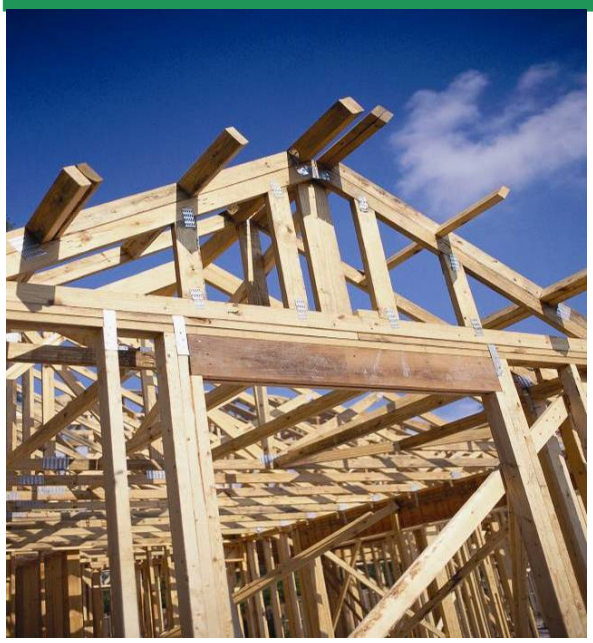
Tallawarra Lands Part 3A Concept Plan Application
Bushfire Planning Assessment

Prepared for TRUenergy

4 February 2011



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Bushfire Planning Assessment

PREPARED FOR	**TRUenergy Pty Ltd**
PROJECT NO	**09SUTECO-0077**
DATE	**February 2011**

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Abbreviations

ABBREVIATION	DESCRIPTION
APZ	Asset Protection Zone
AS	Australian Standard
DoP	Department of Planning
EA	Environmental Assessment
EP& A Act	*NSW Environment Planning & Assessment Act 1979*
FB	NSW Fire Brigade
GIS	Geographical Information System
IPA	Inner Protection Area
IRS	Illawarra Regional Strategy
LGA	Local Government Area
NZS	New Zealand Standard
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection 2006
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose development
TRUE	TRUenergy Pty Ltd

1 Introduction

This bushfire planning assessment has been prepared by Eco Logical Australia for the Tallawarra Lands Part 3A Concept Plan Application. The applicant for the Tallawarra Lands Part 3A Concept Plan Application is TRUenergy Pty Ltd. This bushfire planning assessment will accompany a Concept Plan Application lodged with the Department of Planning (DoP) under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

1.1 THE SUBJECT SITE

The site is known as Tallawarra Lands, and is located in Wollongong Local Government Area, on the western foreshore of Lake Illawarra, approximately 13 kilometres south of Wollongong town centre. The site (**Figure 1**) is approximately 536 hectares in area with an additional 36 hectares used by Tallawarra power station (not part of this assessment).

The established suburbs of Koonawarra and Dapto are located immediately to the north of the site, and the newly established Haywards Bay development area is located to the south.

The site is a mix of steep ridges and undulating to flat cleared land and low lying flood affected wetland areas, including Coastal Wetlands identified under State Environmental Planning Policy 14. The site has a history of disturbance however remnant and regenerating vegetation is found in various areas of the site.

Illawarra Regional Strategy identifies Tallawarra Lands as one of only three employment investigative areas in the region and also as a potential source of land to address demand for residential land release in the region.

1.2 THE PROPOSED CONCEPT PLAN

TRUenergy Pty Ltd has developed a Concept Plan for the site (**Figure 2**), which delineates broadly the proposed land uses which will be put forward in the Part 3A application to DoP. The Tallawarra Lands Concept Plan proposes a mix of residential, employment, retail, education, retirement living, conservation, riparian and open space uses.

This report provides a bushfire planning assessment of the Concept Plan (**Figure 2**). The Concept Plan provides a broad plan for the Tallawarra Lands Site, and incorporates on-site ecological values (including remnant vegetation and habitat for flora, fauna and riparian values) into a network of environmental and open space areas in combination with development land uses.

1.3 PLANNING PROCESS

In 2006, a Local Environmental Study was prepared for the Tallawarra Lands (Williana Associates et al. 2006) as the Tallawarra Lands were no longer required for the future expansion of the old power station. The LES process was undertaken in accordance with various legislative requirements and the project was supervised by a Project Control Group (PCG) comprising TRUenergy, Wollongong Council Department of Planning and the Premier's Department. The LES was informed on bushfire matters by a Bushfire Assessment (ELA 2006) which outlined bushfire hazards of the site and key bushfire planning requirements for any development of the site.

In 2009, a Landscape Master Plan (TRUenergy 2009) was prepared for the site to further the work detailed in the LES and to assist with the rezoning of the site in the Wollongong Local Environment Plan 2009. The concept plan aligns with the LEP and indeed with bushfire planning advice detailed in the LES (ELA 2006). Initial consultation with the Rural Fire Service and the NSW Fire Brigade was also undertaken at this time.

This Bushfire Planning Assessment addresses the bushfire component of the Environmental Assessment for the Tallawarra Lands Part 3A Concept Plan Application. This report responds to the requirements of the Director General of the NSW Department of Planning under Part 3A of the NSW Environmental Planning & Assessment Act 1979 for this project (MP 09_0131) concerning bushfire issues, which are as follows:

20. Bushfire

The EA must demonstrate compliance with the relevant provisions of *Planning for Bushfire Protection (PBP) 2006*.

Wollongong City Council identifies the study area as containing 'bush fire prone land'. Development on bush fire prone land requires an assessment against the NSW Rural Fire Service (RFS) document 'Planning for Bushfire Protection 2006' (NSWRFS 2006), referred to as 'PBP' within this report.

