

h o l m e s  
fire & safety

## BUSHFIRE HAZARD ASSESSMENT

FOR

# **MATERIALS PROCESSING CENTRE, WASTE TRANSFER STATION AND CLASS 2 INERT SOLID WASTE LANDFILL**

ON

ARCHBOLD ROAD,

EASTERN CREEK

FOR

Light Horse Business Centre Pty Ltd

Sydney

Telephone

+61 2 9299 5321

Facsimile

+61 2 9299 5331

Holmes Fire

& Safety Ltd

L2 30 Clarence St

Sydney NSW 2000

PO Box Q1643

QVB Post Office

Sydney NSW 1230

Australia

ARBN 080 314 549

Offices in

Australia

New Zealand

[sydney@holmesfire.com](mailto:sydney@holmesfire.com)

31 July 2008

Version D



## REPORT ISSUE AUTHORISATION

Project: Light Horse Business Centre, Archbold Road, Eastern Creek

Project No. 98432


Version	Date	Status	Prepared	Reviewed
DRAFT	14 December 2005	Draft Issue to Client	CZS	DXC
DRAFT	17 January 2006	Draft Issue to Client	CZS	DXC
A	15 February 2006	Final Issue to Client	CZS	DXC
B	18 May 2007	Final Issue to Client	GDM	GDM
C	23 May 2007	Final Issue to Client	GDM	GDM
D	31 July 2008	Final Issue to Client	GDM	GDM

Version	Extent of revision
B	Comments from Mersonn Pty Ltd incorporated.
C	Additional minor comments from Mersonn Pty Ltd incorporated.
D	Corrected Appendix References.

This report caters specifically to the requirements of the project, the client and the associated regulatory/approval process. No warranty is intended or implied for use by any other third party and no responsibility is undertaken to any other third party for any material contained herein.

The attention of the readers of this report is drawn specifically to the Conditions of Use within the Executive Summary preceding the body of this report.

Version A Written By:   
Corey Shackleton  
*B. Sc. (Sustainable Resource Management & Marine Biology)*  
Bushfire Consultant

Version A Written By:   
Daniel Copland  
B. App. Sc. (Ecology & Environmental Science)  
Bushfire Consultant



Versions B, C, and D Amended By: G. Mitchell

Glen Mitchell

Branch Manager / Fire Safety Engineer  
BE Hons (Mech), M.App.Sc.(Fire Safety Design), MIEAust



## EXECUTIVE SUMMARY

Holmes Fire & Safety has been engaged by Light Horse Business Centre Pty Ltd to prepare a Bushfire Hazard Assessment.

This Bushfire Hazard Assessment report assesses the capability of developing the site into the proposed materials processing centre (MPC), waste transfer station (WTS) and non-putrescible class 2 inert and solid waste landfill within the existing quarry void, with regard to development within Bushfire-prone lands. The proposed development is not classified as Integrated Development, and is therefore not formally required to be assessed in accordance with the intent of *Planning for Bushfire Protection, 2001*. However, Holmes Fire & Safety has used *Planning for Bushfire Protection, 2001* as a bushfire planning guide for the proposed development.

Holmes Fire & Safety has conducted a site inspection and assessment of the subject site and surrounding areas in relation to the proposed development. The assessment has been undertaken in accordance with the methodology outlined in *Planning for Bushfire Protection, 2001*.

Provided the recommendations stated above are implemented in full, Holmes Fire & Safety is of the opinion that, despite not being a legal requirement, the proposed development achieves the intent of the general requirements for Integrated Development as set out in *Planning for Bushfire Protection, 2001*.

### Conditions of Use

Readers of this report must be aware that the bushfire mitigation recommendations described in this report will not completely remove the risk of bushfire impacting the proposed development. Recommendations contained herein provide general compliance with the intent of the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002*, *The Building Code of Australia*, *Australian Standard AS3959* and *Planning for Bushfire Protection, 2001*. With regard to the proposed development, diligent maintenance of Asset Protection Zones, together with the application of the recommendations within this report, in their entirety, will provide for a reduction of the bushfire threat and the associated risk.

This report caters specifically for the requirements of this project and the client. No warranty is intended or implied, or responsibility undertaken by Holmes Fire & Safety Ltd for its use on any other project or by any third party. This report does not include a detailed environmental / ecological assessment or Aboriginal / European heritage assessment.

This report is provided in accordance with the fee proposal 98432CZS.FFP001 and 'Agreement for the Provision of Consulting Engineering Services' 98432CZS.CA001 both dated 29<sup>th</sup> November 2005, as executed between Holmes Fire & Safety Ltd and the client. No obligations in the contract exist between Holmes Fire & Safety Ltd and any other party.

To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means without the written permission of Holmes Fire & Safety Ltd.



## CONTENTS

1	INTRODUCTION .....	1
1.1	Scope of the Assessment .....	1
1.2	Legislative and Planning Framework.....	2
1.2.1	Environmental Planning and Assessment Act 1979 .....	2
1.2.2	Rural Fires Act 1997 .....	2
1.2.3	Planning Policies.....	3
1.3	Bushfire Prone Land .....	3
2	SITE ASSESSMENT.....	5
2.1	Site Description .....	5
2.1.1	Site Location .....	5
2.1.2	Existing Land Use.....	6
2.1.3	Surrounding Land Use.....	7
2.2	Vegetation .....	8
2.3	Slope .....	11
2.4	Significant Environmental Features .....	11
2.5	Proposed Development .....	12
3	BUSHFIRE PROTECTION PROVISIONS.....	13
3.1	Asset Protection Zones .....	13
3.1.1	Asset Protection Zone Justification .....	14
3.1.2	Management Responsibility .....	15
3.1.3	Performance Requirements .....	15
3.1.4	Landscaping.....	15
3.1.5	Buildings, Structures and Land Uses .....	16
3.1.6	Bushfire Maintenance Plans .....	16
3.2	Level of Construction .....	17
3.2.1	Construction Standard Justification.....	17
4	ADDITIONAL BUSHFIRE MITIGATION .....	18
4.1	Radiant Heat Barriers.....	18
4.2	Fire Hose Reels .....	18
4.3	Natural Protection Features .....	19
5	ACCESS PROVISIONS .....	20



5.1	Public Roads .....	20
5.2	Alternative Access Roads .....	20
5.3	Bushfire Emergency Procedures.....	20
5.3.1	Evacuation Planning .....	20
6	SERVICE SUPPLY .....	21
6.1	Water Supply .....	21
6.2	Electricity .....	21
6.3	Gas .....	21
7	RECOMMENDATIONS.....	22
8	CONCLUSIONS .....	25
9	REPORT BASIS INFORMATION .....	25
10	REFERENCES .....	26
	APPENDIX A – SITE PLAN .....	27
	APPENDIX B – BUSH FIRE PROTECTION MEASURES .....	29



# 1 INTRODUCTION

Holmes Fire & Safety has been engaged by Light Horse Business Centre Pty Ltd to prepare a Bushfire Hazard Assessment.

This Bushfire Hazard Assessment report assesses the capability of developing the site into the proposed materials processing centre (MPC), waste transfer station (WTS) and non-putrescible class 2 inert and solid waste landfill within the existing quarry void, with regard to development within Bushfire-prone lands. The proposed development is not classified as Integrated Development, and is therefore not formally required to be assessed in accordance with the intent of *Planning for Bushfire Protection, 2001*. However, Holmes Fire & Safety has used *Planning for Bushfire Protection, 2001* as a bushfire planning guide for the proposed development.

## 1.1 Scope of the Assessment

This Bushfire Hazard Assessment has been undertaken to determine the necessary principles and requirements for the proposed development in accordance with the relevant legislative and planning frameworks.

The scope of this assessment has been determined based on the requirements outlined within Clause 46 of the *Rural Fires Regulation, 2002*.

Clause 46 states the following:

*For the purposes of Section 100B of the Act (Rural Fires Act 1997), an application for a Bushfire Safety Authority must be in writing and include the following:*

- (a) A description (including the address) of the property on which the development the subject of the application is to be carried out;*
- (b) A classification of the vegetation on and surrounding the property (out to a distance of 140 metres from the boundaries of the property) in accordance with the system for classification of vegetation contained in Planning for Bushfire Protection;*
- (c) An assessment of the slope of the land on and surrounding the property (out to a distance of 100 metres from the boundaries of the property);*
- (d) Identification of any significant environmental features on the property;*
- (e) The details of any threatened species, population or ecological community identified under the Threatened Species Conservation Act 1995 that is known to the applicant to exist on the property;*
- (f) The details and location of any Aboriginal relic (being a relic within the meaning of the National Parks and Wildlife Act 1974) or Aboriginal place (within the meaning of that Act) that is known to the applicant to be situated on the property;*



*(g) A bush fire assessment for the proposed development (including the methodology used in the assessment) that addresses the following matters:*

- *The extent to which the development is to provide for setbacks, including asset protection zones;*
- *The siting and adequacy of water supplies for fire fighting;*
- *The capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency;*
- *Whether or not public roads in the vicinity that link with the fire trail network have two-way access;*
- *The adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response;*
- *The adequacy of bush fire maintenance plans and fire emergency procedures for the development site;*
- *The construction standards to be used for building elements in the development; and*
- *The adequacy of sprinkler systems and other fire protection measures to be incorporated into the development.*

*(h) An assessment of the extent to which the proposed development conforms with or deviates from the specifications set out in Chapter 4 (Bushfire provisions—development stage) of Planning for Bushfire Protection.*

## 1.2 Legislative and Planning Framework

### 1.2.1 Environmental Planning and Assessment Act 1979

- Section 79C (1) (c) – requires the consent authority to consider the suitability of the site for development as part of the development application process.

