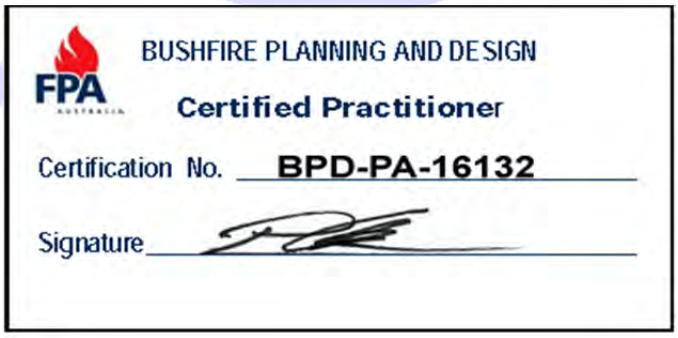
BUSHFIRE ASSESSMENT REPORT

PROPOSED INDUSTRIAL ADDITIONS

LOT 22 DP 873845
98 Wisemans Ferry Road, Somersby

Date: **23/04/2016**

Prepared for: **CSR Hebel**



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Document Status

Revision No.	Issue	Description	Reviewed	Approved by Director
1	23/04/2016	Final	M. Hamilton	P.Couch
2	28/04/2016	Rev A – change the fire rating to match the structural fire engineering report	M. Hamilton	P.Couch

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This report has assessed the proposed industrial additions against the requirements of s79BA of the *Environmental Planning and Assessment Act 1979,* AS3959 (2009) Building in Bushfire Prone Areas and Planning for Bushfire Protection, 2006.

This report establishes that the industrial additions are capable of complying with the performance criteria of Planning for Bushfire Protection 2006.

TABLE 1 – PROPERTY DETAILS AND TYPE OF PROPOSAL

Applicant Name	CSR Hebel		
Site Address	98 Wisemans Ferry Road, Somersby	**Lot/Sec/DP**	Lot 22 DP 873845
Local Government Area	Gosford	**FDI**	100
Bushfire Prone Land	Yes – within the 100 metre buffer of a Category 1 Vegetation		
Type of development	Industrial extensions	**Type of Area**	Industrial Estate
Special Fire Protection Purpose	No	**Flame Temperature**	1090K
Application Complies with DTS Provisions	No. Parts of the building are exposed to BAL-FZ.	**Referral to RFS required**	Council Determination on Referral

TABLE 2 – BUSHFIRE THREAT ASSESSMENT

	North	**East**	**South**	**West**
AS3959 (2009) Vegetation Structure	Maintained Lands	Forest	Forest	Maintained Lands
Asset Protection Zone	140 metres	68 metres	19 metres	140 metres
Accurate Slope Measure	N/A	2 degrees downslope	3 degrees downslope	N/A
Slope Range	N/A	1 to 5 degrees downslope	1 to 5 degrees downslope	N/A
AS3959 (2009) Bushfire Attack Level (BAL)	BAL-LOW	BAL-12.5	BAL-FZ	BAL-LOW

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). The Asset Protection Zone will be maintained for the life of development and defendable space is provided onsite. The southern conservation zone places two parts of the building in BAL-FZ (flame zone).	Alternate Solution
Siting and Design	Buildings have been designed to minimise the risk of bushfire attack.	Acceptable Solution
Construction Standards **AS3959 – 2009**	Bushfire Attack Levels have been determined in accordance with AS 3959-2009 Method 1 Simplified 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 National Construction Code 2015 structural fire protection measures deemed adequate. Parts of the building are within the flame zone and require BAL-FZ construction to reduce the threat. The southern parts of the building will be constructed with 90 minute fire rated hebel with other building vulnerabilities addressed in section 3.4 of this report.	Alternate Solution
Private and or Public Road Infrastructure	The public road system is not affected or changed as part of this application.	Acceptable Solution
Property Access	Property access will exceed the requirements of Planning for Bushfire Protection (2006) S4.1.3.	Acceptable Solution
Water and Utility Services	Water, electricity and gas services offer compliance with Planning for Bushfire Protection (2006) S4.1.3.	Acceptable Solution
Landscaping	Landscaping to comply with Planning for Bushfire Protection (2006) Appendix 5.	Acceptable Solution

2.0 INTRODUCTION

2.1 PURPOSE OF REPORT

The purpose of this report is to establish suitable bushfire mitigation measures for the proposed industrial additions to be constructed at Lot 22 DP 873845, 98 Wisemans Ferry Road, Somersby in order for Council to make determination of the proposed development pursuant to the requirements of s79BA of the *Environmental Planning and Assessment Act 1979*.

