Bushfire Hazard Assessment Report

Proposed: Alterations and Additions

At: Clancy Catholic College, West Hoxton

Reference Number: 150245

Prepared For: CEO Archdiocese of Sydney C/- Fulton Trotter Architects

12th June 2015



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List of Abbreviations:

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2009 as amended.
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BPMs	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
Council	Liverpool City Council
DA	Development Application
EP&A Act	Environmental Planning and Assessment Act - 1979
ESD	Ecologically Sustainable Development
FRNSW	Fire and Rescue NSW
IPA	Inner Protection Area
NCC	National Construction Code
NP	National Park
NSW	Neighbourhood Safer Places
OPA	Outer Protection Area
PBP	Planning for Bush Fire Protection – 2006
ROW	Right of Way
RF Act	Rural Fires Act - 1997
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SWS	Static Water Supply

1.0 Introduction

The development application relates to the alternations and additions to an existing Special Fire Protection Purpose (SFPP) development known as, "Clancy Catholic College" which is located at 201 Carmichael Drive, West Hoxton NSW.

The proposed alterations and additions involve:

- Alterations and additions to the existing Blocks A, B, C, F, G, H, J & K;
- New Gathering Space (multipurpose hall) which includes a performance stage control box, multi-purpose indoor sports court and amenities. This space will be used for mass, assemblies, performances and sport;
- New Visual Arts/ Fitness building;
- New Canteen & Flexible Learning Area building;
- New Gallery space located between the Lecture Theatre and Gathering Space to be an entry foyer, Flexible Learning Area, Exhibition Space and Food Servery;
- External works 2 x new outdoor multi-purpose courts and extension to the existing driveway courts to be used as overflow parking if required (TBC) &
- New landscaping.

The subject property is a large allotment which has street frontage to Moondarra Drive to the north and south and Carmichael Drive to the east and south and abuts drainage corridor to the west, followed by Dryander Avenue/ Warby Avenue.

The vegetation identified as being the hazard is within Western Sydney Parklands to the north and existing drainage corridors to the south and west.

Liverpool City Council's Bushfire Prone Land Map identifies the subject property as being within the 100 metre buffer zone from designated Category 1 Vegetation and therefore the application of Planning for Bush Fire Protection - 2006 (PBP) must apply in this instance.

The college was approved post 2002 with a 20 metre Asset Protection Zone (APZ) to the drainage corridor and sports oval. This Development Application increases the APZ to the drainage corridor in accordance with Planning for Bush Fire Protection to all new work and includes the sports oval in the separation distance to the southern hazard.

2.0 Purpose of Report

The purpose of this Bushfire Assessment Report is to provide Catholic Education Office Archdiocese of Sydney, the Rural Fire Service and Council with an independent bushfire hazard determination together with appropriate recommendations for both new building construction and bushfire mitigation measures considered necessary having regard to construction within a designated 'bushfire prone' area.

3.0 Scope of this Report

The scope of this report is limited to providing a bushfire hazard assessment and recommendations for the subject property. Where reference has been made to the surrounding lands, this report does not purport to directly assess those lands; rather it may discuss bushfire impact and/or progression through those lands and possible bushfire impact to the subject property.

4.0 Referenced Documents and Persons

Comments provided are based on the requirements of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act), the Rural Fires Act 1997, the Rural Fires Regulation 2013, the RFS document known as 'Planning for Bush Fire Protection – 2006' for the purposes of bushfire hazard determination and Australian Standard 3959 – 2009 titled 'Construction of buildings in bushfire-prone areas' as amended for building/structural provisions.

A company representative has undertaken a site inspection of the subject property and surrounding area.

The Site Plan prepared by Fulton Trotter Architects, project no 7023WH11, SD101, Rev G, dated 03.06.15 has been relied upon for this assessment.

5.0 Summary Tables & Notes

The following table sets out the projects compliance with *Planning for Bush Fire Protection – 2006*.

