Our Ref: 20HARB03: NVD

Tuesday 17th November, 2020

Harbour Trust
PO Box 607
MOSMAN NSW 2088

Attention: Ms K Werner

Dear Kathryn

Re: Bushfire Assessment for the 10 Terminal Renewal Project, 1110 Middle Head Road, Mosman (Lot 203 DP 1022020)

Travers bushfire & ecology (TBE) have been requested by Sydney Harbour Federation Trust (SHFT) to prepare a preliminary bushfire constraints assessment to inform the renewal of the 10 Terminal Precinct at the above address.

TBE understand that the 10 Terminal Renewal Project comprises the following components:

- Works to the brick buildings on the southern side of Middle Head Road (Buildings 1, 3, 6 & 7) to facilitate their future adaptive reuse for a range of commercial and community purposes;
- Demolition of Building 2 (Boiler House) on the southern side of Middle Head Road;
- Demolition of the weatherboard two-storey barracks, and one (1) laundry building on the northern side of Middle Head Road, to facilitated the creation of landscaped public open space; and
- Construction of an "easy grade" path around Harbour Trust parkland on both sides of Middle Head Road.

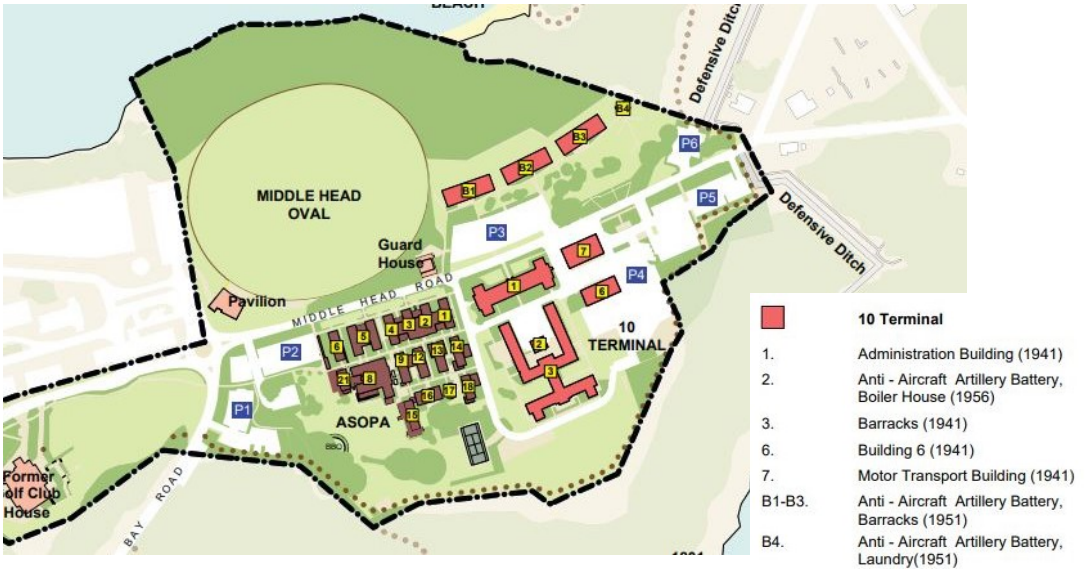

Figure 1 – Study area

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The following assessment has been undertaken to review the bushfire protection measures required to be incorporated into the future development of the site based on the following range of potential building uses for Buildings 1, 3, 6 and 7 for the renewal project;

- Offices and shops (Class 5)
- Food and beverage (Class 6)
- Community activities
- Indoor / outdoor education (Class 9b assembly building <500m^2)

1. Planning for Bush Fire Protection

Planning for Bush Fire Protection (PBP) 2019 provides development standards for designing and building on bush fire prone land. It provides guidance for the following bushfire protection measures required for any new development application.

- asset protection zones (APZ)
- building construction and design
- access arrangements
- water supply and utilities
- landscaping
- emergency management arrangement

PBP 2019 acknowledges the variation in bushfire risk associated with different types of developments, and therefore provides different standards based on the nature of the proposed use. Some of these uses are outlined below:

Special Fire Protection Purpose Development (SFPP)

For many SFPPs, larger APZs are required because of the characteristics of occupants. For most SFPP developments, 10kW/m² is the maximum exposure at any point of the building wall or façade and where emergency services may be supporting or evacuating occupants from the building.

SFPP development includes (but is not limited to) schools, hospitals, seniors housing & retirement villages, tourist accommodation (including hotel, motel), child care centres, student or staff accommodation associated with a school, university or other educational establishment and community bushfire refuges.