All development on Bush Fire Prone Land must satisfy the aim and objectives of Planning for Bushfire Protection (2006). The aim of Planning for Bushfire Protection (2006) is to use the NSW development assessment system to provide for the protection of human life (including firefighters) and to minimise impacts on property from the threat of bush fire, while having due regard to development potential, onsite amenity and protection of the environment.

More specifically, the objectives are to:

(i) Afford occupants of any building adequate protection from exposure to a bush fire;
(ii) Provide for a defendable space to be located around buildings;
(iii) Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
(iv) Ensure that safe operational access and egress for emergency service personnel and residents is available;
(v) Provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ); and
(vi) Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting).

The report addresses the matters identified in A4.1 of Appendix 4 of Planning for Bushfire Protection (2006) and demonstrates that the proposal satisfies the aim and objectives of Planning for Bushfire Protection (2006) by satisfying the performance criteria within section 4.3 of the document. The specific objectives for infill development are as follows:

(i) Ensure that the bushfire risk to adjoining lands is not increased;

(ii) Provide minimum defendable space;

(iii) Provide better bush fire protection, on a re-development site, than the existing situation. This should not result in new works being exposed to greater risk than an existing building;

(iv) Ensure that the footprint of the proposed building does not extend towards the hazard beyond existing building lines on neighbouring land;

(v) Not result in an increased bush fire management and maintenance responsibility on adjoining land owners unless they have agreed to the development; and

(vi) Ensure building design and construction enhances the chances of occupant and building survival.

The recommendations within this report address the aim and objectives of Planning for Bushfire Protection 2006 to reduce the risk of ignition of the building in a bushfire event.

2.2 PROPOSED DEVELOPMENT

The proposed development includes extensions to the existing hebel manufacturing plant. A Routing Room will be added in the north eastern portion of the site and will be located outside the flame zone.

PHOTOGRAPH 1 – SITE PHOTO

View of the existing hebel manufacturing plant looking north. The extension to the existing plant will be located south of the existing building. The dominant fire weather path for Somersby is to the northwest with existing industrial development located north and west of the site.

