ADDENDUM TO BUSHFIRE THREAT ASSESSMENT REPORT DATED 10TH NOVEMBER 2011

PORT MACQUARIE HOSPITAL POD 4 AND 5 ADDITION

Date:	**26th APRIL 2012**
Reference:	**11186a**
Subject Property:	**Port Macquarie Base Hospital** **Lot 23 DP 1099567 Wrights Road** **Port Macquarie NSW**
Prepared By:	**Peter Thornton** **BPAD – A Certified Practitioner**

BUSHFIRE & BUILDING CONSULTANTS
BCA Check Pty Ltd - ACN 104 451 210
PO Box 375 Lennox Head NSW 2478
Telephone 02 6687 7461 Fax 02 6687 6295 Email bcacheck@bigpond.com

INTRODUCTION

This report is an addendum to the bushfire threat assessment report prepared by BCA Check Pty Ltd Ref: 11186 dated 12th September 2011(amended 10th November 2011) in response to the NSW Rural Fire Service (NSW RFS) correspondence dated 13th April 2012. The two items raised in the NSW RFS correspondence are as follows;

Item No 1

'The RFS has concerns with the location of the proposed buildings. In this regard the new works are located closer to the bushfire threat to the west of the site than the existing building. This does not meet the intent for Special Fire Protection Purpose developments as identified in 'Planning for Bush Fire Protection 2006' (PBP). The RFS recommends the location of the new works are to comply with asset protection zone requirements as identified in Table A2.6 in PBP or alternatively, demonstration through fire behaviour modeling is required that demonstrates compliance with the intent of Section 4.2.5 of PBP or demonstration is required on the grounds the application should be considered under section 3.3 of PBP. The applicant is requested to submit further details demonstrating how the proposed building footprints and appropriate asset protection zones required by PBP can be achieved for the proposed expansion works'

Item No. 2

'The applicant is requested to submit further details demonstrating how access complies with section 4.2.7 of 'Planning for Bush Fire Protection 2006'. In this regard, given the development type, the expansion of the existing car parking facility relies on only a singlular access and egress point that is required to traverse the identified bush fire threat located to the west of the site.'

DISCUSSION

The proposed development is an addition to the existing hospital building and is classified as infill Special Fire Protection Purpose (SFPP) development. The building location will not allow Asset Protection Zones (APZ's) to be compliant with Table A2.6 of Planning for Bushfire Protection 2006 for a Special Fire Protection Purpose. In this regard, as requested from the pre-lodgment discussions with the NSW RFS documentation was included with the original bushfire threat assessment report outlining why the building addition is located as proposed.

The original bushfire threat assessment report acknowledges Section 4.2.5 of Planning for Bushfire Protection 2006 which is the relevant section of Planning for Bushfire Protection 2006 for SFPPs that are classified as infill development.

SECTION 4.2.5 – SFPPs AS INFILL

Section 4.2.5 of Planning for Bushfire Protection 2006 identifies alterations and additions to existing SFPP's which may involve an increase in size and footprint of the building are considered to be infill development. Section 4.2.5 states that;

'This type of development should also seek to achieve a better bush fire outcome (such as improved construction standards) than if the development did not proceed. The new building work should comply with AS 3959-1999 ***or*** *be no closer to the hazard than the existing building. Existing facilities such as water supply should also be upgraded'.*

Section 4.2.5 PBP2006 references AS 3959-1999 for the new building works which was relevant at the time PBP2006 was implemented into legislation. It is acknowledged that AS 3959-1999 only had scope to Level 3 construction which had an upper threshold of 29kW/m^2 and no flame zone construction standards. It is also noted that AS 3959-1999 has been superseded by AS 3959-2009.

The current AS 3959-2009 has included an additional level of construction being Bushfire Attack Level 40 (BAL40) which in many cases is actually within the 'flame zone' as defined by PBP2006. In this regard it is considered that to satisfy the intent of s4.2.5 the proposed building works must be outside the flame zone and not receive any forecast radiant heat flux that exceeds 29kW/m^2.

The assessment has complied with the above requirement of s4.2.5 PBP2006 by demonstrating that the building, without including the Council cycle way adjacent to the western boundary is compliant with Table 2.4.3 AS 3959-2009 for BAL 29 construction standards. The following modeling of the specific vegetation slope and site slope forecasts that at the very closest section of the building the radiant heat flux will be 21.78kW/m^2 it being noted that the majority of the building will be less than the radiant heat threshold for BAL 19 AS 3959-2009.

The modeling establishes that the proposed building works will be well outside the flame zone given that the forecast flame length based on the bushfire threat assessment is 11.55m and the building at its closest point is 16.9m from the western boundary not including the Council cycle way.