	North	East	South	West
Vegetation Structure	Woodland	Maintained grounds	Riparian (Rainforest)	Riparian (Rainforest)
Hazard Slope	n/a	n/a	1 degrees down	1 degrees down
Required APZ	n/a	n/a	26 metres	26 metres
Existing APZ	>100 metres	n/a	>100 metres	>26 metres
Significant Environmental Features	Moondarra Drive	Carmichael Drive	Sports Oval / Moondarra Drive / Carmichael Drive	Drainage corridor
Threatened Species	APZ Existing	APZ Existing	APZ Existing	APZ Existing
Aboriginal Relics	APZ Existing	APZ Existing	APZ Existing	APZ Existing
Bushfire Attack Level (BAL)	BAL Low	n/a	BAL Low	BAL 12.5

Asset Protection Zones Compliance

The minimum required Asset Protection Zones were determined from bushfire design modelling (see attached) consistent with Appendix 2 of Planning for Bush Fire Protection 2006. The Asset Protection Zones consist of maintained land within the subject site and land considered to be equivalent to an APZ being Moondarra Drive. The Asset Protection Zones within the subject site shall be managed as an Inner Protection Area.

Construction Level Compliance

The highest Bushfire Attack Level to the closest building within the subject property was determined from table 2.4.2 of AS3959 – 2009 to be 'BAL 12.5'.

Access and Services

Guideline Ref.	Proposed Development Determinations
Property Access	The subject property has street frontage to Moondarra Drive to the north and south and Carmichael Drive to the east and south. Fire service access to the bushfire hazard is available via Moondarra Drive, Warby Avenue and Dryander Avenue. The proposed extension to the internal access road will comply with the performance criteria for Internal Roads as detailed in section 4.2.7 of PBP.
Water Supply	Existing hydrants are available along Moondarra Drive, Carmichael Drive and surrounding streets and throughout the college for the replenishment of fire service vehicles. Furthermore a new Fire Hydrant Pump is proposed adjacent Block G and Carmichael Drive to ensure adequate coverage for the site.
Evacuation	A Bush Fire Evacuation Plan in accordance with the NSW Rural Fire Service guidelines for emergency management plans will be recommended for the college as part of this assessment.

6.0 Aerial view of the subject allotment



Image 01: Aerial view of the subject area c/- NSW Government SixMaps database 2014

7.0 Bushfire Hazard Assessment

7.01 Preface

Properties considered to be affected by possible bushfire impact are determined from the local Bushfire Prone Land Map as prepared by Council and or the Rural Fire Service. All property development within affected areas is subject to the conditions detailed in the document 'Planning for Bush Fire Protection - 2006' (PBP). Set back distances for the purpose of creating Asset Protection Zones (APZ's) must be applied and any buildings must then conform to corresponding regulations detailed in Australian Standard 3959 – 2009 'Construction of buildings in bushfire prone areas'.

Planning for Bush Fire Protection – 2006, (PBP) formally adopted on the 1st March 2007 and amended May 2010 (Appendix 3) provides for the protection of property and life (including fire-fighters and emergency service personnel) from bushfire impact.

The thrust of the document is to ensure that developers of new properties or sub-divisions include the constraints associated with the construction of buildings in bushfire prone areas within their proposed development sites. PBP is applicable to proposed development inside a determined Category 1 or 2 areas and also inside a buffer zone radius of 100m from a Category 1 bushfire area or 30m from a Category 2 bushfire area.

The document also acknowledges 'infill' developments associated with re-development of existing properties and allows some higher levels of building safety where the increased 'set backs' (APZ's) may not be achievable.

The development application relates to the alterations and additions to an existing educational establishment approved after 1st August 2002. To accord with PBP the development is classified as Special Fire Protection Purpose development and assessed as a section 100b application under the Rural Fires Act 1997.



Image 02: Extract from Liverpool City Council's Bushfire Prone Land Map

7.02 Location

The subject property is known as "Clancy Catholic College" and is located at 201 Carmichael Drive West Hoxton, NSW, being Lot 1013 DP 1079422. The subject property is a large allotment (zoned R2 – Low Density Residential) which has street frontage to Moondarra Drive to the north and south and Carmichael Drive to the east and south and abuts a drainage corridor followed by public roads to the west.

