PLANNING FOR BUSHFIRE PROTECTION ASSESSMENT

Location:

University Ring Road, Callaghan
Lot 16 DP 817507

Proposed Anatomy Teaching and Mortuary Facility
For University of Newcastle, Callaghan

Date Produced: September 27th, 2011

FPA AUSTRALIA

BUSHFIRE PLANNING AND DESIGN

Certified Practitioner

Certification No. BPD-PA-16132

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1	28/04/2011	Draft Issued for Review	L.Couch	P.Couch
2	14/06/2011	Final	L.Couch	P.Couch
3	12/07/2011	Corrected Lot and DP	L.Couch	P.Couch
4	27/9/2011	Rewrote report in accordance with Rural Fires Act 100B SFPP	L.Couch	P.Couch
5	27/9/2011	Minor alteration of terminology	L.Couch	P.Couch
6	28/9/2011	Reworded hydrant condition.	L.Couch	P.Couch

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1.0 EXECUTIVE SUMMARY AND COMPLIANCE TABLES

The report has assessed the proposed Anatomy Teaching and Mortuary Facility against the requirements of s100B of the *Rural Fires Act 1997,* AS3959 (2009) Building in Bushfire Prone Areas and Planning for Bushfire Protection, 2006.

Planning for Bushfire Protection (2006) Section 4.2.5 Special Fire Protection Purpose as Infill, is the basis for the assessment of compliance for this site due to the development being an alteration/addition to an existing classroom.

Compliance with the intent and performance of Planning for Bushfire Protection (2006) Section 4.3.5 Infill development will be made and Section 4.2.3 Specific Objectives for Special Fire Protection Purpose Developments will be addressed.

TABLE 1 – PROPERTY DETAILS AND TYPE OF PROPOSAL

Applicant Name	University of Newcastle		
Site Address	University Ring Road, Callaghan	**Lot/Sec/DP**	Lot 16 DP 817507
Local Government Area	Newcastle City Council	**FDI**	100
Bushfire Prone Land	Yes		
Type of development	Tertiary Education Building	**Type of Area**	Urban
Special Fire Protection Purpose as Infill	Yes	**Flame Temperature**	1090K
Application Complies with DTS Provisions	Yes	**Referral to RFS required**	Yes. Bushfire Safety Authority Required.

TABLE 2 – BUSHFIRE THREAT ASSESSMENT

	North	**East**	**South**	**West**
AS3959 (2009) Vegetation Structure	Riparian Corridor/ Rainforest	Managed Lands	Managed Lands	Forest Remnant/ Rainforest
Asset Protection Zone	20 metres	>100 metres	>100 metres	20 metres
Accurate Slope Measure	2 degrees downslope	N/A	N/A	7 degrees upslope
Slope Range	0 to 5 degrees downslope	N/A	N/A	Level/upslope
AS3959 (2009) Bushfire Attack Level (BAL)	BAL-19	BAL-12.5	BAL-12.5	BAL-19

TABLE 3 – PLANNING FOR BUSHFIRE PROTECTION (2006) 4.3.5 COMPLIANCE

Performance Criteria	Proposed Development Determinations	Method of Assessment
Asset Protection Zone	Asset Protection Zones have been determined in accordance with AS 3959-2009 Method 1 Simplified Procedure and Planning for Bushfire Protection (2006).	Acceptable Solution
Siting and Design	Buildings have been designed to reduce the potential for flame contact and ignition to the building.	Acceptable Solution
Construction Standards **AS3959 – 2009**	Bushfire Attack Levels have been determined in accordance with AS 3959-2009 Method 1 Procedure and Planning for Bushfire Protection (2006). Non-residential Class 5 to 9 buildings require no specific level of construction in accordance with AS3959 (2009) with BCA structural fire protection measures deemed adequate.	Acceptable Solution
Private and or Public Road Infrastructure	The public road system is not affected or changed as part of this application. Present road infrastructure complies.	Acceptable Solution
Property Access	The property access remains unchanged. Present road infrastructure complies.	Acceptable Solution
Water Supply	Hydrant network will comply with deemed to satisfy provisions.	Acceptable Solution
Electrical Supply	The existing electrical transmission lines are located underground and require no additional protection measures.	Acceptable Solution
Gas Supply	Any gas supply to comply with Planning for Bushfire Protection (2006) being underground pipes or aboveground metal pipe work.	Acceptable Solution
Landscaping	Landscaping to comply with Planning for Bushfire Protection (2006) Appendix 5.	Acceptable Solution