NBC Bushfire Attack Assessment Report V2.0

AS3959 (2009) Appendix B - Detaied Method 2

Print Date: 26/04/2012 **Assessment Date:** 26/04/2012

Site Street Address:	Port Macquarie Hospital, Port Macquarie
Assessor:	Peter Thornton; BCA Check Pty Ltd
Local Government Area:	Hastings
Alpine Area:	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Design Fire No. 1 - 7 degrees

Vegetation Information

Vegetation Type:	Remnant Vegetation	**Vegetation Group:**	Remnant Vegetation
Vegetation Slope:	7 Degrees	**Vegetation Slope Type:**	Downslope
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(m)	Default	**APZ/Separation(m):**	16.9

Fire Inputs

Veg./Flame Width(m):	100	**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:**	80

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	5.39
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	9648
Radiant Heat(kW/m2):	21.78	**Flame Angle (degrees):**	69
Flame Length(m):	11.55	**Maximum View Factor:**	0.338
Rate Of Spread (km/h):	1.56	**Inner Protection Area(m):**	17
Transmissivity:	0.847	**Outer Protection Area(m):**	0

The intent of s4.2.5 is also that the '*development should also seek to achieve a better bush fire risk outcome (such as improved construction standards) than if the development did not proceed'.*

BUILDING ACHIEVES A BETTER OUTCOME THAN IF THE DEVELOPMENT DID NOT PROCEED
The existing development does not have any significant bushfire safety protection measures, with exception to a fire hydrant system, which would be considered sufficient to reduce the risk of ignition or provide adequate protection to the occupants and emergency service personnel.

It is acknowledged that the bushfire threat to the existing health care facility is relevant and an opportunity is available to implement a number of bushfire safety measures with the development. The proposed development will provide the Rural Fire Service an opportunity to specifically require and asset protection zone and the preparation of an Evacuation Plan and Fire Management Plan thereby creating a more controlled and safer environment during a bushfire event should the development proceed.

The proposed building will be provided with construction standards that will limit the risk of ignition as required by the relevant performance standard of Part G of the Building Code of Australia 2011, Appendix 3 of Planning for Bushfire Protection 2006 and AS 3959-2009.

The assessment ensures that the facility in general will have a higher level of bushfire safety with the development proceeding as outlined in the following points.

- The recommended asset protection zone (Table A3.4 PBP2006) and landscaping complying with Planning for Bushfire Protection 2006.

- Evacuation plans/procedures are to be prepared and submitted to the RFS for approval prior to occupation.

- The proposed building will have construction standards that will limit the risk of ignition i.e. compliance with AS 3959-2009 for BAL 40 (even though BAL 29 will comply).

- Upgrading the existing buildings for ember protection to external openings i.e. vents may be considered and is at the discretion of the RFS however it is recommended that as a minimum there must be procedures in the evacuation plan to ensure all windows and doors are closed in a local bushfire event.

In the above regard it is considered that the specific intent for alterations and additions to the existing SFPP has been satisfied. However, not withstanding this and as requested by the NSW RFS in their correspondence for additional information the specific objectives of s4.2.3 PBP2006 are addressed as follows to further demonstrate compliance with the intent of PBP s4.2.5. The specific objectives of s4.2.3 PBP2006 are also considered as follows:

OBJECTIVE DOT POINT 1

'Proved for the special characteristics and need of occupants. Unlike residential subdivisions which can be built to a construction standard to withstand the fire event, enabling occupants and firefighters to provide property protection after the passage of fire, occupants of SFPP developments may not be able to assist in property protection. They are more likely to be adversely affected by smoke or heat when being evacuated'.

Comment

As shown in the following Figures 1 - 4 the building has many external required exits that will be shielded from the hazard and or greater than 60m from the hazard to the west allowing emergency personnel to assist people without significant exposure to the hazard i.e. <10kW/m^2. It is noted that there are many more external required exits to the east and south of the proposed development and within the existing building that area greater than 60m from the hazard and allow occupants to evacuate externally.

For these required exits the distance from the hazard exceeds that required by Table A2.6 PBP2006 and as the following modeling of the radiant heat flux with a 1200K fire source demonstrates the exits will not receive more than 6.26kW/m^2.

This modeling does not take into account the significant amount of shielding the exits will receive from the hazard by the building itself. Further, the fire isolated stairways are effectively a fire compartment that provides passive protection and have a number of fire hydrants available to fire fighting personnel to use during a bushfire event.

