

# **BUSHFIRE MANAGEMENT STRATEGY**

## **Moorebank Precinct East Stage 1, Package 2**

11 JANUARY 2019

# SYDNEY INTERMODAL TERMINAL ALLIANCE

## Moorebank Precinct East, Stage 1, Package 2

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## REVISIONS

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003	26/10/2017	Revision of Construction footprint		
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005	11/01/2019	Minor updates associated with 'non-conformance,' 'non-compliance' and 'corrective and preventative actions'		

## ACRONYMS AND DEFINITIONS

Term	Definition
AHD	Australian Height Datum
ARI	Average Rainfall Intensity
BMS	Bushfire Management Strategy
CEMP	Construction Environmental Management Plan
CERP	Construction Emergency Response Plan
CoC	Conditions of Consent
CSWMP	Construction Soil and Water Management Plan
CTAMP	Construction Traffic and Access Management Plan
DECC	Department of Energy and Climate Change
DPE	Department of Planning and Environment
EDO	Environmental Defenders Office
EMS	Environmental Management Systems
EPA	Environment Protection Authority
FERP	Flood Emergency Response Plan
HAZID	Hazardous Substances Identification
HSE	Health Safety and Environment
IMEX	<p>Import Export Terminal. Includes the following key components:</p> <ul style="list-style-type: none"> <li>• Truck processing, holding and loading areas - entrance and exit from Moorebank Avenue</li> <li>• Rail loading and container storage areas – installation of four rail sidings with adjacent container storage area serviced by manual handling equipment initially and overhead gantry cranes progressively</li> <li>• Administration facility and associated car parking- light vehicle access from Moorebank Avenue.</li> </ul>
IMT facility	<p>MPE Stage 1 Site including the construction of the following key components together comprising the intermodal terminal (IMT):</p> <ul style="list-style-type: none"> <li>• Truck processing and loading areas.</li> <li>• Rail loading and container storage areas.</li> <li>• Administration facility and associated car parking</li> <li>• Rail Link.</li> </ul>

Term	Definition
ISO	International Organisation for Standardisation
ITP	Inspection and Test Plan
JSEA	Job Safety and Environmental Analysis
L&EC	Land and Environment Court
Non-compliance	An occurrence, set of circumstances, or development that results in a non-compliance or is non-compliant with Development Consent SSD 6766 Conditions of Consent or EPBC Act Approval (EPBC 2011/6229) Conditions of Approval but is not an incident
Non-conformance	Non-conformances are observations or actions that are not in strict accordance with the CEMP and the aspect specific sub-plan.
SDS	Safety Data Sheet
SSD	State Significant Development
SCRIM	SIMTA Incident Management Reporting System
SHEMS	SIMTA Environmental Management System
SIMTA	Sydney Intermodal Terminal Alliance
SWMS	Safe Works Method Statement

## COMPLIANCE MATRICES

Table 1 Final Compilation of Mitigation Measures (FCMM)

FCMM	Requirement	Document Reference
14A	A bushfire management strategy, or equivalent, will be prepared as part of the CEMP for the construction phase. The strategy will include: <ul style="list-style-type: none"> <li>Emergency response plans and procedures</li> </ul>	This Document
	<ul style="list-style-type: none"> <li>Restrictions on activities (namely hot works) that cannot be undertaken on total fire ban days within areas of high Bushfire Hazard Rating, unless otherwise advised by the NSW Rural Fire Service.</li> </ul>	Table 4 BM8 and BM9 Section 6.1.1
	<ul style="list-style-type: none"> <li>All construction site offices and temporary buildings will be located outside buffer areas to ensure minimum setbacks of 10m.</li> </ul>	Table 4 BM13
	<ul style="list-style-type: none"> <li>All construction site offices will be accessible via access roads suitable for firefighting appliances similar to NSW Rural Fire Service Category 1 tankers.</li> </ul>	Table 4 BM10

Table 2 Revised Statement of Commitments

RSoC	Requirement	Document Reference
1.65	Bushfire Management <p>a) The Proponent commits to incorporating the key objectives identified by the Rural Fire Service (RFS) into relevant future design stages, in accordance with the following principles:</p> <ul style="list-style-type: none"> <li>Afford occupants of any building adequate protection from exposure to a bush fire</li> <li>Ensure safe operational access and egress for emergency service personnel and residents.</li> <li>Provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in asset protection zones (APZs)</li> <li>Ensure that utility services are adequate to meet the needs of fire fighters</li> </ul>	Table 4
	b) The Proponent commits to the development of a Bushfire Management Plan for both the construction and operational phases of the Principal proposal that aligns with the requirements	This Document

RSoc	Requirement	Document Reference
	of the local RFS Bushfire Management Committee operational plans of management.	

*Table 3 Commonwealth Mitigation Measures*

Cth MM	Requirement	Document Reference
Biodiversity	<ul style="list-style-type: none"> <li>Vehicles and plant should not block fire trails.</li> </ul>	This Document

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## APPENDIX A

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# 1 INTRODUCTION

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 1 of the Moorebank Precinct East (MPE) Project, comprising an Intermodal (IMT) Facility including a rail link (Package 1) and Import Export (IMEX) Terminal (Package 2) on 12 December 2016 (SSD 6766). The construction and operation of the associated rail link was subject to an appeal in September 2017 (Appeal Number 2017/00081889). The approval was upheld and the revised Conditions of Consent (CoC) were released on 13 March 2018.

This strategy has been established to demonstrate the contractor's approach to bushfire management.

This Bushfire Management Strategy (BMS) addresses the relevant requirements of the Project Approvals, including the EIS, Submissions Report and Minister's Conditions of Consent (CoC), and all applicable guidelines and standards specific to the management of bushfire during construction of the Project

## 1.1 Background and Scope

The MPE Project site is located approximately 27 kilometres (km) south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany and includes the former Defence National Storage and Distribution Centre (DNSDC) site.

The MPE Project involves the development of an intermodal facility, including warehouse and distribution facilities, rail link, freight village (ancillary site and operational services), stormwater, landscaping, servicing and associated works on the eastern side of Moorebank Avenue, Moorebank. It is to be developed in three key stages:

Stage 1 - Construction of the IMT

Stage 2 - Construction of warehouse and distribution facilities

Stage 3 - Extension of the IMT and completion of warehouse and distribution facilities.