TABLE 4 – PLANNING FOR BUSHFIRE PROTECTION (2006) 4.2.3 COMPLIANCE

Performance Criteria	Proposed Development Determinations
Provide for the special needs of the occupants. Provide for safe emergency evacuation procedures	The university should incorporate the new building into the existing university evacuation plans. The proposed development provides multiple building exits and lifts facing away from the vegetative threat. The Riparian Corridor to the north and Remnant Vegetation to the West will provide limited sustained fire effects to building occupants exiting the building.
Bushfire Maintenance Plan.	Good landscaping maintenance already surrounds the proposed building. It is recommended to maintain landscaping at present levels. The university wide landscaping plan provides detail and maintenance regimes ensuring that landscaping maintenance will continue. Discussions with university staff indicate a roofing contractor is employed to remove leaf litter from roofing and this maintenance program is to extend to the proposed building if any trees overhang the roof.
Minimise Risk to Emergency Service Personnel and Building Occupants	The building has multiple exits facing away from the vegetative threat, with any fire effects being short lived and reduced intensity. The proposed building is a concrete resilient structure with adult students able to be evacuated quicker than a typical “school” student. The building provides a safe shelter in its present design and with peak evacuation expected to provide limited congestion.

2.0 INTRODUCTION

2.1 PURPOSE OF REPORT

The purpose of this report is to establish suitable bushfire mitigation measures for the proposed new university building to be constructed on the University Ring Road, Callaghan. The assessment acknowledges the requirements of s100B of the Rural Fires Act 1997 and Planning for Bushfire Protection 2006 to protect persons, property and the environment from danger that may arise from a bushfire.

Under the provisions of section 100B of the Rural Fires Act 1997 as amended, a Bushfire Safety Authority (BFSA) is required from the Commissioner of the NSW Rural Fire Service.

This report complies with Rural Fires Regulation 2008 Clause 44 Application for Bushfire Safety Authority. The assessment encompasses the subject site and neighbouring areas.

2.2 PROPOSED DEVELOPMENT

The proposed development incorporates the construction of an attached Class 9B Anatomy Teaching and Mortuary Facility. The proposed development site is surrounded by the university ring road, Medical Sciences Building, Biological Sciences and Greenhouses. A large parking area is located to the North. The university is well established with multiple lecture halls, classrooms and accommodation facilities onsite. A Wetlands area and bushland extend along the northern perimeter of the university a distance from the proposed development site.

2.3 SIGNIFICANT ENVIRONMENTAL FEATURES

There are no known significant environmental features on the development footprint. The building footprint is adjacent the existing Medical Sciences building with minimal additional clearing required.

2.4 ENVIRONMENTAL ASSETS

There are no known environmental assets on the development footprint.

2.5 ABORIGINAL HERITAGE

Searches of National Parks and Wildlife database identify no known aboriginal relics or aboriginal places as defined by National Parks and Wildlife Act 1974 to exist on the development footprint.

3.0 BUSHFIRE ATTACK ASSESSMENT

3.1 VEGETATION CLASSIFICATION

Potential bushfire hazards were identified from Newcastle City Council bushfire prone mapping as occurring within the investigation area. An assessment of the vegetation structure is required under the Planning for Bushfire Protection (2006) guidelines to categorise the level of threat posed by this vegetation. Ground truthing forms the basis of the vegetation classification.

Two major vegetative threats are located within close proximity of the proposed development. These include:

- A thin road corridor of vegetation located between the University Ring Road and Main Road (123) presently 20 metres from the proposed building.
- A riparian corridor located between the University Ring Road and Aviation building 20 metres north of the proposed building.

Both pieces of vegetation are identified as remnant vegetation with reduced fire runs.

Road Corridor located 20 metres West of the proposed building

The road corridor of vegetation to the west has a fire run of 20 metres directly towards the building and represents the potential for a low intensity adjacent burn to the proposed development with little chance for sustained canopy fire. Vegetation in the road corridor is dominated by tall eucalypts and a low density understorey comprised of native shrubs.

