BUSHFIRE HAZARD ASSESSMENT

FOR

UNIVERSITY OF TECHNOLOGY, SYDNEY

KURING-GAI CAMPUS

AT

ETON ROAD, LINDFIELD

FOR

CRI Australia Pty Ltd

19th September 2007

Version C

CONTENTS

Disclaimer

Readers of this report must be aware that the bushfire mitigation recommendations described in this report will not completely remove the risk of bushfire impacting the proposed development site. With regard to the proposed development, the application of recommendations in their entirety, together with the diligent maintenance of Asset Protection Zones, will provide for a reduction of the bushfire threat and the associated risk.

This report caters specifically for the requirements of this project and the Client. No warranty is intended or implied, or responsibility undertaken by Barry Eadie Consulting Pty Ltd for its use on any other project or by any third party.

This report does not include an environmental assessment, Aboriginal heritage assessment or identify endangered species in the area.

1 INTRODUCTION

1.1 Report Purpose

This report considers the Bushfire Hazard Assessment for a proposed Concept Plan and redevelopment of the existing site at Eton Road, Lindfield. The report will form part of the supporting documentation for the Study in Support of Significant Site and Concept Plan Environmental Assessment Report for the UTS Kuring-gai Campus site.

The site is designated as bushfire prone land as identified on the Council Bush Fire Prone Land Map as approved by the Commissioner of the NSW Rural Fire Service. The proposal is classified as Subdivision in accordance with *'Planning for Bushfire Protection' (2006).*

A Bushfire Hazard Assessment has been undertaken to determine the necessary requirements for the development in accordance with:

- NSW Rural Fire Service, Planning NSW, *'Planning for Bushfire Protection' (2006)*, and
- AS 3959-1999: *Construction of Buildings in Bush Fire Prone Areas*.

Barry Eadie Consulting Pty Ltd has been engaged by CRI Australia Pty Limited to prepare the Bushfire Hazard Assessment report, to be used in support of the Application.

1.2 Director-General's Environmental Assessment Requirements

The NSW Department of Planning, through the Director-General's Environmental Assessment Requirements, has identified the following matters as key issues to be addressed in regards to Bushfire Risk Assessment.

Key matters to be addressed include;

- *bushfire risk assessment to determine the level of hazard posed upon the proposal*
- *provision of setbacks, water supply, access, supply of services and fuel management on the site*
- *identification of asset protection zone (to be identified on a site plan and demonstrated to be outside the boundary of the Lane Cove National Park) or building requirements to minimise the impact of any bushfire hazard*
- *identification of evacuation and relocation measures / strategies to be implemented in a bushfire event*

This report addresses each of the above matters relevant to bushfire and the current stage of the application.

2 BUSHFIRE LEGISLATION IN NSW

The *Environmental Planning and Assessment Act 1979* and the *Rural Fires Act 1997* were amended in 2002 via the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002*.

With regard to the *Environmental Planning and Assessment Act 1979*, the amendments:

a) Require local government councils to record on maps land identified by the Commissioner of the NSW Rural Fire Service as bushfire prone land; and

b) Prevent development consent being granted for the carrying out of development for certain purposes on bushfire prone land unless the consent authority is satisfied that the development conforms to certain documented bushfire protection specifications and requirements (*Planning for Bushfire Protection* and *AS 3959 – Construction of Buildings in Bushfire-Prone Areas*) or has consulted with the Commissioner; and

c) Provides for the integration of procedures to obtain development consent with a requirement to obtain a Bush Fire Safety Authority from the Commissioner under the *Rural Fires Act 1997* with respect to the fire safety of:

   (i) a subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes; or

   (ii) developments for purposes that are particularly vulnerable in bush fires and that require special protection. Such developments may include schools, child care centres, hospitals, hotels, motels, tourist accommodation, homes for mentally incapacitated persons, SEPP 5 developments (housing for older people or people with disabilities), SEPP 9 developments (Permanent and transitional group homes for disabled or socially disadvantaged persons) and retirement villages.

'Planning for Bushfire Protection' (2006), defines bushfire prone areas as an area that can support a bushfire or is likely to be subject to bushfire attack. In general, a bushfire prone area is an area containing a high, medium or low bushfire hazard, or any area within 100 m of a high or medium bushfire hazard, or within 30 m of a low bushfire hazard. Bushfire hazard areas do not include existing urban areas or water bodies (other than wetland vegetation), and are identified by bushfire hazard mapping produced under an approved Bushfire Risk Management Plan, or other such map certified by the Commissioner of the NSW Rural Fire Service for this purpose.

3 SITE ASSESSMENT

Barry Eadie conducted inspections of the Eton Road, Lindfield site and the surrounding area on 4 June, 12 July and 10 August 2007. The following assessment has been undertaken in accordance with the requirements of *'Planning for Bushfire Protection' (2006).*

The site is currently used as a campus of the University of Technology Sydney, and it is proposed to redevelop part of the site for residential purposes.

3.1 Location

The UTS Kuring-gai Site, Eton Road, Lindfield, is located immediately to the south and south west of Eton Road and to the east of Lady Game Drive, and is situated immediately to the north of Lane Cove National Park, within the Local Government Area of Kuring-gai.

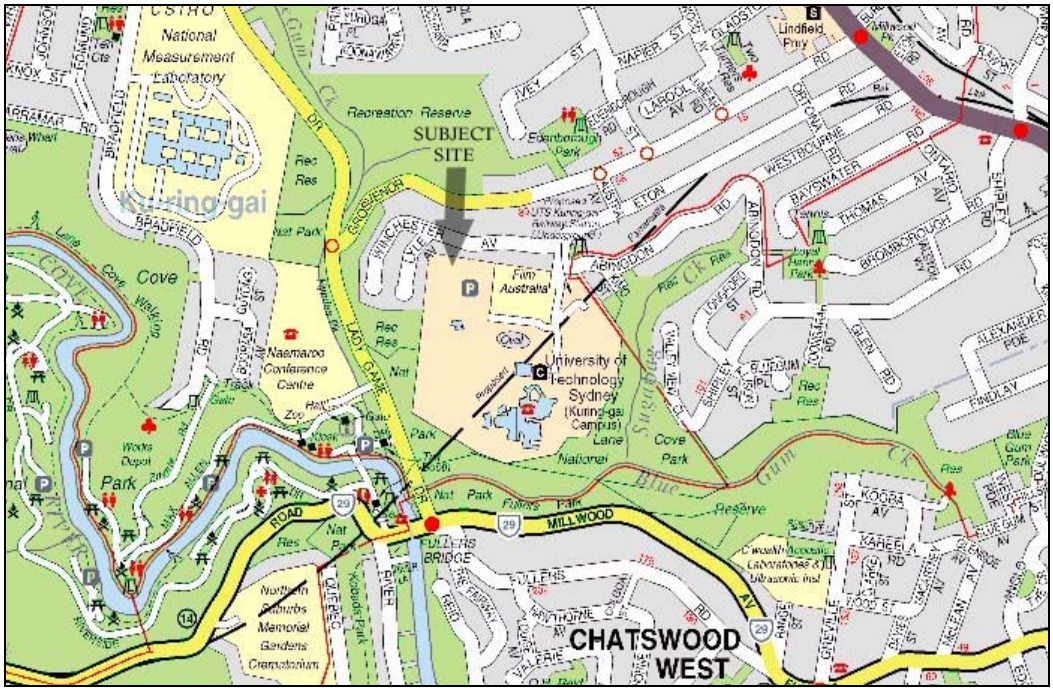

Figure 3.1 – Site Location. *(Base Map is Copyright to Universal Press Pty Ltd and extracted from UBD CityLink 2002)*

The subject site (as shown in Appendix A) is bound to the north west, north and north east by existing residential development, associated infrastructure, such as Winchester Avenue, and other types of development, including Film Australia. Lane Cove National Park and other areas of bushland tenure, such as Crown Land, bound the property to the west, south west, south, south east and east.

On a broader scale (further from the subject site), dense existing residential development and associated infrastructure is situated to the north, north east, east, south east, and to a lesser extent, the north west and south of the UTS Kuring-gai Site. The residential areas are typified by large single lot dwellings with extensive gardens. Lane Cove National Park, and other bushland areas, generally extend to the north west, west and south west of the subject site, however, it should be noted

that in this particular region, the bushland areas form fingers of vegetation that are associated with Lane Cove River, and these fingers of vegetation extend into the existing residential development in the area forming a vast urban-bushland interface. As a result of this situation, Lane Cove National Park could be described as an urban-locked bushland area that is significantly fragmented in places by the presence of existing development. Lane Cove National Park separates the Kuring-gai campus from the nearby suburbs of Roseville and Chatswood West to the east.

In relation to the potential impacts of bushfire upon the Concept Plan, the main areas of concern are from the bushland areas that are directly adjacent to the western, south western, southern, south eastern and, to a lesser extent, eastern boundaries of the property.

Blue Gum Creek is situated within Lane Cove National Park to the south of the subject site. The creek flows with an easterly to westerly orientation and is a major tributary of Lane Cove River, which is situated further to the south west of site. In addition, Sugarbag Creek, which is a smaller tributary of Blue Gum Creek, is situated along to the east of the subject site and generally flows from north to south. The property is situated within the catchment of the Lane Cove River, which flows in a southerly direction into the Parramatta River and Sydney Harbour.

This report assesses the bushfire risk of the subject site for the purpose of potential residential subdivision and development, with regard to development within bushfire prone lands.

3.2 Vegetation

The vegetation has been assessed over a distance of 140 m from the proposed building lines in all directions in accordance with Table A2.1 of *'Planning for Bushfire Protection' (2006)* (refer Appendix B).

The site contains areas of both disturbed and undisturbed bushland vegetation, which at the east, west and southern boundaries are contiguous with that of the Lane Cove National Park. The campus buildings and facilities are well integrated with the bushland, although there has been clearing of native plants adjacent to the buildings, carparks and oval. The bushland areas of the site ranges from moderate to good condition other than areas of weed plumes located primarily in drainage lines.

The bushland supports populations of the threatened plant species *Darwinia biflora* and one known habitat of the threatened Red-crowned Toadlet. The threatened flora occurs within the upper hillside areas of the campus. The breeding creek for the Toadlet is located in the south-west of the campus within generally undisturbed bushland. The existing native vegetation in the catchment of the breeding creek requires protection to avoid impacts on the Toadlet.

ERM has prepared a detailed flora and fauna report which provides additional details on the protection and management of the threatened species as well as general practices to ensure disturbance to natural habitats and corridors is minimised.

The site is designated as Bush Fire Prone Land and the vegetation west, south west, south, south east, and east of the existing and propose buildings are considered to be predominantly Forest in accordance with Table A2.1 of *'Planning for Bushfire Protection' (2006)*. The Forest vegetation is generally moderately dense throughout the area and possesses a high level of connectivity both within the canopy and understorey vegetation as it runs up slope to the subject site.