### 1.2.2 Rural Fires Act 1997

- Sections 63 (2) - requires owners/occupiers of land to take all practicable measures to prevent the occurrence of bushfires on, and to minimise the danger of the spread of bushfires from, their property.





### 1.2.3 Planning Policies

- Planning for Bushfire Protection, 2001 - Prepared by the NSW Rural Fire Service and Planning NSW (now DOP) as guidelines and requirements for the protection of lives and property from the impacts of bushfire.
- Blacktown Bushfire-prone Land Map - Identifies Bushfire-prone areas and provides a trigger for the bushfire planning legislation and relevant planning provisions for the Blacktown Local Government Area.
- Blacktown Development Control Plan – There is currently no Development Control Plan specific to bushfire planning and design issues and constraints within the Blacktown Local Government Area.
- Blacktown City Council State Environmental Planning Policy No. 59 – This plan outlines the planning and development limitations / requirements including bushfire protection and management over the Eastern Creek Precinct.
- Australian Standard AS3959: Construction of Buildings in Bushfire-prone Areas – This document is prepared by Standards Australia and provides building construction requirements as recommended by *Planning for Bushfire Protection, 2001*.
- Building Code of Australia (BCA) 2005 – This document is a uniform set of technical provisions for the design and construction of buildings and other structures throughout Australia. It allows for variations in climate and geological or geographical conditions.

### 1.3 Bushfire Prone Land

The *Environmental Planning and Assessment Act 1979* requires local government councils to map land identified by the Commissioner of the NSW Rural Fire Service as Bushfire-prone Land.

Section 146 of the *Environmental Planning and Assessment Act* requires councils, where a Bush Fire Risk Management Plan applies, to prepare Bushfire-prone Land maps in consultation with the Commissioner of the NSW Rural Fire Service. The Commissioner will designate lands to be Bushfire-prone within an area and, when satisfied that the lands have been recorded on a map, will certify the maps as Bushfire-prone Land Maps for the purposes of this or any other Act (NSW Rural Fire Service, 2001)



*Planning for Bushfire Protection, 2001*, defines Bushfire-prone Land as an area that can support a bushfire or is likely to be subject to bushfire attack. In general, a Bushfire-prone area is an area containing a high, medium or low bushfire hazard, or any area within 100m of a high or medium bushfire hazard, or within 30m of a low bushfire hazard. Bushfire hazard areas do not include existing urban areas or water bodies (other than wetland vegetation), and are identified by bushfire hazard mapping produced under an approved Bushfire Risk Management Plan, or other such map certified by the Commissioner of the NSW Rural Fire Service for this purpose.

Section 100B of the *Rural Fires Act, 1997* provides the Commissioner the ability to issue a Bushfire Safety Authority for residential or rural residential subdivision or for special fire protection purpose developments of Bushfire-prone Land where the Commissioner believes that the development complies with standards which provide the development with appropriate protection measures, namely *Planning for Bushfire Protection, 2001*.

For the purposes of the Building Code of Australia (BCA), designated Bushfire-prone Land maps are also used to give effect to *Australian Standard AS3959: Construction of Buildings in Bushfire-prone Areas*.



## 2 SITE ASSESSMENT

### 2.1 Site Description

Holmes Fire & Safety conducted a site inspection of the site and the surrounding areas on 7<sup>th</sup> December 2005.

The land covers an area of approximately 123 hectares. It has a northern boundary to M4 Motorway and a western frontage partly bounded by Archbold Road. The eastern boundary is partly bounded by undeveloped grazing land and partly by the Hanson Asphalt Batching Plant. The remainder of the southern and south-western boundaries adjoin grazing lands.

The following assessment has been undertaken in accordance with the requirements of *Planning for Bushfire Protection, 2001*.

#### 2.1.1 Site Location

The site is located the south eastern side of the intersection between the M4 Motorway and Archbold Road, Eastern Creek within the Blacktown Local Government Area.

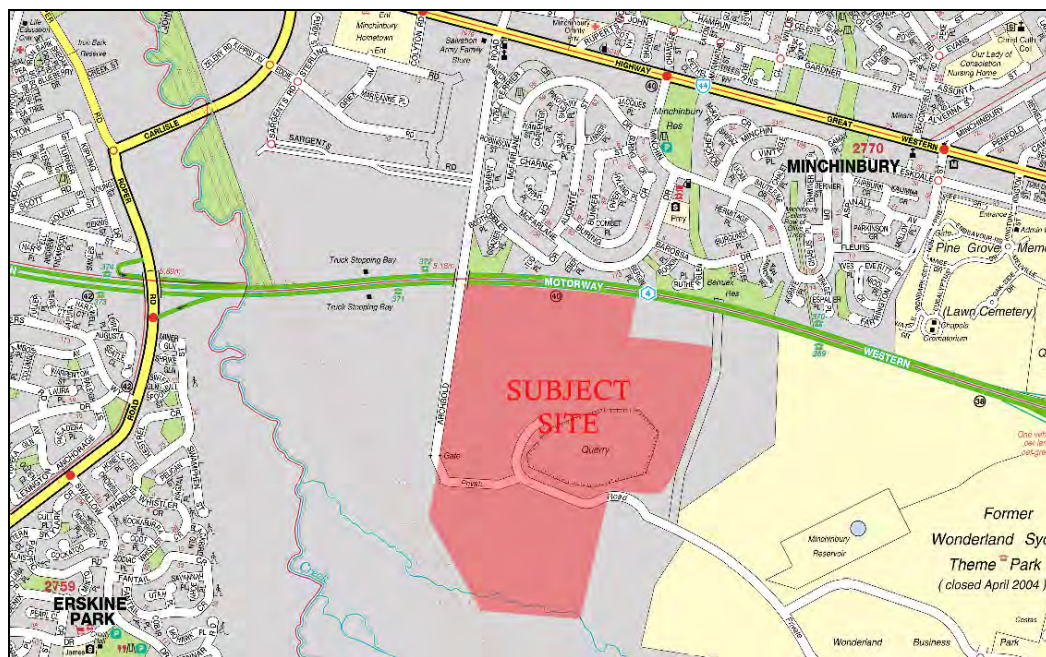


Figure 1 – Site Location (shaded red). (Base Map is Copyright to Universal Press Pty Ltd and extracted from UBD CityLink 2002)



### 2.1.2 Existing Land Use

The site currently contains a large quarry and associated infrastructure within the central portions, several access roads throughout the site, large areas of grassland and a small pocket of Cumberland Plain Woodland in the northwestern corner.

The topography of the site has been significantly altered from that which would have originally existed as a result of 50 years of quarrying. The quarry void dominates the north-eastern sector while overburden stockpiles to a height of 30m dominate the northern and western portions. The southern portion of the land has been modified over time through drainage and earth works but generally presents as gently sloping cleared grazing lands.

The quarry is of an open cut design with a stepped spiralling access road around its edge and providing access to the quarry floor. The quarry is elliptical in shape with an approximate length of 700m (east-west) and width of 430m (north-south). It has a depth of 150m and an estimated volume of 1.5 million cubic metres. The circumference of the pit at the upper level is approximately 1.5 km with the access road being around 20m wide.

Hanson, the operators of the quarry, ceased quarrying works in September 2006. They continue to operate an asphalt batching plant on the site adjoining the quarry but this use is on a separate allotment and does not form any part of this application.

Primary access to the site is via a right-of-carriageway across Lot 2 DP 644518 and connects to Old Wallgrove Road approximately 1.5km to the south-east of the site. While the site has direct frontage to the M4 Motorway it provides no direct access to the site. Vehicular access to the site is also available from Archbold Road which crosses the M4 Motorway to the north and links with the Great Western Highway. This access road is currently gated to the north of the M4 Motorway and used infrequently. The NSW Roads and Traffic Authority (RTA) have a draft plan (about to be exhibited) involving the upgrade of Archbold Road and its extension south-west.





### 2.1.3 Surrounding Land Use

The M4 Motorway and residential development adjoins the site to the north, Archbold Road abuts the western boundary, while large areas of grassland adjoin to the east, south and west. Areas of woodland are present further to the east of the site.

A large business park exists over the former Wonderland Theme Park to the east and southeast of the site.



**Figure 2** – Aerial Photograph of the subject site. *(Base photo is Copyright to the Department of Lands 2005).*



## 2.2 Vegetation

The vegetation has been assessed over a distance of 140 metres from the proposed development area in all directions in accordance with Figure A2.2 of *Planning for Bushfire Protection, 2001*.