This vegetation is best described as remnant woodland, in accordance with Planning for Bushfire Protection (2006) “Remnant vegetation is a parcel of vegetation with a size of less than 1 ha or a shape that provides a potential fire run directly toward buildings not exceeding 50m. These remnants are considered a low hazard and APZ setbacks and building construction standards for these will be the same as for rainforests. The effective slope is to be determined over the length of the remnant.” (P 52).

Riparian Corridor located 20 metres North of the proposed building

The riparian corridor extends to 25 metres in width in close proximity to the proposed development. This vegetation widens further to the west and connects to a small valley of dry sclerophyll forest. The riparian corridor is dominated by tall eucalypts with a moist sparse shrub layer of native shrubs and a body of water. This vegetation is unlikely to support a sustained canopy fire.

The riparian corridor occupies less than 20 metres in length on either side of the creek bank and will be assessed with Rainforest fuel loadings.

Primary Vegetation Structures have been identified in Figure 1 – Site Constraints Map and separation distances shown in Table 2 – Bushfire Attack Assessment.

2.3 EFFECTIVE SLOPE

Methodology
Average slope was measured using 2 metre contour data obtained from Department of Lands and verified by a laser hypsometer on site. The laser hypsometer verified slope within the vegetation remnant for the entirety of the vegetation. The average slope is calculated from 5 separate measurements in each direction.

Results Road Corridor
There is an effective slope of 7 degrees upslope. The dominant wind and fire pattern will come from the northwesterly direction.

Results Riparian Corridor
There is an effective slope of 2 degrees downslope. The eastern portion of the vegetative threat is the greatest influence on Rate of Spread for fire.

3.3 SPECIAL FIRE PROTECTION PURPOSE AS INFILL

Minimum setbacks in accordance with Table A2.6 (Planning for Bushfire Protection) Safe Defendable Space is unachievable without significant clearing of a riparian corridor. The vegetation does not have significant depth or available fuel load to produce a 1200 Kelvin Flame, as measured for Safe Defendable Space.

In Accordance with Planning for Bushfire Protection (2006) Section 4.2.5 Alterations and Additions to existing Special Fire Protection Purposes, the development is to address the performance criteria of Section 4.3.5 infill development. Table 3 addresses full compliance with the acceptable solutions of infill development. The Specific Objectives of Section 4.2.3 have been addressed in Table 4.

3.4 BUSHFIRE ATTACK LEVELS

Bushfire Attack Levels in accordance with AS3959 (2009) has been demonstrated in Section 1 Executive Summary and Compliance Tables, Table 2 Bushfire Threat Assessment.

Result for Road Corridor
In accordance with AS3959 (2009) Table 2.4.2 the category for bushfire attack with a slope of level/upslope, between 16 and 23 metres from Forest Remnant/Rainforest is BAL-19.

Result for Riparian Corridor
In accordance with AS3959 (2009) Table 2.4.2 the category for bushfire attack with a slope of 0 to 5 degrees downslope, between 20 and 29 metres from Riparian Corridor/Rainforest is BAL-19.

AS3959 (2009) construction levels are designed for residential development and the proposed development is identified as "other development" under Planning for Bushfire Protection (2006). The provisions of the BCA 2011 for fire safety are accepted for bushfire purposes where the aims and objectives of Planning for Bushfire Protection are met.

Construction of the building is to comply with BCA 2011 fire safety provisions.

3.4 COMPLIANCE WITH AIMS AND OBJECTIVES OF PLANNING FOR BUSHFIRE PROTECTION

Each aim and objective of Planning for Bushfire Protection will be addressed.

Afford occupants of any building adequate protection from exposure to a bush fire;
The building has managed lands to the east and south in the form of existing university buildings. Managed lands extend to the north of the riparian corridor in the form of carparking and university buildings. The building has high thermal mass with the concrete walls and roofing system exceeding the BAL-19 Bushfire Attack Level. Multiple building exits are located away from the vegetation with evacuation planning in the event of bushfire clearly indicating to evacuate away from the vegetation.