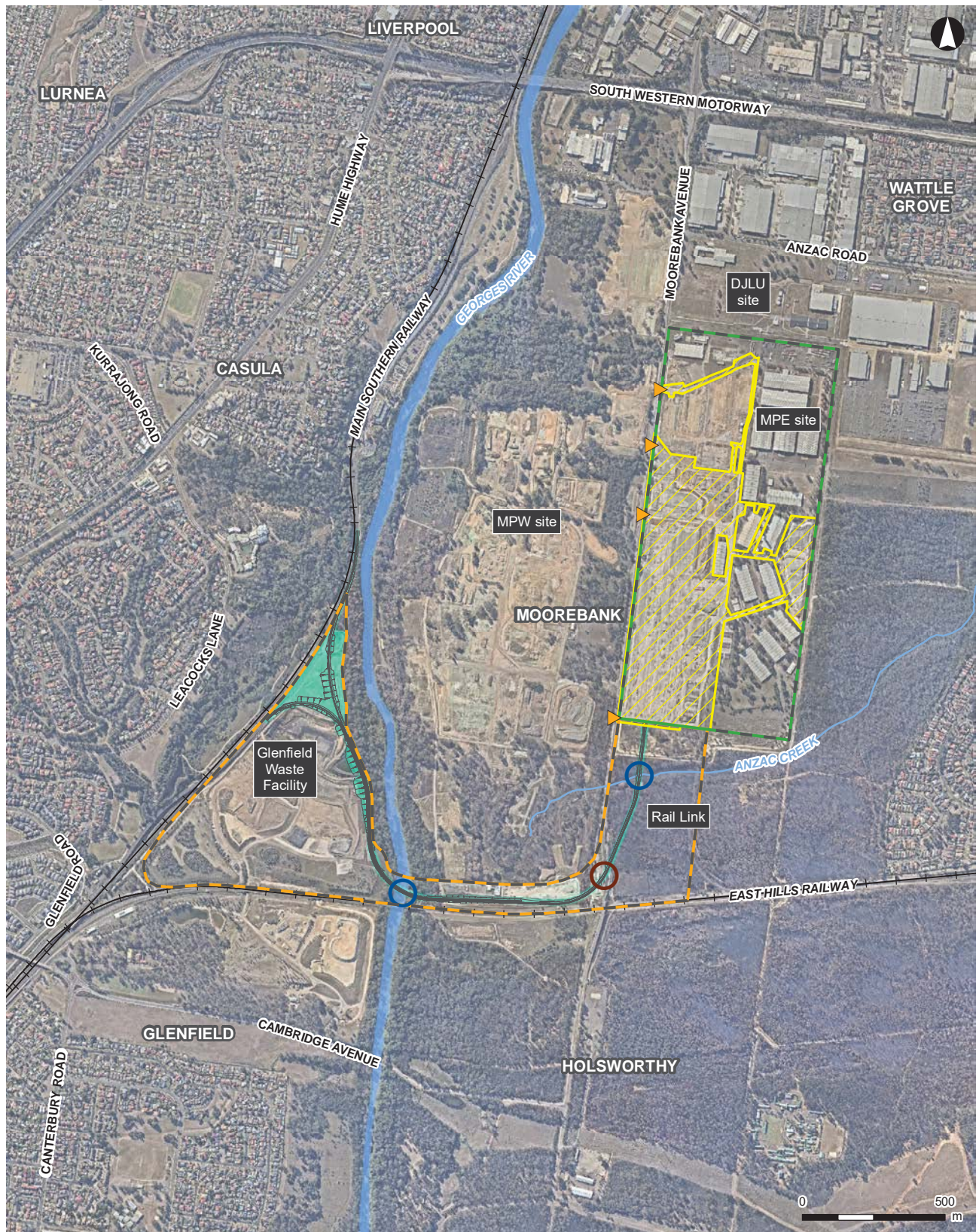
Stage 1 of the MPE Project comprises, and will be constructed across, two packages:

- Package 1: The Rail Link (not included within this BMS) includes a connection to the IMEX, and traverses across Moorebank Avenue, Anzac Creek and Georges River prior to connecting to the Southern Sydney Freight Line (SSFL) (refer to Figure 1).
- Package 2: The IMEX (subject of this BMS) includes the following key components:
  - Truck processing, holding and loading areas - entrance and exit from Moorebank Avenue
  - Rail loading and container storage areas – installation of four rail sidings with adjacent container storage area serviced by manual handling equipment initially and overhead gantry cranes progressively
  - Administration facility and associated car parking- light vehicle access from Moorebank Avenue.

The layout of the IMEX generally comprises operational areas, an administration area, rail sidings, utilities and drainage infrastructure, landscaping and signage. The operational areas of the IMEX consists of the primary and secondary container loading / unloading areas and container storage areas, and the truck holding area. Within these areas containers will be stacked up to five high.



## MPE Stage 1 BMS



### LEGEND

- |  |                                   |  |                      |
|--|-----------------------------------|--|----------------------|
|  | Project site                      |  | Rail link            |
|  | Rail Corridor                     |  | Creek/river crossing |
|  | MPE site                          |  | Road crossing        |
|  | MPE Stage 1 Package 1 (Rail Link) |  | Existing railway     |
|  | Construction footprint            |  | Watercourse          |
|  | Construction access               |  |                      |

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 Aerial imagery supplied by nearmap (May, 2018)

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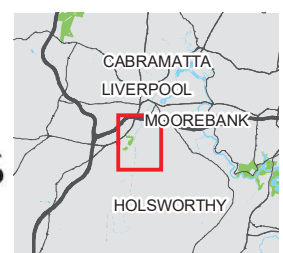


Figure 1: MPE Site Overview



### 1.1.1 Environmental Planning Approval

The MPE Stage 1 Project has been assessed by the Department of Planning and Environment (DP&E) under Division 4.7 (Division 4.1 prior to March 2018) of the Environmental Planning and Assessment Act 1979 (EP&A Act) as State Significant Development (SSD). The Planning Assessment Commission (PAC) granted Approval for the MPE Stage 1 Project on 12 December 2016 and is subject to the Minister's Conditions of Consent (CoC, 18 December 2016 (ref SSD-6766)). The MPE Stage 1 Project, its impacts, consultation and mitigation were documented in the following suite of documents:

- State Significant Development Application SSD 6766 (as amended in the Land and Environment Court 13 March 2018)
- SIMTA Intermodal Terminal Facility – Stage 1 – Environmental Impact Statement (Hyder Consulting Pty Ltd, May 2014)
- SIMTA Intermodal Terminal Facility – Stage 1 – Response to Submissions (Hyder Consulting Pty Ltd, September 2015)
- Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) Approval (No. 2011/6229) granted on March 2014.

