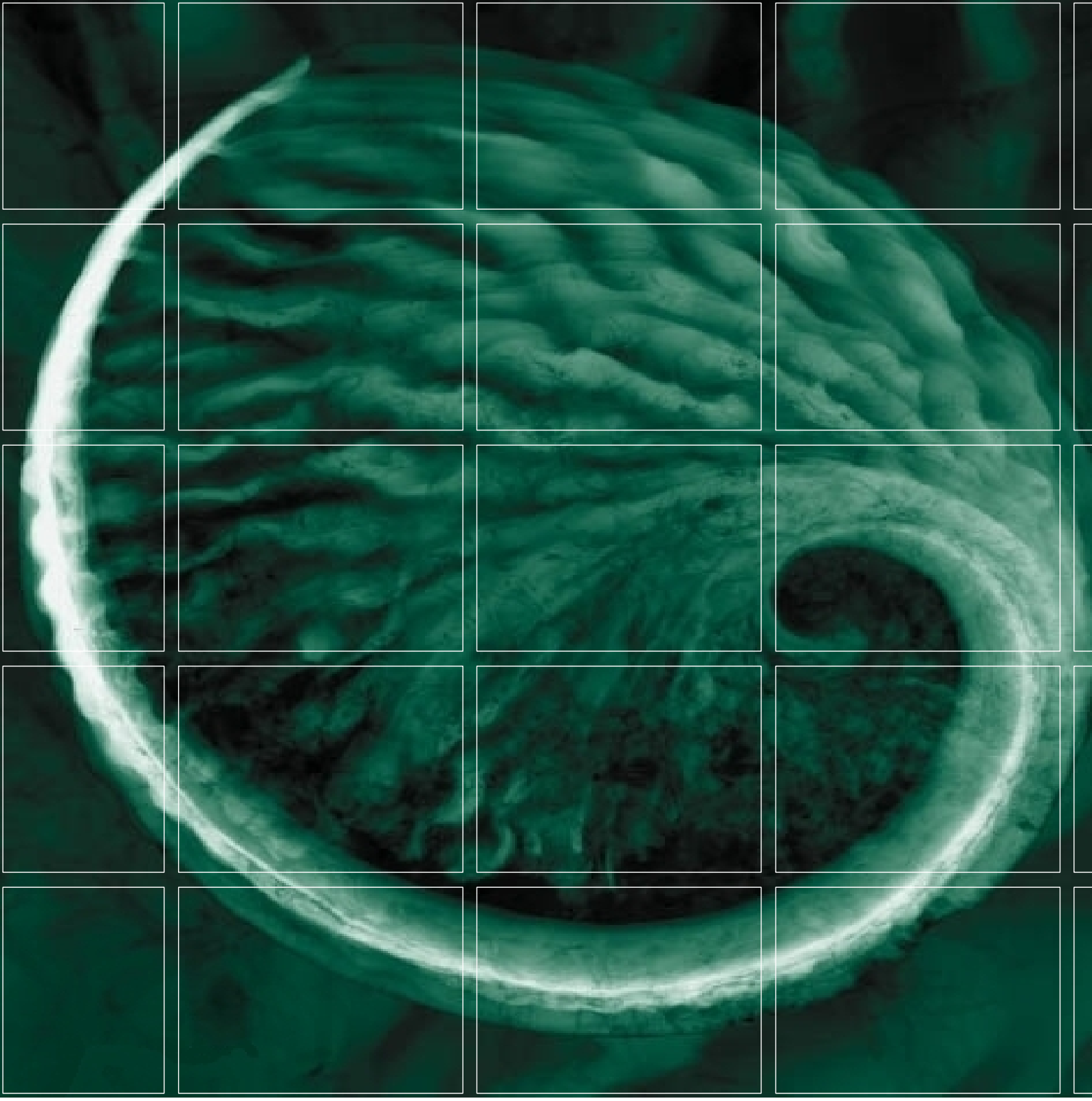


Volume 3

ANNEXURES

ANNEX L

Bush Fire Management Report



Fern Bay Seaside Village
Bush Fire Hazard Assessment

Aspen Group Pty Ltd

February 2009

0063154 BFHA Final 2

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Fern Bay Seaside Village
Bush Fire Hazard Assessment

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Position:	Project Manager
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Environmental Resources Management Australia Pty Ltd Quality System

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1 INTRODUCTION

1.1 BACKGROUND TO THE PROPOSED FERN BAY SEASIDE VILLAGE

Environmental Resources Management Australia Pty Ltd (ERM) have been engaged by Aspen Group Pty Ltd to prepare an Environmental Assessment Report (EAR) pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP & A). The EAR has been prepared to accompany the application for project approval for a residential subdivision consisting of 713 lots called 'Fern Bay Seaside Village'.

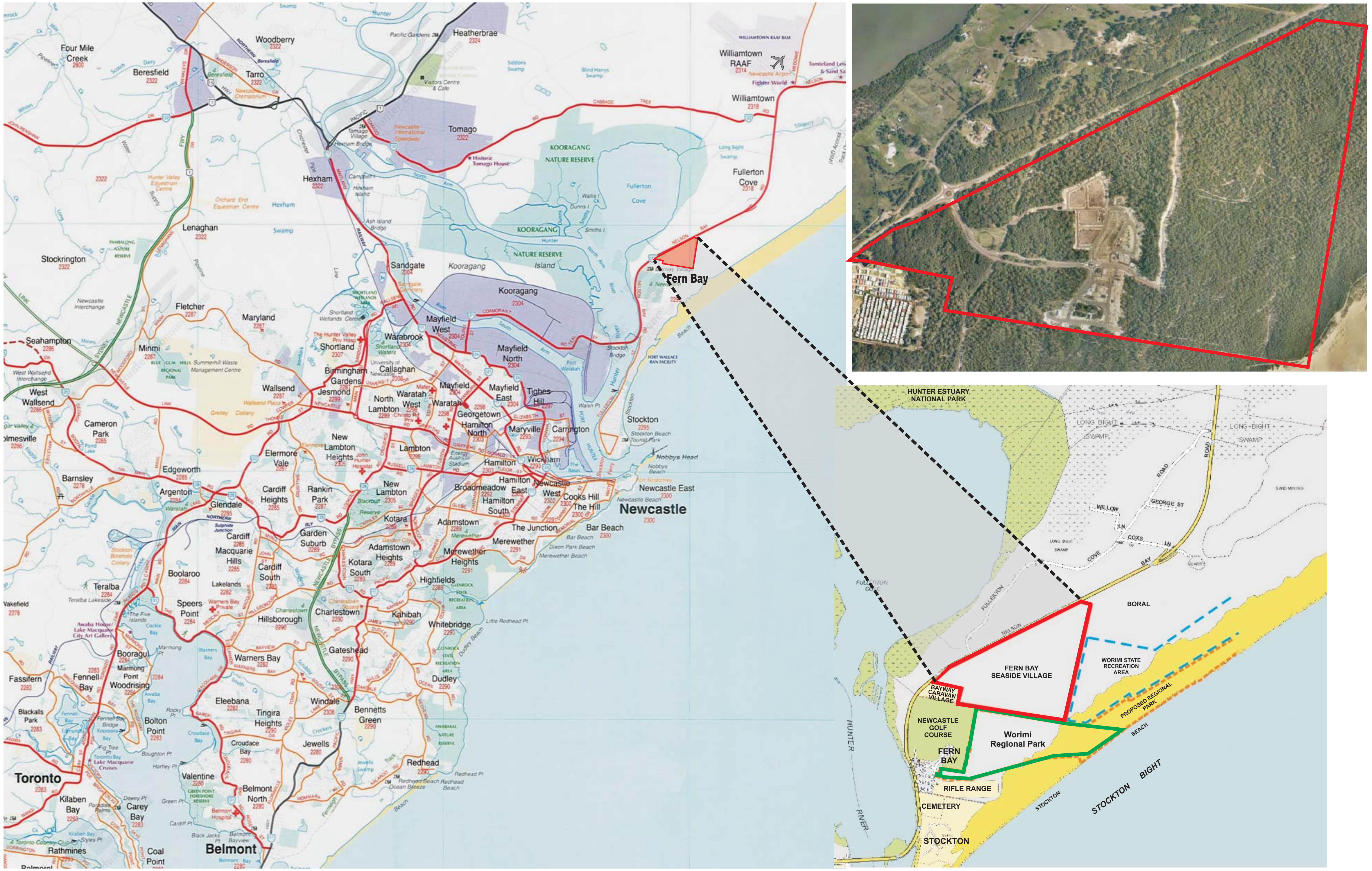
Part of the 'Fern Bay Seaside Village' has an existing approval from the Land and Environment Court in 1997 and is currently under construction. In addition, the NSW Minister of Planning approved a Master Plan for the Fern Bay Estate residential subdivision pursuant to State Environmental Planning Policy No.71 – Coastal Protection on 8 August 2006.

The Master Plan application was accompanied by a Bushfire Hazard Assessment (ERM 2005a) prepared pursuant to Section 100B(1) of the *Rural Fires Act 1997* and Clause 46 of the Rural Fires Regulation 2002 which sets out the matters that must be assessed in an application for a Bushfire Safety Authority. The Fern Bay Estate Master Plan Bushfire Assessment Report considered the guidelines as set out in Planning for Bushfire Protection (NSW Rural Fire Service 2001).

The Project Plan application is consistent with the Master Plan approval. The Project Plan application adopts the bush fire hazard management measures as set out in the Fern Bay Estate Master Plan Bushfire Assessment Report (ERM 2005a). While there has been minor changes to the lot structure, the overall footprint and layout has not been altered. The Project Plan bush fire hazard assessment has adopted the updated guidelines set out in Planning for Bush Fire Protection 2006 (NSW Rural Fire Service 2006). The assessment has been prepared to ensure fulfilment of the requirements of a Part 3A application.

1.2 THE SITE

The site is approximately six kilometres north of Stockton along the Stockton Bight dune system (see *Figure 1.1*). The site is described as Lot 3, DP 270466 Nelson Bay Road, Fern Bay and is within the Port Stephens local government area. It covers approximately 205 hectares in area and comprises 16.4 hectares zoned 1 (a) Rural Agriculture, 136.4 hectares zoned 2 (a) Residential, and 52.2 hectares zoned 7 (a) Environmental Protection under Port Stephens Local Environmental Plan 2000 (LEP).



Legend

Fern Bay Seaside Village

Figure 1.1

Locality Plan

Client:	Aspen Group Pty Ltd		
Project:	Fern Bay Seaside Village BFMA		
Drawing No:	0063154hv_Planning-AnnexL_03		
Date:	14/05/08	Drawing size:	A3
Drawn by:	SP	Reviewed by:	PD
Source:	-		
Scale:	Not to Scale		

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The site is characterised by naturally stabilised dune system with interdunal depressions. Active dunes occur in the southeast corner of the site and a 100 year dune hazard line restricts development in this corner.

The site is bounded to the:

- northwest by Nelson Bay Road;
- northeast by rural zoned land partly used for sand extraction;
- east and southeast by remnant bushland within the Worimi State Conservation Area and Worimi Regional Park respectively, that is managed by the Department of Environment and Climate Change (DECC); and
- southwest by remnant bushland adjoining a mobile home park and Newcastle Golf Course.

The site is characterised by three main vegetation communities. The dunes support Coastal Sands Apple-Blackbutt Forest. The dune swales support wet heath community with Swamp Mahogany-Paperbark Forest in poorly drained swales near Nelson Bay Road. The endangered ecological community 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions' is present in the swamp forest on site where it adjoins Nelson Bay Road. The site is representative of the vegetation communities that occur throughout the Stockton Bight dune system.

1.3 PROPOSED DEVELOPMENT

The layout of the proposed development is provided in *Figure 1.2*. The project is described as a community title subdivision which contains the following components:

- a subdivision of 713 residential allotments with four of these lots having the potential for further subdivision into approximately 94 integrated housing lots;
- various areas of recreational and open space are proposed which will include children's playgrounds, formal parks, a Cultural Heritage Reserve, open space for both passive and active recreation, stormwater management, pedestrian trails and ecological corridors;
- a community centre is proposed within an area of open space;
- conservation is proposed through the retention of large areas of natural vegetation within the site to be managed by the Community Association and also the management of the adjoining Worimi Regional Park to the

Legend

- Managed Community Reserves/Parks[1]
- Community Conservation Lands[2]
- Local Activity Centre
- Mixed Use Residential Development
- Commercial Development
- Cultural Heritage Reserve
- Part of the Approved Subdivision Area
- Potential Stormwater Management Infrastructure
- Pathway
- Fire Trail
- 10 metre Asset Protection Zone
- 20 metre Asset Protection Zone
- 25 metre Asset Protection Zone

Notes:

1 Managed Community Reserves/Parks are areas of active and passive recreation for community purposes and do not form part of the community land.

2 Community lands are the 'Conservation Lands' to be managed for ecological and environmental values.

Figure 1.2

Project Plan

Client:	Aspen Group Pty Ltd		
Project:	Fern Bay Seaside Village		
Drawing No:	0063154hv_planning_Annex L_01		
Date:	10/2/09	Drawing size:	A3
Drawn by:	SP	Reviewed by:	PD
Source:			
Scale:	Refer to Scale Bar		

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south through an offset compensation package which has been negotiated with the Department of Environment and Climate Change (DECC);

- a commercial outlet or convenience store in the southeast of the site; and
- a shared footpath/cycleway is to be constructed from the roundabout at the intersection of Nelson Bay Road and Fullerton Cove Road to the bus shelter at Bayway Village to the south.

The Project Plan development adopts the approved road design network.

1.4 RURAL FIRES ACT 1997

The main objectives of the *Rural Fires Act 1997* (RF Act) are to:

- prevent, mitigate and suppress bush and other fires in NSW;
- co-ordinate bush fire fighting and bush fire prevention throughout the State;
- protect people from injury or death and property from damage and as a result of bush fires; and
- protect the environment.

In accordance with section 100B(1) of the RF Act, authorisation from the Commissioner of the NSW Rural Fire Service is required for '*subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes'*. This is known as a bush fire safety authority. The Port Stephens Council Bush Fire Prone Land maps have identified the site as category 1 bush fire prone land the development will need to consider the provisions of Planning for Bush Fire Protection (NSW Rural Fire Service 2006).

Section 100B(2) of the RF Act specifies that in determining whether to provide this authorisation, the Commissioner will take into consideration the subdivision's compliance with standards regarding setbacks, provision of water supply and other matters considered by the Commissioner to be necessary to protect persons, property or the environment from danger that may arise from a bush fire.

However, it should be noted that, in accordance with Section 75U of the EP&A Act, a bush fire safety authority under Section 100B of the RF Act is not required for an approved project under Part 3A of the EP&A Act. Nevertheless, a bush fire hazard assessment has been prepared with consideration of the matters sets out in Clause 46 of the Rural Fires Regulation 2002 that must be assessed in an application for a bush fire safety authority.

Clause 46(1)(g) of the Rural Fires Regulation 2002 specifies that a bush fire assessment for a proposed development must address the following matters:

'(i) the extent to which the development is to provide for setbacks, including asset protection zones,

(ii) the siting and adequacy of water supplies for fire fighting,

(iii) the capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency,

(iv) whether or not public roads in the vicinity that link with the fire trail network have two-way access,

(v) the adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response,

(vi) the adequacy of bush fire maintenance plans and fire emergency procedures for the development site,

(vii) the construction standards to be used for building elements in the development, and

(viii) the adequacy of sprinkler systems and other fire protection measures to be incorporated into the development.'

Clause 46(1)(h) of the Rural Fires Regulation 2002 specifies that an assessment of the extent to which the proposed development conforms with or deviates from the standards, specific objectives and performance criteria set out in Chapter 4 (Performance Based Controls) of Planning for Bush Fire Protection (NSW Rural Fire Service 2006) must also be undertaken.

2 *METHODOLOGY*

The bush fire hazard assessment methodology addresses the matters listed in Clause 46 (1)(g) and 46(1)(h) of the Rural Fires Regulation 2002 and the Planning for Bush Fire Protection (NSW Rural Fire Service 2006) guidelines in particular Appendix 2.

The main tasks in determining the extent to which the development is to provide asset protection zones were:

- identifying the distribution and structure of vegetation communities within the development area and for a distance of 140 metres;
- identifying the predominant vegetation type being the vegetation that presents the greatest hazard;
- assessing the effective slope of the land under the predominant vegetation for a distance of at least 100 metres from the development footprint;
- determining appropriate fire (weather) areas; and
- using the above information to determine the asset protection zones (APZs) requirements.

According to Planning for Bush Fire Protection (NSW Rural Fire Service 2006) slope should be assessed using the following guiding principle:

> *'In assessing the slope, it may be found that there are a variety of slopes covering different distances. Determine the gradient within the hazard (vegetation) which will most significantly influence the fire behaviour of the site having regard to vegetation class found.'*

Specifications for public roads, water supplies, access and egress were assessed against the project plan.

The construction standards to be used for building elements in the development is determined based on the category of bush fire attack as set out in Appendix 3 of Planning for Bush Fire Protection (NSW Rural Fire Service 2006). Determination of the category of bush fire attack is based on the distance from vegetation, type and structure of surrounding vegetation and the slope of the land (NSW Rural Fire Service 2006).

3 BUSHFIRE ENVIRONMENT

3.1 FIRE WEATHER DISTRICT

Fern Bay Seaside Village is within the Port Stephens LGA within the Greater Hunter fire area. Forest fire danger index (FDI) is 100.

3.2 VEGETATION

Vegetation surveys have been conducted over the site by Clements and Associates (1992), Gunninah (1996, 1997, 2002) and ERM (2005a). These surveys are summarised in the Species Impact Statement (ERM 2005b). The site is characterised by three main vegetation communities (see *Figure 3.1*). The dunes support Coastal Sand Apple-Blackbutt Forest. The dune swale support wet heath community with Swamp Mahogany-Paperbark Forest in poorly drained swales near Nelson Bay Road. The endangered ecological community 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions' is present in the swamp forest on site where it adjoins Nelson Bay Road.

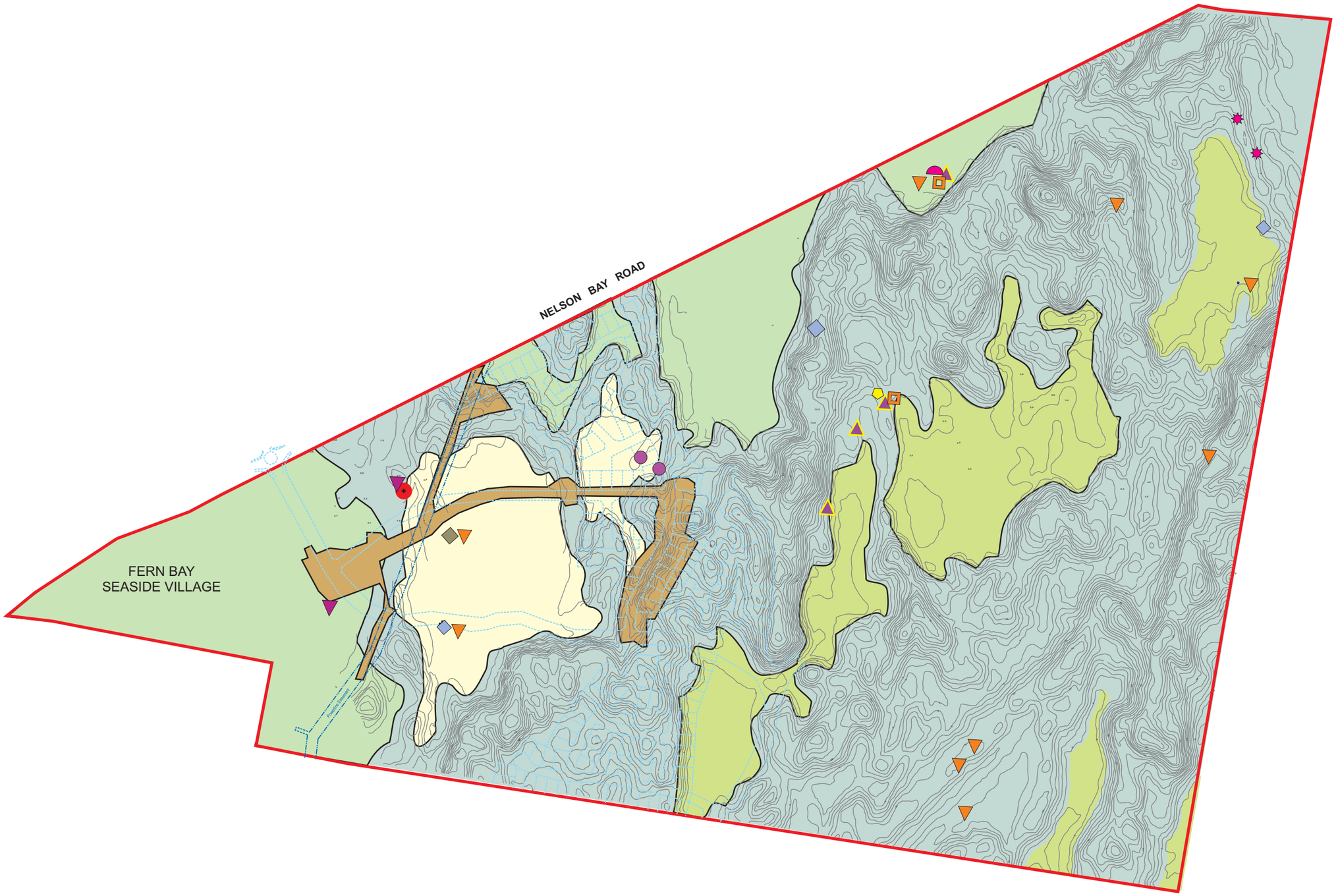
Table 3.1 identifies the vegetation formation class as defined in Table A2.1 of Planning for Bush Fire Protection (NSW Rural Fire Service 2006). The predominant vegetation class affecting fire behaviour across the site is dry sclerophyll forest. While there is a reduced risk associated with areas of swamp forest near Nelson Bay Road, this is negated by dominance of the higher hazard associated with the dry sclerophyll forest. Therefore the requirements for asset protection zones and construction standards for the majority of the development are based on forests.

Table 3.1 Vegetation Formation Classes

Vegetation Community	Vegetation Formation Class
Coastal Sand Apple-Blackbutt Forest	Forest
Swamp Mahogany-Paperbark Forest	Forested Wetland
Wet Heath	Heathlands

1. Vegetation Formation Class as per Table A2.1 Appendix 2 Planning for Bush Fire Protection (NSW Rural Fire Service 2006).

Remnant vegetation will be retained within the development footprint within the Cultural Heritage Reserve. This area of remnant vegetation is characterised by Coastal Sand Apple-Blackbutt Forest and is less than 1 hectare in area. As identified in Appendix 2 of Planning for Bush Fire Protection (NSW Rural Fire Service 2006) these areas are considered to provide a low hazard and the asset protection zone requirements and levels of construction are the same as for rainforests.



Legend

- Fern Bay Seaside Village
- Cleared Vegetation
- Swamp Mahogany - Paperbark Forest
- Coastal Sand Apple Blackbutt Forest
- Wet Heath - Tomago Sand Swamp Woodland
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner Bioregion
- 1(a) 1(a) Rural Agriculture Zone
- 2(a) 2(a) Residential Zone
- 7(a) 7(a) Environment Protection Zone
- Powerful Owl Roost Tree

Threatened Species

- Powerful Owl
- Masked Owl
- Squirrel Glider
- Grey-headed Flying-fox
- *Diuris praecox*
- Greater Broad-nosed Bat
- Eastern Bentwing-bat
- Little Bentwing-bat
- Hoary Wattled Bat
- Wallum Froglet
- Approved Subdivision

Figure 3.1

Vegetation Communities and Threatened Species in the Study Area

Client:	Aspen Group Pty Ltd		
Project:	Fern Bay Seaside Village BFMA		
Drawing No:	0063154hv_planning_Annex L_02		
Date:	14/05/08	Drawing size:	A3
Drawn by:	SP	Reviewed by:	NB
Source:	-		
Scale:	Refer to Scale Bar		

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A managed reserve located near the entrance to the subdivision includes an active recreational facility and remnant bushland which supports Swamp Mahogany-Paperbark Forest. Within the reserve, the remnant bushland will be less than 1 hectare in area. The hazard from this area would be considered the same as the Cultural Heritage Reserve.

The vegetation communities occurring on site are part of a large tract of vegetation extending along the Stockton Bight dune system. Vegetation in the environs surrounding the subdivision is the same or similar communities and the vegetation formation classes identified in *Table 3.1* apply. The conservation lands adjoining the subdivision to the south and east are managed by the Department of Environment and Climate Change (DECC). These areas are mapped as category 1 vegetation in recognition of the land use and management regime of the DECC reserve. The hazard afforded by the DECC reserves, in particular to the south of the subdivision were considered in formulation of management measures for the subdivision.

3.3 TOPOGRAPHY

The site is characterised by a system of dunes and interdunal swales. Dune system ridgelines rise to 26.3 metres AHD and are aligned north east to south west through the site and along the eastern boundary of the site. Between the dune ridges are low lying areas supporting wet heath. To the west of the dominant dune system is a low lying often wet area that supports swamp forest. Slopes vary from three degrees to generally 14 degrees along the dune ridgelines.

The ridgelines and some of the low lying areas are zoned 7(a) Environment Protection under Port Stephens Local Environmental Plan 2000. Residential lots are not proposed within the 7(a) zone. Asset protection zones are not proposed within the 7(a) zone in particular where the 7(a) zone protects a significant environmental feature.

The dominant slope affecting fire behaviour was determined from the development footprint to the hazard over 100 metres. The slope and direction towards the hazard relative to the development footprint was used to determine asset protection zones.

3.4 THREATENED SPECIES AND ARCHAEOLOGICAL SIGNIFICANCE

Threatened species and ecological communities within the site and surrounding environs are described in detail in the Fern Bay Estate Species Impact Statement (ERM 2005a). Threatened species recently recorded on the site include the Squirrel Glider (*Petaurus norfolcensis*), Masked Owl (*Tyto novaehollandiae*), Powerful Owl (*Ninox strenua*), Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Little Bentwing-bat (*Miniopterus australis*),

Greater Broad-nosed Bat (*Scoteanax rueppellii*), Hoary Wattled Bat (*Chalinolobus nigrogriseus*), Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Eastern Freetail Bat (*Mormopterus norfolkensis*), Grey-headed Flying-fox (*Pteropus poliocephalus*), Wallum Froglet (*Crinia tinnula*), *Eucalyptus parramattensis* subsp *decadens* and threatened orchid *Diuris praecox*. The endangered ecological community 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions' is present in the swamp forest on site where it adjoins Nelson Bay Road.

To minimise the impact of the development and avoid isolating the land holding to the south of the subdivision, a minimum 200 metre wide ecological corridor is proposed to be retained along the Nelson Bay Road boundary (see *Figure 1.2*). The width of the corridor will minimise edge effects along the road and development interface. The corridor includes a variety of habitats and will conserve some of the swamp forest habitat on site.

The site is known to provide habitat for Koalas (*Phascolarctos cinereus*) as defined by the *Port Stephens Council Comprehensive Koala Plan of Management* (CKPoM). Preferred Koala habitat on site is provided in the swamp forest and wet heath community (see *Figure 3.1*). It is a requirement of the CKPoM that a minimum 50 metre habitat buffer be provided to preferred Koala habitat. This requirement has been considered in the identification of the location of bushfire management measures.

An Aboriginal Heritage Assessment has been conducted by ERM (2005c) to assess the impact of the proposed development on Aboriginal heritage. This assessment has recommended that an area be preserved because of its archaeological significance (see *Figure 1.2*). The Cultural Heritage Reserve covers approximately 0.95 hectares. Vegetation and soils within the reserve will not be removed in order to minimise disturbance of artefacts.

4 BUSH FIRE PROTECTION MEASURES

4.1 ASSET PROTECTION ZONES

Where a bush fire hazard exists on or adjacent to the development site, an asset protection zone (APZ) will be established on the hazard side of the development. The APZ serves as a buffer zone between the development and the hazard and is located within the boundaries of the development.

The APZ will:

- maintain minimal fuel loads;
- have minimal, discontinuous vegetation; and
- not contain woodpiles, garden mulch or other combustible materials.

The APZ will not be located on land steeper than 18 degrees. As a condition of development consent a mechanism will be established to allow for the maintenance of the APZ and legal enforcement of management of the APZ.

Determination of appropriate setbacks was based on minimum specifications for APZ for residential purposes as set out in *Table 4.1* and Appendix 2 of Planning for Bush Fire Protection 2006.

Table 4.1 Minimum Specification for Asset Protection Zones for Residential Subdivision (FDI 100)

Vegetation Formation	Slope from the Building Envelope to the Hazard	APZ (metres)	IPA + OPA (metres)
Forest	upslope/flat	20	10 + 10
	downslope >0-5°	25	15 + 10
	downslope >5-10°	35	25 + 10
	downslope >10-15°	50	40 + 10
Rainforest/Low Hazard Area Forested Wetlands	upslope/flat	10	10 + 0
	downslope >0-5°	10	10 + 0
	upslope/flat	15	15 + 0
	downslope >0-5°	20	20 + 0
	downslope >5-10°	25	25 + 0

1. APZ = Asset Protection Zone, IPA = Inner Protection Area, OPA = Outer Protection Area.
2. Source Table A2.4 Planning for Bush Fire Protection (NSW Rural Fire Service 2006).
3. Upslope = hazard is located upslope of the building envelope.
4. Downslope = hazard is located downslope of the building envelope.
5. Low Hazard Area = remnant vegetation less than 1 hectare in area or a shape that provides a potential fire run directly towards building not exceeding 50 metres (NSW Rural Fire Service 2006, p52)

Figure 1.2 provides an indicative representation of likely requirements for APZs. The project plan incorporates APZ ranging from 20 to 25 metres. These are generally provided by the perimeter roads which are 20 metres wide. Where a 25 metre APZ is required the perimeter road and the first 5 metres of the lot would be managed as an APZ. This area is within the 6 metre setback for the lots as required by Port Stephens Council Development Control Plan PS10.

As identified in *Section 3.2* the Cultural Heritage Reserve will be less than 1 hectare in area and as such is assessed as having a low hazard under Planning for Bush Fire Protection 2006 and the APZ setback is the same as for rainforests. This requirement is identified in *Table 4.1* as Rainforest/Low Hazard Areas as 10 metres wide. This will be provided within the 17.5 metre wide road reserves fronting the Cultural Heritage Reserve. It should be noted that the 20 metre APZ shown to the recreational park at the entrance to the village may be reduced to 10 metre to reflect management of the vegetation within park and the area of remnant vegetation retained within the park. This would be identified within the bush fire management plan prepared for stage four and stage five of the development.

4.2 CONSTRUCTION STANDARDS AND DESIGN

Construction over the majority of the subdivision will need to consider the provisions of AS3959-1999 *Construction in Bushfire-prone Areas* as the site is mapped as bush fire prone land. Provision of a complying APZ within the boundary of the subdivision, allows for subsequent construction of a dwelling within the scope of AS 3959.

The level of construction required is determined using the distance from the building envelope to the hazard and the slope of the land. In most cases, separation distance from the hazard corresponds to the width of the APZ or the width of the inner protection area (IPA) (where the hazard is a forest) and set back within the lot.

The construction requirements of AS3959-1999 *Construction of Buildings in Bushfire-prone Areas* are accepted by Planning for Bush Fire Protection as the deemed-to-satisfy construction standard for buildings in designated bush fire prone areas. These standards will have to be applied to all individual DA's within the subdivision. The exact level of construction required is dependent upon the individual development applications for each of the proposed lots, as the siting of building envelopes will vary. An indication of likely levels of construction from forest vegetation is provided in *Table 4.2*.

Table 4.2 Category of Bush Fire Attack and Level of Construction

Slope	Flame Zone	Category of Attack and Distance from Hazard Level 3 (Extreme)	Level 2 (High)	Level 1 (Medium)	No Requirement
Forests:					
Upslope and flat	<20m	20 to <29m	29 to <40m	40 to 100m	> 100m
Downslope >0 to 5 °	<25m	25 to <36m	36 to <49m	49 to 100m	> 100m
Downslope >5 to 10 °	<34m	34 to <45m	45 to <59m	59 to 100m	> 100m
Downslope >10 to 15 °	<47m	47 to <55m	55 to <71m	71 to 100m	> 100m
Downslope >15 to 18 °	<57m	57 to <62m	62 to <80m	80 to 100m	> 100m
Forested Wetlands:					
Upslope and flat	<16m	16 to <23m	23 to <32m	32 to 50m	> 100m
Downslope >0 to 5 °	<20m	20 to <29m	29 to <40m	40 to 100m	> 100m
Downslope >5 to 10 °	<25m	25 to <36m	36 to <49m	49 to 100m	> 100m
Downslope >10 to 15 °	<35m	35 to <45m	45 to <60m	60 to 100m	> 100m
Downslope >15 to 18 °	<43m	43 to <51m	51 to <67m	67 to 100m	> 100m
Rainforest/Low Hazard:					
Upslope and flat	<9m	9 to <13m	13 to <19m	19 to 50m	>50m
Downslope >0 to 5 °	<10m	10 to <16m	16 to <24m	24 to 50m	>50m
Downslope >5 to 10 °	<14m	14 to <21m	21 to <31m	31 to 50m	>50m

1. Category of Bush Fire Attack and Level of Construction AS 3959-1999 for FDI 100 (Source: Table A3.3 NSW Rural Fire Service 2006).
2. Construction in flame zone outside scope of AS 3959-1999

All dwellings within 100 metres of forest and forested wetlands will be constructed to a minimum of Level 1 construction. The levels of construction apply to the construction of Class 1, 2 and 3 dwellings as defined by the Building Code of Australia (NSW Rural Fire Service 2006).

4.3 ACCESS

The main access to the existing and proposed subdivision is along Seaside Boulevard. The proposed subdivision plan provides for a second access in the north of the subdivision (see *Figure 1.2*) and this will provide for left in and left turn out to Nelson Bay Road.

Table 4.3 identifies the performance criteria and acceptable solutions as set out in Section 4.1.3 of Planning for Bush Fire Protection, to ensure that public roads *provide safe access to structures and water supply for emergency services while residents evacuate*. The collector road (Seaside Boulevard), perimeter roads and neighbourhood streets comply with the design criteria for public roads (see *Table 4.3*).

Table 4.3 Perimeter and Public Roads Performance Criteria

Performance Criteria	Acceptable Solutions	Compliance
Safe all weather access	• two-wheel drive, all weather roads	• Complies
Road widths and design allow safe access and egress	• perimeter roads two-way, two traffic lane widths (carriageway minimum 8 m kerb to kerb);	• Complies
	• non-perimeter roads comply with road widths for Category 1 tankers (ie minimum pavement width of 6.5 m for inside curve radius >100^{o} to 8 m for inside curve radius of <40^{o});	• Complies
	• perimeter road linked to internal road system at intervals of no greater than 500 m;	• Complies
	• traffic management devices constructed to facilitate access by emergency vehicles;	• Complies
	• cross fall not exceeding 3 degrees;	• Complies
	• all roads through roads. If not dead end roads to be less than 200 m in length with minimum 12 m radius turning circle and are clearly signposted;	• Two dead end roads and both comply.
	• non-perimeter road curve minimum inner radius of 6 m. These curves are to be minimised to allow for rapid access and egress;	• Complies
	• minimum distance between inner and outer curves is 6 m	• Complies
	• maximum grade do not exceed 15^{o}, average grade not more than 10^{o} or other gradient specified by road design standards (whichever is lesser); and	• Complies – grades do not exceed 15^{o}
	• minimum vertical clearance of 4 m above road.	• To be maintained.
Capacity of road surfaces and bridges sufficient to carry fully loaded firefighting vehicles.	• capacity of road surfaces sufficient to carry fully loaded firefighting vehicles ie approximately 15 tonnes (for areas with reticulated water). Bridges clearly indicate load limits; and	• Complies
	• roads are clearly signposted (with easily distinguishable names) and buildings/properties are clearly signposted.	• Complies
Clear access to reticulated water supplies	• public roads greater than 6.5 m wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water; and	• Complies
	• where public roads between 6.5 m and 8 m wide 'No Parking' on one side with hydrants located on this side to ensure accessibility.	
Parking does not obstruct minimum paved width	• parking bays are a minimum of 2.6 m wide from kerb edge to road pavement. No services or hydrants are located within parking bays; and	• Complies
	• public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road.	• All kerbs roll top.

Source: Section 4.1.3 Planning for Bush Fire Protection (NSW Rural Fire Service 2006)

Perimeter roads have been provided in preference to fire trails. Perimeter fire trails will be provided within the development footprint of two larger lots (see *Figure 1.2*). *Table 4.4* provides the design performance criteria and acceptable solutions for fire trails as set out in Planning for Bush Fire Protection 2006.

Table 4.4 Performance Criteria for Fire Trails

Performance Criteria	Acceptable Solutions	Compliance
Width and design of the fire trail enables safe and ready access for fire fighting vehicles.	• a minimum carriageway width of four metres with an additional one metre wide strip kept clear of bushes and long grass on each side of the trail;	• Complies
	• the trail is a maximum grade of 15 degrees if sealed and 10 degrees if unsealed;	• Complies
	• a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches;	• Complies
	• the crossfall is not more than 10 degrees;	• Complies

	• 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; and/or
	  • a passing bay every 200 metres (20m x 3m), making a minimum trafficable width of seven metres at the passing bay.
		• Not required as fire trail less than 200m in length.

Fire trails are trafficable under all weather conditions. Where the trail joins a public road, access shall be controlled to prevent use by non authorised persons.	• accessible to fire fighters and maintained in a serviceable condition by the owner of the land;	• Complies
	• appropriate drainage and erosion controls are provided;	• Complies
	• 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;	• Complies
	• fire trails do not traverse a wetland or any other land potentially subject to periodic inundation other than a flood or storm surge; and	• Complies
	• gates for fire trails are provided and locked with a key/lock system authorised by the local RFS.	• Complies
Fire trails designed to prevent weed infestation, soil erosion and other land degradation.	• does not adversely impact on natural hydrological flows;	• Complies
	• acts as an effective barrier to the spread of weeds and nutrients; and	• Complies
	• does not expose acid-sulphate soils.	• Complies

Source: Section 4.1.3 Planning for Bush Fire Protection (NSW Rural Fire Service 2006)

4.4 SERVICES

Table 4.5 identifies compliance with the performance criteria and acceptable solutions to ensure that the subdivision provides *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* as identified ins Section 4.1.3 of Planning for Bush Fire Protection (NSW Rural Fire Service 2006).