Provide for a defendable space to be located around buildings;
A minimum 20 metre Inner Protection Area is to be located surrounding the building. In the event of bushfire, fire fighters will be able to shelter behind the southern or eastern facades of the building, if the fire directly impacts on the site. An access road is available directly south of the building as defendable space with a perimeter road located between the proposed building and the vegetation.

Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
AS3959 (2009) indicates that BAL-FZ or flame zone could occur 10 metres from the riparian corridor to the north or 8 metres from the western remnant vegetation. Existing asset protection zones double this distance, with the concrete building well outside the flame zone.

Ensure that safe operational access and egress for emergency service personnel and residents is available;
The existing access to the facility offers compliance with Planning for Bushfire Protection access requirements.

Provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ);
The university should incorporate the fuel management program into its landscaping activities.

Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting).
Utility Services offer compliance with Planning for Bushfire Protection requirements offering compliance with electrical supply and water services in accordance with AS2419.1.

Compliance with Planning for Bushfire Protection Objectives
As all objectives are met, BCA 2011 fire safety provisions are deemed adequate with no additional construction measures required.

4.0 UTILITY SERVICES AND INFRASTRUCTURE

4.1 WATER SUPPLY

A site inspection found multiple hydrants located throughout the university grounds, however the present combined hydrant span does not extend to all areas of the proposed building. Hydrants are to be upgraded to provide full compliance with AS2419.1 and the proposed design is not located within a road carriageway.

4.2 ELECTRICITY SERVICES

The existing electrical transmission lines are located underground and require no additional protection measures.

4.3 GAS SERVICES

- Reticulated or bottled gas installed and maintained in accordance with AS 1596 -2002 and the requirements of the relevant authorities. Metal piping is to be used.
- Fixed gas cylinders to be kept clear of flammable material by a distance of 10m and shielded on the hazard side of the installation.
- Gas cylinders close to the dwelling are to have the release valves directed away from the building and at least 2m from flammable material with connections to and from the gas cylinder being of metal.
- Polymer sheathed flexible gas supply lines to gas meters adjacent to the buildings are not to be used.

5.0 PROPERTY ACCESS AND PUBLIC ROAD SYSTEM CAPACITY

The subject site is located on the University Ring Road, with the university having its own road network system. The ring road is a dual carriageway road providing good access to the site. Emergency Services may be restricted under large scale fire events however typically the site will have good access. The university road network is quite wide, with parking spaces and passing bays providing good opportunity for Emergency Services to turn a large vehicle around in a short space of time. The present access to the proposed building remains unchanged and the additions will not impact on access.

The university road network is fully sealed bitumen, including all roads surrounding the proposed building. There are no gradients greater than 15 degrees on the site.

Fire Fighter Access. There is significant opportunity for fire appliances to be utilized.

Present property access roads comply with sections 4.1.3 and 4.2.7 of Planning for Bush Fire Protection 2006 and require no upgrade.

6.0 LANDSCAPING MAINTENANCE

It is recommended that landscaping is undertaken in accordance Appendix 5 of Planning for Bushfire Protection 2006 and maintained for the life of the development.

Trees should be located greater than 2 metres from any part of the roofline of a building. Garden beds of flammable shrubs are not to be located under trees and should be no closer than 10 metres from an exposed window or door. Trees should have lower limbs removed up to a height of 2 metres above the ground.

The landscaped area should be maintained free of leaf litter and debris. The gutter and roof should be maintained free of leaf litter and debris.

Landscaping should be managed so that flammable vegetation is not located directly under windows.

Ground fuels such as fallen leaves, twigs (less than 6mm in diameter) and branches should be removed on a regular basis, and grass needs to be kept closely mown and where possible green.

7.0 EMERGENCY AND MAINTENANCE PLANS

7.1 BUSHFIRE MAINTENANCE PLANS

The University should add the proposed building to the existing landscape management plan and building maintenance plans deemed adequate for Bushfire Maintenance. A condition of development is to maintain the specified asset protection zones for the life of the development.

7.2 FIRE EMERGENCY PROCEDURES

An Emergency Management Plan is already implemented for the university. The university should add this building into its Emergency Management Plan giving specific consideration for bushfire. The Emergency Management Plan should consider Bushfire Evacuation Planning in accordance with NSW Rural Fire Service template.