NBC Bushfire Attack Assessment Report V2.0

AS3959 (2009) Appendix B - Detaied Method 2

Print Date: 30/04/2012 **Assessment Date:** 26/04/2012

Site Street Address:	Port Macquarie Hospital, Port Macquarie		
Assessor:	Peter Thornton; BCA Check Pty Ltd		
Local Government Area:	Hastings	**Alpine Area:**	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Design Fire No. 2 - Required Exits 1200K

Vegetation Information

Vegetation Type:	Remnant Vegetation	**Vegetation Group:**	Remnant Vegetation
Vegetation Slope:	7 Degrees	**Vegetation Slope Type:**	Downslope
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(m)	Default	**APZ/Separation(m):**	60

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K)**	1200

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Category of Attack:	LOW	**Peak Elevation of Receiver(m):**	5.72
Level of Construction:	BAL 12.5	**Fire Intensity(kW/m):**	9648
Radiant Heat(kW/m2):	6.26	**Flame Angle (degrees):**	82
Flame Length(m):	11.55	**Maximum View Factor:**	0.073
Rate Of Spread (km/h):	1.56	**Inner Protection Area(m):**	60
Transmissivity:	0.767	**Outer Protection Area(m):**	0

In addition to the external required exits there are a number of fire and smoke compartments (see Figures 1 – 3) within the building that will allow for horizontal evacuation which is generally the preferred means of escaping the effects of fire in a hospital development. The building is required by the Building Code of Australia to have an automatic shutdown of the air-conditioning system which will limit the spread of smoke externally with the building and fire

and smoke dampers are required to be provided where ducting penetrates fire and smoke walls.

These passive and active measures within the building required by Part E of the Building Code of Australia will provide significant measures in addressing the objective of s4.2.3 PBP2006 to limit the impact of occupants from the effect of smoke and heat when evacuating the building, it being noted that horizontal evacuation is the first option in hospital evacuation to limit exposure of occupants to external elements.

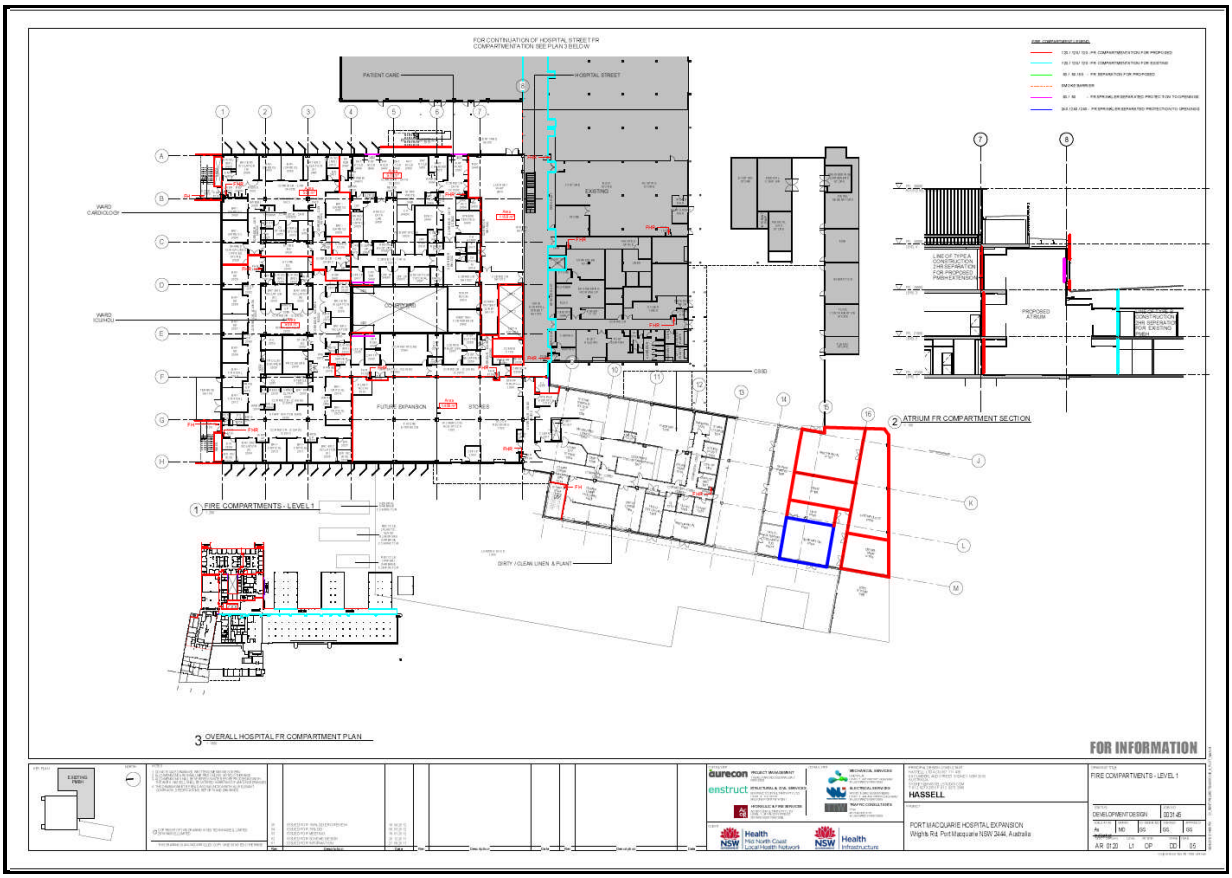

Figure 1 – First Floor (Ground Level) floor plan identifying fire and smoke compartmentation and external required exits.