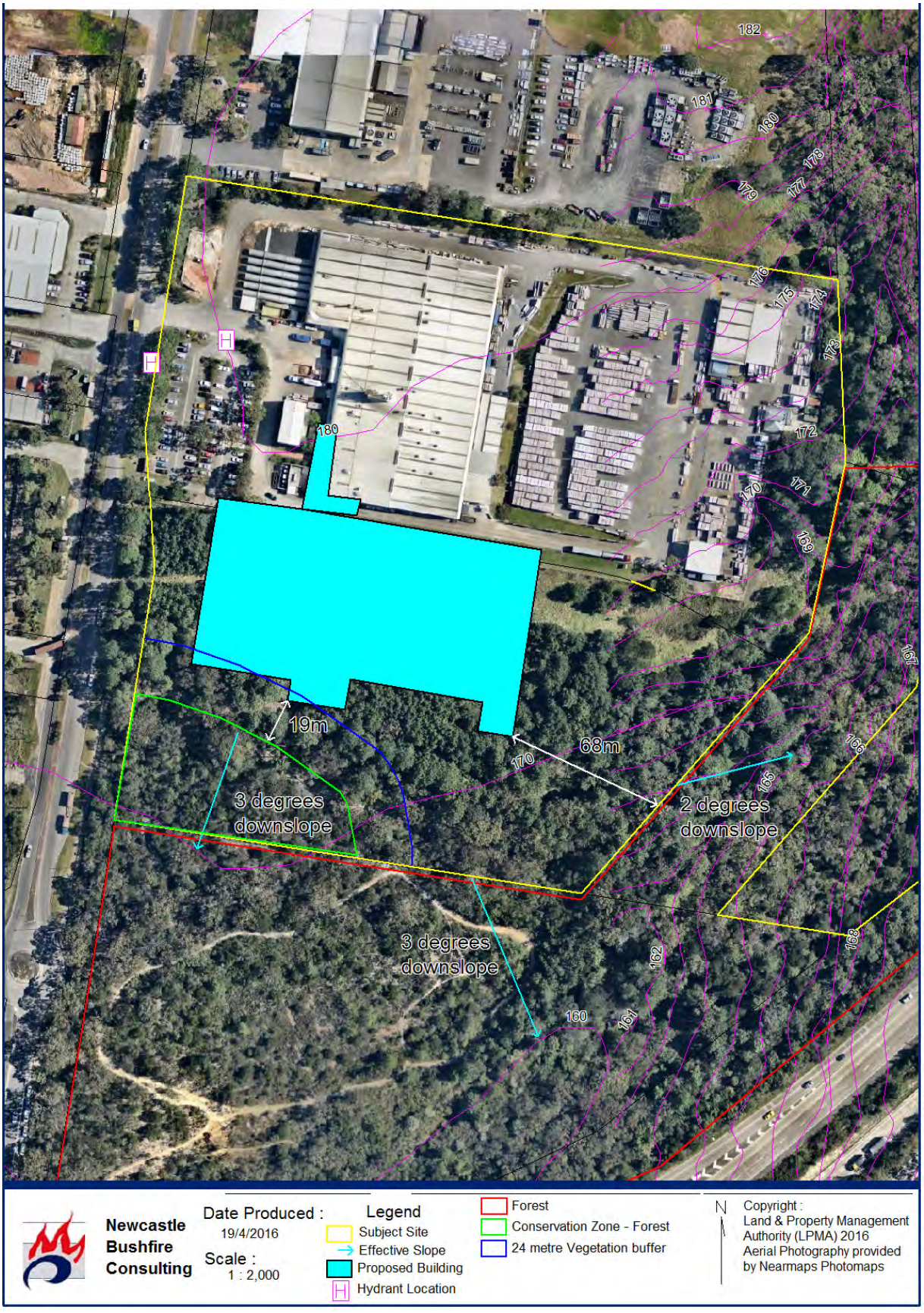

FIGURE 1 – SITE CONSTRAINTS MAP

3.0 BUSHFIRE ATTACK ASSESSMENT

3.1 VEGETATION CLASSIFICATION

Potential bushfire hazards were identified from Gosford Council's Bushfire Prone Mapping as occurring within the investigation area. Aerial mapping and inspection of the site reveals that the bushfire prone land map is reasonably accurate in respect to the current bushfire hazard.

The major vegetative threats have been determined using Keith (2004) to derive vegetation structures listed in Planning for Bushfire Protection (2006). General vegetation structures have been translated to AS3959 (2009) groupings.

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

PHOTOGRAPH 2 – VEGETATIVE THREAT

View of forest vegetation located south of the site. The forest is dominated by an open canopy of eucalypts with an understorey of native shrubs and grasses. There is an area of pines located to the north and west of the conservation zone that will be cleared to make way for the development.