8.0 RECOMMENDATIONS

Based upon an assessment of the plans and information received for the proposal, it is recommended that development consent be granted subject to the following conditions.

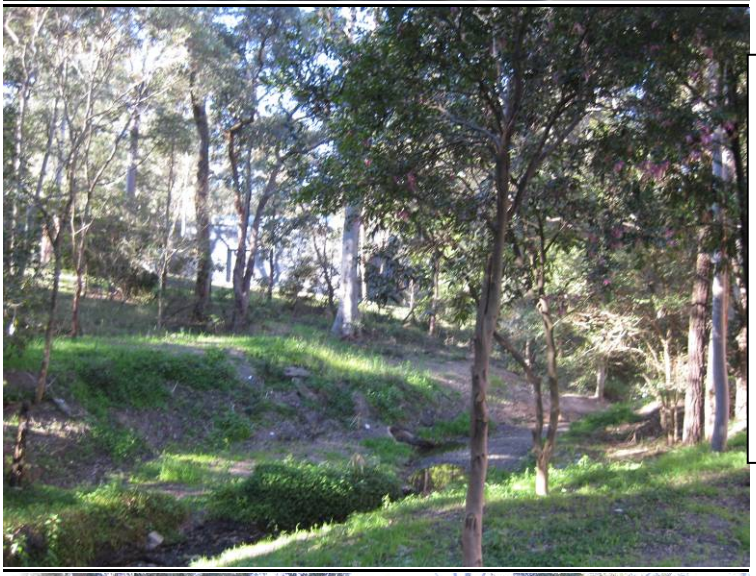
1. The proposed building works shall comply with BCA 2011 structural fire safety provisions.
2. At the commencement of building works and in perpetuity the property around the building shall be managed as an Inner Protection Area for the immediate 20 metres in accordance with Appendix 5 of Planning for Bush Fire Protection 2006 and the NSW Rural Fire Service's document Standards for the following asset protection zones:
3. Hydrant supply to comply with AS2419.1 for the building.
4. The University should add the proposed building to the existing landscape management plan and building maintenance plans deemed adequate for Bushfire Maintenance.
5. The university should add this building into its existing Emergency Management Plan giving specific consideration for bushfire.

9.0 FINAL RECOMMENDATION

There is potential for bushfire attack at this site and a list of recommendations has been included in the above assessment to reduce that risk. The proposed development offers compliance with Planning for Bushfire Protection Special Fire Protection Purpose provisions for Infill Development.