A classification of Woodland vegetation has been applied to the hazard adjacent in the northwestern corner of the site due to a number of factors including the percentage foliage cover of the tallest stratum 20-30 %, the growth form and height of the tallest stratum (trees up to 20 metres in height), and a sparse understorey. Therefore it is considered that a Low to Moderate level of threat is associated with this vegetation.

Unmanaged Grassland vegetation with pockets of scattered trees adjoin the site to the east, south and west, while similar vegetation is present within the western and southern portions of the site.

As part of the proposed development a series of landscaped berms will surround the operational area of the MPC, WTS and landfill. These embankments will be constructed from rock and soil located on site and where appropriate also gabion baskets to lend stability. Generally the embankments will be 8 metres high and approximately 12- 14 metres at the base. As a result this area will pose a Low bushfire threat to the proposed development. Replanting will occur along the watercourse that runs along the southern boundary of the site. The proposed replanting will create an 80 metre wide riparian corridor, which, due to its narrow width and linear nature also only proposes a Low bushfire threat to the proposed development.

The following photographs show various aspects of the subject site and adjacent lands.



**Figure 3** – Photo looking south along Archbold Road, showing the scattered trees on the development site (left) and the open nature of the adjoining land to the west (right).



**Figure 4** – Photo taken from Archbold Road looking west at the adjoining grassland area.





**Figure 5** – Photo taken from Archbold Road looking southwest towards adjoining grassland areas.



**Figure 6** – Photo taken from the southern portion of the western boundary looking southeast towards the adjoining grassland areas.





**Figure 7** – Photo taken from the south eastern side of the quarry looking northwest towards the small stand of Woodland vegetation (rear) in the north western corner of the site.

### 2.3 Slope

Slope is used when determining required Asset Protection Zones in accordance with *Planning for Bushfire Protection, 2001*. The slope is assessed in all directions within the area of the bushfire hazard for a distance of at least 100 metres. Where the slope varies over this distance, the gradient used will be that which will most significantly influence the fire behaviour, referred to as the ‘effective slope’, having regard to the vegetation found. It is important to realise that the effective slope is not assessed within the area of the APZ but rather within that part of the landscape (including on neighbouring land) that will remain the hazard.

Land within, and adjoining the subject site is generally level, however land does undulate around several small watercourses, while land around the quarry (on-site) is extremely steep. It should be noted that future rehabilitation of the quarry site will result in the quarry area returning to its nature ground level.

Therefore, the effective slope for this assessment is considered to vary from level to 5 degrees downslope.

### 2.4 Significant Environmental Features

No significant environmental features (such as watercourses, escarpments, steep slopes, etc.) were observed during the course of the site assessment performed for the purpose of this bushfire hazard assessment.



## 2.5 Proposed Development

The proposed development comprises bulk earthworks and facility construction for the use of the site as a materials processing centre (MPC), waste transfer station (WTS) and non-putrescible class 2 inert and solid waste landfill within the existing quarry void.

The facility is proposed for resource recovery accepting solid, inert building and demolition wastes. Liquid wastes, medical wastes, toxic and hazardous wastes will not be received at the facility. Green wastes, excluding putrescible material containing foodstuffs will be received and handled at the facility. Wastes will be treated by sorting, crushing and screening in order to recover resources for recycling. Recycled materials may be blended to form saleable products which will be stored on the site until sold. Un-recoverable materials, estimated at 20% of the volume received, will be transferred to the landfill area for disposal.

The land when fully operational will include a recycled materials sales facility, an inwards weighbridge, outwards weighbridge, wheel washing station, administration office, employee facilities, workshop, bunded above ground fuel storage, hard stand processing and stockpile areas, paved sales areas, parking areas, roadways, lighting, drainage, leachate wells, water treatment and storage facilities, radio controlled water spray system, security fencing and gates.



### 3 BUSHFIRE PROTECTION PROVISIONS

The following bushfire protection provisions have been determined in accordance with the requirements of *Planning for Bushfire Protection, 2001* and Australian Standard AS3959: *Construction of Buildings in Bushfire Prone Areas*.

#### 3.1 Asset Protection Zones

The Asset Protection Zone (APZ) acts as a buffer zone between the development and the hazard. The primary purpose of the APZ is to ensure a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures. The APZ consists of an Inner Protection Area (IPA) and an Outer Protection Area (OPA). See Appendix B for further details.

Table A2.2 of *Planning for Bushfire Protection, 2001* specifies the minimum APZ requirements for residential developments within Bushfire-prone Areas. This has been used as a guide in this instance, due to the non-habitable nature of the proposed development.

**Table 1** – Asset Protection Zone requirements for the proposed development.

Development Aspect	Adjoining Vegetation	Predominant Vegetation Class	Effective Slope	Required Width of APZ		Recommended Width of APZ (metres)		
				IPA	OPA	IPA	OPA	Total
North	None	-	0° Level	-	-	-	-	-
East	Grassland	Group 3	0-5° Down	20	-	10	-	10
South	Grassland	Group 3	0-5° Down	20	-	10	-	10
West	Grassland	Group 3	0° Level	20	-	10	-	10
Northwest	Woodland	Group 2	0° Level	20	10	20	-	20
Riparian Area (South)	Open Forest	Group 1	0-5° Down	30	10	20	-	20
Quarry Buffer (Central)	Woodland	Group 2	0-5° Up	20	10	10	-	10



### 3.1.1 Asset Protection Zone Justification

#### East, South and West

According to the requirements of *Planning for Bushfire Protection, 2001* it is necessary to implement an APZ of 20 metres between the proposed development and the Grassland vegetation that adjoins the eastern, southern and western boundaries of the subject site. However, given the non-habitable nature of the development it is recommended that a minimum 10 metre Inner Protection Area (IPA) should be provided along with a 1.8 metre high, non-combustible radiant heat fence or an earthen constructed embankment comprising rock and soil with a width at base of at least 10 metres and a height of no less than 1.8 metre. In areas where over 20 metres of separation is provided from the grassland vegetation, there will be no requirement for the radiant heat fence.

#### Northwest

According to the requirements of *Planning for Bushfire Protection, 2001* it is necessary to implement an APZ of 30 metres (20 metres of IPA and 10 metres of OPA) between the proposed development and the Woodland vegetation that is located in a small isolated pocket in the northwest of the site. However, given the small size and isolated nature of this remnant vegetation pocket, along with the non-habitable nature of the proposed development it is considered that an APZ of 20 metres (managed as an IPA), in conjunction with the implementation of alternative protection measures such as appropriate construction standards, is adequate to provide a sufficient level of protection to the portions of the proposed development within the vicinity of this vegetation. It is proposed that a local road of some 20 metres width will separate the Woodland conservation area from the proposed development and this together with the proposed berms or embankments will serve as an appropriate protection measure.

#### Riparian Area (South)

Planning for Bushfire Protection indicates that the riparian zone on the watercourse in the southern portion of the site requires an APZ 40 metres, however given the nature of the proposed development and the narrow width of these vegetation fingers it is considered by Holmes Fire & Safety that a 20 metre APZ would be adequate in this instance.

#### Quarry Buffer (Central)

The SEPP applicable to this land proposed a 30 metre vegetated quarry buffer zone which, were it to occur would require a 10 metre APZ with a 1.8 metre non combustibile radiant heat fence.

In this application however there is no proposal for any vegetated area between the Quarry edge and the proposed Waste Transfer facility and as a consequence there is no bushfire risk presented within the development.



### 3.1.2 Management Responsibility

The land owner / land manager is responsible for the implementation and ongoing management of all Asset Protection Zones that are required as part of the proposed development.

Asset Protection Zones should be maintained in perpetuity or for the life of the proposed development to ensure there is an ongoing level of protection to life and property within the subject site.

### 3.1.3 Performance Requirements

#### *Inner Protection Area (IPA)*

The IPA is to be located between the development and the OPA, within the boundary of the development.

The proposed development requires a 10-20 metre Inner Protection Area. It is more practical to determine the specifications of the IPA in terms of performance than in terms of minimum fuel loading. The design and management of the IPA should ensure that:

- there is minimal fine fuel at ground level; and
- any vegetation within the IPA does not provide a path for the transfer of fire to the development (i.e. the fuels are discontinuous).

Shrubs and / or trees can be present within the IPA provided they:

- do not touch or overhang the building;
- do not form a continuous canopy;
- are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and
- are located far enough away from the building so that they will not ignite the building by direct flame contact or radiant heat emission.

In addition, woodpiles, wooden sheds, combustible material storage areas, large areas/quantities of garden mulch, stacked flammable building materials etc should not be located within the IPA.

### 3.1.4 Landscaping

Future landscaping design for the property should, where appropriate, adhere to the performance requirements of an IPA or OPA. Generally, however, there should be an area of either low cut grass or managed gardens with appropriate mulch around any future construction. It is recommended that future landscaping design for the site uses flora species that are considered fire resistant and do not create excessive fine fuel loadings with shrubs located away from windows. See Appendix B for further detail on landscaping within Bushfire-prone Areas.