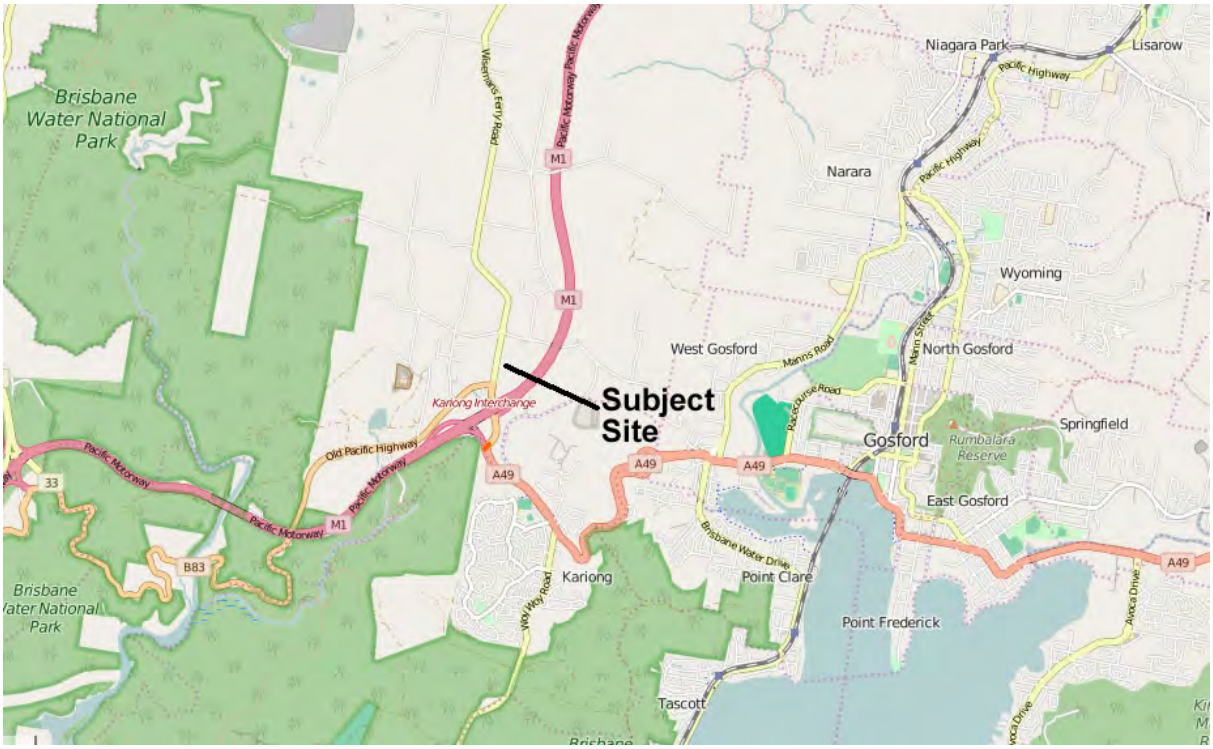

FIGURE 2 – LOCALITY MAP
Courtesy of OpenStreetMap

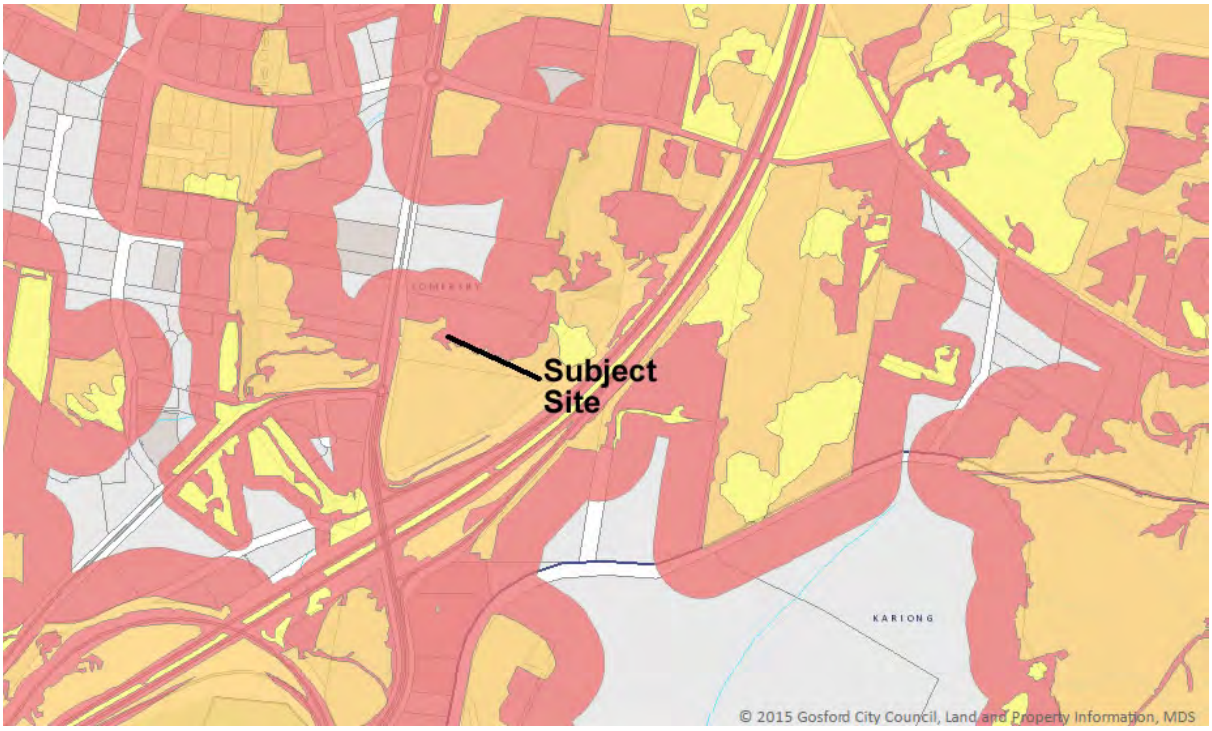

FIGURE 3 – COUNCIL'S BUSHFIRE PRONE LAND MAP

3.2 EFFECTIVE SLOPE

Effective 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 calculating effective fire run slope from 5 separate measurements in each dominant direction.