10.0 APPENDIX 1.0 – SITE PHOTOGRAPHS

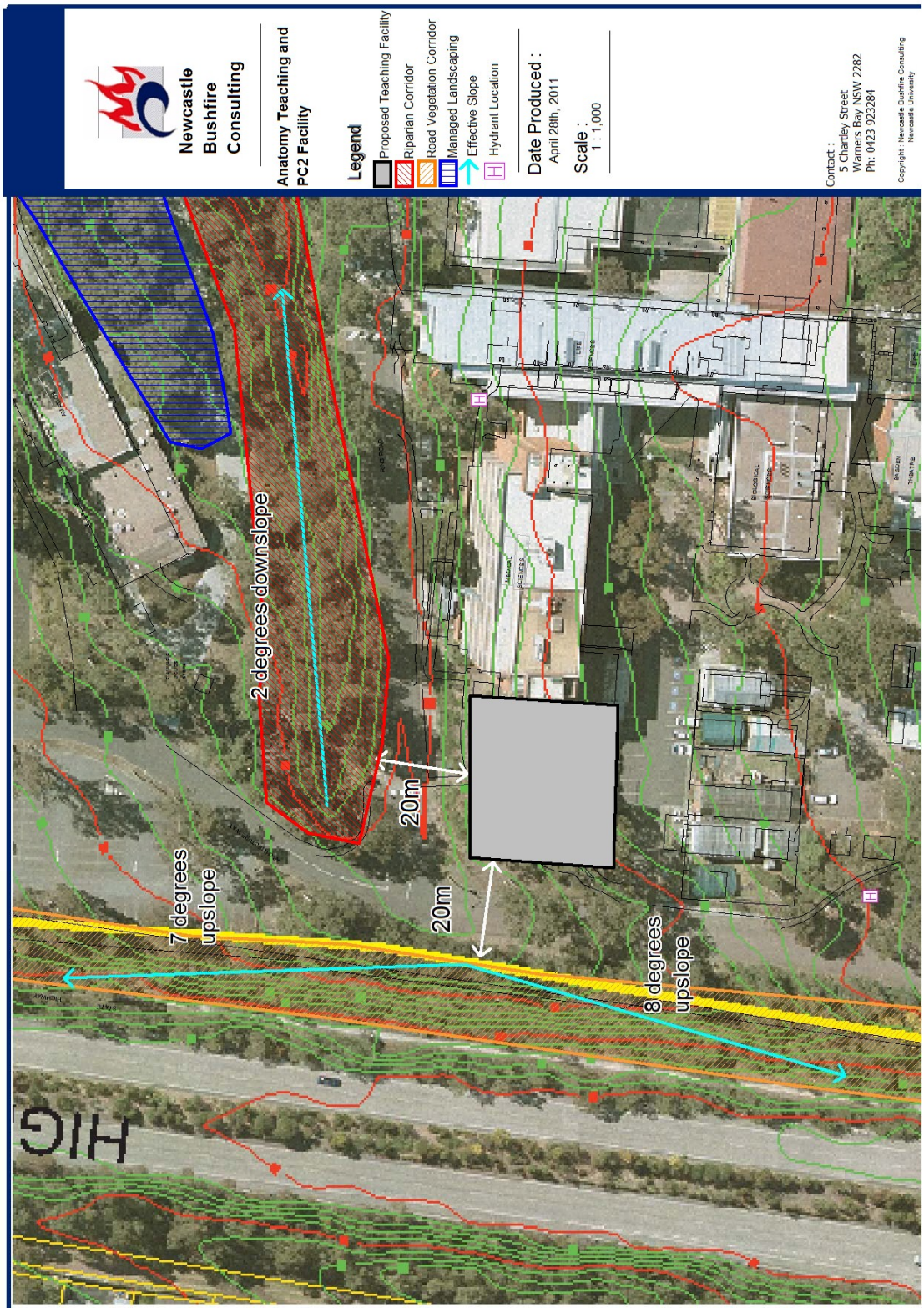
View of the proposed building location, looking south from the University Ring Road. The proposed building will attach to the existing Medical Sciences building.