It is noted that SHFT does not propose any future uses associated with SFPP development on this site.

Other development

The term 'other' development within *PBP* refers to commercial & industrial uses and development which involves large numbers of people (i.e. other uses which are not classified as residential or SFPP). In order to comply with *PBP* the following conditions must be met for these types of development:

- satisfy the aim and objectives of *PBP*;
- consider any issues listed for the specific purpose for the development; and
- propose an appropriate combination of BPMs.

In all circumstances it is important to ensure that a defendable space is provided for the size and scale of the development (i.e. as a minimum to avoid flame contact to the building). Proposed measures must operate in combination to minimise the impact of bush fire and

ensure that access and services are adequate. Specific requirements for 'other' development are outlined below:

Public Assembly Buildings (Class 9b)

PBP 2019 acknowledges the variation in bushfire risk associated with occupants of assembly buildings, and in particular the evacuation challenges presented by large numbers of occupants. As a result, *PBP* provides the following two options for assembly buildings:

1. Buildings used for public assembly with a floor space area of greater than 500m^2. These developments are to be treated technically as SFPP and must not experience radiant heat levels of greater than 10kW/m^2 on any part of the building; and
2. Buildings used for public assembly with a floor space less than 500m^2. These buildings are to consider the aims and objectives of *PBP* (i.e. avoid flame contact).

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.

Whilst the National Construction Code (NCC) does not provide for any bush fire specific performance requirements for these particular classes of buildings, compliance with the bushfire construction standards (i.e. AS3959 and the NASH Standard) must be considered when meeting the aims and objectives of *PBP* (i.e. depicted in red in Schedule 1).

In order to comply with the aims and objectives of *PBP* an appropriate defendable space (i.e. APZ) is to be provided to prevent the likely spread of fire. *TBE*, can advise that as a minimum, buildings should not be exposed to flame zone contact.

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 bush fire prone areas.

Outdoor events in bushfire prone areas

Outdoor events include music festivals, cultural festivals, sporting events, and regional shows. Events that involve overnight camping, multiple days, or attract large numbers of people in high risk or isolated bush fire prone areas during the bush fire danger period require careful consideration. Such events create a number of logistical and operational issues if evacuation is required due to a bush fire.

Whilst this assessment does not specifically address the 10 Terminal Renewal Project ability to support outdoor events the following should be considered in any future proposal:

- holding events outside the gazetted bush fire danger period for the area;
- preparation of a Bush Fire Emergency Management and Evacuation Plan;
- provision of a refuge building of suitable capacity to contain all participants and staff that complies with the NSW RFS Neighbourhood Safer Place Guidelines: or
- an open air bush fire emergency assembly area capable of accommodating all participants and staff that complies with the NSW RFS Neighbourhood Safer Place Guidelines:

- cancelling the event on severe or higher fire danger rating days;
- ensuring a suitable method of staging evacuation, ensuring that evacuation flow is directed through different stages/areas of the site, moving from areas of higher risk to lower risk;
- ability to cease and override P.A. and audio systems throughout the site to announce emergency warnings, alerts or safety information, which can be clearly heard from all areas of the site;
- a prescribed ratio of trained fire wardens to participants: and
- emergency management planning during the event organisation stage to be undertaken in consultation with the NSW RFS and all other relevant stakeholders.

2. Asset protection zones (APZ)

The size of the asset protection zone (APZ) and bushfire attack level (BAL) setbacks are assessed in terms of the bushfire hazard – vegetation, topography and fire danger index as well as the development type.

Hazardous fuels

PBP guidelines require the identification of the predominant vegetation formation in accordance with David Keith (2004) if using the simplified acceptable solutions in PBP 2019, or alternatively the vegetation class if adopting the comprehensive vegetation fuel loads (as allowable when undertaking an assessment under Method 2 of AS3959). The hazardous vegetation is calculated for a distance of at least 140m from a proposed building envelope.

The following vegetation is based on Sydney Metro Area (V3) vegetation mapping (2016) and is depicted in Schedule 1 attached.

Table 1 – Hazardous vegetation

Aspect	Vegetation classification	Comprehensive fuel loads (t/ha)	Acceptable solution fuel loads (t/ha) *(PBP 2019)*
North & south	Sydney Coastal Dry Sclerophyll Forest	21.3/27.3	22/36.1
North-east	North Coast Wet Sclerophyll Forest	22/35.98	22/36.1
East	Sydney Coastal Heath	36.9/36.9	36.9/36.9
	Coastal Headland Heath	36.9/36.9	36.9/36.9
	Littoral Rainforest	10/13.2	10/13.2

Effective slope

The effective slope has been assessed for up to 100m from the development site. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined.