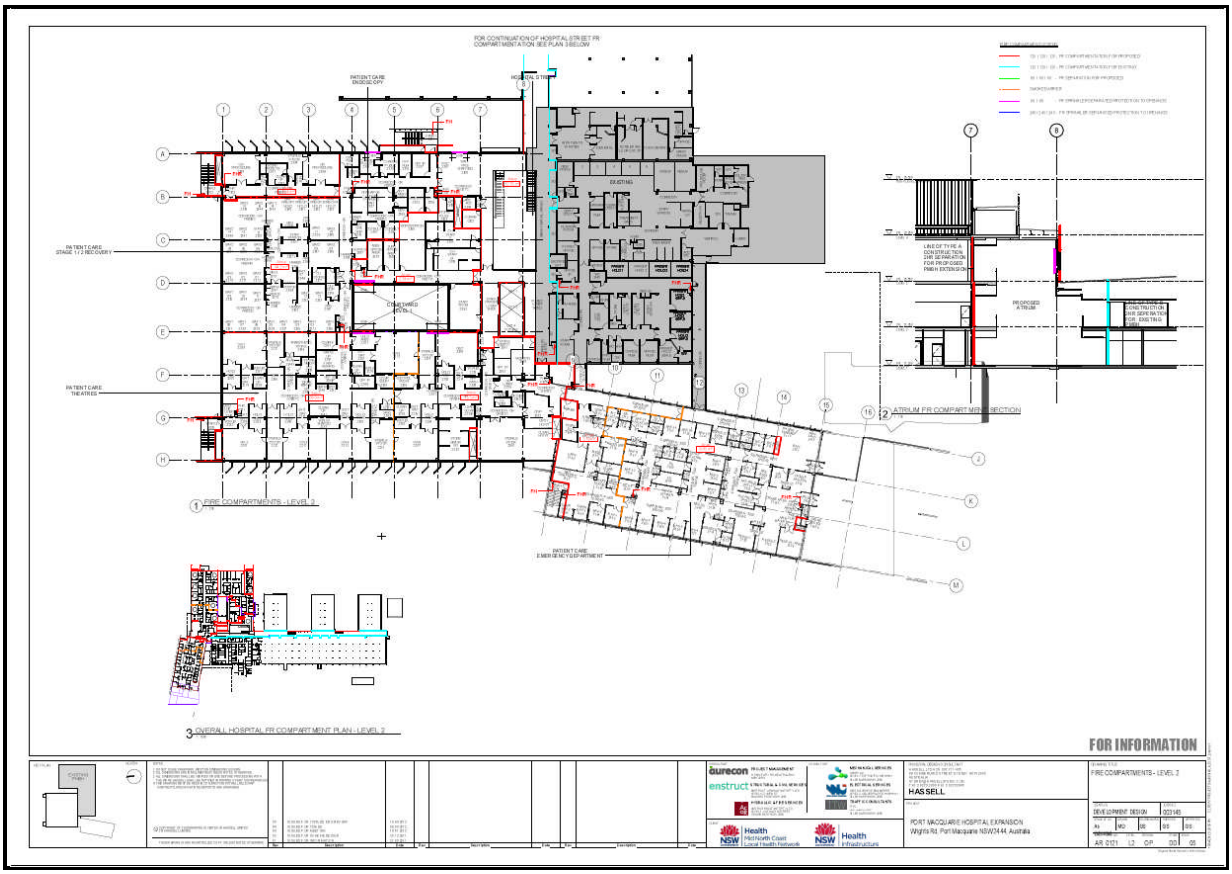

Figure 2 – Second Level floor plan showing fire and smoke compartments and external required exits.