The vegetation identified as being the hazard is within Western Sydney Parklands to the north and existing drainage corridors to the south and west.



Photograph 01: View south from Moondarra Drive along the north-western access road



Image 03: Extract from street-directory.com.au

7.03 Vegetation

The predominate vegetation within the subject site was found to consist of managed grounds and mown lawns.

The subject property does contain a small pocket of Cumberland Plain Woodland within the northern portion of the site. This area is required by DA consent to be managed to a 'safe fuel loading of 4 - 6 tonnes per hectare'.

The woodland area in the northern parts of the site should be fuel managed to reduce any risks from within this area. A safe fuel loading of 4-6 tonnes per hectare should be maintained. A fuel management plan will be required to be prepared to manage this landscape in perpetuity. The plan will recognise that trees will generally remain in this landscape as well as approximately 20-25% of the existing shrub / grass vegetation. This management will significantly reduce the risk from within the Cumberland Plain Woodland.

At the time of our inspection the Cumberland Plain Woodland within the northern portion of the subject property was found to be managed to the standard of an Asset Protection Zone and therefore in recognition of the existing management and existing DA consent we have not assessed this area as a bushfire hazard.

The vegetation identified as being the hazard is within Western Sydney Parklands to the north and existing drainage corridors to the south and west.

The vegetation posing a hazard to the north beyond Moondarra Drive within Western Sydney Parklands was found to consist of trees 10-20 metres high with a 10-30% canopy foliage cover and an understorey of predominately grasses. For the purpose of assessment the vegetation posing a hazard to the north was determined to be Woodland.

While it is acknowledge that the drainage corridors to the south and west of the subject property are not mapped as being bushfire hazards they were not found to fit the criteria for being excluded or low threat vegetation. These corridors were found to be in a state of regeneration and therefore we have considered them as bushfire hazards.

In accordance with Appendix 2.3 of Planning for Bush Fire Protection 2006 as the drainage corridors were found to have a predominate vegetated width of approximately \leq 40 metres (<20m either bank) we have assessed the vegetation as riparian and used a Rainforest structure (with 40m vegetation width) to determine the minimum required Asset Protection Zones.



Drainage corridor / riparian hazard

Photograph 02: View south along the western boundary of the subject property

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7.04 Slope and Topography

The slope that would most significantly affect bushfire behaviour within the hazard must be assessed for at least 100 metres from the new works. As the hazard to the north was found to be located > 100 metres from the new works no slope analysis is required.

The effective slope within the southern and western hazards was measured onsite using an inclinometer and verified from topographic imagery of the area. The results are as follows:



1 degree down slope within the hazard to the south and west

Photograph 03: View west from the western boundary of the subject property



Image 04: Extract from Land and Property Management Authority Spatial Information Exchange

7.05 Asset Protection Zones

Asset Protection Zones for new Special Fire Protection Purpose (SFPP) development are determined from Table A2.6 of PBP or bushfire design modelling achieving a radiant heat impact of no more than 10 kW/m² at the closest point of the subject building footprint. In this instance the minimum required APZs were determined from bushfire design modelling (see attached) consistent with Appendix 2 of PBP to be 26 metres to the south and west.

The available Asset Protection Zones to the closest proposed works were found to be >100 metres to the north and \geq 26 metres to the south and west. The Asset Protection Zones consists of maintained land within the subject site and land considered to be equivalent to an APZ being Moondarra Drive.

The Asset Protection Zones within the subject site shall be managed as an Inner Protection Area and will be subject to the requirements of Appendix 5 of 'Planning for Bush Fire Protection' - 2006 for the life of the development.



Managed Cumberland Plain Woodland within northern portion of subject property

Photograph 04: View north from within the northern portion of the subject property



Existing college building

Photograph 05: View north along the western boundary of the subject property

7.06 Fire Fighting Water Supply

Existing hydrants are available along Moondarra Drive, Carmichael Drive and surrounding streets and throughout the college for the replenishment of fire service vehicles. Furthermore a new Fire Hydrant Pump is proposed adjacent Block G and Carmichael Drive to ensure adequate coverage for the site.