The effective slope within the hazardous vegetation is described in detail within Table 2.

Bushfire attack assessment

The following assessment has determined the APZ and BAL levels via the following approaches;

- Table A1.12.1 (SFPP) & A1.12.5 of *PBP 2019*; and
- Appendix B Method 2 (alternative solution) of *AS3959 Construction of buildings in bushfire prone areas* (2018).

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Sydney region. Table 2 provides a summary of the bushfire attack assessment based on the methodologies identified above.

This table applies to developments that are to comply with the 'aims and objectives' of *PBP*. Ideally, these buildings are to comply with BAL 29 setback. These buildings include offices, shops, public car parks and other commercial facilities as well as Class 9b public assembly with a floor space less than 500m^2.

Table 2 – Bushfire attack assessment (other development)

Aspect	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	Minimum APZ required (to avoid flame zone) (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
North	Sydney Coastal Dry Sclerophyll Forest (21.3/27.3t/ha)	18 - 24 ^{oD}	Deemed to satisfy *(PBP 2019)*	56 (refer Note 1)	BAL 29 (56 - <73m) BAL 19 (73 - <92m) BAL12.5 (92-<100m)	N/A
East	North Coast Wet Sclerophyll Forest (22/35.98 t/ha)	9.5 ^{oD}	Deemed to satisfy *(PBP 2019)*	28 (refer Note 2)	BAL 40 (28 - <36m) BAL 29 (36 - <49m) BAL 19 (49 - <65m) BAL12.5 (65-<100m)	N/A
	Littoral Rainforest (10/13.2 t/ha)	17 ^{oD}	Deemed to satisfy *(PBP 2019)*	23	BAL 40 (23 - <30m) BAL 29 (30 - <42m) BAL 19 (42 - <56m) BAL12.5 (56-<100m)	N/A
South-east	Sydney Coastal Dry Sclerophyll Forest (21.3/27.3t/ha)	15^{oD}	Alternative solution	28m APZ provided (refer Note 3)	N/A	Potential 19.55kW/m^2

Aspect	Vegetation formation within 140m of development	Effective slope of land	Assessment method used	Minimum APZ required (to avoid flame zone) (metres)	Building construction standards Deemed to satisfy (Table A1.12.5 *PBP*)	Building construction standards Alternative solution
South	Sydney Coastal Dry Sclerophyll Forest	5-10 ^{oD}	Deemed to satisfy *(PBP 2019)*	28	BAL 40 (28 - <36m) BAL 29 (36 - <49m) BAL 19 (49 - <65m) BAL12.5 (65-<100m)	N/A

Notes: * Slope is either 'u' meaning upslope or 'c' meaning cross slope or 'd' meaning downslope

Note 1 – The existing weatherboard barracks (northern side of Middle Head Road) are located within the flame zone. From a bushfire perspective it is recommended that these buildings are either demolished or their future use is restricted to a Class 10 (i.e. storage shed). These buildings will be particularly vulnerable in a bushfire event and therefore their future use will be restricted. If these buildings were to be retained significant bushfire protection measures would be required based on their proposed use. This would involve reviewing the potential to increase the APZ (noting the steep land >18 degrees) and use of appropriate building materials (i.e. BAL FZ construction).

Note 2 – There is a pinch point to the east of Building 6 on the southern side of Middle Head Road, where the APZ is limited to 24m. A range of alternative solutions should be reviewed (i.e. increasing the APZ into the adjoining land with landowner consent or increasing building construction standards and review of building design) in order to comply with the aims and objectives of PBP. The future use of this building should be carefully considered and would exclude public assembly.

Note 3 - There is a pinch point to the south-east where the setback from the existing building (no.3) to the site boundary is limited to 28m. This APZ could be supported with the use of an alternative solution pending further assessment.

3 Hazard management

Future development is to ensure that the entire property (outside of the retained vegetation areas) is managed in accordance with the standards required for an Inner Protection Area as outlined in the following documents:

- *Standards for Asset Protection Zones* available from www.rfs.nsw.gov.au by following the link 'Publications' and 'Hazard Reduction' and that:
- Landscaping within the property is to be undertaken in accordance with Appendix 4 of *PBP* as follows:

Trees are to be maintained to ensure;

- Canopy cover does not exceed 15% at maturity
- Trees (at maturity) do not touch or overhang the building
- Lower limbs should be removed up to a height of 2m above ground
- Tree canopies should be separated by 2 to 5m
- Preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

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

Grass is to be maintained to ensure:

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

4 Construction standards

Future building upgrades and refurbishments are be constructed in accordance with *Australian Standards AS3959 (2018) Construction of buildings in bushfire-prone areas* and *Section 7.5 of Planning for Bush Fire Protection 2019.* Setbacks for all BAL ratings are depicted in Schedule 1, noting that if one building elevation is exposed to a particular BAL rating that whole façade will also need to comply with that BAL rating. A downgrading in BAL (one level only) can apply to those facades that are shielded from the hazard.

5 Access

Middle Head Road provides the only access route into the site. This road is adjoined by bushland and therefore it is recommended that an APZ is applied (where feasible) along the length of this road.

Any future road upgrades within the 10 Terminal Renewal project should consider compliance with Table 4 below.

Table 4 – Performance criteria for access

Performance criteria		Acceptable solution
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all weather access to structures.	Property access roads are two-wheel drive, all-weather roads
		Perimeter roads are provided for residential subdivisions of three or more allotments.
		Subdivisions of three or more allotments have more than one access in and out of the development.
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.
		Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient.
		All roads are through roads
		Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200m in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end.
		Where kerb and guttering are provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.
		Where access / egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.
		One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.
	The capacity of access roads is adequate for firefighting vehicles.	The capacity of perimeter and non-perimeter road surfaces and any bridges / causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges / causeways are to clearly indicate load rating.
	There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.
		Hydrants are provided in accordance with *AS 2419.1:2005.*
		There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.

Performance criteria		Acceptable solution
PERIMETER ROADS	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	Are two-way sealed roads.
		Minimum 8m carriageway width kerb to kerb.
		Parking is provided outside of the carriageway width.
		Hydrants are located clear of parking areas.
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.
		Curves of roads have a minimum inner radius of 6m.
		The maximum grade road is 15° and average grade is 10°.
		The road crossfall does not exceed 3°.
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
NON-PERIMETER ROADS	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating.	Minimum 5.5m carriageway width kerb to kerb.
		Parking is provided outside of the carriageway width.
		Hydrants are located clear of parking areas.
		Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.
		Curves of roads have a minimum inner radius of 6m.
		The road crossfall does not exceed 3°.
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

6 Water supply

Future water supply upgrades is to comply with Table 5.

Table 5 – Performance criteria for water supplies

Performance criteria	Acceptable solutions
Adequate water supplies is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available.
	A static water supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed
	Static water supplies shall comply with Table 5.3d.
Water supplies are located at regular intervals. The water supply is accessible and reliable for firefighting operations.	Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard *AS 2419.1:2005.*
	Hydrants are not located within any road carriageway.
	Reticulated water supply to urban subdivisions uses a ring main system for areas for areas with perimeter roads.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of *AS 2419.1:2005.*
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps.
	Above ground water storage tank shall be of concrete or metal

7 Gas supply

Any future gas supply provisions on site are to comply with the following acceptable solutions:

Table 6 – Performance criteria for gas supplies

Performance criteria	Acceptable solution
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used;
	All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
	Connections to and from gas cylinders are metal;
	Polymer-sheathed flexible gas supply lines are not used;
	Above-ground gas service pipes are metal, including and up to any outlets

Should you require further information, please do not hesitate to contact Nicole van Dorst at info@traversecology.com.au.

Yours faithfully

Nicole van Dorst
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BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Travers bushfire & ecology **employs a**
Bushfire Planning and Design (BPAD) Accredited Practitioner

Legend

- Middle Head Precinct (Lot 203 DP1022020)
- Contour 1m (source: LPI)
- Rock escarpment
- Asset Protection Zone (APZ)

* Please refer to additional construction requirements for BAL levels which are contained in *'Planning for Bushfire Protection'* (2019).

Bushfire Construction Standards AS3959 (2018)*

- BAL Flame Zone
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5

Vegetation Class (source: VISID 4489_SydneyMetroArea V3 2016)

- CHH Coastal Headland Heaths
- LF Littoral Rainforests
- NCWSF North Coast Wet Sclerophyll Forests
- SCDSF Sydney Coastal Dry Sclerophyll Forests
- SCH Sydney Coastal Heaths
- WE Weeds/exotics

Aerial source: Nearmap

Travers bushfire & ecology
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PROJECT & MXD REFERENCE
Lot 203 in DP1022020 Middle Head Rd, Mosman
20HARB03_BF001

DATE & ISSUE NUMBER
13/11/2020
Issue 1
EB

SCALE & COORDINATE SYSTEM
1:2,500 @ A3
GDA 1994 MGA Zone 56

0 50 100 m

TITLE

Schedule 1 - Bushfire Protection Measures

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

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