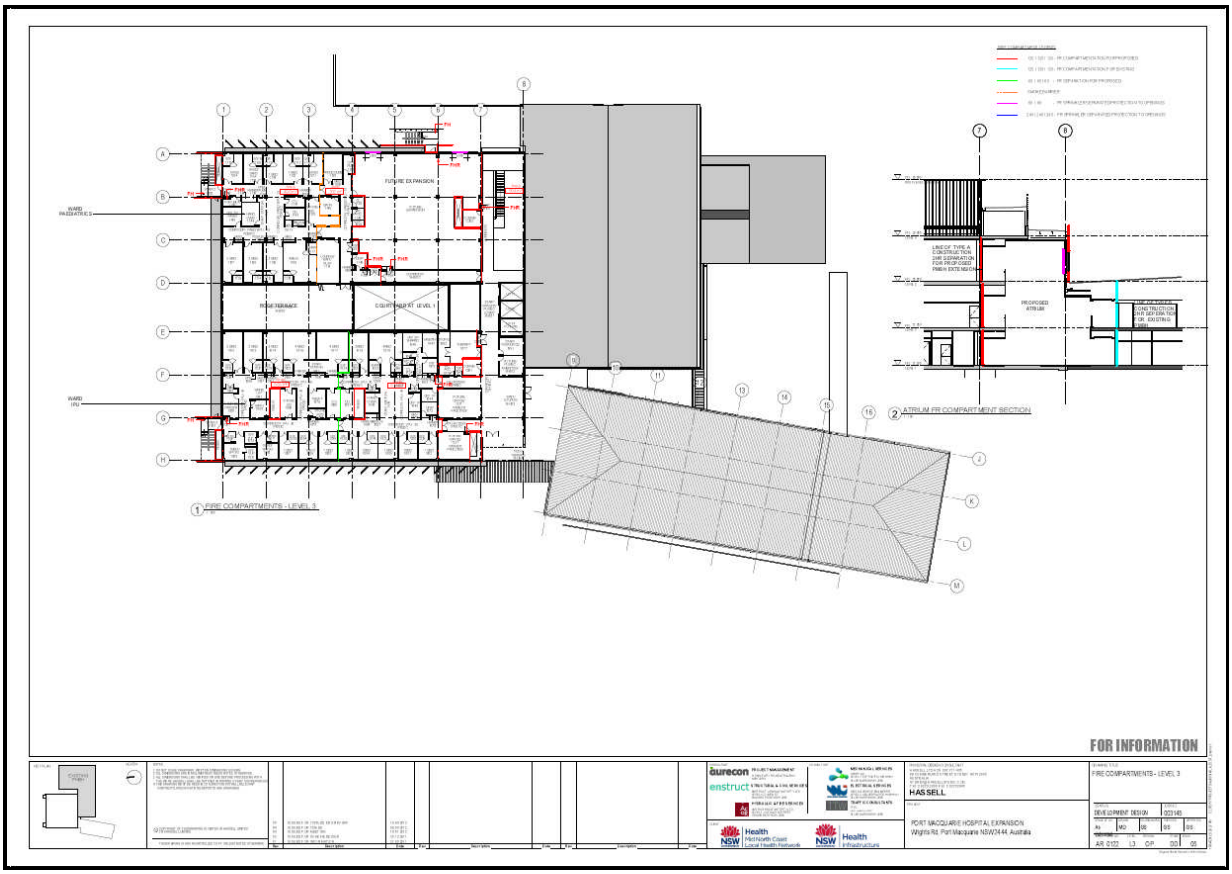

Figure 3 – Third Level floor plan showing fire and smoke compartments and external required exits.