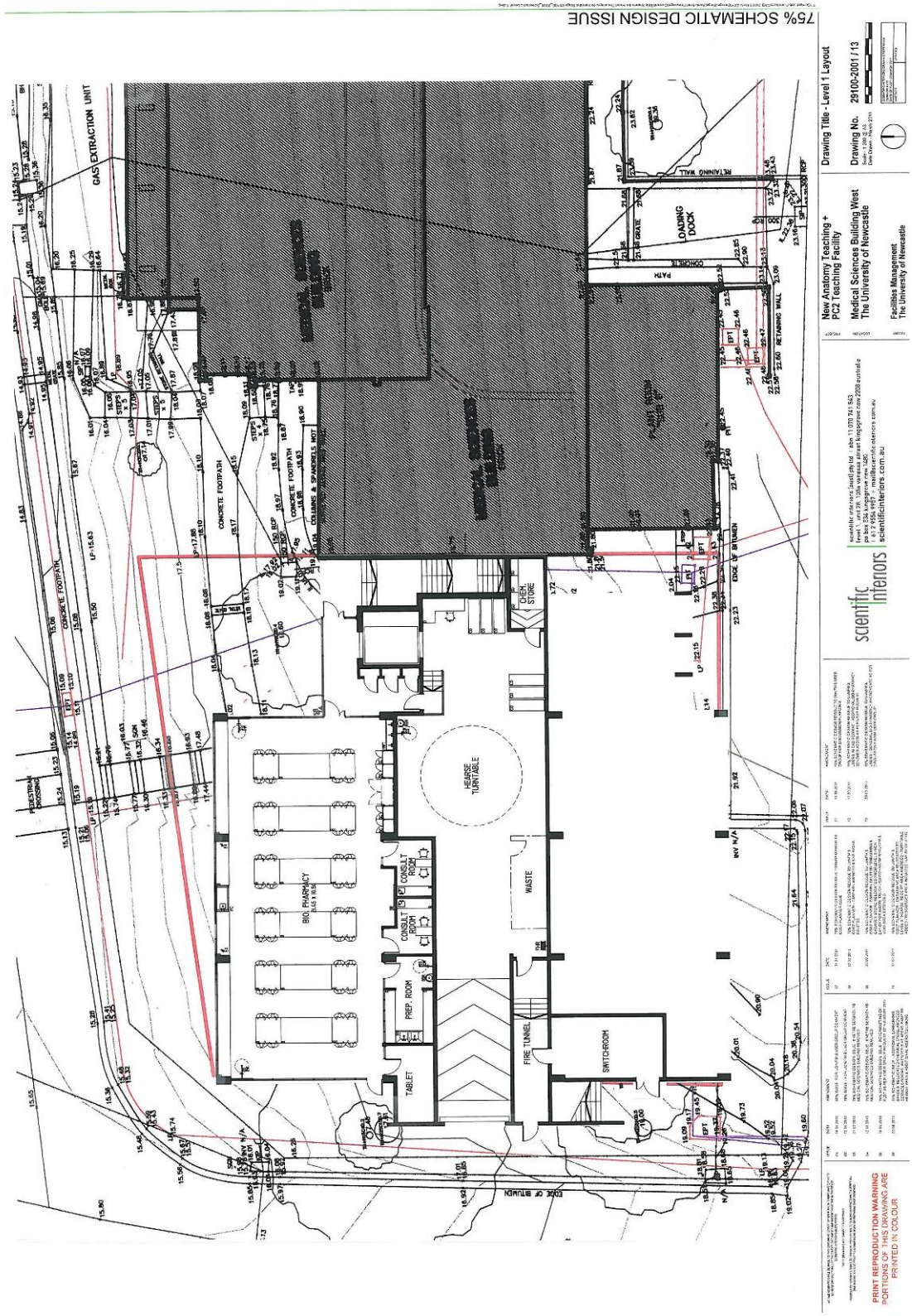
View of the riparian corridor located north of the proposed building. The vegetation consists of a thin line of eucalypts straddling a creekline. The vegetation immediately north of the site will not sustain a canopy fire however increases in density a distance east of the site.

The road corridor of vegetation to the west has a fire run of 20 metres directly towards the building and represents the potential for a low intensity adjacent burn with little chance for sustained canopy fire. Vegetation in the road corridor is dominated by tall eucalypts and a low density understorey of native shrubs and grasses.