The existing hydrant coverage is considered adequate for the replenishment of attending fire services in consideration of the bushfire threat posed to the subject property.

7.07 Property Access

The subject property has street frontage to Moondarra Drive to the north and south and Carmichael Drive to the east and south.

The subject college has through road access to existing car parks from Moondarra Drive to the north and Carmichael Drive to the east.

Attending fire services can access the hazards via Moondarra Drive, Warby Avenue and Dryander Avenue for fire suppression or hazard reduction activities without the need to enter the subject property.

The proposed extension to the internal access road will comply with the performance criteria for Internal Roads as detailed in section 4.2.7 of PBP.

The existing and proposed access provisions are considered adequate for fire service access and staff and student egress.

8.0 Site & Bushfire Hazard Determination

8.01 Planning for Bush Fire Protection – 2006

Planning for Bush Fire Protection – 2006 (PBP) is applicable to those lands determined as being within a 'bushfire prone area' in accordance with a local Bushfire Prone Land Map as provided by the Rural Fire Service and Council.

The most appropriate method of determining site bushfire hazard under the terms of PBP is to consider the site in a singular form.

Bushfire prone areas are defined as those areas;

- within or within 100m of high or medium bushfire hazards; or
- within or within 30m of low bushfire hazards.

In this instance the subject property has been identified as being bushfire prone land therefore it is appropriate to apply PBP.

8.02 Australian Standard AS 3959 – 2009 'Construction of buildings in bushfire –prone areas'

Australian Standard 3959 – 2009 'Construction of buildings in bushfire-prone areas' provides for six (6) levels of building construction these being BAL - Low, BAL - 12.5, BAL - 19, BAL - 29, BAL - 40 and BAL - FZ. The Australian Standard 3959 specifies construction standards for buildings within various Bushfire Attack Levels as determined by the Planning for Bush Fire Protection – 2006 document.

8.03 Correlation between bushfire impact and AS3959

Bushfire Attack Level	Maximum radiant heat impact (kW/m²)	Level of construction under AS3959-2009		
Low		No special construction requirements		
12.5	≤12.5	BAL - 12.5		
19	12.6 to 19.0	BAL - 19		
29	19.1 to 29.0	BAL - 29		
40	29.1 to 40.0	BAL - 40		
Flame Zone	>40.0	BAL FZ No deemed to satisfy provisions		

8.04 Site Specific Bushfire Hazard Determination

All property development must be assessed on an individual basis as broad-brush approaches of documents such as PBP may not be applicable in every instance. The proposed development located at *"Clancy Catholic College"* West Hoxton was assessed against the requirements of Planning for Bush Fire Protection 2006 noting the following:

- a) Water supplies for firefighting purposes are considered adequate.
- b) The existing and proposed access provisions are considered adequate.
- c) A Bush Fire Evacuation Plan in accordance with the NSW Rural Fire Service guidelines for emergency management plans will be recommended as part of this assessment.

8.05 Viable Construction Method

One of the objectives of Planning for Bush Fire Protection – 2006 is for the protection of life including fire fighters. Provided these objectives can be met the construction of buildings is feasible and both the Rural Fire Service and Council should be in a position to consider such applications.

The highest Bushfire Attack Level to the proposed works within the subject property was determined from table 2.4.2 of AS3959 – 2009 to be 'BAL 12.5'. The proposed works must therefore comply with section 5 (BAL 12.5) Australian Standard AS3959-2009 "Construction of buildings in bush fire-prone areas" and section A3.7 Addendum Appendix 3 of "Planning for Bush Fire Protection".

9.0 Recommendations

The following recommendations are provided as the minimum necessary for compliance with Planning for Bush Fire Protection – 2006 and Australian Standard 3959 'Construction of buildings in bushfire-prone areas' - 2009. Additional recommendations are provided to supplement these minimum requirements where considered necessary.

General

1. That the proposed development complies with the Site Plan prepared by Fulton Trotter Architects, project no 7023WH11, SD101, Rev G, dated 03.06.15.

Asset Protection Zones

2. That all grounds within the subject site are to be maintained in accordance with an Inner Protection Area as detailed in Appendix 2 of Planning for Bush Fire Protection 2006 and the NSW Rural Fire Service document 'Standards for Asset Protection Zones'

Construction

3. New construction shall comply with section 5 (BAL 12.5) Australian Standard AS3959-2009 "Construction of buildings in bush fire-prone areas" and section A3.7 Addendum Appendix 3 of "Planning for Bush Fire Protection".

Landscaping

4. That any new landscaping is to comply with Appendix 5 'Landscaping and Property Maintenance' under Planning for Bush Fire Protection 2006.

Emergency Management

5. That a Bush Fire Evacuation Plan be prepared for the college and is in accordance with the NSW Rural Fire Service guidelines for emergency management plans.

10.0 Conclusion

Given that the property is deemed bushfire prone under Liverpool City Council's Bushfire Prone Land Map any development would need to meet the requirements of Planning for Bush Fire Protection – 2006 and of the construction requirements of Australian Standard 3959 – 2009. The determination of any bushfire hazard must be made on a site-specific basis that includes an assessment of the local bushland area and its possible impact to the subject property.

The development application relates to the alterations and additions to an existing educational establishment approved after 1st August 2002.

The vegetation identified as being the hazard is within Western Sydney Parklands to the north and existing drainage corridors to the south and west. The vegetation posing a hazard was determined to be Woodland to the north and Riparian (Rainforest) to the south and west.

The minimum required Asset Protection Zones were determined from bushfire design modelling (see attached) consistent with Appendix 2 of PBP to be 26 metres to the south and west. The available Asset Protection Zones to the closest proposed works were found to be >100 metres to the north and \geq 26 metres to the south and west.

The Asset Protection Zones consists of maintained land within the subject site and land considered to be equivalent to an APZ being Moondarra Drive.

The highest Bushfire Attack Level was determined from table 2.4.2 of AS3959 – 2009 to be 'BAL 12.5'. The new works must therefore comply with BAL 12.5 under section 5 of AS3959 - 2009.

A Bush Fire Evacuation Plan in accordance with the NSW Rural Fire Service guidelines for emergency management plans has been recommended for the college as part of this assessment.

The existing and proposed access arrangements are considered adequate for occupant evacuation and fire service access. Hydrants are available within the subject site, along Moondarra Drive, Carmichael Drive and surrounding streets for the replenishment of attending fire services.

In accordance with the bushfire safety measures contained in this report, and consideration of the site specific bushfire risk assessment it is our opinion that when combined, they will provide a reasonable and satisfactory level of bushfire protection to the subject development and also satisfy both the Rural Fire Service's concerns and those of Council in this area.

We are therefore in support of the development application. Should you have any enquiries regarding this project please contact me at our office.

Prepared by Building Code & Bushfire Hazard Solutions

Da

Stuart McMonnies G. D. Design in Bushfire Prone Areas. Certificate IV Fire Technology Fire Protection Association of Australia BPAD – L3 Certified Practitioner Certification number – BPAD9400



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Disclaimer:

Quote from Planning for Bush Fire Protection 2006, 'Any representation, statement opinion, or advice expressed or implied in this publication is made in good faith on the basis that the State of New South Wales, the NSW Rural Fire Service, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above..'

Similarly the interpretations and opinions provided by Building Code and Bushfire Hazard Solutions in regard to bushfire protection are also given in the same good faith.