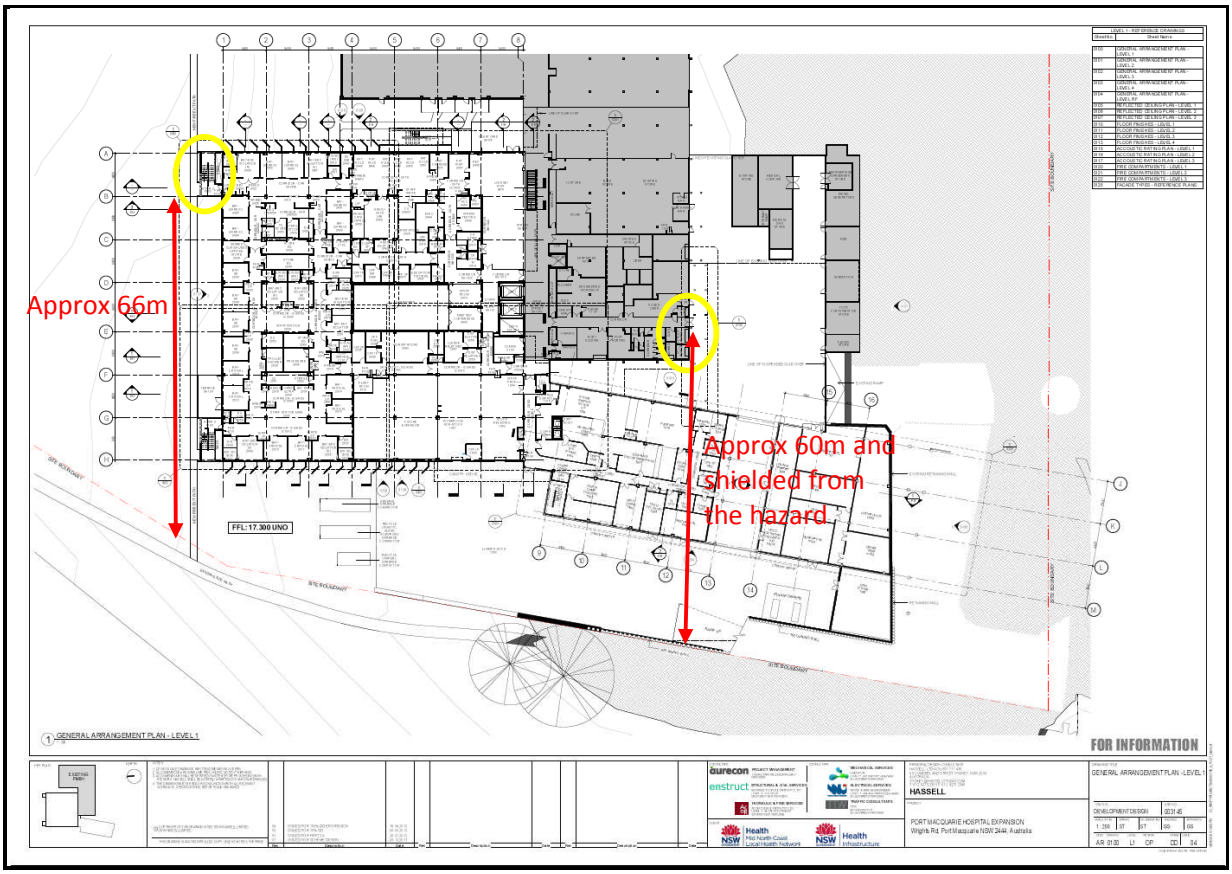

Figure 4 – Shows two required exits that are available that are no less than 60m from the hazard

It is considered that this addendum clearly demonstrates compliance with s4.2.5 PBP2006 and the objectives to s4.2.3 PBP2006. It is further considered that in addition to these compliances the intent of s4.3.5 PBP2006 has also been achieved. The intent of s4.3.5 is:

Asset Protection Zones

- *A defendable space is provided onsite*
- *An asset protection zone is provided and maintained for the life of the development.*

Comment

Defendable space is defined by PBP2006 as 'an area within the asset protection zone that provides an environment in which a person can undertake property protection after the passage of a bush fire with some level of safety'. The asset protection zone is compliant with Table 2.4.3 of AS 3959-2009 and Appendix 3 of PBP2006 which in itself is an acceptable solution for compliance with the definition of defendable space.

A condition of the consent or approval can ensure that the asset protection zone is provided and maintained for the life of the development if condition 6 of the original bushfire threat assessment report is adopted. This condition requires that the construction standard and the asset protection zone be included on the Fire Safety Schedule to ensure maintenance is undertaken in perpetuity.

Construction Standards

- *It is demonstrated that the proposed building can withstand bush fire attack in the form of wind, smoke, embers, radiant heat and flame contact*

It is acknowledged both in Planning for Bushfire Protection 2006 and AS 3959-2009 that there can be no guarantees in a bushfire event the building will not be adversely impacted by the bushfire conditions. The proposal however will comply with AS 3959-2009 which is considered to be an acceptable level of public risk for a building.

OBJECTIVE DOT POINT 2

'Provide for safe emergency evacuation procedures. SFPP Developments are highly dependent on suitable emergency evacuation arrangements, which require greater separation from bush fire threats.

During emergencies, the risk to fire fighters and other emergency services personnel can be high through prolonged exposure, where door to door warnings are being given and exposure to the bush fire is imminent'.

As demonstrated in this report the building will be constructed to BAL 40 AS 3959-2009 construction standards which is a higher level of construction than required by Table 2.4.3 of AS 3959-2009 when the bushfire threat is assessed. The added redundancy in construction is provided in recognition of the proposed building use and occupant characteristics within a hospital building.

The required exits of the building which include internal horizontal exits and external required exits have been shown not to receive more than 10kW/m^2 with exception to one fire isolated exit located in the northwest corner of the proposed building. It is considered however that this exit being the only exit directly exposed to the hazard would not be used as a means of egress as part of the emergency evacuation which will support the common sense approach that it is not desirable to egress directly into the path of a fire front when all other required exits are in the opposite direction.

The recommendation of the original bushfire threat assessment report is considered adequate for the development in that a bushfire evacuation and procedure is to be prepared and adopted as a condition of approval.

The bushfire risk has been assessed and it is considered to be minor even though AS 3959-2009 would considered the nature of the bushfire risk to be low. The risk to fire fighting personnel is not to an extent that fire brigade intervention could not be safely undertaken prior to or after the passing of the fire front.

Fire hydrants are located within the fire isolated exits, within the building and externally with a significant number of areas that will provide safe shielding from the fire front which is expect to last approximately 5 – 10minutes.

Figure 5 – The bushfire risk is considered to be minor it being noted that AS 3959-2009 would considered the bushfire risk to be low.

As outlined in the objective of Dot Point 2 s4.2.3 PBP2006 consideration also needs to be given to the prolonged exposure to emergency services personnel where door to door warnings are being given and exposure to the bush fire is imminent. In this regard the building development is connected to the existing building and door to door warnings will not be required.

The building is required by Part E of the BCA to have a 'sound system and intercom systems for emergency purposes' which will allow fire brigade direction to occupants and a coordinated approach to evacuation whilst not being directly exposed to the hazard.

ACCESS

Item No. 2 of the NSW RFS response

'The applicant is requested to submit further details demonstrating how access complies with section 4.2.7 of 'Planning for Bush Fire Protection 2006'. In this regard, given the development type, the expansion of the existing car parking facility relies on only a singlular access and egress point that is required to traverse the identified bush fire threat located to the west of the site.'

The building is classified as infill SFPP and in turn is to comply with s4.3.5 PBP2006 for access purposes and as outlined in the acceptable solutions compliance with s4.1.3 and s4.2.7 is to be achieved. The property access is within 200m of the public road and will only require one access point. As shown in Figures 6 and 7 the existing access has not been altered but actually improved in that the distance between the existing vegetation and the existing access is greater than currently available.