11.0 APPENDIX 2.0 – BUSHFIRE CONSTRAINTS MAP

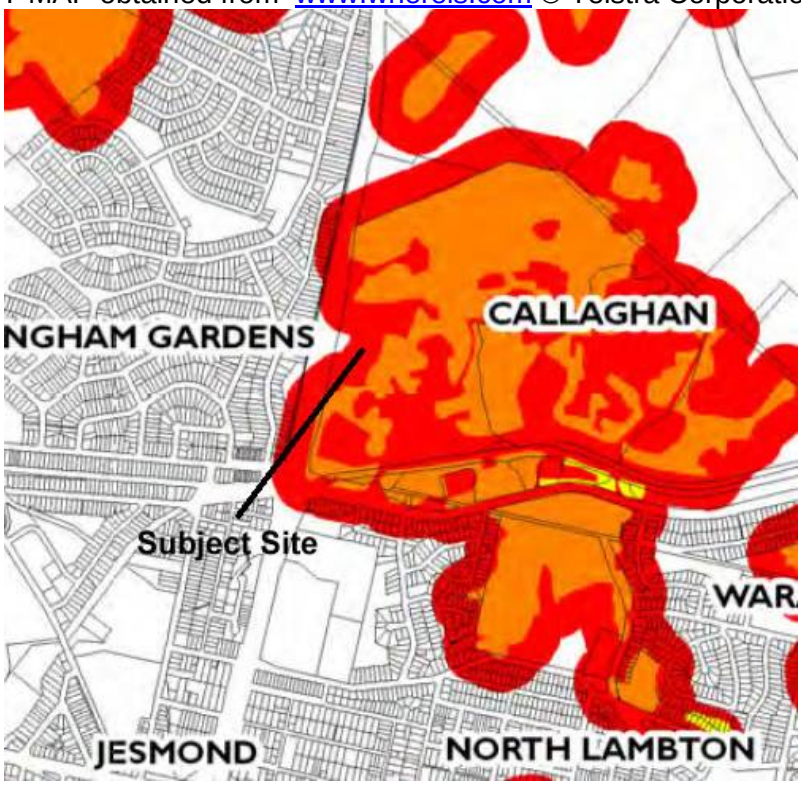


11.1 APPENDIX 2.1 – SITE PLAN



12.0 APPENDIX 3.0 – BUSHFIRE PRONE MAP AND LOCALITY MAP

LOCALITY MAP obtained from www.whereis.com © Telstra Corporation Limited



COUNCIL'S BUSHFIRE PRONE LAND MAP

13.0 APPENDIX 4.0 – ASSET PROTECTION ZONES

Generally

Asset Protection Zones (APZ) refers to the area between the bushfire threat and the asset (ie building). The APZ may contain two areas; the Inner Protection Area (IPA) and the Outer Protection Area (OPA). Some areas should be managed entirely as an Inner Protection Area (IPA). Refer to the plans for locations of APZ and distances from Assets.

Inner Protection Area (IPA)

The inner protection area is located adjacent to the asset and is identified as a fuel free zone.

A. Shrubs (consisting of plants that are not considered to be trees)

1. Shrubs must be located away from a buildings glazing and vent openings.
2. Avoid planting around entry ways if the vegetation is flammable.
3. A maximum 30% of the Inner Protection Area may contain shrubs.
4. A minimum 1.5 metre separation of shrubby vegetation from the building shall be maintained.
5. Shrubs must not have a connection with the tree canopy layer; remove/trim shrubs or underprune trees.
6. Ensure turf is suitably mown and/or grasslands are continually slashed to restrict to max 100mm high.

B. Trees: Maintain a minimum 2-5 metre canopy separation.

1. Trees are allowed in the inner protection area however they should not touch or overhang buildings. No tree should be within 2 metres of the roofline.
2. Underprune branches between the shrub layer and the canopy layer.
3. Ensure branches do not overhang buildings.
4. Ensure all trees in the IPA within 3m of buildings do not provide a serious fire threat.
5. Trees should have lower limbs removed up to a height of 2 metres above the ground.

Outer Protection Area (OPA)

The Outer Protection Area (OPA) is located adjoining vegetation threat. The OPA should be maintained as a fuel reduced area. This assumes trees may remain but with a significantly reduced shrub, grass, and leaf litter layer. In many situations leaf litter and the shrub layer may not require maintenance at all.

A. Shrubs:

1. Reduce or trim large stands of shrubs

B. Trees:

1. Existing trees can be retained.
2. Ensure a separation is available between shrubs and tree canopy.
3. Reduce tree canopy so there is no interlocking canopy.

Note: The above is a summary of full requirements outlined in Appendix 5 of Planning for Bushfire Protection (2006) and the NSW Rural Fire Services “Standards for Asset Protection Zones”. The land owner should familiarise themselves with those two documents.

14.0 REFERENCES AND DISCLAIMER

References

Standards Australia (2009) AS3959 Construction of Buildings in Bushfire-Prone Areas

Keith D. (2004) "Ocean Shores to Desert Dunes", Department of Environment and Conservation, Sydney.

Environmental Planning and Assessment Act (1979)

New South Wales Rural Fire Service (2006) Planning for Bushfire Protection

New South Wales Rural Fire Service (2010) Planning for Bushfire Protection Appendix 3 Amendment

Rural Fires Act (1997)

Rural Fire Regulation (2008)

Disclaimer

Despite the recommendations in this report, it is impossible to remove the risk of fire damage to the building entirely. This report assesses and provides recommendations to reduce that risk to a manageable level. It is of paramount importance that the recommendations are adhered to for the life of the structure and that all maintenance is performed, to ensure a level of protection is provided to the building, occupants and fire fighters.

Planning for Bushfire Protection (2006) states that not withstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small always remains.

AS3959 (2009) Building in Bushfire Prone Areas states that the standard is designed to lessen the risk of damage to buildings occurring in the event of the onslaught of bushfire. There can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion.