

Middle Head - Bushfire Considerations Barracks B1

**For
Sydney Harbour Trust**

**19 June 2023
Version 1.1**

Document Tracking:

Project Name:	Middle Head - Bushfire Considerations Barracks B1
Prepared by	Lew Short
Client Details:	Sydney Harbour Trust Building 28, Best Avenue (off Suakin Drive) MOSMAN NSW 2088

BlackAsh Contact Details	
Lew Short	Principal
0419 203 853	lew.short@blackash.com.au

Document Control

Version	Primary Author(s)	Description	Date Completed
1.1	Lew Short	Final	19 June 2023



Lew Short | Principal

BlackAsh Bush fire Consulting

B.A., Grad. Dip. (Design for Bush fires), Grad. Cert. of Management (Macq),

Grad. Cert. (Applied Management)

Fire Protection Association of Australia BPAD Level 3 BPD-PA 16373



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Executive Summary

This report examines the implications of the adaptive reuse of the Barracks B1 within the context of the acceptable solutions within Planning for Bushfire Protection and the Australian Standard for Construction of Buildings in Bushfire Prone Areas 2018 (AS3959). The existing condition of the Barracks, being constructed before the implementation of modern bushfire planning and mandatory building requirements, renders it significantly vulnerable to bushfire impact, lacking necessary elements and design features to withstand such events.

The Sydney Harbour Trust has asked Blackash to review the bushfire implications on B1 only. This is because the Management Plan for Middle Head states at page 78 in part *The Barracks will be demolished with the possible exception of Building B1*. B1 was the only barrack ever considered to be potentially adapted or rebuilt.

The report highlights the location of the B1 barracks within the Bushfire Attack Level (BAL) Flame Zone (FZ) and Asset Protection Zone (APZ) requirements and explains their significance under contemporary bushfire planning regulations. The B1 barracks being within BAL Flame Zone necessitates consideration through a risk based approach to specific guidelines and standards to mitigate the risk of fire.

Considering the requirement for adaptive reuse of the B1 Barracks for occupancy to any Class of building, the report recommends two essential factors. Firstly, the construction must comply with AS3959 and other relevant standards to ensure the necessary level of fire resistance. Secondly, the report emphasises the need for significant vegetation removal within the existing bushland vegetation north of the building to provide the asset protection zone (APZ) to reduce the Bushfire Attack Level (BAL) to an acceptable level.

The report concludes that the Barracks cannot be considered for adaptive reuse unless the aforementioned construction and APZ requirements are fully validated at a detailed design level, considering the significant capital expenditure required to meet these requirements. Moreover, it recommends that the adaptive reuse cannot proceed without the full validation and formal agreement between the Harbour Trust and the proximate land manager, National Parks and Wildlife Service, as the extent of vegetation removal is substantial and falls within the jurisdiction of the National Park. These measures are crucial to ensure compliance with regulations and mitigate the risk of bushfire impact on the Barracks and its surroundings.

Overview

Blackash has been engaged by the Harbour Trust (HT) to assist in the master planning for the Middle Head 10 Terminal site (the site). The site is comprised of 9.34 Ha of Harbour Trust owned land Middle Head Road, Mosman, NSW (Figure 1) which is legally known as Lot 203 in DP 1022020. The land is currently zoned SP2 (Infrastructure Sydney Harbour Federation). This report specifically looks at building B1 Barracks (Figure 2 and Figure 3) and its suitability for adaptive re-use and any bushfire mitigation considerations associated with the use of B1.

The Sydney Harbour Trust has asked Blackash to review the bushfire implications on B1 only. This is because the Management Plan for Middle Head states at page 78 in part *The Barracks will be demolished with the possible exception of Building B1*. B1 was the only barrack ever considered to be potentially adapted or rebuilt.

The *Heritage Impact Assessment* dated February 2022 (Heritage IA) by Lucas Stapleton Johnson and Partners Pty Ltd includes a chronology and history of Buildings B1, B2, B3 (timber barracks). This has been used to determine the history and uses of the B1 building.

The *Middle Head Management Plan* (p. 8) identifies the precinct as *the culmination of the Headland Park: a gateway to Middle Harbour from the land and water. The precinct forms an important historic area within the proposed Headland Park. The key proposals contained in the Comprehensive Plan are: to retain and adaptively reuse the building clusters in a park with public paths through each cluster; to remove, adapt or re-build the northern barrack buildings; and to create a continuous band of parkland that straddles the ridge and envelopes the buildings.*

The concept master plan and the uses, movement and access and landscape framework are currently being reviewed as part of the Master Plan process. The aim for Middle Head includes:

- maximising public access
- providing visitor facilities and amenities including parking and walking tracks
- realising the potential for easy access including access for the disabled
- enhancing views to and from the precinct
- adaptively reusing existing facilities for appropriate educational, community, recreational and commercial uses including retail, food and beverage
- providing opportunities and site interpretation for visitors to understand and appreciate the totality of the site of the site's heritage.

The HT will be investigating options for activation of the site (the existing site layout is at Figure 3), including the open space, adaptive reuse of existing buildings within the site. As existing assets and existing uses within the site, the adaptive reuse will need to be considered on a risk and merit-based case by case review, balancing the bushfire risk, vulnerability of occupants, lease and licence controls and the emergency management arrangements that can be utilised within the site and for the intended purpose.

The HT is in a unique position that all operators within the site are under a common management arrangement executed by HT in terms of access to the site and utilisation of facilities within the site. These arrangements are governed by leases and licences that provide legal weight by the HT to execute management arrangements associated with bushfire and emergency management.

HT decisions regarding the future mix of uses at the site will be informed by a range of issues, including Commonwealth and national heritage values, ecosystems, aboriginal heritage and bushfire risk, etc. Getting the balance right and recognising the tension between these sometimes-competing aspects requires consideration of the bushfire risk, risk tolerance and management options for each of the buildings and activities within the site.