This IMEX Bushfire Management Strategy (BMS) has been prepared to address:

- Condition 14A (Final Compilation of Mitigation Measures (FCMM)) – A bushfire management strategy, or equivalent, will be prepared as part of the CEMP for the construction phase.

## 1.2 Purpose and Application

The purpose of this BMS is to provide key information pertaining to the bushfire hazard during the construction phase of IMEX, provide a strategic assessment of bushfire risk, identify priority areas of risk and outline coordinated, proactive processes in the management and prevention of this risk.

By implementing the various components of the Project environmental management system (EMS) such as the Construction Emergency Response Plan (CERP), bushfire risk will be mitigated in line with the Project approval conditions and directives.

## 1.3 Objectives and Targets

The following high level objectives and targets are set for the Project for bushfire management:

*Table 4 Bushfire Objectives and Targets*

Objectives	Performance Indicators
<ul style="list-style-type: none"> <li>• Minimise adverse impacts or adverse environmental consequences of bushfire</li> <li>• Mitigate on-site landscaping contributing to precinct bushfire via installation of appropriate flora species and management devices (as per approved Landscape Plan)</li> </ul>	<ul style="list-style-type: none"> <li>• No death or injury to personnel during bushfire event</li> <li>• No avoidable contribution to fire via landscaping fuel loads during bushfire event</li> </ul>

## 1.4 Context of the Report

This BMS is site specific pertaining to construction of MPE Stage 1 Package 2 (IMEX Terminal), and should be read in conjunction with the final and approved Contractor's Emergency Response Plan (CERP) to be developed and approved prior to commencement, and other related studies including Appendix W of the MPE Stage 1 Environmental Impact Statement.

It should be noted that the final approved CERP will prescribe all emergency response procedures, based on hazards and risk identified within the Risk Assessment (Contractor), and where any conflict or confusion arises with this BMS, the Construction Emergency Response Plan (CERP) shall apply. This BMS will be revised and updated immediately upon completion of the CERP to ensure compliance and conformance with overall emergency response management.

## 1.5 Interface with other Plans & Requirements

This BMS is to be read in conjunction with the Construction Emergency Response Plan, Construction Project Management Plan, Construction Environmental Management Plan, Urban Design Landscape Plan and the Construction Health & Safety Management Plan.

## 1.6 Access

Access to the Project would be to and from Moorebank Avenue, as detailed within the Construction Traffic and Access Management Plan, and Environmental Control Plan(s) (Appendix Q of the CEMP).

The main construction compound will be accessed and egressed directly to and from Moorebank Avenue via internal haul roads through the Project site. The compound will utilise the existing main central entrance (from Moorebank Avenue) and transition to use of the proposed main entrance (from Moorebank Avenue) once this has been constructed. An emergency access point has been nominated to the south of the site (figure 3). All construction site offices will be accessible via these access roads which will be suitable for firefighting appliances such as NSW Rural Fire Service category 1 tankers.

## 2 ENVIRONMENTAL OBLIGATIONS

Table 1 details project condition requirements related to bushfire. A full legislation register is provided in Appendix M of the CEMP.

The following outlines relevant legislation and guidelines applicable to bushfire management on this project which have been considered in the development of this strategy:

- *Environmental Planning and Assessment Act 1979*
  - Section 79C(1)
  - Section 79BA
- *Rural Fires Act 1997*
- Liverpool Local Environmental Plan 2008
- Planning for Bush Fire Protection (PBP) – NSW RFS 2006
- Australian Standards AS3959-2009 – Construction in Bushfire Prone Areas

### 3 EXISTING ENVIRONMENT

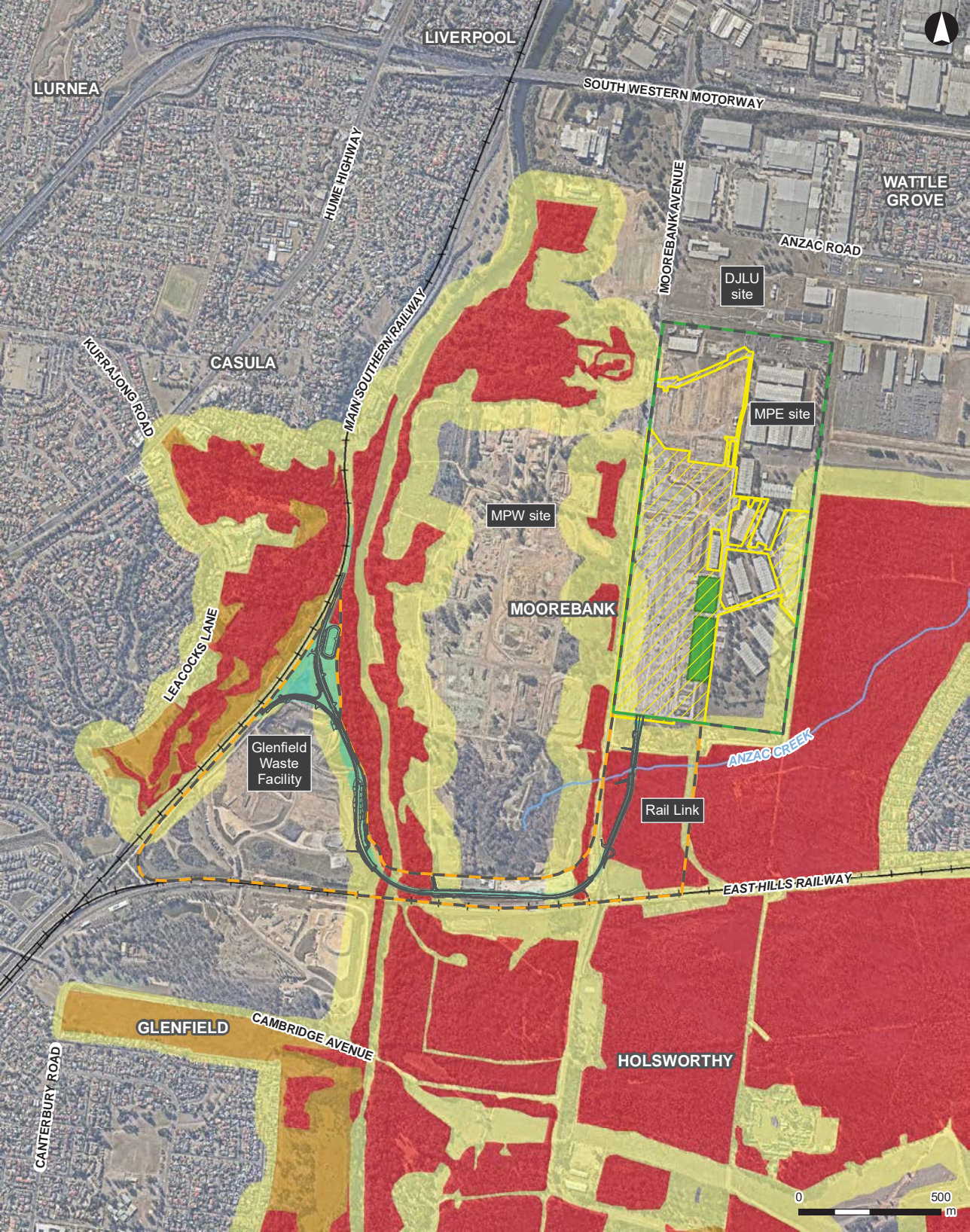
The Project has been assessed in the EIS as having a low bushfire risk, having been designed to ensure compliance with Planning for Bushfire Protection (PBP).