However, there is localised variation in the density of the vegetation throughout the area. This variation is due largely to the presence of large sandstone 'rocky outcrops' surrounding the subject site, both within the property and external to the boundaries. As a result, the vegetation (canopy and understorey) is notably fragmented in places, with the presence of these rocky outcrops effectively providing potential, naturally occurring, fire break around existing and proposed buildings as indicated in the Concept Plan.

On a regional scale, the Forest vegetation that extends throughout the area is generally bound, and fragmented in part, by the presence of existing residential development and associated infrastructure throughout the region.

Figure 3.2 – Photo taken from the roof of one of the existing UTS buildings looking to the south east across Lane Cove National Park. This photo shows a example of the management that already occurs within some sections of the property, with managed grass (centre) and managed garden/landscape areas (foreground left and right). Areas of residential development can be seen across the valley on the southern side of Lane Cove National Park (background).

Figure 3.3 – Photo of the UTS Kuring-gai site showing an example of a large sandstone outcrop broken by heath-type understorey vegetation. Areas of rocky outcrops of a similar nature to this one a common around the UTS / Lane Cove National Park interface area. Rocky outcrops such as these effectively act as a natural bushfire mitigation feature, especially when coupled with the implementation of Asset Protection Zones.

Figure 3.4 – Photo taken looking to the north towards the main entrance into the UTS Site via Eton Road (not shown). This photo shows example of the existing landscaping and vegetation that occurs within some sections of the property. Garden/landscaping areas within the site such as these, will be subject to a regular management regime, particular in regards to the understorey vegetation, as has occurred here.

Figure 3.5 – Photo taken looking north into the existing buildings in the south west of the UTS Kuring-gai site. This photo shows the rigorous (high) level of construction that has been implemented in the construction of the existing buildings. The existing design displays the predominant use non-combustible materials such as concrete and bricks, within a relatively simple design layout. Even potential weak points such as the windows are provided with a degree of non-combustible shielding.

3.3 Slope

Based on the site inspection and assessment of topographic maps, the slope of the land over a distance of 100 m from the indicative building lines in all directions has been assessed. In accordance with *'Planning for Bushfire Protection' (2006)*, the slope has been assessed based on the gradient under the bushfire hazard that will most significantly influence the fire behaviour of the site.

The buildings of the Kuring-gai Campus are located on a plateau at the end of a spur that extends to the Pacific Highway ridgeline. The flatter levels of the plateau have generally been developed for university-associated uses including car parks, roads and recreational areas. Moderately steep slopes fall away from the plateau to creek lines to the east, Sugarbag Creek, and to the south, Blue Gum Creek. To the west of the campus buildings the land falls steeply to College Creek. Existing car parks in the east of the campus have been terraced into the sloping land. The landscape in the immediate vicinity is indicative of the topography throughout the entire area, with many ridgelines and gullies (creek lines) creating a generally hilly, and somewhat rugged, landscape.

The Concept Plan is surrounded generally to the north west, north and north east by existing development, hence providing no potential bushfire path from these aspects. The slopes to the north west and north east have a slight downslope of 0 - 5°, whilst the slopes to the north are considered level, with the only variation being localised due to development or earthworks. It should be noted that these slopes are reasonably negligible in relation to their influence on bushfire behaviour due to the presence of existing development and associated infrastructure to these aspects.

The slopes that will predominantly influence bush fire behaviour and provide a potential path for bushfire are to the west, south and southeast, all of which range from 10-15^0 down-slope over 100 m. There is a creek line in the southwest where the slopes are greater than 18^0 down-slope, which will form part of the required Asset Protection Zone (APZ) and will consist of the Outer Protection Area (OPA). This area is manageable as the rock formations enable easy personnel access for the management of this area. The management of this and all the APZs will be addressed in the Bush Fire Management Plan which can only be prepared when the final approval has been granted.

A Bushfire Management Plan will be prepared in accordance with the RFS guideline for Standards for Asset Protection Zones and will, in particular address the following requirements:

- contact person / department and details
- schedule and description of works for the construction of Asset Protection Zones and their continued maintenance
- management strategies, proposed schedule and description of works involving any remnant bush land within the property boundary
- details of access through any gate / fire trail system for remnant bush land areas