The Commonwealth is exempt from certain state laws, including those related to town planning which do not apply on HT land and the Harbour Trust is the planning and consent authority for its land. However, the HT will utilise the NSW framework provided by the NSW Rural Fire Service (RFS) document *Planning for Bushfire Protection 2019* (PBP) for the consideration of bushfire risk and the adaptive reuse of the existing buildings and new uses within the site.

The site is on designated Bushfire Prone Land (Figure 4). The assessment has been provided in a series of maps that show the site assessment methodology inputs to determine the Bushfire Attack Level (BAL) for B1. The utilisation of the BAL and a range of other bushfire mitigation strategies for B1 will provide opportunity for an integrated approach with the surrounding land management and Fire Management Plans and strategies to ensure a cohesive approach is achieved in the management of the unique Sydney Harbour foreshore bushland areas.

This assessment of B1 identifies bushfire issues that should be considered and prioritised to reduce the risk of bushfire impact at B1 and to meet the bushfire legislative provisions that the development proposal must respond to. The analysis can be used in the design process where the information is weighed up to determine what is most pertinent to the development's design and feasibility.

This assessment has been prepared by Lew Short, Principal Blackash Bushfire Consulting (Level 3 FPAA BPAD-A Certified Practitioner No. BPD-PA-16373) who is recognised by the RFS as qualified in bushfire risk assessment and has been accredited by the Fire Protection Association of Australia as a suitably qualified consultant to undertake alternative solution proposals. A site inspection was completed on the 24 October 2022 and 14 June 2023.

1. The Site and Timber Barracks

The Middle Head Precinct is approximately 11 hectares in area and is located at the end of the Middle Head ridge, one of the three headlands that define the entrance to Sydney Harbour. The site sits on an undulating plateau providing a number of natural vantage points with excellent views of Sydney Harbour and Middle Harbour.

Middle Head Road provides the single road link and pedestrian path serving the headland, while Chowder Bay Road traverses Harbour Trust land and Sydney Harbour National Park to provide access to Chowder Bay. The southern area of the precinct contains remnant bushland (forest) and the area north of Middle Head Oval is vegetated with open forest / tall shrubland. The northern edge of the precinct is bound by the rocky escarpment and foreshore of Hunters Bay.

The main clusters of buildings in the precinct include the 10 Terminal Regiment and the Australian School of Pacific Administration (ASOPA) complexes (see Figure 3).

The site and surrounding areas have high visitation rates with high numbers of tourists who may not be familiar with the area or bushfire risk and actions. The site and surrounding area have remote walking tracks within bushfire prone land.

The National Park contains a collection of buildings in an open landscape and a series of gun emplacements. The NPWS have prepared a Plan of Management that applies to the whole of Sydney Harbour National Park including Middle Head. HT have received a *Bushfire Management Plan* for Headland Park (dated 15 February 2021) which outlines a five (5) year plan (2021–2026) and identifies the bushfire protection strategies to be undertaken by HT in a manner that recognises the site's ecological and environmental values and places this in the context of the need to protect life and property from bushfire.

The Heritage IA notes that the timber barracks were constructed in c.1951 and have undergone a range of modifications. The Heritage IA notes (p. 19) that:

All buildings for the Terminal Regiment were officially closed on 27 November 1997 and in February 1998 the site was handed over to Sydney Property Disposals.