However, bushfire risk is most likely to arise from the large area of native vegetation contained on the Commonwealth land adjoining the Project to the east and south.

This vegetation is mapped as 'Vegetation Category 1' bushfire prone land (Liverpool City Council 2014).



MPE Stage 1 BMS



LEGEND

- Project site
- MPE site
- Rail Corridor
- Watercourse
- Existing railway
- MPE Stage 1 Package 1 (Rail Link)
- Construction footprint
- Proposed rail alignment
- Emergency assembly area

- Bushfire Prone Areas
- Vegetation Category 1
  - Vegetation Category 2
  - Vegetation Buffer

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Aerial imagery supplied by nearmap (May, 2018)

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Bushfire Prone Land



## 4 ASPECTS AND IMPACTS

Both on-site and off-site sources which have the potential to ignite a bushfire. The bushfire may result in significant social, economic and ecological impacts on the Project and surrounding environment. External sources of ignition include:

- Deliberate burning of bushland
- Car dumping
- Discarded cigarette butts
- Illegal burning
- Lightning strike

Activities associated with undertaking the Project may have the potential to cause ignition of bushfires as detailed below:

- Hot works
- Vehicle exhaust
- Idling of vehicles on vegetated areas
- Sparks or flame sources such as grinders and welders
- Stockpiles of vegetation such as mulch
- Site staff discarded cigarette butts.

The impacts of the above include:

- Damage to site facilities, property and equipment
- Increased risk of safety to site staff, local residents and businesses and the environment
- Damage/destruction of threatened species

## 5 MITIGATION MEASURES

The Project is more likely to be at risk from bushfire rather than representing a potential ignition source for a bushfire. Fire management or prevention practices include activities that land owners and communities implement to prepare for, and respond to, bushfire events. These include fire control line construction and maintenance, fuel reduction through burning or clearing (slashing, mowing etc.) and having the resources and equipment available to fight fires. The risk of fire is increased if these prevention and preparation activities are incomplete. To keep risks associated with bushfire impact to a low level the following items will be actioned prior to, and during construction:

- Management strategies will be adopted to maintain low availability of ground fuel around all site boundaries and within the Asset Protection Zone.
- Maintenance of weeds and potential fuel sources will be undertaken
- Consultation with the Rural Fire Service will be maintained to facilitate hazard reduction activities in proximity to the Project
- Bushfire response strategies will be included within the contractors Emergency Response Plan for the Project

This is further discussed below (Table 5).

*Table 5 Bushfire Management Measures*

Item	Management Measure	Timing	Responsibility	Reference
Monitoring and Training				
BM1	The contractor will sign up to NSW RFS alerts or similar. BOM and Liverpool Council alerts will also be monitored	Daily during construction	Supervisor	PBP 2006
BM2	All staff will be required to undergo a site induction which will outline the requirements of fire safety	Construction	Safety Coordinator	PBP 2006
BM3	Weather conditions will be monitored daily	Daily during construction	Supervisor	PBP 2006
Plant and Equipment				
BM4	Firefighting equipment will be made available at designated locations in site offices and within site vehicles. These will be well maintained in accordance with AS1851:2012	Construction	Supervisor Safety Coordinator	PBP 2006
BM5	Plant and equipment will be fitted with appropriate guards to minimise potential for sparks causing accidental ignition.	Construction	Supervisor	PBP 2006
BM6	Water trucks will be available on site at all times	Construction	Supervisor	PBP 2006

Item	Management Measure	Timing	Responsibility	Reference
BM6	Hazardous materials transport, containment and storage will comply with the relevant regulations of the Dangerous Goods Safety Act 2004. All hazardous materials will be stored in accordance with the relevant Australian Standards in designated areas	Construction	Supervisor	PBP 2006
Construction				
BM7	No vehicles will be permitted to idle whilst on vegetation to minimise risk of ignition from heat sources	Construction	Supervisor	PBP 2006
BM8	No hot works permitted during total fire bans	Construction	Supervisor	PBP 2006
BM9	All hot works to be undertaken with a hot work permit which must state that all flammable material must be removed from the vicinity of the works	Construction	Supervisor	PBP 2006
Access and Compounds				
BM10	All site offices will be accessible via access roads suitable for firefighting appliances similar to NSW RFS category 1 tankers.	Construction	Supervisor	PBP 2006
BM11	Access roads will be well maintained and inspected to ensure that they are adequate	Construction	Supervisor	PBP 2006
BM12	The emergency assembly point and evacuation routes will be clearly signposted and communicated	Construction	Supervisor	PBP 2006
BM13	All site offices and temporary buildings will be located outside buffer areas to ensure minimum setbacks of 10m	Construction	Supervisor	PBP 2006
BM14	Buffer zones must be maintained to allow full access at all times throughout Construction.	Construction	Supervisor	PBP 2006
BM 15	Fire trails will remain clear of vehicles and plant to enable access for management of APZs.	Construction	Supervisor	PBP 2006
Vegetation Management				

Item	Management Measure	Timing	Responsibility	Reference
BM16	Trees and other vegetation in the vicinity of power lines and tower lines should be managed and trimmed in accordance with the specifications in "Vegetation Safety Clearances" issued by Energy Australia (NS179, April 2002).	Construction	Supervisor	PBP 2006
BM17	Perimeter vegetation buffer zones will be clearly designated and shall not be used at any time for storage of materials during Construction	Construction	Supervisor	PBP 2006
BM18	Stockpiles of mulch will be maintained and turned regularly to minimise potential for spontaneous combustion	Construction	Supervisor	PBP 2006
Consultation				
BM19	The contractor will actively engage in, and maintain, on-going consultation with RailCorp and the Rural Fire Service to facilitate hazard reduction activities in proximity to the Project	Construction	Project Manager	PBP 2006

## 6 EMERGENCY RESPONSE

During conditions of bushfire the initial response of all site personnel will be to ensure safe mobilisation (refuge), beyond the reach of bushfire, to the nominated bushfire emergency assembly area. This procedure will be detailed within the Contractor's Construction Emergency Response Plan (CERP).

The contractor will inform the client and relevant statutory and regulatory authorities (such as the EPA) in the event of an incident as necessary including details of the date, location and area burnt.

Other types of environmental emergencies which could occur on the Project are outlined in Appendix R of the CEMP.

### 6.1 Activation of Bushfire Emergency Response

Bushfire response operations will begin on receipt of National Fire Danger Rating advice indicating, or when other evidence leads to, an expectation of bushfire, as detailed in Table 6.

The Bureau of Meteorology also issue fire weather warnings when weather conditions are conducive to the spread of dangerous bushfires. Warnings are generally issued within 24 hours of the potential onset of hazardous conditions. Warnings are also broadcast on radio and television.

The Bureau of Meteorology does not have the power to declare a total fire ban. This responsibility resides with the NSW Rural Fire Service.

Table 6 Fire Danger Rating alert and activation levels.

Response Item	Action	Procedures	Responsibility
Fire Danger Rating: Low Moderate High Very High	Monitor daily weather / fire danger rating	Monitor NSW Rural Fire Service: <a href="http://www.rfs.nsw.gov.au/fire-information/fdr-and-tobans">http://www.rfs.nsw.gov.au/fire-information/fdr-and-tobans</a> Notify all on-site supervisors of fire danger rating.	Construction Manager
Fire Danger Rating: Very High	Increase level of alert, prepare for activation of ERP	Notify all on-site supervisors of fire danger rating.	Construction Manager
Fire Danger Rating: Severe	Increase level of alert, prepare for activation of ERP	Notify all on-site supervisors of fire danger rating. Monitor Bureau of Meteorology (BOM) website.	Construction Manager
Fire Danger Rating: Extreme	Increase level of alert, prepare for activation of ERP	Notify all on-site supervisors of fire danger rating. Prepare for activation of bushfire emergency response procedures. Monitor Bureau of Meteorology (BOM) website.	Construction Manager

Response Item	Action	Procedures	Responsibility
Fire Danger Rating: Catastrophic	Mobilise site personnel to designated emergency assembly area or evacuation assembly area.  Close site to external visitors	Immediately notify all personnel of the activation of bushfire emergency response procedures.	Construction Manager

### 6.1.1 Total Fire Ban

The NSW Rural Fire Service Commissioner will declare a Total Fire Ban when conditions warrant, and to reduce the risk of fires damaging or destroying life, property and the environment.

During a Total Fire Ban no personnel will be permitted to light, maintain or use a fire in the open, or to carry out any activity in the open that causes, or is likely to cause, a fire.

No general purpose hot works, such as welding or gas cutting will be carried out in the open on the site.

## 6.2 Emergency Contacts

Table 7 Emergency Contact details

Contact name	Telephone number	Address
OEK Pollution Hotline	131 555 or (02) 9995 5555 (if calling from outside NSW).	
Ministry of Health	(02) 9391 9000	
WorkCover	13 10 50	
Fire and Rescue NSW	000	
Liverpool City Council	Customer Contact Centre for NSW residents: 1300 36 2170 Calling from interstate: (02) 9821 9222 National Relay Service (NRS) for hearing and speech impaired customers: 133 677	Ground Floor, 33 Moore St, Liverpool NSW 2170
Client Representative	Contact details to be confirmed	
Interface Manager	Contacts details to be confirmed	
Contractor Environmental Representative	Contact details to be confirmed	

Contact name	Telephone number	Address
Contractor Project Manager	Contact details to be confirmed	
Contractor Health & Safety Manager	Contact details to be confirmed	
Contractor Community Representative	Contact details to be confirmed	

## 7 COMPLIANCE MANAGEMENT

### 7.1 Roles and Responsibilities

All roles and responsibilities are detailed in Section 10.1 of the CEMP. Further to this, the management measures outlined in Table 3 detail personnel responsible for undertaking specific actions.

### 7.2 Training

All site personnel shall undergo site specific induction training, which will include bushfire management. Toolbox meetings will also be undertaken as and when required.

### 7.3 Monitoring, Auditing and Reporting

Monitoring, auditing and reporting will be undertaken in accordance with the CEMP. Audits and inspections will assess the effectiveness of the environmental controls and compliance with this BMS and conditions.

### 7.4 Non-compliances, Non-conformance and Actions

It is the responsibility of all site personnel to report non-compliances and non-conformances to the Site Supervisor and/or the Contractor's EM.

Non-compliances, non-conformances and corrective and preventative actions will be managed in accordance with Section 9.2.1 of the CEMP.