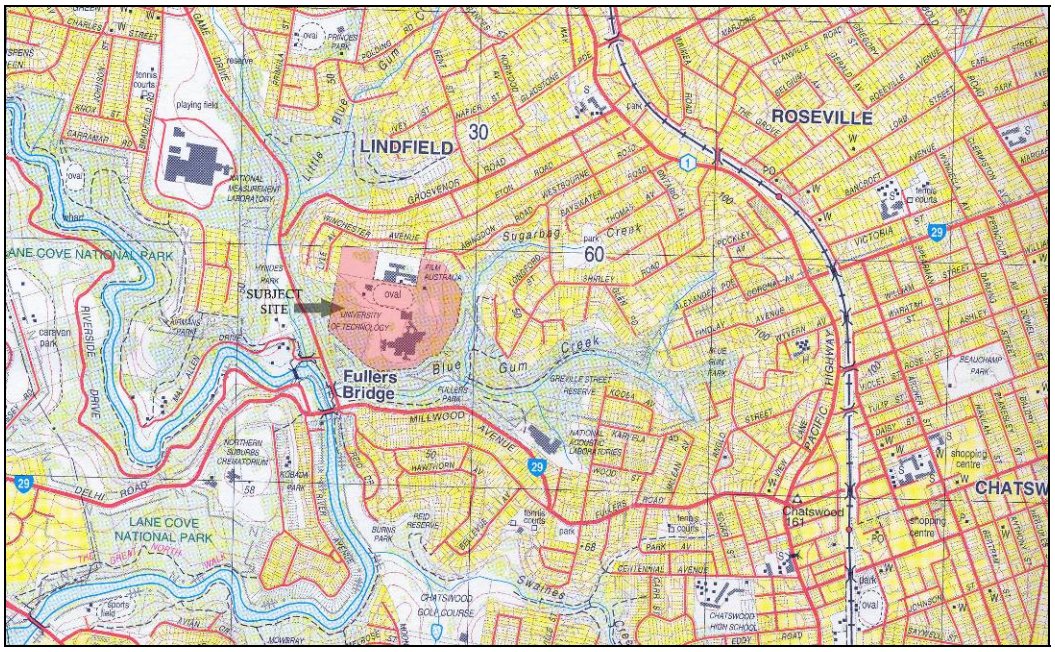

Figure 3.6 –Topographic map showing subject site (shaded red), the neighbouring Film Australia (north), the surrounding residential development (north west, north and north east), and the nature and extent of the landscape and vegetation respectively. *(Base Map is Copyright to NSW Department of Land and Property Information, 2002).*

3.4 Asset Protection Zone

The Asset Protection Zone (APZ) acts as a buffer zone between the development and the hazard. The primary purpose of an APZ is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures. The APZ consists of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

Tables A2.4 to A2.7, within *'Planning for Bushfire Protection' (2006)*, specify the minimum APZ required in bushfire-prone areas (refer to Appendix C) with Table A2.4 (Minimum Specifications for Asset Protection Zones [m] for Residential and Rural Residential Subdivision Purposes) being relevant in this instance. The required APZ for forest vegetation with slopes of 10-15^0 down-slope may comprise a minimum 25 metre IPA and a maximum 25 metre OPA.

Refer to Appendix E for a description of both Inner and Outer Protection Areas, as per *'Planning for Bushfire Protection' (2006).*

A minimum 50 m APZ is required around the western to the southern corner of the existing University Campus building. The north-eastern area of the site will also require a 50 m APZ (refer to plans in Appendix A).

The Concept Plan retains existing car parks within the south-eastern area of the site and does not propose any new development. Consequently, these car parking areas will form the APZ.

The existing University Campus Building will require an APZ subject to the proposed use of the building. Irrespective of any future use of this building the required APZ may not be achievable due to the existing nature and location of the building. ***'Planning for Bushfire Protection' (2006)*** addresses existing buildings in the following way:

- *ensure that the bush fire risk to adjoining lands is not increased*
- *provide a minimum defendable space*
- *provide better bush fire protection on a redevelopment site, than the existing situation. This should not result in new works being exposed to greater risk than an existing building*
- *ensure that the footprint of the proposed building does not extend towards the hazard beyond existing building lines on neighbouring land*
- *not result in an increased bush fire management and maintenance responsibility on adjoining land owners unless they have agreed to the development*
- *ensure building design and construction enhance the chances of occupants and building survival*

The existing University Campus Building, if built under today's regulations would be considered to be Special Fire Protection Purpose and would attract the greater APZ, which might not be achievable. However, with any redevelopment or change of use or even the retention of the current use (educational), any building improvements and the provision of defendable space around the southern portion of the building would greatly improve the level of protection from bush fire. The provision of the proposed fire trail and APZ in this area will immediately improve the current situation irrespective of any future use of the building.

Table 3.1 – Bushfire Protection Summary

Development Aspect	**Hazard/ Vegetation within 140m of Development**	**Predominant Vegetation Class** *(Fig A2.2 and Table A2.1)*	**Average Slope of Land (over 100m)**	**Recommended Width of Asset Protection Zone (IPA + OPA)** *(Table A2.4 and 2.7)*	**Proposed Width of Asset Protection Zone (IPA + OPA)**
North	Film Australia, Winchester Avenue, Existing Residential Development	*None*	0° level	*None*	*None*
North West	Lyle Avenue, Existing Residential Development	*None*	0 - 5° downslope	*None*	*None*
West	Open Forest, Lay Game Drive	Forest	10 - 15° downslope	50 metres	50 metres
South West	Open Forest, Lady Game Drive	Forest	10 - 15° downslope	50 metres	50 metres
South	Open Forest, Blue Gum Creek, Millwood Avenue	Forest	10 - 15° downslope	50 metres	50 metres
South East	Open Forest, Sugarbag Creek, Blue Gum Creek	Forest	10 - 15° downslope	50 metres	50 metres
East	Open Forest, Sugarbag Creek, Existing Residential Development, Valley View Close	Forest	10 - 15° downslope	50 metres	50 metres
North East	Existing Residential Development, Kimo Street, Abingdon Road	*None*	0 - 5° downslope	*None*	*None*

3.4.1 MANAGEMENT PRACTICES FOR ASSET PROTECTION ZONES

The cross-sections identified in Figure 3.7 are representative of the different slopes within the APZ and the level of vegetation. Management practices would vary depending on the terrain. Provided below are indicative management practices which vary depending on the slope and level of vegetation for a number of distinctive areas within the APZ, Figures 3.8 - 3.11.

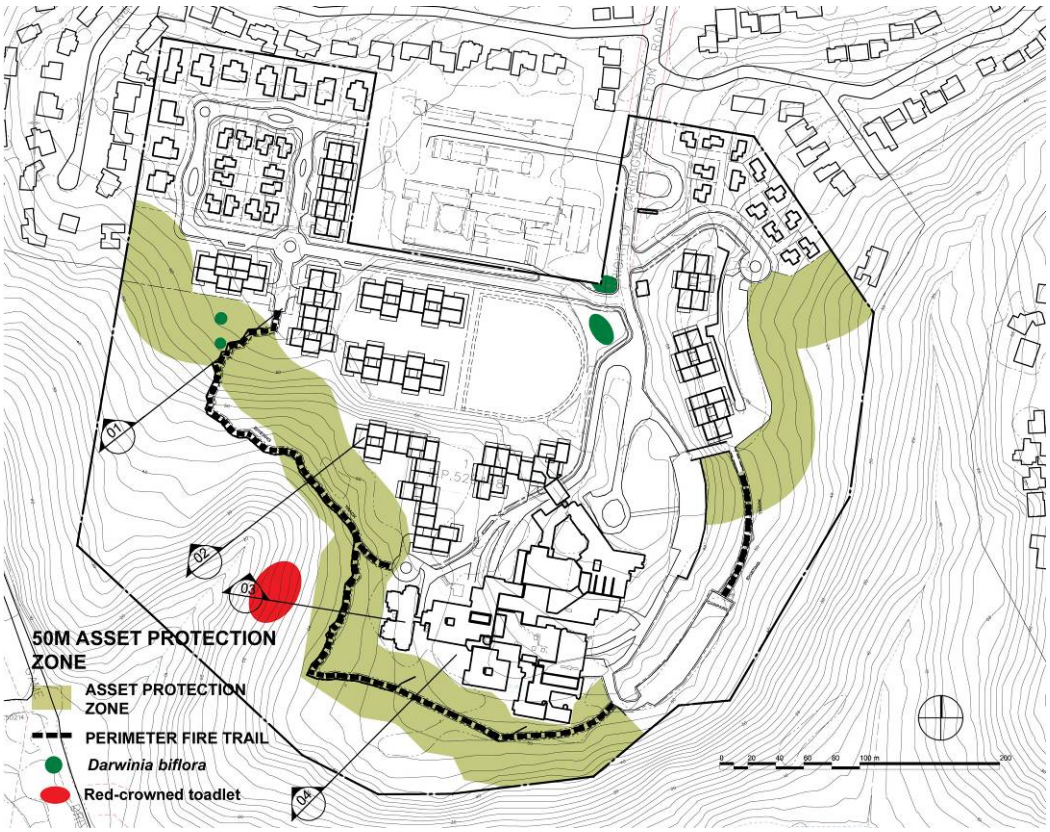

Figure 3.7 – Map identifying location of APZ and cross sections *(DEM)*

Indicative Management Practices

An APZ is a fuel reduced area surrounding a built asset or structure and provides:

- a buffer between a bush fire hazard and an asset
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

Accordingly, it is important that vegetation in an Asset Protection Zone be retained. It is also important however that the correct balance be found between vegetation retention and fuel loads. In this regards, fuels can be controlled by:

1. raking or manual removal of fine fuels
2. mowing or grazing of grass
3. removal or pruning of trees, shrubs and understorey
4. Slashing and trittering
5. Ploughing and grading (Not recommended for this site)
6. burning (hazard reduction) only to be conducted with and in conjunction with the Fire Service.

Management of the Asset Protection Zone would be a central part of the Bushfire Management Plan to be prepared for the site. The maintenance of the APZ around the site would vary in response to a number of considerations including:

1. Vegetation type
2. Topography
3. Location of existing/proposed buildings
4. Location of access ways and paths
5. Proximity to areas of environmental sensitivity

Accordingly, different management practices would be implemented as necessary. The following cross-sections show the slope in relevant parts of the site and associated APZ. With each cross-section are examples of how management regimes could vary to accommodate the above considerations.

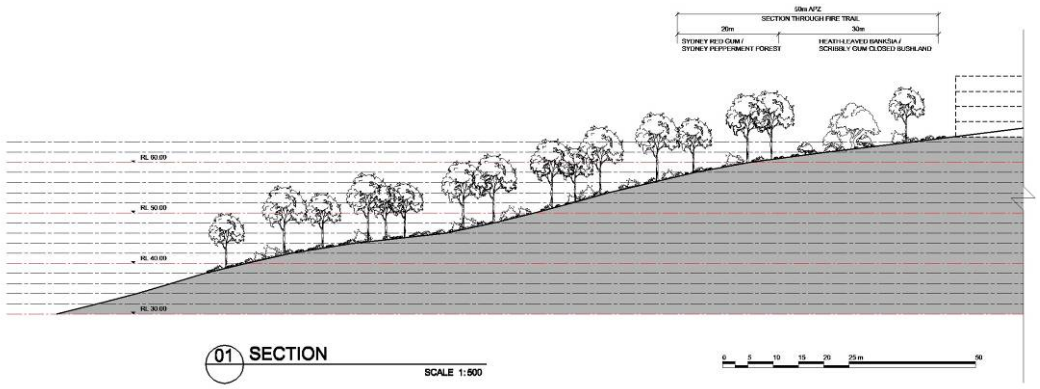

Figure 3.8 – Cross Section 1 *(DEM)*

Characteristics

- Gentle topography
- Open vegetation
- Easy access

Indicative Management Practices

- Mechanical and Manual removal of ground fuels each spring (raking, etc.)

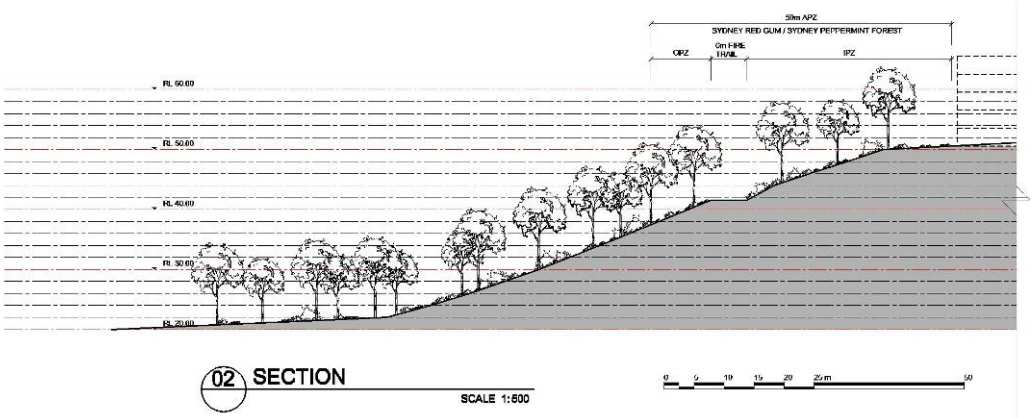

Figure 3.9 – Cross Section 2 *(DEM)*

Characteristics

- Steepest part of the APZ
- Denser vegetation
- Access via fire trail
- Mechanical access not available through entire APZ
- Existence of creek line

Indicative Management Practices

- Limited use of machinery
- Pruning of trees, shrubs and understorey
- Manual management of ground fuels each Spring

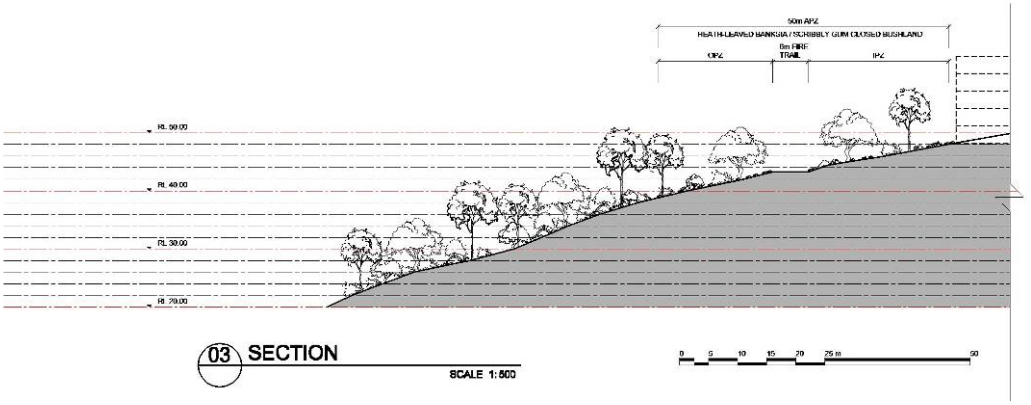

Figure 3.10 – Cross Section 3 *(DEM)*

Characteristics

- Gentle topography
- Open, heath vegetation
- Rocky outcrops
- In vicinity of the Red-crowned Toadlet

Indicative Management Practices

- Limited management required
- Manual management of ground fuels each Spring

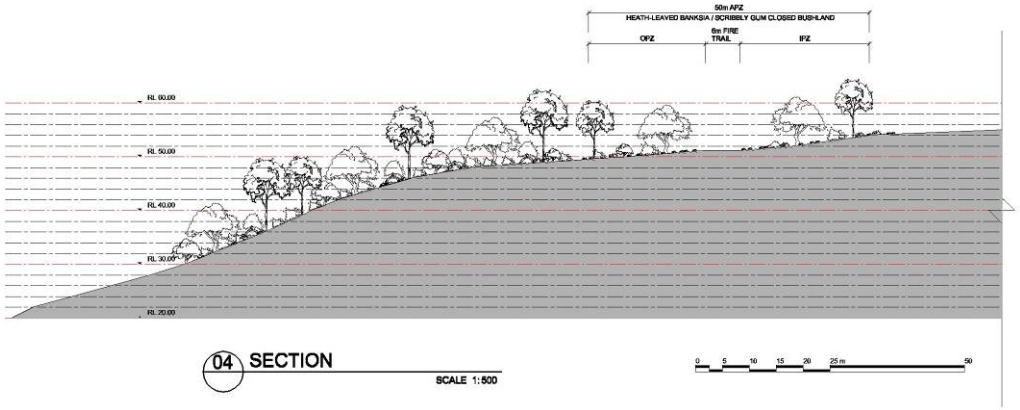

Figure 3.11 – Cross Section 4 *(DEM)*

Characteristics

- Gentle topography
- Grassed and landscaped area associated with the University
- Open vegetation

Indicative Management Practices

- Mechanical and Manual removal of ground fuels each spring (raking, etc.)