11.0 Annexure 01

List of Referenced Documents

- a) Environmental Planning and Assessment Act 1979
- b) Rural Fires Act 1997 & Rural Fires Regulation 2013
- c) 'Planning for Bush Fire Protection'- 2006

- NSW Rural Fire Services & Planning NSW
- d) 'Construction of buildings in bushfire prone areas'
- AS 3959 2009 (as amended) – Standards Australia
- e) 'Liverpool City Council's Bushfire Prone Land Map'
- f) Acknowledgements to:

NSW Department of Lands – SIXMaps Street-directory.com.au Nearmap.com

g) Site Plan prepared by Fulton Trotter Architects, project no 7023WH11, SD101, Rev G, dated 03.06.15

Attachments

Attachment 01: Bushfire Attack Assessment Report

FPA AS:	BC Bush 3959 (2009) App	Fire Attack	Assessment Repor	t V2.1	1		
Certified Business Pri	nt Date:	4/06/2015	Assessment Da	ate:	28/04/2015		
Site Street Address:	Clancy	/ Catholic Colleg	e, West Hoxton				
Assessor:	Stuart	McMonnies: Bui	Iding Code & Bushfire Haza	rd Solut	ions Ptv I td		
Assessor.							
Local Government Ar	ea: Liverpo	JOI	Alpine Area:		INU		
Transmissivity: Fuss ar Flame Length: RFS PB Rate of Fire Spread: No Radiant Heat: Drysdale Peak Elevation of Rece Peak Flame Angle: Tar	nd Hammins, P, 2001 oble et al., 19 e, 1985; Sulli eiver: Tan et a n et al., 2005	2002 80 van et al., 2003; al., 2005	Tan et al., 2005				
Run Description:	West - Ap	pendix 2					
Vegetation Informat	ion						
Vegetation Type:	Rainfore	st	Vegetation Group:	Fores	st and Woodlan		
Vegetation Slope:	1 Degree	es	Vegetation Slope Type	: Dowr	nslope		
Surface Fuel Load(t/ha	a): 8		Overall Fuel Load(t/ha): 10			
Site Information							
Site Slope	0 Degree	es	Site Slope Type:	Leve	I		
Elevation of Receiver	(m) Default		APZ/Separation(m):	26			
Fire Inputs							
Veg./Flame Width(m):	40		Flame Temp(K)	1200)		
Calculation Paramet	ters						
Flame Emissivity:	95		Relative Humidity(%):	25			
Heat of Combustion(k	J/ka 18600		Ambient Temp(K):	308			
Moisture Factor:	5		FDI:	100			
Program Outputs							
Category of Attack:	LOW		Peak Elevation of Rec	eiver(m): 3.84		
Level of Construction	: BAL 12.5		Fire Intensity(kW/m):		5314		
	4.0		Elamo Anglo (degrees)):	77		
Radiant Heat(kW/m2):	10		i laille Aligie (uegiees)				
Radiant Heat(kW/m2): Flame Length(m):	10 7.89		Maximum View Factor	:	0.109		
Radiant Heat(kW/m2): Flame Length(m): Rate Of Spread (km/h)	10 7.89): 1.03		Maximum View Factor	: m):	0.109 26		

Run Description:	West - AS3959				
Vegetation Information	<u>on</u>				
Vegetation Type:	Rainforest	Vegetation Group:	Forest	and Woodland	
Vegetation Slope:	1 Degrees	Vegetation Slope Type:	Downs	lope	
Surface Fuel Load(t/ha)	: 10	Overall Fuel Load(t/ha):	12		
Site Information					
Site Slope	0 Degrees	Site Slope Type:	Level		
Elevation of Receiver(n	n) Default	APZ/Separation(m):	26		
Fire Inputs					
Veg./Flame Width(m):	40	Flame Temp(K)	1090		
Calculation Parameters					
Flame Emissivity:	95	Relative Humidity(%):	25		
Heat of Combustion(kJ/	/kg 18600	Ambient Temp(K):	308		
Moisture Factor:	5	FDI:	100		
Program Outputs					
Category of Attack:	LOW	Peak Elevation of Receiver(m): 4.71		4.71	
Level of Construction:	BAL 12.5	Fire Intensity(kW/m):		7971	
Radiant Heat(kW/m2):	8.67	Flame Angle (degrees):		74	
Flame Length(m):	9.8	Maximum View Factor:		0.139	
Rate Of Spread (km/h):	1.29	Inner Protection Area(m):	26	
Transmissivity:	0.818	Outer Protection Area(n	ו):	0	