### 7.5 Review and Improvement

Continuous improvement of this strategy will be achieved by the ongoing evaluation of environmental management performance against regulatory environmental policies, legislative requirements, SIMTA's Environmental Policy, Project objectives and targets for identifying opportunities for improvement.

The continuous improvement process is designed to:

- Identify areas of opportunity for improvement of environmental management and performance.
- Determine the cause or causes of non-conformances and deficiencies.
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies.
- Verify the effectiveness of the corrective and preventative actions.
- Document any changes in procedures resulting from process improvement.
- Make comparisons with objectives and targets.

Any revisions to the BMS will be in accordance with the process outlined in Section 1.6 of the CEMP. A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure.

This strategy will be reviewed annually as a minimum but may be updated more regularly depending on process changes and refinements.



## APPENDIX A

### NSW RFS Bush Fire Provisions - Landscaping and Property Maintenance

## Appendix 5

# Bush Fire Provisions - Landscaping and Property Maintenance

### A5.1 Introduction

Bush fires are a natural and periodic event in the Australian landscape. Many Australian plants and animals have adapted to fire over thousands of years and require fire as part of their life cycle.

However, development adjacent to bushland areas has increased the risk of fire impacting on people and their assets. Fire management needs to strike a balance between the protection of life and property and the maintenance of ecological processes and systems.

In Australia, bush fires are inevitable and an essential aspect of the landscape.

However, the impact on property and life can be reduced with responsible preparation and management of bush fire hazards. This is the responsibility of all land managers, as well as communities and individuals taking responsibility for their own fire safety.

The level of protection for life or whether or not a house or other assets survive a bush fire ultimately depends on the landowner and their level of preparedness against bush fire attack.

The planning system can be used to better effect in protecting human life, property and environmental values from the impacts of bush fire events.

In some cases this will involve land use planning and development controls, construction standards, APZs and subdivision layout, siting, design and provision of services. It also involves careful and deliberate consideration of the environmental impacts of these and how we can recognise the need to protect our wetlands, rainforests, koala habitat and other biodiversity and cultural values.

However, the best planning can be undone by poor maintenance and lack of forethought when landscaping a development. Therefore house survival ultimately depends on the householder.

Some maintenance also depends upon adjoining neighbours and upon fuel management in adjacent bush land areas by the owners, occupiers or managers of that land. General housekeeping and maintenance of the grounds by the householder is equally important and, in some cases, may even be more so.

Experience from the Canberra 2003 fires suggests that house losses are greatest in the area up to 250 metres from the bush interface. Distances of

less than 100 metres are particularly vulnerable to flame contact, radiant heat and ember attack.

Hence it is within this distance that efforts should be made to prepare for the onslaught of major bush fire events.

While other legislation provides the impetus for planning objectives, the RF Act provides the legislative vehicle to achieve bush fire management objectives.

In this appendix consideration will be given to the principles for landscaping and management, and the role of property maintenance during the fire event.

### A5.2 Principles of Protection

Bush fire attack takes essentially five forms;

- wind,
- smoke,
- ember,
- radiant heat and
- flame.

Evidence indicates ember attack is responsible for most bush fire related house fires. Strong winds resulting from severe bush fires will drive embers into vulnerable areas of a building, preheat and dry fuel ahead of a fire, lift roofing and extend flames along a more horizontal plane closer to building elements. Embers can also cause spotting in advance of the bush fire and provide piloted ignition to building elements. To effectively protect a building, strategies must be implemented that separate it from the hazard and reduce the intensity of bush fires to minimise the combined impact of ember, wind, flame and heat attack.

While smoke will cause minimal damage to property, it can severely affect the health of residents. Smoke is a significant factor in areas in which aged or disabled persons reside – hospitals and nursing homes - and more so where residents are susceptible to respiratory disorders.

Radiant heat (measured in kW/m<sup>2</sup>) can severely impair firefighting operations, the health of residents and the integrity of building elements. Radiant heat in excess of 10kW/m<sup>2</sup> can prevent emergency services personnel assisting residents of SFPP developments.

Flame attack will severely restrict firefighting operations, provide piloted ignition to building elements and threaten the health of residents and their capacity to evacuate the area.

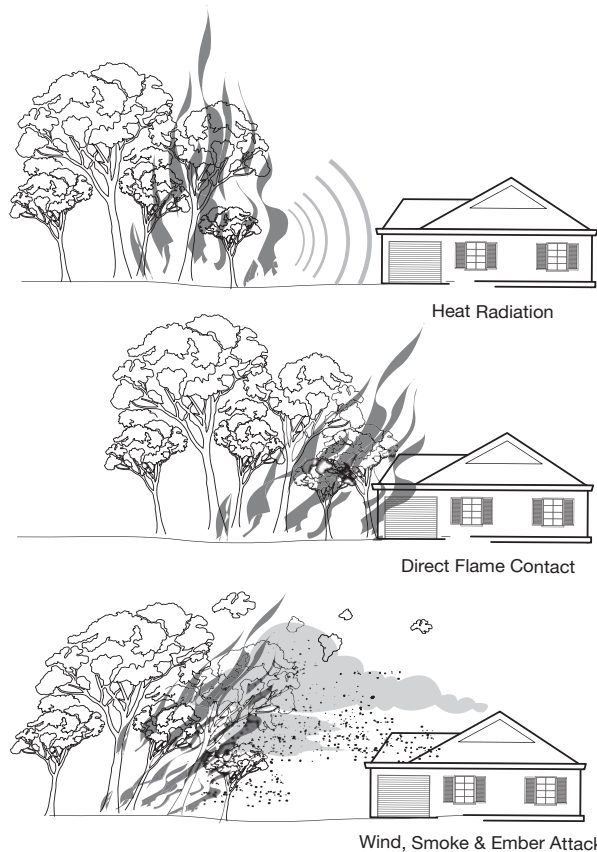


Figure A 5.1 Bush Fire Attack Mechanisms

Overall the intention of bush fire protection measures should be to prevent flame contact to a structure, reduce radiant heat to below the ignition thresholds for various elements of a building, to minimise the potential for wind driven embers to cause ignition and reduce the effects of smoke on residents and firefighters.

## A5.3 Principles of Landscaping Properties for Bush Fire Protection

The principles of landscaping for bush fire protection aim to:

- Prevent flame impingement on the dwelling;
- Provide a defendable space for property protection;
- Reduce fire spread;
- Deflect and filter embers;
- Provide shelter from radiant heat; and
- Reduce wind speed.