Table 4.5 Performance Criteria for Supply of Services

Performance Criteria	Acceptable Solutions	Compliance
Reticulated water supplies are easily accessible and located at regular intervals	• reticulated water supply uses a ring main system for areas with perimeter roads;	• Complies
	• fire hydrant spacing, sizing and pressures comply with AS 2149.1-2005;	• Complies
	• hydrants are not located within any road carriageway;	• Complies
	• all above ground water and gas service pipes external to the building are metal, including and up to any taps; and	• Complies
	• provisions of parking on public roads are met (as identified in *Table 4.3*).	• Complies
Electricity services located to limit risk of ignition and risk of disruption of service.	• where practicable, electricity transmission lines are underground; and	• Supply within subdivision is underground.
	• where overhead transmission lines installed with short pole spacing and in accordance with specifications in Vegetation Safety Clearances issued by EnergyAustralia.	• NA
Gas services located so as to not lead to ignition of the surrounding bushland or buildings	• reticulated or bottled gas installed and maintained in accordance with AS 1596 and local authorities. Metal piping to be used;	• Reticulated supply will be available.
	• polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	• Complies

1. Source: Section 4.1.3 Planning for Bush Fire Protection (NSW Rural Fire Service 2006).
2. Details regarding bottled gas supply not addressed.

The existing subdivision is connected to the existing Hunter Water Corporation system. The proposed residential subdivision was supported by a comprehensive Sewer and Water Servicing Strategy prepared by GHD (November 2004). This strategy was endorsed by the water supply authority Hunter Water Corporation. All existing lots and proposed lots within the subdivision have access to reticulated water supply. The subdivision is also supported by a number of Fire Hydrants that have been installed to comply with *AS2419.1-1994 Fire Hydrants Installation* and the requirements of Hunter Water Corporation.

4.5 DESIGN AND STAGING

Stage 1 and 2 of the approved subdivision, the main access road (Seaside Boulevarde) and the emergency fire trail (aligned to northern access road) have been constructed. The staging of the development will be contiguous thereby minimising the perimeter of urban development that is exposed to the bush fire hazard interface.

For each stage of the development a bush fire management plan will be prepared to accompany the construction certificate. The management plans will identify APZs, indicative levels of construction, establishment and management of APZs.

4.6 LANDSCAPING

Where APZs and reserves occur along the hazard development interface they will be landscaped to blend with the adjoining remnant forest. Landscaping will include lawns and plantings in drainage areas and planting with streetscape species along the roads. The APZs and reserves will be managed under Community Title.

Landscaping is permissible within the APZ provided it does not provide a direct path to transfer fire to the dwelling. The principles of landscaping for bush fire protection aim to:

- prevent flame impingement on the dwelling;
- provide a defendable space for property protection;
- reduce fire spread;
- deflect and filter embers;
- provide shelter from radiant heat; and
- reduce wind speed.

Landscaping will not provide a path for the transfer of fire to the houses due to the following management measures:

- maintaining tree crowns separation by at least two metres;
- pruning low branches two metres from the ground;
- planting and maintaining short, green and infertile grass. This should not include invasive species such as kikuyu;
- not permitting canopy to overhang to within five metres of the dwelling;
- erection of non combustible fencing material;

- locate gardens away from the dwelling so that plants do not ignite the house by direct flame contact or radiant heat emission. Where gardens do abut the dwelling, plant non flammable plants; and

- keeping areas under fences, fence posts, gates and trees cleared of fuel.

The principles of landscaping and maintenance as set out in Appendix 5 of Planning for Bush Fire Protection will be provided to individual property owners.

As the proposed development is situated adjacent to remnant vegetation that exhibits a high bush fire danger, constraints will influence development that borders this vegetation. The proposed development provides an APZ in accordance with Planning for Bush Fire Protection 2006 (NSW Rural Fire Service 2006).

In summary, the main mitigation measures proposed (or already approved in the master plan) to minimise bush fire threat are as follows:

- APZs will be provided and managed along all hazard boundaries (including external to the Cultural Heritage Reserve) as shown in *Figure 1.2*;
- APZs will not be provided with the land zoned 7 (a) Environmental Protection under Port Stephens Local Environmental Plan (LEP) 2000;
- roads have been designed in accordance with the design criteria as summarised in this assessment and Planning for Bush Fire Protection 2006 to provide safe operational access for emergency services while residents are evacuated;
- Planning for Bush Fire Protection guidelines for landscaping of individual lots to minimise bush fire hazard (Appendix 5) will be distributed through the community;
- services (water, electricity and gas) will be provided in accordance with the acceptable solutions as summarised in this assessment;
- fire hydrants have been and will be provided at regular intervals in accordance with AS 2419.1-1994 Fire Hydrant Installation and the requirements of Hunter Water Corporation;
- provision of complying APZs ensures that dwellings will be constructed to a standard that complies with AS 3959;
- the staging of the development will be contiguous thereby presenting a line of development to the hazard interface and development expanded from the perimeter of existing development; and
- a bush fire management plan will be prepared for each stage of the development.

These measures will increase the level of protection afforded to the subdivision in the event of a bush fire and meet the performance criteria for Class 1 buildings.

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