Figure 1 Location



Figure 2 Location B1 Barracks

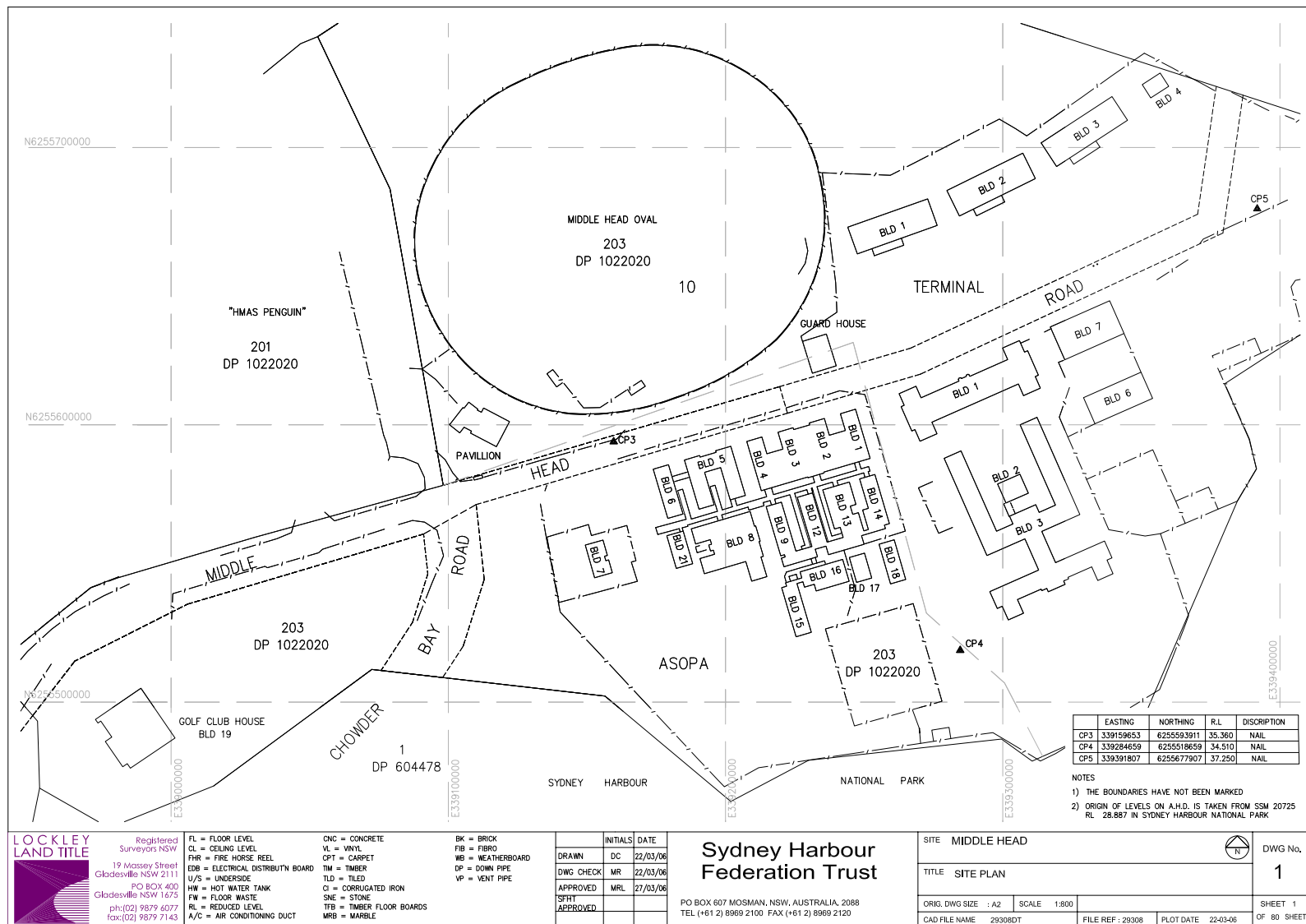


Figure 3 Site Plan (source HT)



Figure 4 Bushfire Prone Land

2. Legislative and Assessment Framework

Under Section 71 of the *Sydney Harbour Federation Trust Act 2001*, certain state laws, including those related to town planning, do not apply on Harbour Trust land. The Harbour Trust is the planning and consent authority for its land and planning approval from the NSW Government, including the NSW Rural Fire Service or the local council are not required. However, in some circumstances, the Harbour Trust may consult with local councils and NSW Government agencies, in respect of proposal or issues.

The Harbour Trust have requested that the NSW bushfire framework be utilised for the assessment of bushfire risk and the BAL assessment. The bushfire requirements are outlined in the RFS document *Planning for Bushfire Protection 2019* (PBP). PBP provides a framework for the consideration of new and existing development. PBP does not articulate a clear position in relation to adaptive reuse of existing buildings but recognises infill or existing development and change of use for buildings and activities within building.

In circumstances where new building projects, change of use or adaptive reuse of existing buildings are proposed, PBP requires that an appropriate combination of Bushfire Protection Measures (BPM) are provided commensurate with the bushfire risk and vulnerability of occupants. The types of BPM include asset protection zones (APZ), access, landscaping, water supply, building design and construction and emergency management arrangements. These measures assist building survival during a bushfire. They also contribute to the safety of firefighters and members of the community occupying buildings during the passage of a bushfire front¹. The range of different BPMs which should be applied in combination based upon the development type, adaptive reuse and the level of bushfire risk.

The intention for any adaptive reuse of building work occurring within an existing building is to achieve a better bushfire outcome than if the development or use did not proceed. Achieving this may require a combination of BPM including improved construction standards, APZs and evacuation management. This may result in a level of retrofitting of existing buildings and managing other portions of the site (i.e. APZs) to ensure an improved level of bushfire

¹ Planning for Bushfire Protection 2019 p. 25

protection. In some circumstances the bushfire risk and vulnerability of potential occupants may be too high and alternative locations should be sought.

Intensification of the use, increase in occupancy or change of use/ adaptive reuse must consider the risk to the asset, occupants and firefighters. Where practically achievable, full compliance with PBP should be provided before variations to the required BPMs are considered. Proposals that involve internal alterations only to an existing building are not subject to any specific requirements².

All adaptive reuse must meet the aim and objectives of PBP (p. 10):

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives are to:

- *afford buildings and their occupants protection from exposure to a bushfire*
- *provide for a defensible space to be located around buildings*
- *provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings*
- *ensure that appropriate operational access and egress for emergency service personnel and occupants is available*
- *provide for ongoing management and maintenance of Bushfire Protection Measures*
- *ensure that utility services are adequate to meet the needs of firefighters.*

Use and Framework Considerations

The HT will utilise the framework provided by PBP for the consideration and assessment of new development and adaptive re-use of existing buildings within the site. The Trust accepts the performance-based approach for new and infill development and adaptive reuse within PBP which provides for a risk-based approach for the intended use and established minimum standards.

² Planning for Bushfire Protection 2019 p. 52

As part of this approach, the HT could provide minimum standards such as:

- For **new residential development** (including residential subdivision), APZ requirements are based on radiant heat level exposure to buildings not exceeding 29kW/m² (calculated on a flame temperature of 1090 Kelvin).
- For new **Special Fire Protection Purpose** (SFPP) developments, 10kW/m² (calculated on a flame temperature of 1200 Kelvin) is the maximum exposure at any point of the building wall or facade and where emergency services may be supporting or evacuating occupants from the building. SFPP development includes:
 - schools
 - hospitals
 - seniors housing & retirement villages
 - tourist accommodation (including hotel, motel)
 - group homes
 - child care centres
 - manufactured home estates
 - sheltered workshops (established for the purpose of employing persons with disabilities)
 - respite care centres
 - student or staff accommodation associated with a school, university or other educational establishment; and
 - community bushfire refuges.
- **Other** development (including commercial, industrial, critical infrastructure, development with large numbers of people such as events) must meet the aim and objectives of PBP and be constructed to the Bushfire Attack Level. For other uses they must meet the aim and objective of PBP:
 - provide a defensible space to enable unimpeded access for firefighting around the building
 - provide better bushfire outcomes on the existing building that may include retrofitting and building upgrade for ember protection, commensurate with the scale of works proposed
 - the leasee provides suitable insurance

- the site (Middle Head) is not occupied on Catastrophic Fire Danger Rating or when out of control or scheduled hazard reduction burns are within Middle Head.
- If use of a building is excluded (and so excluded in a lease or license) above a certain fire danger index (FDI), the assessment for BAL and risk should be undertaken on the maximum FDI that the building is occupied.