### (a) Vegetation choices

All vegetative material can burn under the influence of bush fire.

With this in mind, careful attention must be paid to species selection, their location relative to their flammability, avoidance of continuity of vegetation (horizontally and vertically), and ongoing maintenance to readily remove flammable fuels (leaf litter, twigs and debris).

In the paper “*Landscape and Building Design for Bushfire Areas*” G.C. Ramsay and L. Rudolph have provided 14 attributes of vegetation which affect bush fire attack. In summary these attributes are:

- Moisture content of leaves;
- Volatile oil content of leaves;
- Mineral content of leaves;
- Leaf fineness;
- Density of foliage;
- Continuity of plant form;
- Height of lowest foliage above ground;
- Size of plant;
- Dead foliage on the plant;
- Bark texture;
- Quantity of ground fuels;
- Fineness of ground fuels;
- Compaction ability of ground fuels; and
- Mineral content of ground fuel.

What is clear is that the higher moisture content of leaves (mesic), the less bark that will be available and the lower the leaf drop, all of which will assist with maintenance of the understorey and will also assist in reducing bush fire attack.

Work in the USA and elsewhere has also suggested that in addition to removal of understorey species, the trimming of lower limbs of trees also assists in reducing fire penetration into the canopy. Trees such as ‘pencil pines’ and African olive have been attributed with high fire propagation due to the high fine fuel and/or oil content captured within the canopy. This leads to significant flame height. Avoid such species in favour of rainforest species such as Figs and Syzygium.

When choosing plants, be sure not to introduce weed species into an area. Fire events may provide the opportunity for weed species to spread and may contribute fuel to an area of otherwise lower fuel loads.

Contact local councils, plant nurseries and plant societies to determine suitable species for your area.

### (b) Trees as Windbreaks

The use of trees as windbreaks is a common practice but trees also provide a useful function, trapping embers and flying debris, which would otherwise reach the house. The tree crown will rarely carry fire unless there is a significant fuel loading on the ground.

By reducing the wind speed, a row of trees also slows the rate of spread of a bush fire and a dense foliage traps radiant heat, lowering bush fire radiant heat.

Because of the effect of turbulence, a balance has to be struck between a high density of trees (that

maximises the trapping of embers and radiant heat but also maximises turbulence) and a lower density (that allows more embers and radiant heat to pass through but minimises turbulence). A windbreak that allows 30–60% of the wind to pass through is ideal as less than this becomes too solid with ember laden winds being carried over the top of the break.

To be effective a windbreak must:

- be located on the side of the lot from which fire weather normally approaches;
- be of sufficient length (generally 100 metres minimum length);
- be located at a distance of one to three times the height of fully grown trees but not within the IPA;
- use smooth barked eucalypts, rainforest trees or deciduous trees;
- make sure there are no breaks of sufficient size to allow winds to funnel through; and
- be separated by sufficient distance from the hazard so as not to be consumed and become a hazard itself.

## A5.4 Vegetation Management

Where APZs have been incorporated as part of the development approval for subdivision or for dwelling construction, the environmental aspects of the development should have already been taken into account.

In general, it is expected that APZs will be maintained by the owner of the land including maintenance of any fire trail constructed as part of the development.

It is accepted practice that after construction of a dwelling, gardens will be established and landscaping of the grounds will be undertaken. It is essential that efforts to reduce fuels on adjoining properties are therefore not negated by actions within the immediate curtilage of the building.

In terms of priorities of addressing bush fire attack, priority should be given to preventing flame impingement by not allowing fine debris to accumulate close to the building. Secondly, removal of understorey fuels aids in the reduction of flame heights and likely canopy fire, thereby reducing overall radiant heat. Removal of loose bark and fine fuels reduces both heat output and ember generation, while the retention of taller trees with canopies will also assist in filtering out embers.

To maintain a garden that does not contribute to the spread of bush fires, it is necessary to plan the layout of the garden beds and take an active decision to minimise certain features in favour of other features. These should include:

- maintaining a clear area of low cut lawn or pavement adjacent to the house;
- keeping areas under fences, fence posts and

- gates and trees raked and cleared of fuel;
- utilising non-combustible fencing and retaining walls
- breaking up the canopy of trees and shrubs with defined garden beds;
- organic mulch should not be used in bush fire prone areas and non flammable material should be used as ground cover, eg Scoria, pebbles, recycled crushed bricks.
- planting trees and shrubs such that:
  - the branches will not overhang the roof;
  - the tree canopy is not continuous; and
  - there is a windbreak in the direction from which fires are likely to approach.

The RFS has developed its document “Standards for Asset Protection Zones” which should be consulted for APZ specifications. This is also available on the RFS web page at [www.rfs.nsw.gov.au](http://www.rfs.nsw.gov.au).

## A5.5 Maintenance of Property

Sensible arrangements for landscaping and maintenance of the property are critical in the prevention of losses.

In considering property maintenance the following items should therefore be implemented in advance of the bush fire season:

- removal of material such as litter from the roof and gutters;
- ensure painted surfaces are in good condition with decaying timbers being given particular attention to prevent the lodging of embers within gaps;
- check pumps and water supplies are available and in working order;
- driveways are in good condition with trees not being too close and forming an obstacle during smoky conditions;
- check tiles and roof lines for broken tiles or dislodged roofing materials;
- screens on windows and doors are in good condition without breaks or holes in flyscreen material and frames are well fitting into sills and window frames;
- drenching or spray systems are regularly tested before the commencement of the fire season;
- hoses and hose reels are not perished and fittings are tight and in good order;
- doors are fitted with draught seals and well maintained;
- mats are of non combustible material or in areas of low potential exposure; and
- woodpiles, garden sheds and other combustible materials are located downslope and well away from the house.

Trees and other vegetation in the vicinity of power lines and tower lines should be managed and trimmed in accordance with the specifications in “Vegetation Safety Clearances” issued by Energy Australia (NS179, April 2002).

**AS 3959**

Australian Standard AS 3959 Construction of buildings in bushfire-prone areas, Standards Australia, 1999, that outlines construction standards applicable to residential developments in bush fire prone areas.