The assessment of bushfire protection contained in this report was based on the Specific Objectives for each development type addressed within PBP (i.e. residential, Special Fire Protection Purpose, and employment), taking into account the Standards for Bushfire Protection Measures and compliance with the Acceptable Solutions of PBP.

Figure 1: Location of Tallawarra Lands Site

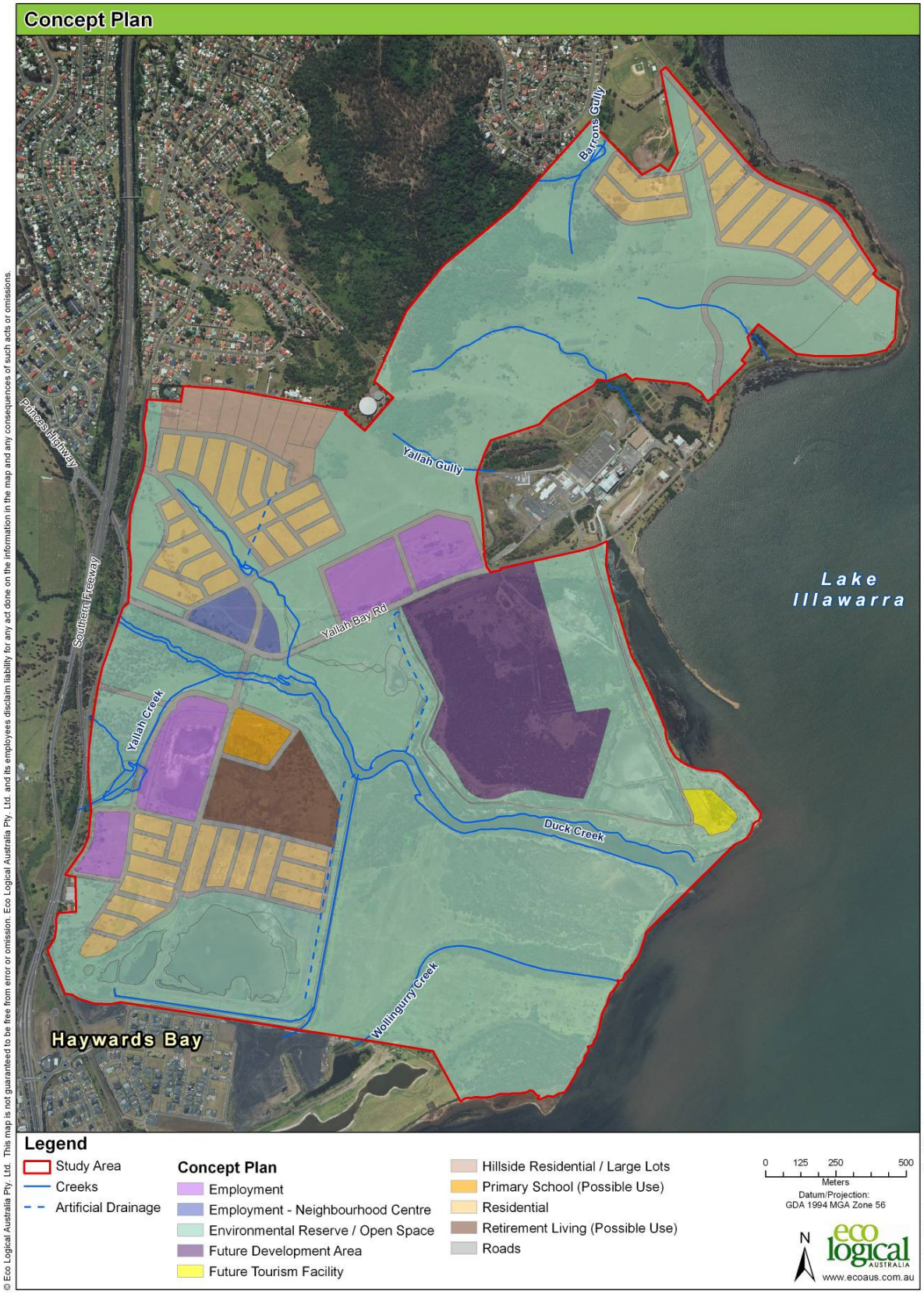

Figure 2: Tallawarra Lands Concept Plan

2 Vegetation and Slopes

This section details the environmental characteristics required to make informed decisions on the application of bushfire protection measures. The vegetation, ecological, topographical and land use data provided within this section was used to determine Asset Protection Zone location and dimensions as required by the Acceptable Solutions within PBP 2006.

2.1 VEGETATION TYPES AND COVERAGE

The areas of bushfire prone vegetation either currently or likely to regenerate (either naturally or assisted) within the study site have been assessed and are shown in **Figure 3**. Each of the areas contains one or more of the four bush fire prone vegetation types discussed in more detail below. Identification of current or likely future vegetation character has been informed by the following documents:

- Ecological Assessment (ELA 2010a)
- Vegetation Management Plan (ELA 2010c)
- Riparian Assessment (ELA 2010b)
- Landscape Masterplan (Corkery Consulting, in prep)

2.1.1 Forest

There are three areas of vegetation within the Tallawarra site that are classified as 'forest' for the purpose of applying PBP and these are discussed in more detail below. While 'forested wetland' is a separate vegetation category under PBP, it falls under 'forest' for the purpose of assessing bushfire construction levels and has consequently been classified as 'forest' for the purpose of this bushfire assessment.

Zone 2 - This area is on the north-western side of the site and currently contains degraded dry sclerophyll forest on the north-western side of the ridge tending to wet sclerophyll forest on the south-eastern side of the ridge and within moist gullies. The forest has a heavily weed infested understorey and is likely to be restored including revegetation of the Barrons Gully waterway.

Zone 7a – The area surrounding Duck Creek contains both remnant forested wetland vegetation that has been classified as 'forest' for the purpose of this assessment. The areas that are not currently vegetated that are proposed for revegetation for riparian buffer zone objectives have also been classified as 'forest' given that the revegetation will seek to match the type of the remnant vegetation in the area. Remnant or revegetated patches that are less than 1 ha in size and/or are no greater than 50 m wide or not proposed for full structural revegetation have been classified as 'low hazard vegetation' (7b, 7c and 7f).

Zone 8 – This Zone is a remnant of dry sclerophyll forest approximately 3 ha in size located east of the Princes Highway. It will be retained in the concept plan and has been classified as 'forest' in this assessment.

2.1.2 Woodland

There are two areas within Tallawarra that are already and/or will be managed in a state best classified as 'grassy woodland'.

Zone 4 – Most of this zone is currently grassed open space with only random groups of plantings within and surrounding the Tallawarra Power Station facility. However, a mosaic of managed plantings interspersed with maintained lawns is proposed (URS 2006) to shield this facility from surrounding development. It is expected that the resulting fuel loads of this zone will most closely approximate 'grassy woodland' vegetation.

Zone 13 – This is a vegetation remnant that floristically and structurally constitutes 'grassy woodland' due to its history of grazing and other agricultural disturbance. Open space land use and vegetation management within this area will likely maintain the 'grassy woodland' character of this remnant.

2.1.3 Freshwater wetlands

Zone 14a – The vegetation within this zone is largely sedges and other low-lying water loving plants (many non-native species). This area of vegetation has been conservatively assessed as 'freshwater wetland'. Two other vegetated areas (Zones 14b and 14c) are found in this area and have been classified as Forested Wetland (Forest with patches of Saline Wetland) and Grassland respectively however given their sighting in relation to the proposed development (i.e. do not form part of the hazard interface and mostly >140m from proposed development) they have not been considered in depth in the hazard assessment.

2.1.4 Saline wetland

Zone 5b – This location provides water overflow storage area for the power station that periodically contains water. At other times it contains saltmarsh species and exotics. It has been assessed as 'saline wetland'

2.1.5 Low hazard vegetation

There are a number of areas of vegetation within the Tallawarra site that contain 'low hazard vegetation'. Low hazard vegetation includes areas of bush fire prone vegetation that are either no greater than 1 ha in size and/or are no greater than 50 m wide. Low hazard vegetation uses rainforest setbacks and construction levels as a surrogate for the reduced fire behaviour expected from small and/or narrow areas of vegetation.

Zone 1 – The Tallawarra Foreshore Masterplan (Siteplus 2007) has indicated that there will be limited revegetation of this area. Small clumps of She-oaks are to be planted within the Foreshore Reserve, however, the majority of the Reserve will be managed parkland. The small clumps of She-oaks will constitute low hazard vegetation due to their small size and narrow width (mostly less than 30m wide).

Zone 5a - The 'Environmental Reserve' along the foreshore south of the Tallawarra Power Station currently contains a mixture of grassland and planted Casuarina glauca (Swamp Oak) and Acacia spp with a heavily weed infested understorey. The lack of a significant soil seed bank within this area and the disturbed nature of the soil (mostly imported fill and coal wash) means that the vegetation is unlikely to regenerate naturally. Proposed open space and recreation land uses within this area will also remove some of the current vegetation in this area (weed and planted natives) leaving a series of small disconnected clumps of native species. Vegetation management works proposed will also reduce the fuel load through removal of many weed species individuals that are present in this area. Given the likely future vegetation character and nature of zone management the zone has been classified as 'low hazard vegetation'.

Zone 7b & 7f – This area of the Duck Creek corridor is currently cleared although is proposed to receive open space revegetation. The likely future character of this vegetation is similar to OPA standard however has been conservatively assessed as 'low hazard vegetation'.

Zone 7c – The eastern end of the duck creek riparian zone contains a narrow strip of remnant Coast Swamp Oak Forest. Likely open space treatments will not add to this hazard so this area has been assessed as conforming to 'low hazard vegetation'.

Zone 9a – This zone will consist of a narrow riparian corridor on either bank of the creek which will be no more than a total of 20 m wide constituting low hazard vegetation.

Zone 9b – Open space is proposed as the landuse here but will contain scattered but likely landscape plantings and WSUD features (also likely containing a level of fuel). This area has been assessed as likely to conform to 'low hazard vegetation'.

Zone 11 – As for Zone 9 above.

Zone 12a – A narrow strip of buffer planting is proposed around the water feature in this zone and this will constitute low hazard vegetation.

Development interface boundary locations and adjacent predominant vegetation types are mapped in **Figure 3** and are also summarised within **Table 1** in Section 3.

2.1.6 Managed vegetation

Other areas of open space within the Tallawarra Lands concept plan will be managed for open space and recreation land uses. Given the likely vegetation management in these areas and the likely fuel reduced state of the vegetation, they are not considered to comprise a bushfire hazard and have been assessed as 'managed vegetation'.

Zone 3 – The entire area will be grazed by horses or otherwise managed for open space (apart from a few small disconnected vegetation remnants). Current weedy vegetation in this area will be removed which will lessen the vegetation hazard. Proposed landscape amenity plantings will be undertaken such as to not create a bushfire hazard.

Zone 6 – Much of this zone is currently cleared and remnant vegetation comprises planted *Casuarina* sp and *Acacia* spp or woody and pasture weeds. Open space land uses will manage the vegetation such that it does not constitute a bushfire hazard.

Zone 7d – This area is currently cleared of vegetation. Proposed future land use is as open space and recreation with targeted revegetation. Revegetation works will focus on the provision of canopy trees although these will be disconnected and/or in clumps with a managed understorey suitable for assessment as 'managed vegetation'.

Zone 7e – This area is currently cleared of vegetation and proposed land use will likely retain this character.

Zone 10 – This area is currently cleared. Landscape amenity plantings will be provided along with a management regime suitable for assessment as 'managed vegetation'.

Zone 12b – as per zone 7d.

2.2 SLOPES INFLUENCING FIRE BEHAVIOUR

The effective slope is determined as the slope most affecting fire behaviour within 100 m of proposed development. The Tallawarra site is generally relatively flat throughout its southern half. There are steeper slopes associated with the ridgelines in the Mount Brown area along the north-western boundary of the site however the vegetation in this part of the site is on upslopes in relation to proposed development. The majority of the slopes throughout the site are gentle downslopes into riparian corridors.

The effective slopes within the Tallawarra site fall into the PBP slope categories of 'all upslopes and flat land' and 'downslope >0-5 degrees'.

Development interface boundary locations and the effective slopes are mapped in **Figure 4** and listed within **Table 1** in Section 3.

Figure 3: Vegetation classification for the Tallawarra study area

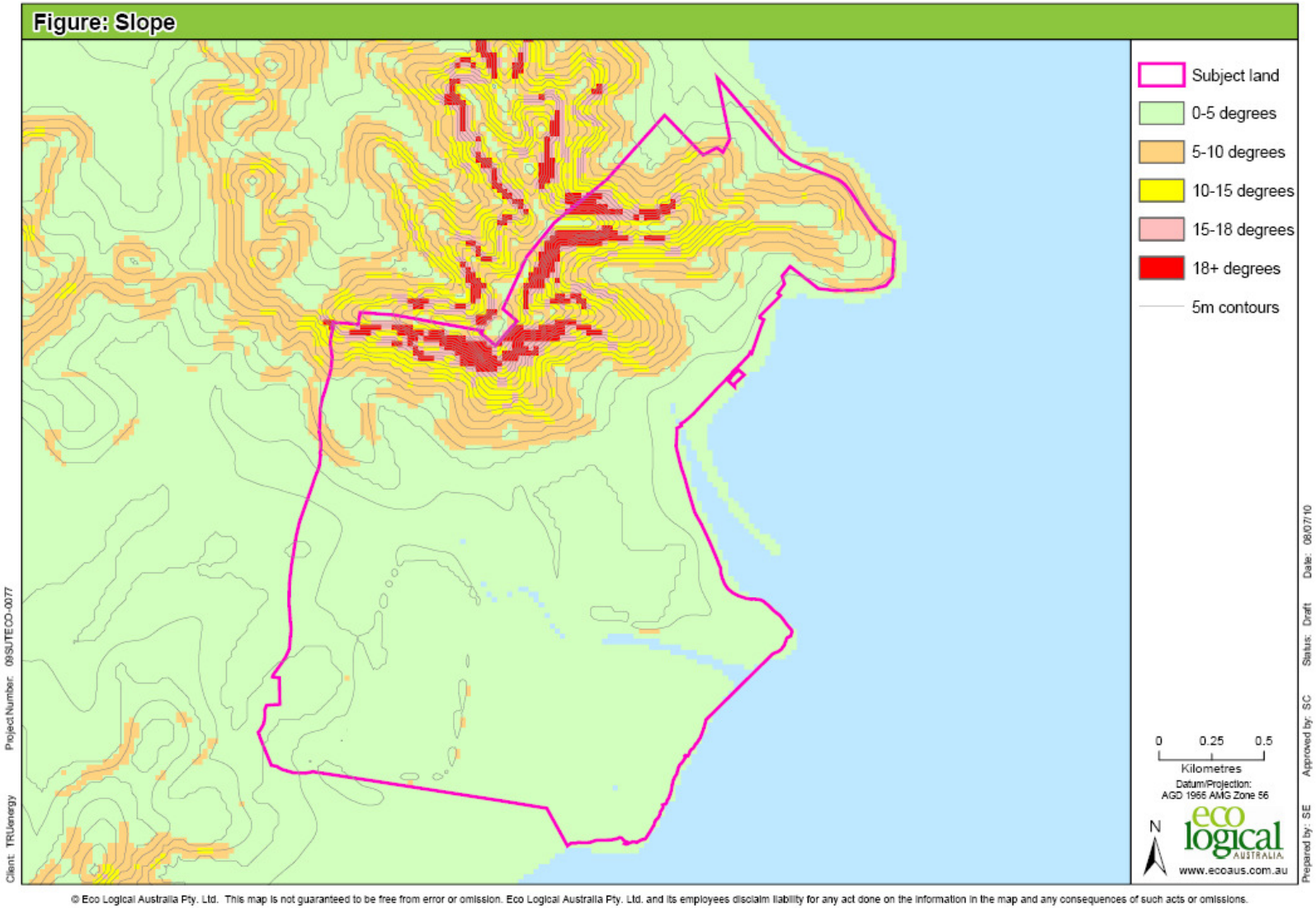

Figure 4: Effective slopes across Tallawarra study area

3 Bushfire Protection Measures

This section details the bushfire protection measures recommended for development within the study area required by the Acceptable Solutions of PBP. They are based on the Concept Plan (**Figure 2**) and the data presented in Section 2 (including **Figures 3** and **4**) and **Table 1** below.

The bushfire protection measures consist of Asset Protection Zones (APZ), building construction standards, access, and services (such as water supply).

3.1 ASSET PROTECTION ZONES (APZ)

This section outlines the location and minimum dimension of Asset Protection Zones (APZ) within the study area.

PBP identifies three groups or types of development, each requiring a different level of bushfire protection, hence requiring a different method of assessment and application of APZs:

- APZ for **residential subdivision** can be based on the Acceptable Solutions contained within Appendix 2, Table A2.4 of PBP;
- APZ for **Special Fire Protection Purpose Development** (SFPP) can be based on the Acceptable Solutions within Appendix 2, Table A2.6 of PBP; and
- APZ for **Class 5 to 8 and 10 buildings (such as commercial and industrial development)** is not specified within PBP however the Aim and Objectives of PBP need to be satisfied. This includes an appropriate separation from the bushfire hazard in combination with an adequate construction standard to prevent ignition, and the provision of defendable space and adequate access.

As it is proposed to have predominantly housing at the bushland interface areas, this assessment focuses on the bushfire protection standard for residential subdivision, however the detail necessary for the planning of SFPP developments (such as schools and retirement villages) and other developments (such as shopping centres and employment lands) is also included.

3.1.1 Residential subdivision

Residential subdivision means the subdivision of land for future housing and may include multi-housing developments such as townhouses.

Subdivision of bush fire prone land under Part 3A *Environmental Planning and Assessment Act 1979* requires consultation with the NSW Rural Fire Service based on an assessment of the proposal against PBP. After subdivision, applications for single dwellings will be assessed against PBP.

Appendix 2, Table A2.4 of PBP requires a minimum APZ ranging from 10 m for residential development adjacent 'Low Hazard Vegetation', to 25 m for residential development adjacent to forest vegetation within larger riparian corridors. **Table 1** lists the development interface locations of the study area potentially affected by APZs and **Figure 5** maps their location.

3.1.2 Special Fire Protection Purpose (SFPP) developments

Special Fire Protection Purpose (SFPP) developments require a higher standard of bushfire protection due to the potential vulnerability of the occupants and the potential need for assisted evacuation. The *Rural Fires Act 1997* and *Rural Fires Regulation 2008* identify SFPP developments to include a:

- School;
- Child care centre;
- Hospital;
- Hotel, motel or other tourist accommodation;
- Building for mentally incapacitated persons;
- Housing for older people (SEPP Seniors Living) or disability (SEPP 5);
- Group homes (SEPP 9);
- Retirement village;
- Estates under SEPP 36;
- Employment areas solely for employees with disabilities;
- Respite care centres or similar; and
- Accommodation associated with an educational institution.

These types of developments are recognised under Section 100B of the *Rural Fires Act 1997* as integrated development, and therefore a development or project application is to be referred to the NSW Rural Fire Service head office for assessment against PBP and the issuing of a Bush Fire Safety Authority.

Appendix 2, Table A2.6 of PBP requires a minimum APZ ranging from 30 m for SFPP development adjacent 'Low Hazard Vegetation', to 70 m for SFPP development adjacent forest vegetation. **Table 1** lists the development interface locations of the study area potentially affected by APZs and **Figure 5** maps their location.

3.1.3 Other development

The BCA does not provide for any bushfire specific performance requirements for non-habitable buildings such as Class 5, 6, 7, 8 and 10 buildings (which include offices, factories, warehouses and other commercial or industrial facilities), and as such APZs and building construction standards do not apply as a set of deemed to satisfy provisions. The general fire safety constructions provisions are taken as acceptable solutions, but the Aim and Objectives of PBP apply in relation to other matters such as access, water and services, emergency planning, and landscaping/vegetation management.

If the above types of development are proposed near the bushland interface, it is recommended that an APZ compliant with those recommended for residential subdivision are applied for the purpose of Concept Plan approval. A reduction of an APZ could be achieved later dependant on the desired development type/building.

3.1.4 APZ location

The location of APZs is indicatively shown on **Figure 5** at areas of the likely bushland/development or bushland/open space interface. The actual placement of the APZ will depend on the nature of the specific development type at that particular interface segment (also listed in **Table 1**) and its actual sighting.

Refinement of the APZ location should be undertaken at the detailed design stage in future subdivision applications. However, the indicative APZs shown on **Figure 5** should be considered 'worst case' and have been shown as such to demonstrate that appropriate APZs can be provided for the development proposed by the concept plan.

Table 1: APZ calculation, location and dimensions

Interface segment No.*	Slope class of most influence[1]	Predominant vegetation community[2]	Residential APZ[3]	SFPP APZ[4]	Comment
1	Downslope >0 - 5°	Low hazard vegetation	10 m (OPA not allowed)	40 m (OPA not allowed)	The residential APZ may be contained within a combination of the managed portions of the Tallawarra Foreshore Reserve and the perimeter road surrounding proposed residential development in this area.
2	Downslope >0 - 5° and cross slope (flat land)	Forest	20 m – 25 m (OPA 10 m)	60 m – 70m (OPA 20 m)	The residential APZ may be located within the perimeter road and front yard setbacks surrounding proposed residential development in this area.
3	All upslopes and flat land	Managed	N/A	N/A	N/A
4	Downslope >0 - 5°	Grassy woodland	15 m (OPA not allowed)	50 m (OPA not allowed)	The managed plantings with the Tallawarra Power Station buffer will most closely approximate 'grassy woodland'. APZ/minimum defendable space for employment development may be located within the adjacent perimeter road and within the development allotments.
5	Downslope >0 - 5°	Low hazard vegetation	10 m (OPA 10 m)	40 m (OPA 20 m)	APZ/minimum defendable space for the adjacent 'employment' development may predominantly be located within perimeter roads and within the development allotments.
6	Downslope >0 - 5°	N/A	N/A	N/A	All vegetation adjacent to the 'tourism' development will be 'managed' and a formal APZ will not be required (outside that provided by this arrangement. Other bushfire mitigation and emergency measures may need to be considered.

Interface segment No.*	Slope class of most influence[1]	Predominant vegetation community[2]	Residential APZ[3]	SFPP APZ[4]	Comment
7	Downslope >0 - 5°	Forest	25 m (OPA 10 m)	70 m (OPA 20 m)	The APZs on the northern side of Duck Creek may be located within perimeter roads, areas of open space and setbacks on large sized employment allotments. On the southern side of Duck Creek, the majority of the interface will be managed using techniques to allow the classification of this area as non hazard vegetation. APZ's will thus extend from the unmanaged vegetation closer to Duck Creek itself.
		Low hazard vegetation	10 m (OPA not allowed)	40 m (OPA not allowed)	
8	All upslopes and flat land	Forest	20 m (OPA 10 m)	60 m (OPA 20 m)	APZ/minimum defendable space for the adjacent 'employment' development may predominantly be located within perimeter roads and within the development allotments.
9	Downslope >0 - 5°	Low hazard vegetation	10 m (OPA not allowed)	40 m (OPA not allowed)	APZ for residential development may be located within the adjacent perimeter roads. The APZ/minimum defendable space for the 'local centre' will need to be located within the 'local centre' allotment or within the open space corridor.
10	Not applicable	Managed land (reserve)	N/A	N/A	N/A
11	Downslope >0 - 5°	Low hazard vegetation	10 m (OPA not allowed)	40 m (OPA not allowed)	APZ for residential development and the APZ/minimum defendable space for the 'employment' development may be located within adjacent perimeter roads and within large lot allotment setbacks.
12	Downslope >0 - 5°	Low hazard vegetation	10 m (OPA not allowed)	40 m (OPA not allowed)	APZ for residential development may be located within perimeter roads and open space areas. The majority of this area will be managed vegetation and will not require an APZ.
		Managed	N/A	N/A	

Interface segment No.*	Slope class of most influence[1]	Predominant vegetation community[2]	Residential APZ[3]	SFPP APZ[4]	Comment
13	All upslopes and flat land	Grassy woodland	10 m (OPA not allowed)	40 m (OPA not allowed)	APZs/minimum defendable spaces for surrounding development will be located within perimeter roads.
14a	Downslope >0 - 5°	Freshwater wetlands	10 m (OPA not allowed)	25 m (OPA not allowed)	APZ for adjoining residential development will be located within the adjacent perimeter road. The vegetation within 14 b and c is forested wetland and grassland respectively however this vegetation is located well over 140 m from the nearest proposed development interface.

* To determine interface segment number, refer to vegetation zone shown on Figure 3.

[1] Slope class most significantly influencing fire behaviour where the vegetation (bushfire hazard) is found over 100 m from the development boundary.

[2] Predominant vegetation is the most predominant and problematic vegetation over 140 m from the development boundary.

[3] PBP required setback for residential subdivision.

[4] PBP required setback for Special Fire Protection Purpose (SFPP) development.

Figure 5: APZ locations and dimensions for Tallawarra study area

3.1.5 APZ fuel management

The management of an APZ is to be considered in three ways: firstly, the separation of a building from the bushfire source; secondly, the provision of access or defendable space between the building (asset) and bushfire source; and thirdly, the continual maintenance of fuels within the APZ.

APZs can contain managed vegetation and may be utilised as areas of public open space, recreational areas such as sports grounds, access ways such as roads, and ancillary parts of development such as yards and car parks.

The APZ is to be measured from the edge of the unmanaged bushland to the most external point of a building. Landscaping within the APZ may differ between the Outer Protection Area (OPA) and Inner Protection Area (IPA). The OPA is a relatively smaller portion of the total APZ and extends from the bushfire source towards the IPA, which is adjacent the building. The purpose of the OPA is to reduce the rate of spread of fire, and reduce the likelihood of crown fire whilst providing a slightly denser tree canopy than the IPA to filter embers. The IPA offers more protection for defendable space and managing heat intensities at the building. The dimension of the OPA depends on the type of development and effective slope. These dimensions are indicated for specific development interface locations in **Table 1**.

The following APZ fuel management specifications can be used as a guide and are deemed as the Acceptable Solutions for APZ management.

- No part of a building is to be within the APZ;
- Mature canopy trees may be within the OPA providing crowns and canopies (which may include small clumps of crowns or a single grove of trees) do not overlap and have an overall canopy cover of less than 30%;
- Mature canopy trees may be within the IPA providing crowns and canopies (e.g. a small clumps of crowns or a single grove of trees) are separated and have an overall canopy cover of less than 15%;
- Understorey saplings, shrubs and groundcovers within both the OPA and IPA are to be managed in the following manner:
    - The saplings provide a sparse scatter of individuals useful for the long-term replacement of canopy species typically retained within the APZ;
    - The saplings and shrubs are limited and well spread out so as not form a contiguous pathway from the bushfire source to a building; and
    - A minimal ground fuel is to be maintained to include either mown or slashed grass, mulch, managed groundcovers, organic matter, bare or sealed ground, providing the final groundcover does not exceed 4 tonnes per hectare of fine fuel (*i.e.* material less than 6 millimetres in diameter). The OPA may have up to 8 tonnes per hectare of fine fuel.

The management of an APZ can differ from that listed above so long as the performance requirements noted can be achieved. The placement and management of built landscaping structures and items within the APZ also requires consideration in accordance with PBP as there is the potential for structures to ignite and act as a lasting and significant radiant heat source after the passage of a fire front.

3.1.6 APZ management responsibility

The management responsibility of the APZ is to be designated to a responsible party whom can ensure the maintenance of the APZ in perpetuity and is discussed in further detail in ELA (2001c). For the Tallawarra study area, this will likely consist of:

- Individual allotment owners or managers (if leased) for those portions of the APZ within private residential allotments;
- Wollongong City Council and/or Lake Illawarra Authority where an APZ occurs within a road reserve, parkland or open space dedicated to the Council; and
- TRUenergy Pty Ltd (or other land owner/manager) where an APZ occurs within parkland, open space or a temporary APZ until such time that construction and landscaping are completed and the ownership/management of the land is transferred over to Wollongong City Council.

3.1.7 Perimeter access

The bushland/development interface areas may require perimeter access roads depending on the level of the bushfire threat. These roads should be in the form of a public perimeter roads, and can be in the form of fire trails in lower threat circumstances or where particular development types and/or densities will allow.

Section 3.3 of this report provides further road design and construction information for perimeter roads and non-perimeter roads.

3.2 BUILDING CONSTRUCTION

The building construction standard for future buildings is based on the separation distance between the building and the bushfire source, and the vegetation type and slopes, as determined for the APZ. Using Table 2.4.4 within AS 3959-2009 'Construction of buildings in bushfire-prone areas', a 'Bushfire Attack Level' (BAL) potentially received by a building within 100 m of the bushfire source may be determined (Standards Australia 2009). The range of categories permitted by RFS is 'BAL-40', 'BAL-29', 'BAL-19', 'BAL-12.5' and 'BAL-LOW'. There is an additional BAL known as 'BAL-FZ' (BAL-Flame Zone) which is the highest BAL in AS 3959-2009, however, the RFS do not permit building to this construction level within new subdivisions.

The assessment of building construction standard is undertaken at the development application stage for a particular building as aspects of the building, its location with respect to the bushfire hazard, the nature of the bushfire hazard, and surrounding development can alter the required level of construction.

3.3 ACCESS

It is recommended that public roads within the Tallawarra study area achieve the Acceptable Solutions within PBP as listed in **Table 2** overleaf. Any perimeter fire trails are also recommended to achieve the Acceptable Solutions for fire trails within PBP as listed in **Table 3** overleaf. The performance criterion of the road system is to allow safe access for fire-fighters while residents are evacuating the area. Perimeter roads within the Tallawarra study area also need to comply with the requirements outlined in **Table 4**.

Specifications for internal roads servicing SFPP development are listed in **Table 5**. Emergency evacuation plans for SFPP developments are also required to be prepared as these developments proceed.

Table 2: Accepted solutions for public road design and construction in bush fire prone areas

PBP Public Roads Acceptable Solutions
• Public roads are two-wheel drive, all weather roads • Urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Roads that are not perimeter roads can comply with the road widths within **Table 4** below. • The perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas. • Traffic management devices are constructed to facilitate access by emergency services vehicles. • Public roads have a cross fall not exceeding 3 degrees. • Public roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard. • Curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress. • The minimum distance between inner and outer curves is 6 metres. • Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient. • There is a minimum vertical clearance to a height of 4 metres above the road at all times. • The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicated load rating. • Public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression. • Public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression. • Public roads up to 6.5 metres wide provide parking within parking bays and located services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. • One way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and located services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. • Parking bays are a minimum of 2.6 metres wide from kerb to kerb edge to road pavement. No services or hydrants are located within the parking bays. • Public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side.

Table 3: Accepted solutions for fire trail design and construction in bush fire prone areas

PBP Fire Trail Acceptable Solutions
• A minimum carriage way width of four metres with an additional one metre strip each side of the trail (clear of bushes and long grass) is provided. • The trail is a maximum grade of 15 degrees if sealed and not more than 10 degrees if unsealed. • A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches is provided. • The crossfall of the trail is not more than 10 degrees. • The trail has the capacity for passing by reversing bays using the access to properties to reverse fire tankers, which are six metres wide and eight metres deep to any gates, with a inner minimum turning radius of six metres and outer minimum radius of 12 metres; and/or a passing bay every 200 metres, 20 metres long by three metres wide, making a minimum trafficable width of seven metres at the passing bay (Note: some short constrictions in the access may be accepted where they are not less than the minimum (3.5 m) and extend to no more than 30 m and where obstruction cannot be reasonably avoided or removed). • The fire trail is accessible to fire-fighters and maintained in a serviceable condition by the owner of the land. • Appropriate drainage and erosion controls are provided. • The fire trail system is connected to the property access road and/or to the through road system at frequent intervals of 200 metres or less. • Fire trails do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge). • Gates for fire trails are provided and locked with a key/lock system authorised by the local RFS. • Fire trail design does not adversely impact on natural hydrological flows. • Fire trail design acts as an effective barrier to the spread of weeds and nutrients. • Fire trail construction does not expose acid-sulphate soils.

Table 4: Minimum road widths for roads that are not perimeter roads

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

Table 5: Accepted solutions for internal roads servicing SFPP development

PBP SFPP Development Internal Road Acceptable Solutions
• Internal roads are two-wheel drive, sealed, all-weather roads; • Internal perimeter roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions; • Roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; • Traffic management devices are constructed to facilitate access by emergency services vehicles. • A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided. • Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress. • The minimum distance between inner and outer curves is six metres. • Maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees. • Crossfall of the pavement is not more than 10 degrees. • Roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge). • Roads are clearly sign-posted and bridges clearly indicate load ratings. • The internal road surfaces and bridges have a capacity to carry fully-loaded firefighting vehicles (15 tonnes).

3.4 SERVICES

3.4.1 Water supply

Reticulated water (e.g. hydrant spacing, sizing and pressures) is to be supplied throughout the development site in accordance with AS 2419-2005 'Fire hydrant installations – System design, installation and commissioning' (Standards Australia 2005). Hydrants are not to be located within any road carriageway and the provisions of parking and hydrant locations in the public road access **Table 2** above are to be met.

3.4.2 Electricity

Where practicable, electrical distribution lines at the bushland interface areas are to be underground. If above ground, they are to be installed with short pole spacing (e.g. 30 metres) and no part of a tree is closer to a powerline than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).

3.4.3 Gas

Reticulated or bottled gas is installed and maintained in accordance with AS/NZS1596 'The storage and handling of LP gas' (Standards Australia 2008) and the requirements of relevant authorities.

3.4.4 Emergency services

Liaison undertaken by ELA in 2007 with the local Rural Fire Service Brigade and the NSW Fire Brigade for the development of the Masterplan (2009) indicated initial support of the development in general terms. Further, a review of the current fire stations located within close proximity to the Tallawarra site was undertaken and discussed with the RFS and NSW FB. The existing fire stations located at Dapto and Albion Park were confirmed (by NSW FB) as being sufficient at that time for the development proposed at the Tallawarra site both in terms of emergency response times and emergency resources infrastructure. Further, the existing HAZMAT resource at Shell Harbour services Port Kembla and were confirmed as being capable of servicing the Tallawarra Lands site (NSW FB and RFS).

4 Summary and Conclusion

This bushfire planning assessment has been prepared for the Tallawarra Lands Concept Plan; a master planned community development by TRUenergy Pty Ltd and subject to an application under Part 3A of the *Environmental Planning & Assessment Act 1979.* The Tallawarra Lands site is located on the western shores of Lake Illawarra in the Wollongong Local Government Area and the project proposes a mix of residential, employment, retail, education, retirement living, conservation, riparian and open space uses.

This report provides a bushfire planning assessment of the Concept Plan under the provisions of the NSW Rural Fire Service guidelines 'Planning for Bushfire Protection 2006'. In strict accordance with 'Planning for Bushfire Protection 2006', the primary outcomes of the assessment include:

- An assessment of the bushfire hazard (predominant vegetation and effective slopes);
- Required Asset Protection Zones (APZs) for all bushland-development interface locations;
- Requirements for the management of APZs;
- Guidance on the minimum standards for safe access and egress which includes road layout, design and construction standards;
- Additional requirements relating to Special Fire Protection Purpose developments such as increased APZs, access and egress as well as emergency evacuation; and
- A guide on the requirements for services such as water supply for fire fighting.

In conclusion this report provides an assessment against 'Planning for Bushfire Protection 2006' as required, to fulfil the Environmental Assessment Requirements issued by the Director General. In the authors' professional opinion the recommendations within this report will provide an appropriate standard of bushfire protection for the Tallawarra Lands Concept Plan Application consistent with 'Planning for Bushfire Protection 2006'.

Key bushfire protection features of concept plan include:

1. Development areas consolidated and simplified such as to minimise the perimeter of the area of land interfacing the hazard;
2. Perimeter access provided to all development types;
3. Alternative access and egress provided to development precincts should one be cut by fire;
4. Required APZs afforded to all development types;
5. APZs to be provided in most parts by perimeter roads.
6. APZ sighting in areas with larger APZs has been informed by an Ecological Assessment, Vegetation Management Plan, Riparian Assessment and Landscape Strategy to ensure

APZs avoid potential conflict with other objectives and that long term management can be appropriately provided for;

7. Sensitive sighting of SFPP developments that affords these developments sighting away from high risk areas, appropriate setbacks, emergency access and egress provisions (including alternatives should primary routes be cut) and recommendation for the development of emergency evacuation plans as the development proceeds;

8. Service supply including water according to PBP requirements; and

9. A site that presents a low risk to development and is well serviced by existing emergency services infrastructure.

5 References

Corkery Consulting. in prep. Tallawarra Lands Landscape Masterplan. Report prepared for TRUenergy Pty.Ltd.

ELA. 2006. Tallawarra Lands Ecological Assessment. Local Environment Study. Report prepared for Willana Associates.

ELA. 2010a. Tallawarra Lands Part 3A Concept Plan Application, Ecological Assessment. Prepared by Eco Logical Australia for TRUenergy.

ELA. 2010b. Tallawarra Lands Part 3A Concept Plan Application, Riparian Assessment. Prepared by Eco Logical Australia for TRUenergy.

ELA. 2010c. Tallawarra Lands Part 3A Concept Plan Application, Vegetation Management Plan. Prepared by Eco Logical Australia for TRUenergy.

Keith, D.A. 2004. *Ocean shores to desert dunes: The native vegetation of New South Wales and the ACT*, Department of Environment and Conservation (NSW), Hurstville.

NSWRFS. 2006. *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities and Developers* including the 2010 Appendix 3 Addendum. Australian Government Publishing Service, Canberra.

Siteplus Pty Ltd. 2007. *Lake Illawarra Foreshore, Yallah Bay Precinct, Proposed Master Plan Report*. Siteplus, Figtree.

Standards Australia. 2005. *AS 2419 Fire hydrant installations – System design, installation and commissioning*. Standards Australia, Sydney.

Standards Australia. 2008. *AS/NZS1596 The storage and handling of LP gas*. Standards Australia, Sydney.

Standards Australia. 2009. *AS 3959-2009 Construction of buildings in bushfire-prone areas*. Standards Australia, Sydney.

URS. 2006. Tallawarra Power Station. Landscape Masterplan. Report prepared for TRUenergy Tallawarra Pty. Ltd.

Williana Associates, Northrop Engineers, Eco Logical and Kellegher Nightingale Consulting. 2006. Tallawarra Lands Local Environmental Study 2006. Prepared for Wollongong City Council, TRUenergy, Premiers Department and Department of Planning.

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