Buildings of Class 5 to 8

Class 5 to 8 buildings include offices, shops, factories, warehouses, public car parks and other commercial and industrial facilities.

The National Construction Code (NCC) does not provide for any bush fire specific performance requirements for these particular classes of buildings. However, compliance with the bushfire construction standards (i.e. AS3959 and the NASH Standard) must be considered when meeting the aims and objectives of PBP.

Class 9 Buildings are categorised as Special Fire Protection Purpose (SFPP) development within *Planning for Bushfire Protection 2019* (PBP) where they have a floor area greater than 500m². A performance based approach can be undertaken using the BCA and a range of Bushfire Protection Measures – the key components would be construction to the designated BAL and robust emergency management and evacuation arrangements.

Buildings of Class 10 structures

Class 10 buildings are non-habitable buildings or structures such as private garage, carport, shed or the like, as well as structures such as fence, mast, antenna, retaining or free-standing wall and swimming pools.

There are no bush fire protection requirements for Class 10a buildings located more than 6m from a dwelling in bushfire prone areas.

Public Assembly Buildings

PBP provides guidance for public assembly buildings based on size of the building as a proxy for the number of people present within the site. PBP provides the following two options for assembly buildings:

- Buildings used for public assembly with a floor space area of greater than 500m².
These developments are to be treated technically as SFPP and must not experience radiant heat levels of greater than 10kW/m² on any part of the building.
- Buildings used for public assembly with a floor space less than 500m².

Blackash have provided reports and guidance to HT for events.

Outdoor events in bushfire prone areas

Outdoor events include music festivals, cultural festivals, sporting events, and regional shows. The emergency management and evacuation procedures for smaller, regular events may be addressed via an overarching emergency management and evacuation plan for the site. Large events should be provided with a specifically tailored emergency management and evacuation plan.

3. Adaptive Reuse Considerations

Adaptive reuse is a process that changes a disused or ineffective building into a refreshed item that can be used for a different purpose. Adaptive reuse is an effective strategy for optimizing the operational and commercial performance of built assets.

The adaptive reuse of a historic building and buildings within the MH should have minimal impact on the heritage significance of the building and its setting (including minimising environmental impacts). However, this needs to be weighed with the bushfire risk, the compliance of the building with modern bushfire requirements and the costs of such upgrades.

Applications for development and adaptive reuse within the MH should include a bushfire assessment report. This report should demonstrate that the proposal satisfies the requirements of PBP and considers the risk of bushfire to the occupants. All applications must meet the Aim and Objectives of PBP. PBP uses acceptable solutions and a performance based approach and identifies objectives and detailed performance criteria to satisfy desired outcomes for development types.

Given the existing assets, the control that the HT applies through leases and licences and the potential adaptive reuse, a key BPM will be the emergency management arrangements to

provide for occupant and fire fighter safety. The risk posed to the buildings will be considered on a case by case basis by the HT to reduce risk to tolerable levels. This should link in with the existing BEMP and control arrangements. This report identifies issues and considerations for B1.

The existing buildings within the site and new buildings would be afforded special infill provisions within PBP that provide a risk based approach to demonstrating a better bushfire outcome than currently exists on site. In broad terms proposals for infill development (PBP p. 64) are to:

- *provide a defensible space to enable unimpeded access for firefighting around the building*
- *provide better bush fire outcomes on a redevelopment site than currently exists, commensurate with the scale of works proposed*
- *design and construct buildings commensurate with the bush fire risk*
- *provide access, services and landscaping to aid firefighting operations*
- *not impose an increased bush fire management and maintenance responsibility on adjoining land owners; and*
- *increase the level of bush fire protection to existing dwellings based on the scale of the proposed work and level of bush fire risk.*

4. Bushfire Assessment Methodology

The assessment of buildings has been undertaken in accordance with the framework and assessment methodology outlined by the PBP and the *Australian Standard for Construction of Buildings in Bushfire Prone Areas* (AS3959) to determine the Bushfire Attack Level (BAL). PBP identifies the methodology to BAL based on calculated radiant heat levels at a site. This assessment is based on mapping of vegetation formations and slope assessment in accordance with PBP. This assessment is based on the site inspection and desktop assessment of the site utilising the following resources:

- *Planning for Bushfire Protection* (NSW RFS, 2019)
- Aerial mapping
- Detailed GIS analysis
- Site inspection

Bushfire Hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as likely radiant heat and APZ. The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site, and which determine the Bushfire Attack Level (BAL) of PBP.

The Mosman / North Sydney /Willoughby Bushfire Management Committee Bush Fire Risk Management Plan should be reflected in future bushfire mitigation planning.

Fire weather

The fire weather is prescribed by PBP and assumes a credible worst-case scenario (1:50 year bushfire weather event) and an absence of any other mitigating factors relating to aspect or prevailing winds. The site has a Fire Danger Index (FDI) of 100 as prescribed within PBP. The FDI is a relative number denoting the potential rates of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed.

As existing site with existing assets, a risk based approach can be taken with regard to the FDI and the consideration of likely bushfire weather and fire scenarios. If use of a building is excluded (and so excluded in a lease or license) above a certain FDI, the assessment for BAL and risk should be undertaken on the maximum FDI that the building is occupied.