**Asset Protection Zone (APZ)**

Often referred to as a fire protection zone. Aims to protect human life, property and highly valued public assets and values. An area surrounding a development managed to reduce the bush fire hazard to an acceptable level. The width of the APZ will vary with slope, vegetation and construction level. The APZ, consisting of an area maintained to minimal fuel loads and, for subdivision, comprising a combination of perimeter road, fire trail, rear yard or a reserve, so that a fire path is not created between the hazard and the building.

**Bush fire protection measures (BPM)**

The suite of measures available for minimizing the risk of bush fire attack and the threat to life and property.

**Building Code of Australia (BCA)**

The Building Code of Australia means the document of that name published on behalf of the Australian Building Codes Board (ABCB) (as amended), together with:

- a) such amendments made by the Board, and
- b) such variations approved by the Board in relation to New South Wales, as are prescribed by the EP&A Regulations.

There are 10 classes of buildings as defined by the BCA (see Appendix 1).

**Building footprint**

The area shown on a plan over which a building can be erected.

**Bush fire (also Bushfire)**

A fire involving grass, scrub or forest.

**Bush fire attack**

Arises from direct flame impingement, radiant heat or ember attack.

**Bush fire hazard**

The potential severity of a fire. Usually measured in terms of intensity (kW/m), the factors that influence a bush fire hazard include climate and weather patterns, vegetation (fuel quantity, distribution and moisture) and slope.

**Bush fire hazard reduction works**

- a) the establishment or maintenance of fire breaks on land, and

- b) the controlled application of appropriate fire regimes or other means for the reduction or modification of available fuels within a predetermined area to mitigate against the spread of a bush fire,

but does not include construction of a track, trail or road.

**Bush fire prone area/land**

Is an area of land that can support a bush fire or is likely to be subject to bush fire attack. In general, a bush fire prone area is an area mapped for a local government area that identifies the vegetation types and associated buffer zones. Bush fire prone land maps are prepared by local councils and certified by the Commissioner of the RFS.

**Bush fire prone land map (BPL Map)**

for an area means a map certified under section 146(2) of the EP&A Act.

**Bush fire protection measures (BPMs)**

are a range of measures (controls) available to minimise the risk arising from a bush fire. BPMs include APZs, construction standards, suitable access arrangements, water and utility services, emergency management arrangements and landscaping.

**Bush fire risk**

Is the chance of a bush fire igniting, spreading and causing damage to assets of value to the community. Risk may be rated as being extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset.

**Bush fire safety authority**

An approval of the Commissioner of the NSW RFS required for a subdivision for residential or rural residential purpose or for a special fire protection purpose listed under section 100B(6) of the RF Act. This form of development is considered to be integrated development.

**Bush fire assessment report**

A report submitted in support of a development application by an applicant which determines the extent of bush fire attack to a development and the measures used to mitigate that attack. Appendix 4 provides the information requirements for a bush fire assessment. See also clause 46 of the RF Regulation.

**Certifying Authority**

As defined in the EP&A Act. Those with authority to issue Part 4A and Complying Development Certificates.

**Consent Authority**

Is defined in the EP&A Act, in relation to Development Consents. Usually the local council.

**Defendable space**

Is 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.

**Development**

Is defined in the EP&A Act.

**Development Application (DA)**

An application for consent to carry out development such as building, subdivision, or the use of a building or land. Applications are normally made to the local council.

**Ecologically Sustainable Development (ESD)**

As defined in section 6 of the *Protection of the Environment Administration Act (NSW) 1991*.

**Ecotourist developments**

aim to foster environmental and cultural understanding, appreciation and conservation and to be ecologically sustainable (being located in a relatively undisturbed natural area).

**Equivalent to an APZ**

is when the building will be separated from the bush fire hazard by other development (including roads, other buildings and managed properties) with a setback distance greater than or equal to the distance which would have been occupied by an APZ, if the development had been established having regard to the provisions of Appendix 3 of this document.

**Fire Intensity**

the rate of heat release, per unit length of fire front. The primary unit is kilowatts per metre of fire front (kW/m). It is a function of the heat content of the fuel (H), the weight of the fuel consumed (W), and the rate of spread of the fire (r).

**Fire protection systems.**

In this document the term is used to refer to the use of drencher/sprinkler systems used to dispense water on to the walls, roof, windows and other elements of a building.

**Flame zone**

The distance from a bush fire at which there is significant potential for sustained flame contact to a building. Determined by the calculated distance at which the radiant heat of the design fire exceeds 29kW/m<sup>2</sup> or calculated by the sustained flame length, whichever is the lesser.

**Infill development**

refers to the development of land by the erection of or addition to a residential building (or buildings) which does not require the spatial extension of services including public roads, electricity, water or sewerage and is within an existing allotment.

**Integrated development**

is development referred to under section 91 of the EP&A Act.

**Integrated housing**

development means a subdivision into two or more lots and the simultaneous design and construction of dwellings.

**Local Environmental Plan (LEP)**

Local Environmental Plan prepared under Part 3 of the EP&A Act. Plans prepared by a council that describe the planning status (zone) and/or development standards required for the future development of an area.

**Public road**

is an area that is open to or used by the public and is developed for, or has as one of its main uses, the driving or riding of motor vehicles.

**Setback**

The distance required through planning provisions to separate a building from the bush fire hazard, street frontage or from adjacent buildings.

**Should**

This is to be read as a prescriptive requirement but recognises that there are exceptional circumstances that warrant consideration of a bush fire protection measure based on performance and the merits of the case including provision for community safety.

**Special fire protection purposes**

are defined in Appendix 3.1.

**State Environmental Planning Policy (SEPP)**

is an environmental planning instrument prepared under Part 3 of the EP&A Act

**Subdivision**

of land means the division of land into two or more parts that, after the division, would be obviously adapted for separate occupation, use or disposition. The division may (but need not) be effected:

- (a) by conveyance, transfer or partition, or
- (b) by any agreement dealing, plan or instrument rendering different parts of the land available for separate occupation, use or disposition.

It includes strata subdivision, community title and boundary adjustments.

**Vegetation formations (and sub-formations)**

are different vegetation types and classes defined by Keith D. 2004 in: "Ocean Shores to Desert Dunes" published by DEC.



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