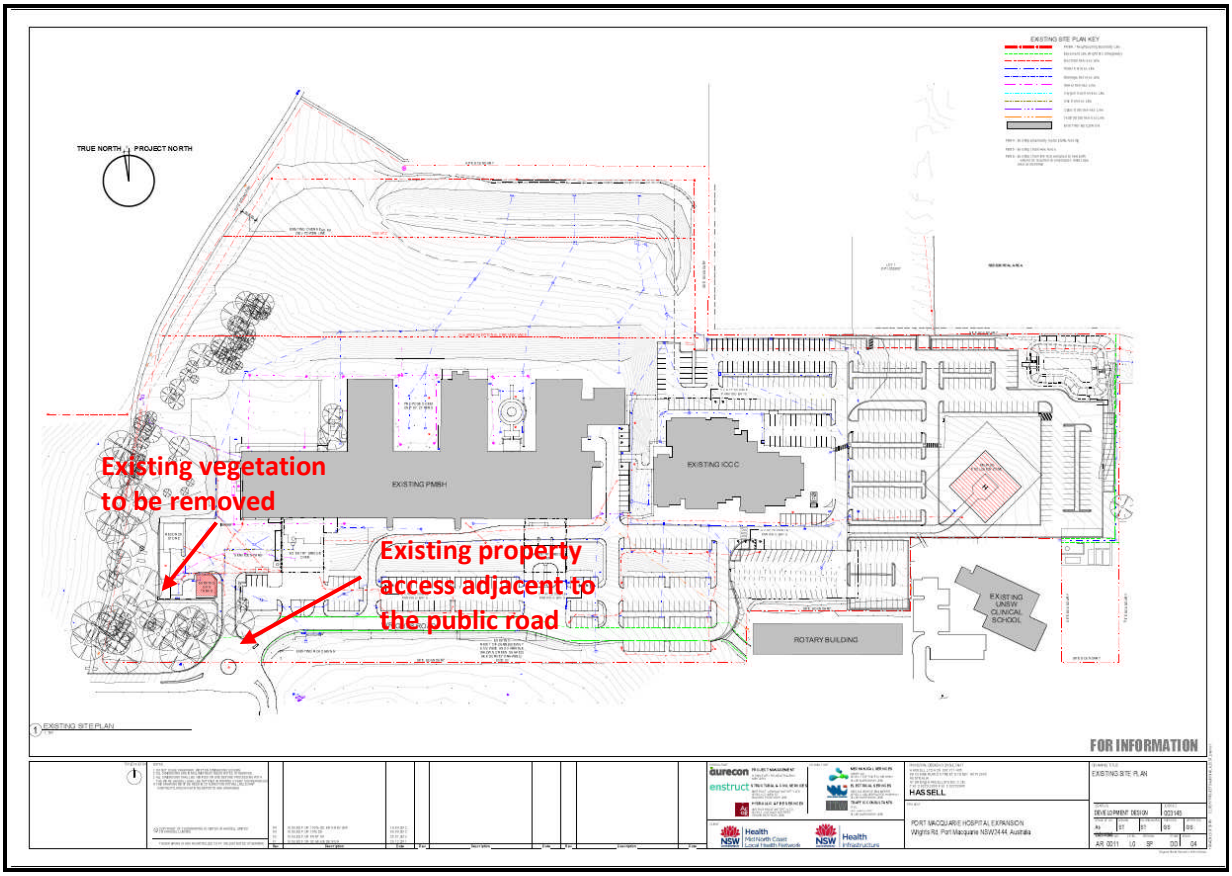

Figure 6 – Existing property access and vegetation location.

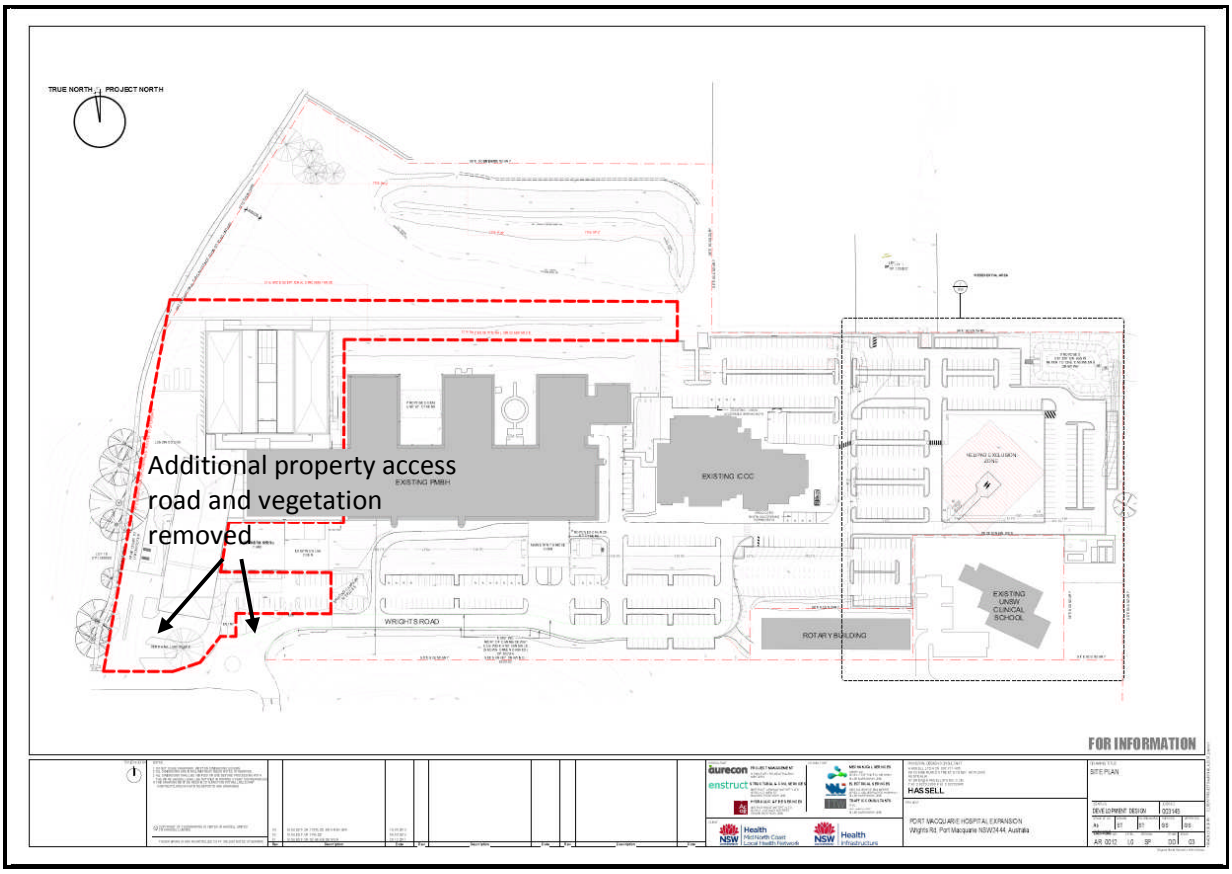

Figure 7 – Proposed access road and existing property access road

It is noted that PBP2006 does not preclude a property access road to traverse 20-30m along-side a remnant section of bushland. The proposed access and evacuation locations will enhance the evacuation opportunities for the existing hospital building whilst complying the Planning for Bushfire Protection 2006.

Should any further clarification be sought or additional information required please do not hesitate to contact Peter Thornton on 02 6687 7461.