3.5 Level of Construction

Tables A3.2 and A3.3 of *'Planning for Bushfire Protection' (2006)* (refer to Appendix D) allow the determination of the relevant level of construction in accordance with AS 3959-1999: ***Construction of Buildings in Bushfire-Prone Areas*.**

The level of construction for residential dwellings is determined by the location of the proposed dwelling on the lot, the type of vegetation (forest in this case), the slope under the unmanaged vegetation and the available APZ. The required APZs for the subdivision application ensure that all lots are capable of providing a building footprint in accordance with the requirements of ***'Planning for Bushfire Protection' (2006).***

In relation to any existing buildings the level of construction will be determined subject to the proposed use, available APZ / defendable space and the nature of possible upgrading where necessary

Table 3.2 – Bushfire Attack Summary

Development Aspect	**Hazard/ Vegetation within 140m of Development**	**Predominant Vegetation Class** *(Table A2.1)*	**Average Slope of Land**	**Proposed Width of Asset Protection Zone (IPA + OPA)**	**Level of Bushfire Attack** *(Table A3.3)*	**Construction Standard** *(Table A3.3)*
North	Film Australia, Winchester Avenue, Existing Residential Development	*None*	0° level	*None*	Low	*None**
North West	Lyle Avenue, Existing Residential Development	*None*	0 - 5° downslope	*None*	Low	*None**
West	Open Forest, Lay Game Drive	Forest	10 - 15° downslope	50 metres	Extreme	Level 3
South West	Open Forest, Lady Game Drive	Forest	10 - 15° downslope	50 metres	Extreme	Level 3
South	Open Forest, Blue Gum Creek, Millwood Avenue	Forest	10 - 15° downslope	50 metres	Extreme	Level 3
South East	Forest, Sugarbag Creek, Blue Gum Creek	Forest	10 - 15° downslope	50 metres	Extreme	Level 3
East	Forest, Sugarbag Creek, Existing Residential Development, Valley View Close	Forest	10 - 15° downslope	50 metres	Extreme	Level 3
North East	Existing Residential Development, Kimo Street, Abingdon Road	*None*	0 - 5° downslope	*None*	Low	*None**

**NOTE: Given the residential nature of the Concept Plan, in conjunction with the topographic locality and presence of extensive bushland areas in the immediate surrounds, it is recommended that a minimum of Level 3 construction be applied to all proposed dwellings/buildings within the Concept Plan. The finalisation of property protection and construction requirements (for the entire site) will be determined in negotiation with the NSW Rural Fire Service.*

3.6 Fire Fighting Personnel Access

3.6.1 PUBLIC ROAD ACCESS

Access is provided to UTS Kuring-gai Site and the Concept Plan area via sealed public roads capable of supporting fully loaded fire fighting vehicles. Both Eton Road and the proposed internal road network are greater than 8 m in width allowing traffic to pass in opposite directions.

An existing internal road network is currently in place throughout the UTS Kuring-gai Site. This road network will continue to be utilised and will be expanded and upgraded as part of the Concept Plan. The upgraded road network will achieve the intent of the requirements for public road access as set out with *'Planning for Bushfire Protection' (2006)* and should also provide fire fighting and emergency services with sufficient access/egress capabilities.

The proposed public roads to service the development will be designed in accordance with the following criteria:

(a) Roads will be two-wheel drive, all weather roads;

(b) Roads will be two-way allowing traffic to pass in opposite directions;

(c) The proposed perimeter roads will be linked to the internal road system at an interval of no greater than 500 metres;

(d) Restrict the use speed humps and chicanes to control traffic;

(e) Roads should be through roads. Dead end roads are not recommended, but if unavoidable, dead ends should be not more than 200m in length, incorporate a minimum 12m radius turning circle, and should be clearly sign posted as dead ends;

(f) The capacity of road surfaces and bridges should be sufficient to carry fully loaded firefighting vehicles (approximately 28 tonnes or 9 tonnes per axle);

(g) Curves should have a minimum inner radius of 6m and be minimal in number to allow for rapid access and escape;

(h) The minimum distance between inner and outer curves should be 6m;

(i) Maximum grades should not exceed 15° and preferably not more than 10° or gradient specified by road design standards, whichever is the lesser gradient;

(j) There must be a minimum vertical clearance to a height of 6 metres above the road at all times;

(k) Roads should provide sufficient width to allow firefighting vehicle crews to work with firefighting equipment about the vehicle.

(l) Roads should be clearly sign-posted (with easily distinguished names) and buildings should be clearly numbered. Bridges should clearly indicate load rating;

(m) Roads should have a minimum total reserve width of 20m where they are a perimeter road as defined in the Guidelines; and

(n) Roads should not traverse through a wetland or other land potentially subject to periodic inundation.

There is one access route in and out of the Concept Plan area, via Eton Road to the north of the property. This access route is surrounded to all aspects by existing development, including residential and Film Australia, and is, therefore, well shielded from the potential impacts of bushfire. The proposed internal road network will connect directly on to Eton Road with the entry/exit point adjacent to the eastern elevation of Film Australia. The grade of the road (adjacent to the property) is relatively flat with no restrictions on vertical clearance. The road network to the north of the campus serves the residential community, connecting it to Lindfield and Roseville Village centres and the Pacific Highway. Lady Game Drive provides direct connections to Ryde Road, Epping Road and the M2 via Delhi Road as well as to Chatswood. All of these roads are capable of carrying fully loaded fire fighting vehicles.

At this stage, it is important to emphasise that the proposed adaptive re-use and residential development of the UTS Kuring-gai site will actually provide a substantial reduction in the overall numbers of people that may be required to evacuate from the area at any given time, due to a significant bushfire (or other emergency) event.

3.6.2 PROPERTY ACCESS

There are existing internal property/emergency access roads currently in place throughout the UTS Kuring-gai Site. These access roads will continue to be utilised and will be expanded and upgraded as part of the Concept Plan. As the proposal is for residential development vehicular access will be available throughout the developed area, all of which will provide emergency services access to all buildings.

The existing access roads have the potential to be upgraded to achieve the intent of the requirements for property access as set out with *'Planning for Bushfire Protection' (2006)* and provide fire fighting and emergency services with sufficient access/egress capabilities.

The proposed property/emergency access roads to service the development will be designed in accordance with the following criteria:

(a) A minimum trafficable width of 4 m with an additional 1 m wide strip on each side of the road kept clear of bushes and long grass;

(b) The road should have a passing bay about every 200 m where possible, which should be 20 m long by 3 m wide, making a minimum trafficable width of 7 m at the passing bay;

(c) The capacity of road surfaces and bridges should be sufficient to carry fully loaded fire fighting vehicles (approximately 28 tonnes or 9 tonnes per axle);

(d) A minimum vertical clearance of 6 m to any overhanging obstructions, including tree branches;

(e) Curves should have a minimum inner radius of 6 m and be minimal in number to allow for rapid access and escape;

(f) The minimum distance between inner and outer curves should be 6 m;

(g) Maximum grades should not exceed 15 degrees and preferably not more than 10 degrees;

(h) Roads should provide sufficient width to allow fire fighting vehicles crews to work with fire fighting equipment about the vehicle;

(i) Dwellings not sited within 200 m of the road system should have an alternative access road providing emergency egress to the through road system; and

(j) Roads should be clearly sign-posted. Bridges should clearly indicate load rating.

3.7 Electricity Supply

It is preferable that transmission lines providing power to the scheme proposed by the Concept Plan should be installed underground.

3.8 Gas

Reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596-2002: ***Storage and Handling of LP Gas*** and the requirements of the relevant authorities. If gas cylinders are to be kept close to buildings, the release valve must be directed away from the building and away from any hazardous materials such as firewood, so that it does not act as a catalyst to combustion.

The site is currently serviced by reticulated town gas system.

3.9 Water Supply

Town reticulated water supply is available to the Concept Plan, therefore a supplementary form of water supply will not be necessary for fire fighting purposes. The development of the site will include the provision of hydrants for both building and bushfire fire fighting. The existing hydrants utilise public water supplies, which provides fire-fighters with easy access to water. There will be adequate coverage to all residential areas within the subject site, particularly those areas adjacent to the bush land.

4 EVACUATION MEASURES

Similar to the Bush Fire Management Plan, the preparation of a Bush Fire Evacuation Plan cannot commence until such time as approval has been granted for the proposal at which time the detailed layout of the development is available to determine the most appropriate evacuation plan for the site.

A Bushfire Evacuation Plan will be submitted to the NSW Rural Fire Service – Development Control Services for approval. The evacuation plan will be consistent with the RFS Guidelines for the Preparation of Emergency / Evacuation Plan and will detail the following:

- under what circumstances the complex will be evacuated;
- where all persons will be evacuated to;
- roles and responsibilities of persons coordinating the evacuation;
- roles and responsibilities of persons remaining with the complex after evacuation;
- a procedure to contact the New South Wales RFS District Office or the New South Wales Fire Brigade to inform them of the evacuation procedure and timing and where they will be evacuated to.

5 RECOMMENDATIONS

The proposed adaptive re-use and residential development of the existing UTS Kuring-gai Site, Lindfield, could proceed with the expectation that the development, as indicated by the Concept Plan provided in Appendix A, could be constructed in accordance with the requirements of asset protection for Subdivision specified in ***'Planning for Bushfire Protection' (2006)***. Based on our site inspection and assessment, the following recommendations are made for the proposed development:

(a) A minimum Asset Protection Zone be provided in accordance with section 3.4 of this report.

(b) A Bush Fire Management Plan be prepared for the site prior to occupation of the site in accordance with section 3.3 of this report.

(c) A Bush Fire Emergency / Evacuation Plan be prepared for the site prior to occupation of the site in accordance with section 4 of this report.

(d) Construction levels for buildings be determined under section 79BA with Development Applications for each proposed dwelling.

(e) The existing buildings be assessed for bush fire protection when the use of the buildings has been approved.

(f) Woodpiles, combustible material storage sheds, large areas / quantities of garden mulch and stacked flammable building materials should not be located within the revegetated areas.

(g) Electricity transmissions lines should be installed underground (where possible);

(h) Reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596-2002: *Storage and Handling of LP Gas* and the requirements of the relevant authorities.

(i) Roof gutters and valleys to all dwellings should be leaf proofed by the installation of an external gutter protection shroud or a gutter system that denies all leaves from entering the gutter and building up on that gutter. Any material used in such a system should have a flammability index of no greater than 5 (as measured against AS 1530.2).

(j) All public roads proposed within the development should be designed in accordance with the criteria set out in Section 3.6.1 of this assessment.

(k) All fire trails/emergency accessways right of carriageway proposed within the development should be designed in accordance with the criteria set out in Section 3.6.2 of this assessment.

(l) The installation of a reticulated hydrant supply, in accordance with the requirements of Australian Standard AS2419.1 (1994), throughout the Concept Plan.

6 CONCLUSIONS

Barry Eadie has conducted a site inspection and assessment of the existing site and the Concept Plan at the University of Technology, Sydney (UTS) Kuring-gai Site, Eton Road, Lindfield. The assessment has been undertaken in accordance with *'Planning for Bushfire Protection' (2006)* and *AS 3959-1999: Construction of Buildings in Bush Fire Prone Areas*.

Provided the recommendations stated above are implemented in full, Barry Eadie Consulting Pty Ltd is of the opinion that the Concept Plan achieves the intent of the relevant legislation and in particular the requirements as set out in *'Planning for Bushfire Protection' (2006)*.

7 REPORT BASIS INFORMATION

The report is based on the following:

(i) Site inspections carried out on 4 June, 12 July and 10 August 2007 by Barry Eadie;

(ii) Concept Plan in Appendix A.