Effective Slopes have been identified in Figure 1 – Site Constraints Map and slope ranges are shown in Table 2 – Bushfire Threat Assessment.

3.3 BUSHFIRE ATTACK LEVELS

Bushfire attack levels and relevant construction levels in accordance with AS3959 (2009) have been demonstrated in Section 1 Executive Summary and Compliance Tables.

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 National Construction Code 2015 for fire safety are accepted for bushfire purposes where the aims and objectives of Planning for Bushfire Protection are met.

Construction of the additions is to comply with National Construction Code 2015 plus the additional measures referenced in Section 3.4 below.

3.4 COMPLIANCE WITH AIMS AND OBJECTIVES OF PLANNING FOR BUSHFIRE PROTECTION

The aims and objectives of Planning for Bushfire Protection are addressed below for a non-combustible industrial building.

Afford occupants of any building adequate protection from exposure to a bush fire
Multiple building exits are available, located away from the bushland threats. Workers should be able to evacuate through the building leaving a distance from the bushland. Evacuation planning in the event of bushfire should clearly indicate to building occupants to evacuate in a direction away from the fire.

Provide for a defendable space to be located around buildings
Defendable space is available around the building with the property access designed for heavy vehicle flow. In the event of bush fire, firefighters will have direct access to the bushland which will support firefighting efforts. There is defendable space around the entire perimeter of the building to fight fire after the firefront has passed.

The entire site shall be maintained as an inner protection area excepting the conservation zone.

Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition

There is an asset protection zone between the hazard and the building, with a southern portion of the slurry room, 2 x kiosks, a research and development room, services room and training room of the building potentially exposed to flame.

The building wall fabric will be fire rated hebel with FRL 90/90/90. The rooms that exposed to BAL-FZ will have fire rated internal walls to the rest of the development and will provide compartmentalization of fire in the event a fire front impacts. The FRL is deemed a significant redundancy considering the potential for a 2 minute fire front and the area of bushland being small with no fire runs exceeding 200 metres towards the building.

The southern windows to the training room shall comply with the below construction requirements:

(i) The window system shall comply with AS 1530.8.2 when tested from the outside. Or

(ii) Completely protected by a non-combustible and non perforated bushfire shutter that complies with Section 3.7 of AS3959-2009 excluding parts (e) & (f). and

a. Window frames and hardware shall be metal.
b. Glazing shall be toughened glass minimum 6mm thick.
c. Seals to stiles, head and sills or thresholds shall be manufactured from materials having a flammability index no greater than 5 or from silicone.
d. The openable portion of the window shall be screened internally or externally with screens that comply with Clause 9.5.1A.

The roof shall be metal in construction with foil backed bulk insulation (anticon blanket). The insulation shall have a flammability index of less than 5.

A FRL 60/60/60 wing wall or radiant heat shield shall be fitted on the southern elevation of the kiosks.

Review of Construction Suitability

The building will be constructed to National Construction Code 2015 Structural Fire Resistance construction levels and will have 90 minute fire rated walls for the majority of the building extension. In my considered opinion the additions are unlikely to be immersed in anything but partial instantaneous flame but experience high levels of radiant heat for up to two minutes and could have residual flame effects for an hour without igniting. The 90 minute fire rated hebel walls will absorb

the energy released by direct flame contact and flame radiation. The windows are identified as a vulnerability and if shutters are closed they should withstand a high intensity firefront. The fire behaviour of AS3959 (2009) overestimate the real fire behaviour in this bushland and a fire rated roof is deemed unnecessary. There may be some distortion of heat to the metal roofing however it is expected to remain intact following a fire event.

Ensure that safe operational access and egress for emergency service personnel and residents is available

The primary 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 building manager shall maintain landscaping and fuel management in accordance with Appendix 5 of Planning for Bush Fire Protection 2006 and the NSW Rural Fire Service's document Standards for the Asset Protection Zones.

Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting)

The development shall comply with AS2419.1. Street hydrants are available and there is an existing hydrant riser located onsite within the car parking area that is not located within the trafficable portion of the road. Electrical supplies are located overhead with no obstructions.

4.0 UTILITY SERVICES AND INFRASTRUCTURE

4.1 WATER SERVICES

A reticulated water supply and street hydrant access is available. Structural fire engineers are involved in the assessment of this development and correspondence confirms that AS2419.1 compliance will be reviewed at construction certificate stage. It is noted that hydrant pressures have not been tested as part of this report.

4.2 ELECTRICITY SERVICES

The existing electrical supply to the local area is via overhead electrical transmission lines however onsite power will be located underground. Landscaping onsite should be managed so that no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ‘Vegetation Safety Clearances’ issued by Energy Australia (NS179, April 2002).

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 10 metres 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 2 metres 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

Property access is by way of Wisemans Ferry Road providing access from the public road system directly to the private land giving fire fighters access to the building.

A review of the propose property access roads show compliance with section 4.1.3 of Planning for Bush Fire Protection 2006.

PHOTOGRAPH 3 – SITE ACCESS

View of property access via Wisemans Ferry Road which provides the site with good access and egress. Access roads within the site support the movement of heavy vehicles that are greater in size than a medium rigid vehicle. The property access will support parallel and direct firefighting efforts for any low-intensity fires that may occur in the bushland.

FIGURE 4 – SITE PLAN

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 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 walls on the southern elevation shall be constructed of hebel with an FRL 90/90/90.
2. An internal perimeter wall of the slurry room, the research and development room, the services room and the training room shall have a minimum fire rating of FRL 60/60/60.
3. The southern windows to the training room shall comply with the below construction requirements:
   (i) The window system shall comply with AS 1530.8.2 when tested from the outside. Or
   (ii) Completely protected by a non-combustible and non perforated bushfire shutter that complies with Section 3.7 of AS3959-2009 excluding parts (e) & (f). and
      a. Window frames and hardware shall be metal.
      b. Glazing shall be toughened glass minimum 6mm thick.
      c. Seals to stiles, head and sills or thresholds shall be manufactured from materials having a flammability index no greater than 5 or from silicone.

   d. The openable portion of the window shall be screened internally or externally with screens that comply with Clause 9.5.1A.
4. The roof shall be metal in construction with foil backed bulk insulation (anticon blanket). The insulation shall have a flammability index of less than 5.
5. A FRL 60/60/60 wing wall or radiant heat shield shall be fitted on the southern elevation of the kiosks.
   Note: CSR Hebel shall acknowledge the potential fire risk to buildings located on the southern portion of the building. An optional recommendation is the sealing of any penetrations into the building where gaps exceed 2mm in diameter to prevent ember ingress, particularly the research room.
6. The building shall comply with structural fire requirements for the National Construction Code 2015.
7. At the commencement of building works and in perpetuity the entire property excepting the nominated conservation zone shall be managed as an inner protection area (IPA) as outlined within section 4.1.3 and Appendix 5 of Planning for Bush Fire Protection 2006 and the NSW Rural Fire Service's document Standards for asset protection zones.
8. Electricity and gas are to comply with section 4.1.3 of Planning for Bush Fire Protection 2006.
9. The water supply shall comply with AS2419.1 and section 4.1.3 of Planning for Bush Fire Protection 2006.
10. The property access shall comply with section 4.1.3 of Planning for Bush Fire Protection 2006.
11. Landscaping is to be undertaken in accordance with Appendix 5 of Planning for Bushfire Protection 2006 and managed and maintained in perpetuity.
12. It is recommended that the building manager incorporate bushfire evacuation planning into emergency evacuation plans prepared for the workplace.

8.0 CONCLUSION

The final recommendation is that the proposed development offers compliance with Planning for Bushfire Protection. 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.

9.0 APPENDIX 1.0 – ASSET PROTECTION ZONES SUMMARY

Below is a summary of Asset Protection Zones outlined in Appendix 5 of Planning for Bushfire Protection (2006) and the NSW Rural Fire Services "Standards for Asset Protection Zones". The property owner should obtain these two documents and familiarise themselves with their content.

Generally
Asset Protection Zones (APZ) refers to the area between the bushfire threat and the asset (i.e. 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 3 metres 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.

10.0 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

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 notwithstanding 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.