Vegetation

Predominant Vegetation is classified by structure or formation using the system adopted by Keith (2004) and by the general description using PBP. Vegetation types give rise to radiant heat and fire behaviour characteristics. There are 12 vegetation formations (with sub-formations) identified in PBP. The predominant vegetation has been determined over a distance of at least 140 metres in all directions from the proposed property boundary or building footprint on the site. Where a mix of vegetation types exist, the type providing the greater hazard is said to predominate.

The background information, mapping and site inspection determined vegetation formations of Dry Sclerophyll Forest, within the assessment boundary for B1 as shown in Figure 5. The ridgetop areas are extensively modified (including car parking, roads, buildings and managed areas) and meet the requirements for managed land and asset protection zones. The Concept Masterplan provides for ongoing management within the existing managed areas. Additional access will be provided in the form of walking tracks to the perimeter of the site, linking with existing NPWS walking trails.

Slopes influencing bushfire

The 'effective slope' influencing fire behaviour has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the worst-case scenario slope where the vegetation occurs over a 100 metre transect measured outwards from the building as shown in Figure 5 (LIDAR).

The slopes Figure 5 within the existing managed areas of B1 (ie the ridgetop) are gentle and drop away to the north and south steeply to the Harbour. To the north of B1, the slopes are 7 degrees downslope to the north east and across the slope of the oval, 17.8 degrees downslope to the north and 16.4 degrees downslope to the north east.

5. Impact Assessment - Bushfire Attack Levels

The Bushfire Attack Level (BAL) is a method for rating the intensity of a locations potential exposure to bushfire. The form of bushfire attack and the severity will vary according to the conditions (FDI, vegetation, slope and setback) on the site. The BAL assesses the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per square metre, which is the basis for establishing the requirements for construction to improve protection of a building from potential attack by a bushfire, as defined in the *Australian Standard for Construction of Buildings in Bushfire Prone Areas 2018* (AS 3959) and shown in Table 1.

Table 1 Bushfire Attack and Radiant Heat Levels

BAL	Heat flux threshold (kW/m ²)	Predicted bushfire attack and level of exposure
BAL-12.5	≤ 12.5	Significant ember attack, burning debris and radiant heat up to a level of 12.5 kW/m ² .
BAL-19	12.5 – 19	Increasing levels of ember attack, burning debris and radiant heat up to a level of 19 kW/m ² .
BAL-29	19 – 29	Increasing levels of ember attack, burning debris and radiant heat up to a level of 29 kW/m ² .
BAL-40	29 – 40	Increasing levels of ember attack, burning debris and radiant heat up to a level of 40 kW/m ² . Flames from the bushfire front may intermittently contact the building.
BAL-FZ	≥ 40	Increasing levels of ember attack, burning debris and radiant heat in excess of 40 kW/m ² . Flames from the bushfire front are likely to engulf part or all of the building.

As required by PBP, each interface area for B1 was divided and classified accordingly by vegetation type, slope class and associated distances for BAL Flame Zone, BAL 40, BAL 29, BAL 19 and BAL 12.5. This enabled 'BAL IN' (Figure 6) to be calculated very precisely for B1. The

existing boundary between managed and unmanaged vegetation was used as the basis for determining the starting point for the BAL IN maps. The BAL or radiant heat received at each of the buildings for the site is shown in Figure 8. This provides the radiant heat at the buildings which can be used as a key consideration in the adaptive reuse of buildings and utilisation of the site.

The BAL ratings are used as the basis for establishing the requirements for construction and APZ to improve protection of a building or to determine the vulnerability of a building to potential bushfire attack. PBP (p. 110) defines BAL as:

A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. In the NCC, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements.

In simple terms, in BAL Flame Zone, direct exposure and contact to bushfire flames would be expected. These are conditions where fire fighters cannot operate, and the house is likely to be immersed in flame. Houses which have not been built to AS3959 are more susceptible to loss while newer houses built to the Standard will be more resilient.

Building B1 is within BAL Flame Zone (Figure 6).

AS3959 describes BAL Flame Zone as:

There is an extremely high risk of ember attack and burning debris ignited by windborne embers, and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front.

The construction elements are expected to be exposed to a heat flux greater than 40 kW/m².

The BAL can be reduced based on the tolerable risk. Tolerable risk refers to a level of risk that is deemed acceptable or manageable within a given context or situation. It is the threshold at which potential harm or negative consequences associated with a bushfire impacting B1 are considered reasonable or within an acceptable range, balancing the benefits and costs associated with the activity or scenario.

The BAL at B1 can be reduced by increasing the area managed as an asset protection zone (APZ). An APZ for bushfire is a designated area surrounding a building or property that is

carefully managed to reduce the risk of fire spread and protect the asset from direct flame contact. It typically involves measures such as vegetation clearance and implementation of fuel management practices to create a buffer zone that mitigates the impact of a bushfire.

Figure 7 shows the BAL OUT and the area of management of vegetation to achieve certain BALs. The establishment and maintenance of an APZ is defined within PBP. It requires significant vegetation modification. The APZ requirements are at Attachment 1.

Because the B1 has no inherent bushfire construction in accordance with AS3959, the commensurate BAL would be BAL 12.5 as per Figure 7. If vegetation management was undertaken to achieve BAL 12.5 as per Figure 7, significant vegetation would need to be removed to meet the APZ requirements (see Attachment 1) and the bushfire hazard would be effectively removed. Such management would have significant impact on the vegetation to the north of B1.

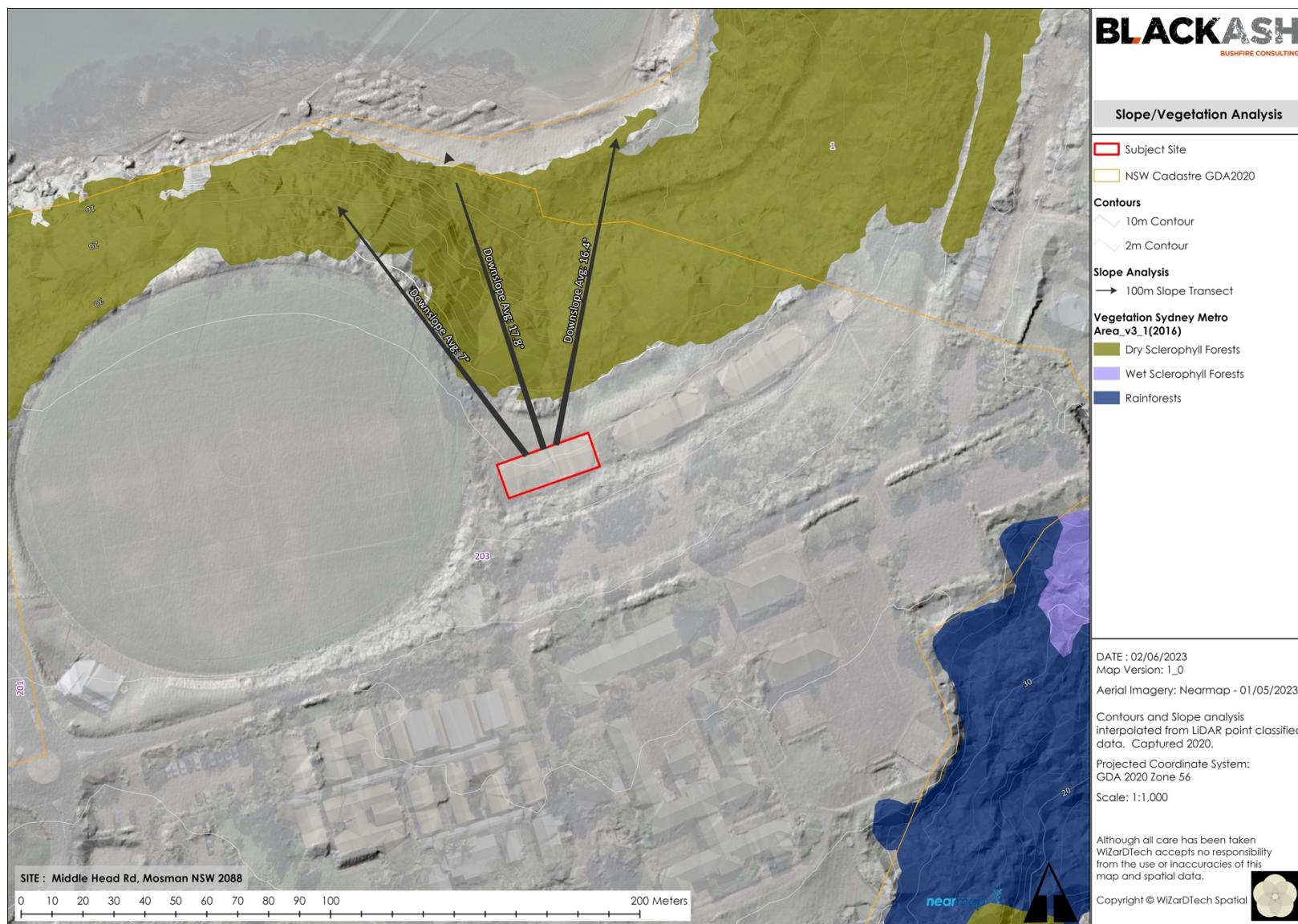


Figure 5 Slope and Vegetation Assessment

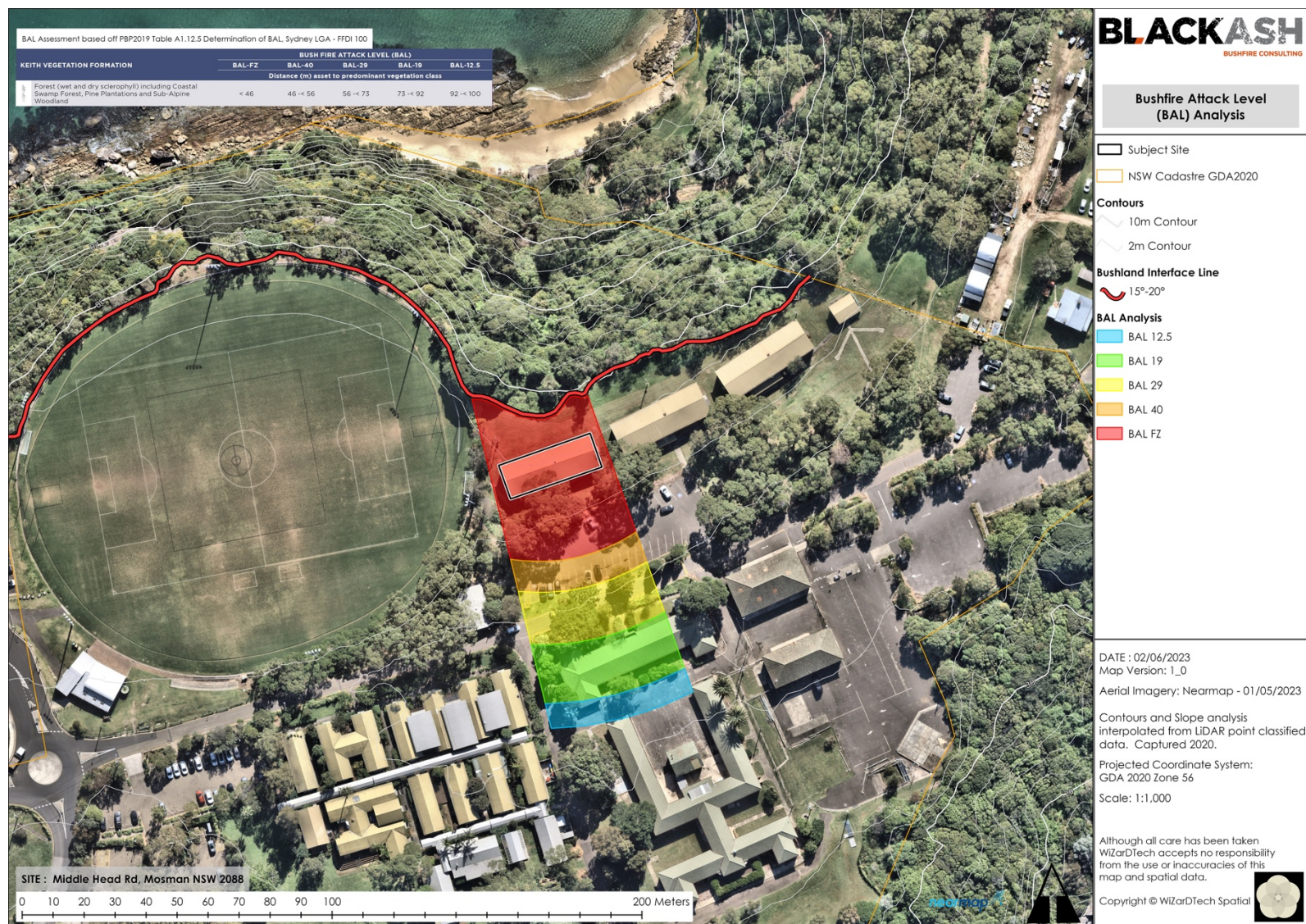


Figure 6 Bushfire Attack Levels IN

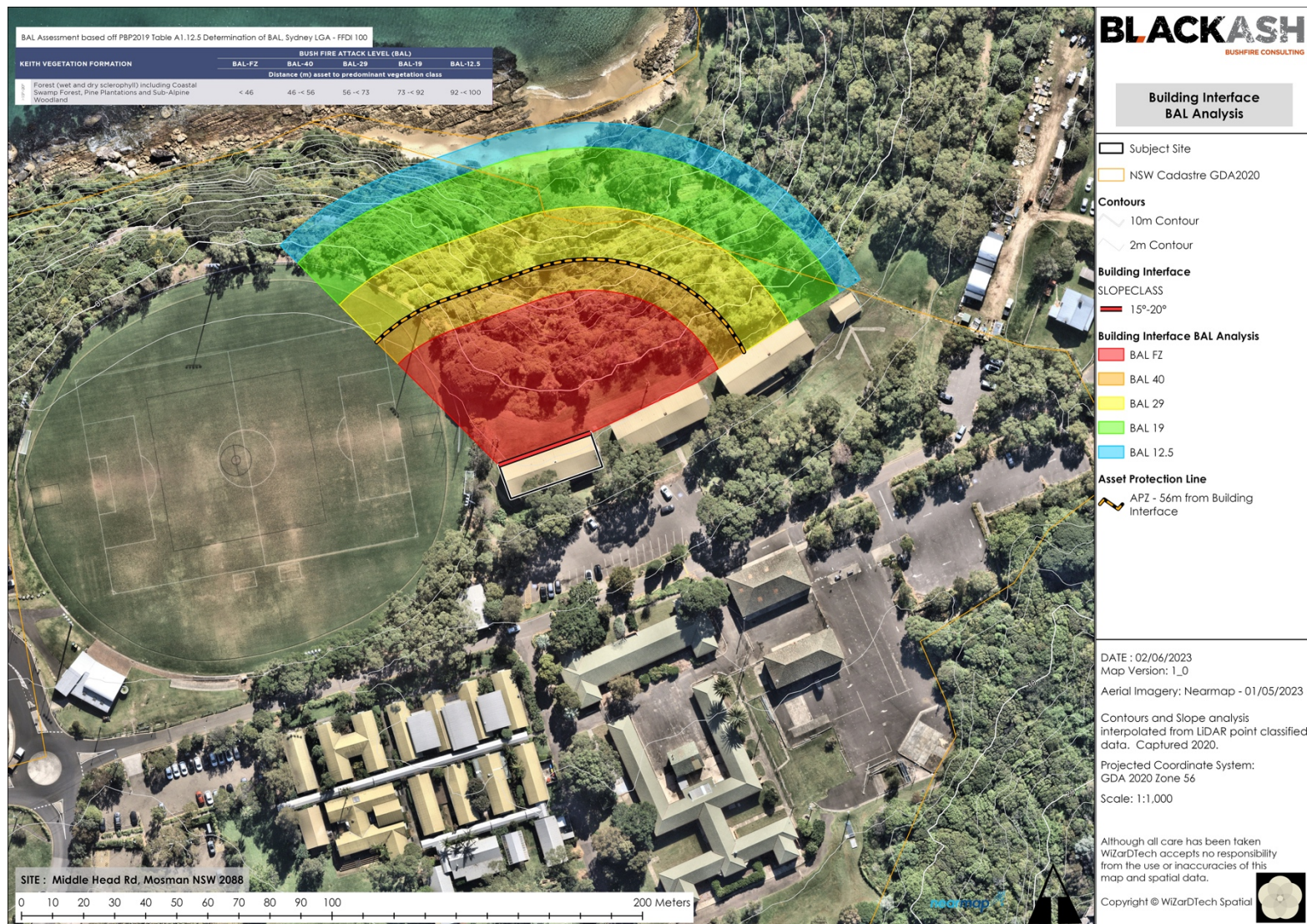


Figure 7 Bushfire Attack Levels OUT

6. Existing Condition of B1

The Heritage IA provides comment on the external façade of the buildings (p. 20) noting that:

The three buildings are essentially identical. In plan, elevation, form and detailing, and consist of two storey, timber framed, weatherboard barracks on a brick base course with gabled, corrugated steel roofs, aluminium framed windows, timber framed doors and external fire stairs or ladders to both east and west elevations.

And




There is some evidence of water and termite damage and generally the buildings are in fair to poor condition, but of moderate integrity.




From a bushfire assessment perspective, the B1 building was built and developed prior to modern bushfire planning and building requirements (see Photographs 1 – 7) and it does not meet any level of construction that would be of equivalence to a BAL in AS3959.

As a result of being constructed before the implementation of modern bushfire planning and building requirements, the B1 building shown in Photographs 1 – 7 exhibits a significant vulnerability to bushfire impact. B1 construction lacks the necessary elements and design features to withstand the intense heat, ember attack, and radiant heat exposure commonly associated with bushfire. The poor state of the buildings exposes the building to all forms of bushfire attack (radiant heat, ember and direct flame contact).

The absence of adequate fire-resistant materials, such as non-combustible cladding, tempered glass, and ember guards, further amplifies the B1 vulnerability. Additionally, the lack of appropriate building setbacks, fire breaks that provide sufficient protection, and vegetation management exacerbates the potential for rapid fire spread and the ignition of the B1 structure.

Without meeting any level of construction equivalence to a Bushfire Attack Level (BAL) in AS3959, the B1 building faces an increased risk of severe damage or complete destruction during a bushfire event, posing significant threats to the lives and safety of occupants and loss of items within the buildings.

Photograph No.	Photograph	Note
1		Front of building B1 looking from the car park.
2		Rear of building B1 looking from edge of vegetation in north eastern corner of the site.
3		Vegetation to the north of the B1 building. Photograph shows managed (mown) land surrounding the building to the edge of the vegetation.

4		<p>North eastern corner of building B1 showing degraded state of timber wall panels.</p>
5		<p>Close up of north eastern corner of building B1 showing degraded state of timber wall panels.</p>
6		<p>Front entry of building B1. Vegetation growing in gutters and roof.</p>

7



Fire hydrant on entry pathway to the front of building B1.

7. Recommendations

The following recommendations and considerations are provided for B1:

1. Be aware of adaptive re-use opportunities and PBP guidance (see section 2).
2. No vulnerable (as defined in Section 100B of the Rural Fires Act 1997) uses are provided on the site and particularly within B1 above the BAL 12.5 threshold without detailed risk and performance-based assessment. Vulnerable uses include: a school, a child care centre, a hospital (including a hospital for the mentally ill or mentally disordered), a hotel, motel or other tourist accommodation, a building wholly or principally used as a home or other establishment for mentally incapacitated persons, seniors housing, aged care or a retirement village, a group home.
3. If B1 were to be used, the tolerable level of risk (based on use) would need to be considered and building upgrades provided to meet AS3959 and or APZ provided to reduce the bushfire risk to tolerable levels. For B1, the extent of vegetation management required to meet the current building standard is significant (see Figure 7).
4. The implementation of the Headland Park Bushfire Management Plan provides a program of management works and actions to provide for species health and diversity as well as management of bushfire fuels. This management program should be aligned with NPWS works programs.
5. Any modifications to the external fabric of the buildings should be undertaken in accordance with the BAL Map (Figure 6) and the Australian Standard for Construction of Buildings in Bushfire Prone Areas (AS3959).
6. The existing barracks buildings on the northern side of the site are in BAL Flame Zone. It is proposed to remove these buildings which reduces fire progression and provides for areas of asset protection zone. Given the state of the buildings and the extent of vegetation management required to provide protection, this approach is supported.
7. A detailed Bushfire Emergency Management and Evacuation Plan should be developed in consultation with existing site stakeholders and implemented across the site by the Harbour Trust. The outputs of the Bushfire Emergency Management and Evacuation Plan should be reflected in future or renegotiated leases and licenses for occupants of the site.

8. Conclusion

Building B1 was constructed before the implementation of modern bushfire planning and building requirements. Building B1 exhibit a significant vulnerability to bushfire impact. B1 construction lacks the necessary elements and design features to withstand the intense heat, ember attack, and radiant heat exposure commonly associated with bushfires. The poor state of the building exposes the building to all forms of bushfire attack (radiant heat, ember and direct flame contact).

The absence of adequate fire-resistant materials, such as non-combustible cladding, tempered glass, and ember guards, further amplifies B1 vulnerability. Additionally, the lack of appropriate building setbacks, fire breaks that provide sufficient protection, and vegetation management exacerbates the potential for rapid fire spread and the ignition of these structures.

If B1 were to be used as adaptive re-use, it should not include vulnerable occupants. Without meeting any level of construction equivalence to a Bushfire Attack Level (BAL) in AS3959, building B1 faces an increased risk of severe damage or complete destruction during a bushfire event, posing significant threats to the lives and safety of occupants and loss of items within the building.

Vegetation management may be undertaken to the north of B1 to reduce the Bal to an acceptable level. However, the vegetation management extent is significant and should be weighed against the potential adaptive reuse of the building and the cost of upgrades to meet modern construction requirements.



Lew Short | Principal

BlackAsh Bushfire Consulting

B.A., Grad. Dip. (Design for Bushfires), Grad. Cert. of Management (Macq), Grad. Cert. (Applied Management)

Fire Protection Association of Australia BPAD Level 3 BPD-PA 16373



Attachment 1 Asset Protection Zone Requirements

(source Planning for Bushfire Protection p. 107 and p. 108)

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defensible space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Figure A4.1

Typical Inner and Outer Protection Areas.