### 3.1.5 Buildings, Structures and Land Uses

Buildings, structures and land uses that are permitted within Asset Protection Zones include those that can be used to create reduced fuel areas and water supply points. All non-habitable buildings / structures should have at least a ten (10) metre separation from any proposed habitable buildings. The purpose being to ensure there is not a continuous path of fuel for bushfire to directly impact upon the proposed habitable buildings.

Buildings, structures and land uses suitable within the APZ include:

- tennis courts
- swimming pools
- garden / storage sheds
- amenities
- garages / carports
- infrastructure
- golf and race courses
- cleared local and regional open space

### 3.1.6 Bushfire Maintenance Plans

Holmes Fire & Safety is unaware of any formal Bushfire Maintenance Plans for the subject site. However, it is considered that all management / maintenance should be performed in accordance with the recommendations within Section 7 and details within Appendix B of this report. All maintenance within the subject site (including management of the Asset Protection Zones, cleaning of gutters, etc.) should be carried out in perpetuity, or for the life of the development to ensure there is an ongoing level of protection.



## 3.2 Level of Construction

The relevant level of construction is based upon the type of vegetation (Section 2.2 of this report), the effective slope (Section 2.3 of this report) and the effective width of the Inner Protection Area (Section 3.1 of this report). Tables A3.1 and A3.3 of *Planning for Bushfire Protection, 2001* then determine the relevant construction standard in accordance with Australian Standard AS3959: *Construction of Buildings in Bushfire-Prone Areas*.

**Table 2 – Construction Standard requirements**

Development Aspect	Adjoining Vegetation	Effective Slope	Effective Width of IPA	Bushfire Attack Category	Construction Standard
North	None	0° Level	-	Low	-
East	Grassland	0-5° Down	10 metres	Low	-
South	Grassland	0-5° Down	10 metres	Low	-
West	Grassland	0° Level	10 metres	Low	-
Northwest	Woodland	0° Level	20 metres	Medium	Level 1
Riparian Area (South)	Open Forest	0-5° Down	20 metres	Medium	Level 1
Quarry Buffer (Central)	None	0-5° Up	-	Low	-

### 3.2.1 Construction Standard Justification

#### Northwest

Due to the threat presented by the Woodland vegetation to the northwest the requirements of *Planning for Bushfire Protection, 2001* specify that any buildings that are situated greater than 30 metres from the hazardous vegetation should not be subject to the implementation of construction standards under Australian Standard AS3959.

#### Riparian Area (South) & Quarry Buffer (Central)

Given the narrow width of Riparian Area and Quarry Buffer vegetation fingers it is considered by Holmes Fire & Safety that a Medium level of bushfire attack is suitable, and the subsequent Level 1 Construction requirement is adequate in this instance. Details of the various levels of construction of Australian Standard AS3959 are provided within Appendix B.





## 4 ADDITIONAL BUSHFIRE MITIGATION

*Planning for Bushfire Protection, 2001* and Australian Standard AS3959: *Construction of Buildings in Bushfire-prone Areas*, provide requirements and practical guidelines for bushfire protection in Bushfire-prone Areas.

These documents do not address and recommend all possible bushfire protection measures. Additional bushfire mitigation measures can often be incorporated into the development design to add supplementary protection to the proposed development or may be present naturally within the site or the adjoining landscape.

Despite the proposed development being in general compliance with the intent of *Planning for Bushfire Protection, 2001* it is envisaged that additional bushfire mitigation measures should be provided in this instance. The following additional bushfire protection measures are recommended as part of the development design.

### 4.1 Radiant Heat Barriers

Radiant heat barriers act to absorb and/or deflect radiant energy from a bushfire source that would otherwise impact upon a building surface. The barrier should be located between the hazard and the building and is most effective when sited close to the building. The provision of a heat barrier in most situations can only provide limited protection from radiant heat to windows and generally should not be relied upon to reduce the need for setbacks or construction standards. Barriers may be best-formed using masonry walls (steel fences such as Colorbond are also considered appropriate). Radiant heat barriers are particularly useful for grassland vegetation and should be used as the primary boundary fence line for buildings adjoining (with less than in 20 metres of separation) the Grassland vegetation to the east, south and west, the Woodland vegetation in the north western corner of the site and the vegetated quarry buffer area.

In many cases, these barriers may be incorporated into the building design as a courtyard or fenced off area for gardens, barbeque areas, swimming pools, tennis courts, retaining walls, etc.

Radiant heat barriers are unlikely to be effective for protection against burning embers.

### 4.2 Fire Hose Reels

A fire fighting hose reel that can reach around the entire building needs to be correctly installed for each building directly adjoining the Woodland vegetation in the northwestern corner of the site. The hose should be a minimum of 19mm in diameter and fitted with an adjustable fire fighting nozzle that is capable of withstanding the pump pressure (as is required to be installed). It should be independent of any bushfire sprayer systems so that water can be conserved. Additionally, the hose should be made of rubber as plastic can melt when subjected to extreme heat.





The fire fighting hose reel needs be connected to a static water supply and driven by a diesel / petrol pump (Note: the pump will need to be suitably protected). At least 10,000 litres of dedicated static water is required for fire fighting capabilities. If the tank is also required for a domestic supply, then the draw off for domestic purposes will need to be above the 10,000 litre line as discussed in Section 6.1 of this report. A 65mm Storz coupling should be provided to draw water from the dedicated water supply to supply the fire hose installed. Generally a 30 metre x 19mm diameter hose would be considered adequate, however should the hose not reach all extremities of the building an additional hose reel shall be installed to achieve full coverage.

#### 4.3 Natural Protection Features

Bushfire protection features are sometimes present within the natural landscape. These protection features may be located within, or adjacent to, the subject site. They may include such features as:

- Rocky Outcrops
- Escarpments / Ledges / Cliffs
- Dams & Waterbodies
- Rivers & Creeks

The site inspection and assessment revealed the presence of two dams and a watercourse that traverses the southern portion of the site. Of the two dams, one is situated in the northwest (within the Woodland vegetation) of the site, the second, within the adjoining land to the southeast of the site.

The presence of the two dams and the watercourse will not necessarily prevent the impact of bushfire, nor replace the requirement for passive or active protection measures, such as Asset Protection Zones, however their presence should be noted as it can play a vital role in reducing the potential intensity of an approaching bushfire.



## 5 ACCESS PROVISIONS

### 5.1 Public Roads

Primary access to the site is currently gained via Private Road to Old Wallgrove Road. Archbold Road links with the Great Western Highway in the north, and runs parallel to the western boundary entering the site in the southern portion of western boundary. Archbold Road will be the secondary access road to the development. Both these access road unlikely to be cut during a bushfire event.

All internal roads proposed as part of the development should be designed in accordance with the criteria outlined in Appendix B of this report.

### 5.2 Alternative Access Roads

Currently access / egress from the site can be gained along both Old Wallgrove Road in the east and Archbold Road in the west.

The proposed public road system should continue to provide alternative access or egress for fire fighters and residents during a bushfire emergency along both these existing roads.

### 5.3 Bushfire Emergency Procedures

There is no guarantee of the presence of fire-fighting vehicles and crews to protect every development during a major bushfire event. Therefore, it is extremely important to develop some form of emergency procedures for implementation during the occurrence of a major bushfire.

#### 5.3.1 Evacuation Planning

Based upon the Coroner's Inquiry into the 1994 bushfires in NSW there has been a need to consider evacuation when planning new developments. The Coroner recommended that in the assessment of urban development within Bushfire-prone Areas, consideration should be given to access for fire fighters and egress for residents during bushfire events.

The evacuation capability of the proposed development area is considered to be adequate and can be achieved via the proposed internal road network which links with Old Wallgrove Road in the east and Archbold Road in the west. Access and egress from both these points will not be cut during a bushfire event due to the separation provided by the surrounding grassland areas and development to these aspects.



## 6 SERVICE SUPPLY

During major bushfire events, the protection and preparedness of the building and its occupants may be seriously jeopardised with the loss of basic services. As part of the development consent process for the construction of a building, it may be necessary to specify the provision of certain services (NSW Rural Fire Service, 2001). The provision of an adequate water supply and the suitable placement and installation of electrical services and gas supplies are of particular importance.

### 6.1 Water Supply

Town reticulated water supply will be available to the proposed development, however due to the expected unreliability of the town reticulated water supply to the proposed development during a bushfire event, a supplementary form of water supply will be necessary for fire fighting purposes.

A reticulated hydrant supply should be installed in accordance with the requirements of Australian Standard AS2419.1 (1994). Hydrants should be installed at regular interval throughout the entire internal road network, including along the proposed perimeter roads situated adjacent to the Woodland vegetation.

The reticulated hydrant and water supply system will be used for both structural fire and bushfire suppression operations and should be readily accessible without being required to leave the sealed internal road network.

It is considered that a dedicated static water supply of at least 10,000 litres be provided for the purpose of fire fighting activities. If the tank is also required for a domestic supply, then the draw off for domestic purposes will need to be above the 10,000 litre line. A 65mm Stortz coupling should be provided to draw water from the dedicated water supply.

### 6.2 Electricity

Transmission lines providing power to the proposed development should be installed underground. Whilst provisions are available if this is not possible, this is the preferred option.

### 6.3 Gas

Reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596-2002: *Storage and Handling of LP Gas* and the requirements of the relevant authorities. If gas cylinders are to be kept close to buildings, the release valve must be directed away from the building and away from any hazardous materials such as firewood, so that it does not act as a catalyst to combustion.



## 7 RECOMMENDATIONS

Based on Holmes Fire & Safety's site inspection and assessment, the following recommendations would be required for the future development of a business park on the Archbold Street, Eastern Creek site:

- (a) Asset Protection Zones should be implemented as specified within Section 3.1 of this report and summarised in Table 3 (below);

**Table 3** – Asset Protection Zone requirements

Development Aspect	Recommended Width of APZ (metres)		
	IPA	OPA	Total
North	-	-	-
East	10	-	10
South	10	-	10
West	10	-	10
Northwest	20	-	20
Riparian Area (South)	20	-	20
Quarry Buffer (Central)	-	-	-

- (b) Management of Asset Protection Zones should be in accordance with Appendix B of this report and Section 4.2.2 of *Planning for Bushfire Protection, 2001*;
- (c) The land owner / land manager is responsible for the implementation and ongoing management of all Asset Protection Zones;
- (d) All proposed buildings within the proposed development should be constructed as per the recommendations in accordance with Australian Standard AS3959: *Construction of Buildings in Bushfire-Prone Areas* set out within Section 3.2 and summarised in Table 4 below;



**Table 4 – Construction Standard requirements**

Development Aspect	Bushfire Attack Category	Construction Standard
North	Low	-
East	Low	-
South	Low	-
West	Low	-
Northwest	Medium	Level 1
Riparian Area (South)	Medium	Level 1
Quarry Buffer (Central)	Medium	Level 1

- (e) All public roads proposed within the development should be designed pursuant to the criteria set out in Section 5.1 of this assessment, Appendix B and Section 4.3.1 of *Planning for Bushfire Protection, 2001*;
- (f) All alternative access roads proposed within the development should be designed pursuant to Section 5.2 of this assessment. All alternative access roads proposed within the development should be constructed (as a minimum) in accordance the private access road requirements outlined in Appendix B;
- (g) Consideration should be given to any areas containing Threatened Species, environmentally significant features and sites of Aboriginal significance in the determination of the an appropriate site for the proposed development (including APZs);
- (h) Electricity transmissions lines should be installed underground (where possible);
- (i) Reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596-2002: *Storage and Handling of LP Gas* and the requirements of the relevant authorities;
- (j) A reticulated hydrant supply should be installed, as per Section 6.1 of this report, in accordance with the requirements of Australian Standard AS2419.1 (1994);
- (k) In any area surrounding the proposed development where there is no earthen embankment a 1.8 metre high non-combustible radiant heat fence should be installed along the eastern, southern and western boundaries of the site where the buildings are located closer than 20 metres from the adjoining Grassland vegetation, or are adjoining the Woodland in the northwest or the vegetated quarry buffer zone;



- (l) A fire hose reel should be provided to each building that adjoins the woodland vegetation in the northwest of the site that is capable of reaching all extremities of the proposed building. Should the hose not reach all extremities of the building an additional hose reel shall be installed achieve full coverage. The fire hose reel should be regularly maintained;
- (m) The fire hose reel should be connected to a dedicated static 10,000 litre water supply. This fire hose reel is to be driven by a petrol pump (Note:- the pump will need to be suitably protected). The dedicated static water supply can be provided as part of the domestic supply provided the draw off for domestic purposes is above the 10,000 litre water line;
- (n) A fire fighting pump of between 5-9 HP should be provided to service the fire fighting hose reel. The manufacturer or distributor should be consulted to establish what size engine and pump is adequate to pressurize the system;
- (o) The pump should be housed in well-ventilated shed or small insulated shelter in an easily accessible area on the protected side of the building. The pump should be able to be operated by all occupants of the building (key start ignition system is preferable) and should be checked weekly during the fire danger period;
- (p) Roof gutters and valleys to all buildings should be leaf proofed by the installation of an external gutter protection shroud or a gutter system that denies all leaves from entering the gutter and building up on that gutter. Any material used in such a system should have a flammability index of no greater than 5 (as measured against AS 1530.2);



## 8 CONCLUSIONS

Holmes Fire & Safety has conducted a site inspection and assessment of the proposed business park in Archbold Street, Eastern Creek. The assessment has been undertaken in accordance with the residential development guidelines outlined in *Planning for Bushfire Protection* and AS3959: *Construction of Buildings in Bush Fire Prone Areas*.

Provided the recommendations stated above are implemented in full, Holmes Fire & Safety is of the opinion that, despite not being a legal requirement, the proposed development achieves the intent of the general requirements for Integrated Development as set out in *Planning for Bushfire Protection, 2001*.

It is also the opinion of Holmes Fire & Safety that the requirements within this report can be applied to any future development of similar nature within the site.

## 9 REPORT BASIS INFORMATION

The report is based on the following:

- (i) Site inspections carried out on 7<sup>th</sup> December 2005 by Corey Shackleton (Holmes Fire & Safety);
- (ii) Development plans as listed in Table 5.

**Table 5** - Referenced Development Drawings

DWG No.	TITLE	DATE	ISSUE
DA 02	Public Domain & Landuse	09/02/2006	-



## 10 REFERENCES

Australian Standard AS3959: *Construction of Buildings in Bush Fire Prone Areas*. Standards Australia.

Australian Building Codes Board (2005), *Building Code of Australia 2005*.

Blacktown City Council (2005), *State Environmental Planning Policy No. 59 - Central Western Sydney Economic and Employment Area, Employment Lands Precinct Plan, Eastern Creek Precinct*.

NSW Rural Fire Service, (2002). *Guideline - Bushfire Prone Land Mapping, Version 2.0, for release to councils*.

NSW Rural Fire Service and Planning NSW (2001). *Planning for Bushfire Protection – a Guide for Councils, Planners, Fire Authorities, Developers and Home Owners*.

NSW Rural Fire Service and Blacktown City Council 2005, *Blacktown Bushfire-prone Land Map*.

State of New South Wales (1979) No 203, *Environmental Planning & Assessment Act*.

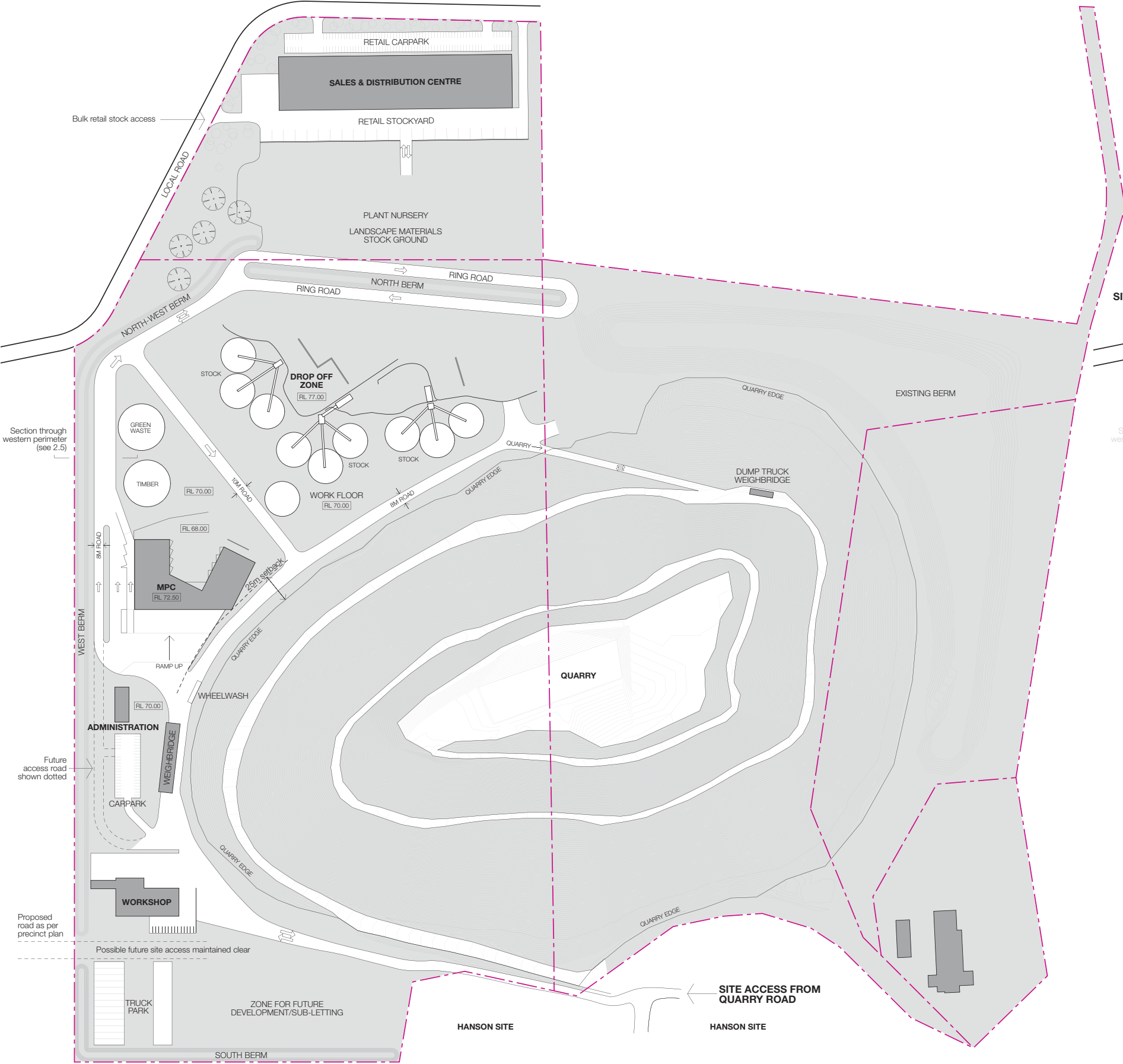
State of New South Wales (1997) No 65, *Rural Fires Act*.



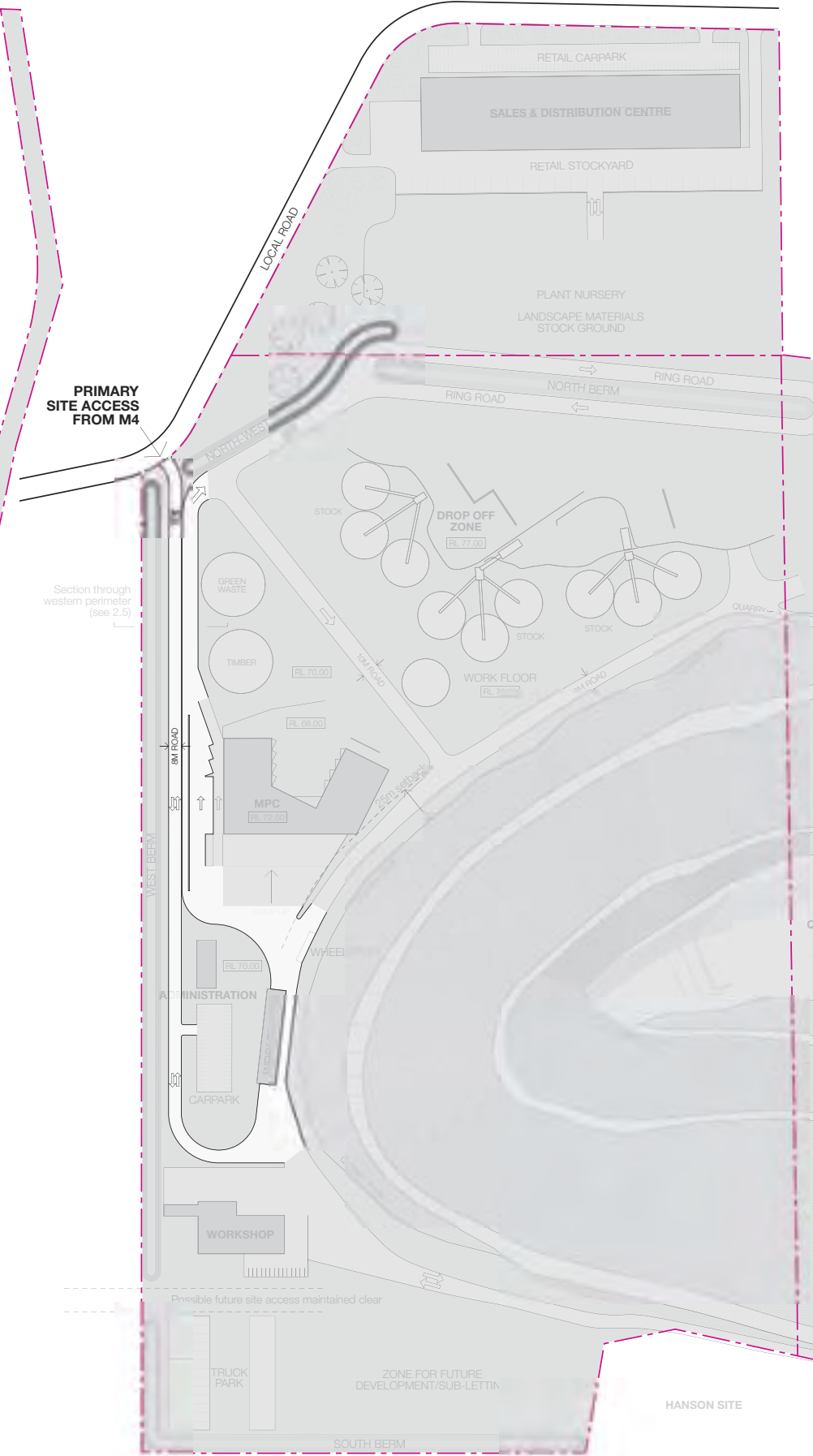
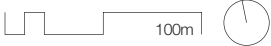


## APPENDIX A      SITE PLAN

# Proposed Light Horse Business Park Staged Development Plans



**PROPOSED SITE PLAN - STAGE 1**  
Sole access from Quarry Road



**PROPOSED SITE PLAN - STAGE 2**  
Primary access from Local Road





## APPENDIX B - BUSH FIRE PROTECTION MEASURES

### B.1 Components of an Asset Protection Zone

In Australia, bushfires are an inevitable, destructive, yet essential part of the natural landscape. Responsible preparation and management of bushfire hazards can significantly reduce the impact of bushfires on the built environment and ultimately human life. This is essentially done with the creation of appropriate Asset Protection Zones (APZ) surrounding residential buildings and other personal assets.

An APZ is an area that surrounds an asset (e.g. dwelling, school, etc.) and is managed in a manner that reduces bushfire fuels to a level that minimises the impact of bushfire on the particular asset. The APZ acts as a buffer between the bushfire hazard and the asset with a primary purpose of ensuring a progressive reduction of bushfire fuels.

The intensity of bushfires can be greatly reduced where there is little to no fuel available for burning. Bushfire fuels can be managed by reducing, removing or changing the state of the fuel through several means.

Reduction of fuel does not have to be as drastic as removing all vegetation. Environmentally this would be disastrous and often trees and plants can provide bushfire protection from strong winds, intense heat and flying embers by changing wind patterns and filtering embers.

Practically the extent of the APZ depends on the type of vegetation and the slope of the land (bushfire hazard). Fires are more intense when burning uphill; therefore meaning that vegetation located downslope will require an APZ of greater width.

When an APZ is required for a new development, whether it be a single dwelling, school, nursing home or large community title subdivision, management of the APZ rests solely with the landowner / land manager. It is also important to understand that while an APZ may be placed over neighbouring land (under exceptional circumstances) the responsibility for management shall always be with that of the landowner / land manager of the dwelling / building affording the benefit.

The APZ itself generally consists of two areas, both with a different degree and intensity of management. The two areas of an APZ are:

- The Inner Protection Area (IPA), which is located adjacent to the asset and is the most intensely managed of the two protection areas. Management within the IPA primarily aims to stop the spread of the bushfire whilst also providing a safe defensible space for fire fighting units.
- The Outer Protection Area (OPA), on the other hand, which is situated between the IPA and the bushfire hazard, is generally not as intensely managed, with its primary purpose being to slow the spread of the bushfire



and bring any potential crown fires out of the canopy by starving the bushfire or ground fuels.

The following provides details on the creation and management of Asset Protection Zones, with specific detail given to both Inner and Outer Protection Areas.

### B.1.1 Inner Protection Area (IPA)

#### B.1.1.1 Location

The IPA extends from the edge of the development to the start of the Outer Protection Area.

#### B.1.1.2 Purpose

The IPA ensures that the presence of fuels, which could become involved in a fire, are minimised close to a development. Therefore the impact of direct flame contact and radiant heat on the development is minimised.

#### B.1.1.3 Depth

The depth of the IPA is dependent upon the slope of the land. The greater the slope, the greater the intensity of any approaching fire and hence the greater the depth required for the IPA.

#### B.1.1.4 Fuel Loadings

It is more practical to determine the specifications of the IPA in terms of performance than in terms of a minimum fuel loading.

The performance of the IPA must be such that:

- (a) there is minimal fine fuel at ground level which could be set alight by a bushfire; and
- (b) any vegetation in the IPA does not provide a path for the transfer of fire to the development – that is, the fuels are discontinuous.

The presence of a few shrubs or trees in the IPA is acceptable provided that they:

- (a) do not touch or overhang the building;
- (b) are well spread out (minimum separation of 2 metres) and do not form a continuous canopy;
- (c) are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and
- (d) are located far enough away from the house (minimum canopy separation 5 metres) so that they will not ignite the house by direct flame contact or radiant heat emissions.

Woodpiles, wooden sheds, combustible material storage areas, large areas/quantities of garden mulch, stacked flammable building materials etc should not be permitted in the IPA.



## B.1.2 Outer Protection Area (OPA)

### B.1.2.1 Location

The OPA is located adjacent to the hazard. Originally the OPA would have been part of the bushfire hazard but has become an area where the fuel loadings are reduced.

### B.1.2.2 Purpose

The reduction of fuel in this area substantially decreases the intensity of an approaching fire and restricting the pathways to crown fuels, reducing the level of direct flame, radiant heat and ember attack on the IPA.

### B.1.2.3 Depth

The depth of the OPA is largely dependent on the type of land use and vulnerability of the dwelling or persons affected.

### B.1.2.4 Fuel Loadings

Within the OPA, any trees and shrubs should be maintained in such a manner that the vegetation is not continuous.

Fine fuel loadings within the OPA should be kept to a level where the fire intensity expected will not impact on adjacent developments. In the absence of any policy to the contrary, 8 tonnes per hectare of fuel is commonly used.

In grasslands, fuel height should be maintained below 10 cm.

## B.2 ACCESS PROVISIONS

Where a bushfire hazard exists on or adjacent to a development site, the following access design criteria need to be applied to the development. The objective of road design within a Bushfire-prone area is to enable a fire truck to gain access to locations in the close proximity to dwellings to deliver water and facilitate the provision of services and equipment to fire fighters. The bushfire access provisions also aims to enable safe egress for residents whilst enabling access and egress for fire fighting units. The design of roads in Bushfire-prone areas must take into account the likely increase in traffic and the often chaotic evacuation of residents during a bushfire event.

The public road system in a bushfire-prone area should provide alternative access or egress for firefighters and residents during a bushfire emergency if part of the road system is cut by fire.

At least one alternative access road needs to be provided for individual dwellings or groups of dwellings more than 200m from a public through road. The routes of these roads should be selected to ensure that both roads are unlikely to be cut by a fire at the same time, to ensure that there is at least one safe evacuation route available at all times.



Short access roads are preferable to long ones for the safety of evacuating residents and emergency service personnel, and therefore it is preferable to site dwellings as close as possible to public through roads.

The following design provisions are as outlined in Section 4.3 of *Planning for Bushfire Protection, 2001*.

## B.2.3 Public Access Roads

### B.2.3.1 Description

These include the perimeter road and the internal road system of any urban subdivision as well as public roads in rural-residential subdivisions.

### B.2.3.2 Design Criteria

- Roads should be two-wheel drive, all weather roads;
- Roads should be two-way, that is, at least two traffic lane widths (8 metres minimum) with shoulders on each side, allowing traffic to pass in opposite directions;
- The perimeter road should be linked to the internal road system at an interval of no greater than 500 metres in urban areas;
- Restrict the use speed humps and chicanes to control traffic;
- Roads should be through roads. Dead end roads are not recommended, but if unavoidable, dead ends should be not more than 200 metres in length, incorporate a minimum 12 metre radius turning circle, and should be clearly sign posted as dead ends;
- The capacity of road surfaces and bridges should be sufficient to carry fully loaded firefighting vehicles (approximately 28 tonnes or 9 tonnes per axle);
- Curves should have a minimum inner radius of 6 metres and be minimal in number to allow for rapid access and escape;
- The minimum distance between inner and outer curves should be 6m;
- Maximum grades should not exceed 15° and preferably not more than 10° or gradient specified by road design standards, whichever is the lesser gradient;
- There must be a minimum vertical clearance to a height of 6 metres above the road at all times;
- Roads should provide sufficient width to allow firefighting vehicle crews to work with firefighting equipment about the vehicle.
- Roads should be clearly sign-posted (with easily distinguished names) and buildings should be clearly numbered. Bridges should clearly indicate load rating;
- Roads should have a minimum total reserve width of 20 metres where they are a perimeter road as defined in Section 4.2.2(c) of *Planning for Bushfire Protection, 2001*; and
- Roads should not traverse through a wetland or other land potentially subject to periodic inundation.





## B.2.4 Property Access Roads

### B.2.4.1 Description

Provide access to individual dwellings or groups of dwellings on battleaxe blocks or in lower density developments. They should join directly to the through-road system. These are roads built on private property.

### B.2.4.2 Design Criteria

- A minimum trafficable width of 4 metres with an additional 1 metre wide strip on each side of the road kept clear of bushes and long grass.
- The road should have a passing bay about every 200 metres where possible, which should be 20 metres long by 3 metres wide, making a minimum trafficable width of 7 metres at the passing bay.
- The capacity of road surfaces and bridges should be sufficient to carry fully loaded firefighting vehicles (approximately 28 tonnes or 9 tonnes per axle).
- A minimum vertical clearance of 6 metres to any overhanging obstructions, including tree branches.
- Curves should have a minimum inner radius of 6m and be minimal in number to allow for rapid access and escape.
- The minimum distance between inner and outer curves should be 6m.
- Maximum grades should not exceed 15° and preferably not more than 10°.
- Roads should provide sufficient width to allow firefighting vehicle crews to work with firefighting equipment about the vehicle.
- Dwellings not sited within 200 metres of the road system should have an alternative access road providing emergency egress to the through road system; and
- Roads should be clearly sign-posted. Bridges should clearly indicate load rating.

## B.2.5 Fire Trails

### B.2.5.1 Description

- Used as access for firefighters, fire control lines and for APZ maintenance.
- In rural residential subdivisions they should surround isolated dwellings or groups of dwellings and can form part of the Inner Protection Area around individual or groups of dwellings.
- In suburban subdivisions they may function as a perimeter road, around the hazard side of the Inner Protection Area, if they are connected to the internal road system at frequent intervals and it is not possible to construct a perimeter road.

### B.2.5.2 Design Criteria

- Where a fire trail forms part of the Inner Protection Area it must be constructed to the specifications outlined in section 4.2.2(c) of *Planning for Bushfire Protection, 2001*.
- A minimum trafficable width of 4 metres with an additional 1 metre wide strip on each side of the road kept clear of bushes and long grass.

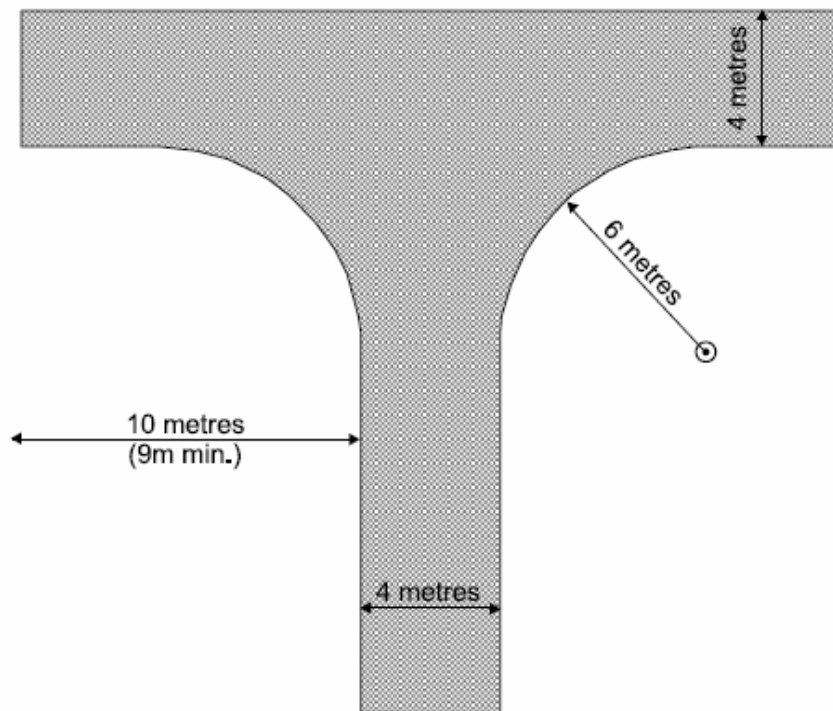


- A maximum grade of 15°.
- A minimum clearance of 6m to any overhanging obstructions, including tree branches.
- The road should have the capacity for passing either by:
  1. reversing bays using the access to properties to reverse fire tankers, which are 6 metres wide and 8 metres deep to any gates with an inner minimum radius of 6 metres and outer minimum radius of 12 metres; and/or
  2. a passing bay about every 200 metres, which is 20 metres long by 3 metres wide, making a minimum trafficable width of 7 metres at the passing bay.
- Appropriate drainage and erosion controls;
- A fire trail system which is connected to the property access road and/or to the through road system at frequent intervals;
- Must be maintained in a serviceable condition by the owner of the land;
- Fire trails should not traverse through a wetlands or other land potentially subject to periodic inundation;
- Must be trafficable under all weather conditions; and
- Trail should be inspected annually by authorities.
- At the time of subdivision, if fire trails are part of the development then the fire trails should be under council administration to ensure that maintenance occurs. From time to time this may not be possible in which case they can occur as easements and rights of way over private land.



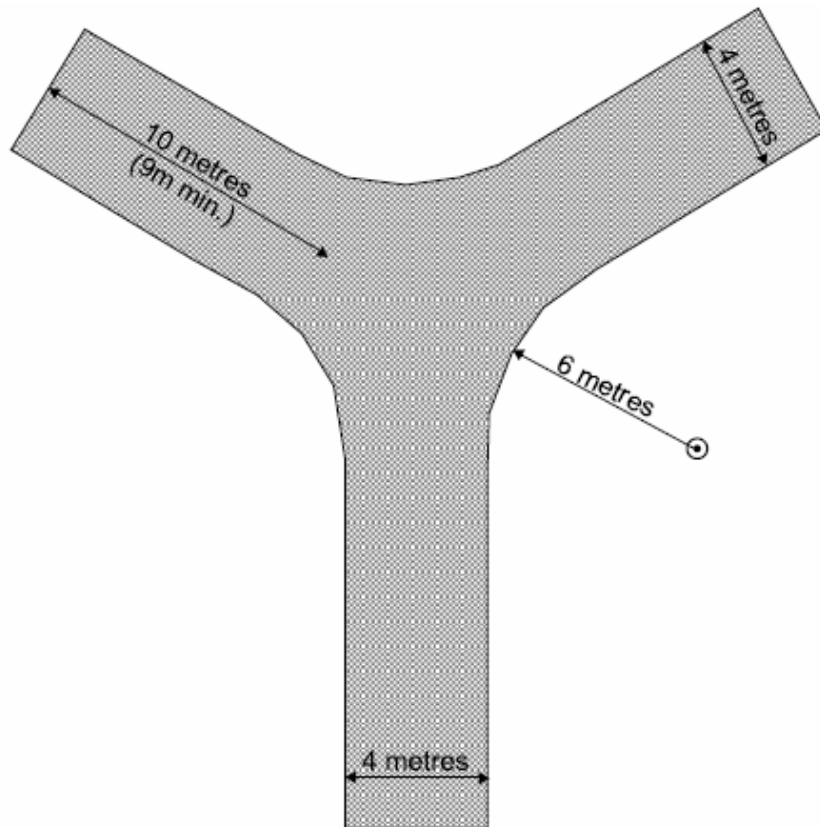


## Example of T-Shape Turning Head





## Example of Y-Shape Turning Head



## B.3 Building Construction Standards (Australian Standard AS3959)

Building Element	Level 1	Level 2	Level 3
<b>Flooring Systems</b> <i>(Clause 3.3)</i>	Concrete slab on ground	As for Level 1	As for Level 1
	<p>Suspended floor, which may be one, or a combination of the following with Clause 3.4 or walls complying with clause 3.5</p> <ul style="list-style-type: none"> <li>a) A concrete floor</li> <li>b) A framed floor where the underside of any one bearer at any one bearer at any point is greater than 600 mm above the finished ground level</li> </ul> <p><i>CI 3.4</i> Non-combustible supporting posts, columns, stumps, piers and poles; or Fire retardant treated timber for a minimum of 400 mm above finished ground; or Timber mounted on galvanised metal shoes with a clearance of not less than 75 mm above the adjacent finished ground level</p> <p><i>CI 3.5</i> A wall having an external leaf of masonry, concrete, pise, rammed earth or stabilized earth A framed wall that incorporates either:</p> <ul style="list-style-type: none"> <li>a) breather-type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 installed immediately behind the external cladding; or</li> <li>b) an insulation material conforming to the appropriate AS for that materials</li> <li>c) A wall of timber logs that have the butting faces of adjacent logs, gauge-planed, and the space between the logs sealed in a manner that prevent the entry of burning debris and which allows building movement</li> </ul>	As for Level 1	<p>As for Level 1 except that;</p> <p>Any framed floor where any bearer or joist is greater than 600 mm above finished ground floor level and the floor is not enclosed, the bearer or joists and flooring shall be of fire retardant treated timber or sheeted underneath with non-combustible material</p>

Building Element	Level 1	Level 2	Level 3
<p><i>Flooring systems</i> (Clause 3.3) (Continued)</p>	<p>A suspended timber floor, framed with timber or metal, where the underside of any one bearer, at any point, <u>is not greater than 600 mm</u> above the finished ground level and which has:</p> <ul style="list-style-type: none"> <li>a) the subfloor space unenclosed any timber flooring, bearers and joists of fire retardant-treated timber; or</li> <li>b) The subfloor space fully enclosed, either by a wall that complies with Clause 3.5.1(a), or by the use of non-combustible sheet material, which extends for at least 400 mm above the finished ground level.</li> </ul> <p>Where non-combustible fibre reinforced cement sheets are used to enclose the subfloor space, the material shall have a minimum thickness of 6 mm and all joints shall be covered or sealed (see Figure 3.1). The non-combustible sheet material shall meet the bottom of the cladding material to ensure there are no gaps on the exterior face of the building</p>	As for Level 1	As for level 1
<p><i>Supporting posts, columns, stumps, piers and poles</i> (Clause 3.4)</p>	<p>One, or a combination, of the following:</p> <ul style="list-style-type: none"> <li>a) Non-combustible.</li> <li>b) Fire-retardant-treated timber for a minimum of 400 mm above the finished ground level.</li> <li>c) Timber mounted on galvanized metal shoes with a clearance of not less than 75 mm above the adjacent finished ground level or paving level (see Figure 3.2).</li> </ul> <p>The above do not apply where the subfloor space is totally enclosed as described in Clause 3.3.1(c) (ii).</p>	As for Level 1	<p>As for Level 1 except that</p> <p>All timber shall be fire retardant-treated to full height.</p>

Building Element	Level 1	Level 2	Level 3
<b>External Walls</b> <i>(Clause 3.5)</i>	<p>External walls shall be one, or a combination, of the following:</p> <ul style="list-style-type: none"> <li>a) A wall having an external leaf of masonry, concrete, pisé, rammed earth or stabilized earth.</li> <li>b) A framed wall that incorporates either— <ul style="list-style-type: none"> <li>i. breather-type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS 1530.2) installed immediately behind the external cladding; or</li> <li>ii. an insulation material conforming to the appropriate Australian Standard for that material.</li> </ul> </li> </ul> <p><i>NOTE: No restrictions apply to the cladding material.</i></p> <ul style="list-style-type: none"> <li>iii. A wall of timber logs that have the butting faces of adjacent logs, gauge-planed, and the space between the logs sealed in a manner that prevents the entry of burning debris and which allows for building movement.</li> <li>iv. Where the external leaf or cladding is of a combustible sheet material and is less than 400 mm above finished ground level, the cladding shall be protected for not less than 400 mm above the adjacent finished ground level (see Figure 3.3)— <ul style="list-style-type: none"> <li>a) by covering it with a suitable non-combustible material, or fire-retardant-treated timber suitably sealed to the existing cladding so as to prevent the entry of burning debris (see Figures 3.3(a) and 3.3(b));</li> <li>b) by substituting with a suitable non-combustible sheet material, or fire-retardant-treated timber (see Figure 3.3(c); or</li> <li>c) where the external cladding is timber, by using fire-retardant-treated timber.</li> </ul> </li> </ul>	<p>As for Level 1 construction except than</p> <p>PVC cladding is not permitted</p> <p>All external timber wall cladding shall be of fire retardant treated timber</p>	<p>As for Level 2 construction</p>

Building Element	Level 1	Level 2	Level 3
<b>Windows</b> <i>(Clause 3.6)</i>	<p>All openable windows, including louvres, shall be screened with corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture size of 1.8 mm in such a way that the entire opening remains screened when the window is open.</p>	<p>As for level 1 construction except</p> <p>Aluminium mesh shall not be used</p> <p>Where timber is used, it shall be fire-retardant-treated timber except where protected by non-combustible shutters.</p> <p>Where leadlight windows are used, they shall be protected by shutters constructed of a non-combustible material or of toughened glass.</p>	<p>As for Level 2 construction except</p> <p>Where non-combustible shutters do not protect the windows, they shall be glazed with toughened glass.</p>
<b>External Doors</b> <i>(Clause 3.7)</i>	<p>External doors shall be fitted with—</p> <ol style="list-style-type: none"> <li>Weather strips or draught excluders to prevent the penetration or build-up of burning debris beneath the door; and</li> <li>tight fitting door screens fitted with corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture size of 1.8 mm.</li> </ol>	<p>As for Level 1 construction except</p> <p>aluminium shall not be used for the mesh.</p> <p>If leadlight glazing panels are incorporated in the doors, they shall be protected by shutters constructed of a non-combustible material or of toughened glass.</p>	<p>As for Level 2 construction except</p> <ol style="list-style-type: none"> <li>timber doors shall be fire-retardant-treated or shall have a non-combustible covering on the exterior surface; or</li> <li>doors shall be protected by shutters of non-combustible material; <i>or</i></li> <li>doors shall be solid-core having a thickness not less than 35 mm.</li> </ol>
<b>Vents and Weepholes</b> <i>(Clause 3.8)</i>	<p>Vents and weepholes shall be protected with spark guards made from corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture size of 1.8 mm</p>	<p>As for Level 1 construction except</p> <p>Aluminium shall not be used</p>	<p>As for Level 2 construction</p>
<b>Roofs</b> <i>(Clause 3.9)</i>	<p>General</p> <p>The following general requirements shall apply to all types of roofing systems:</p> <ol style="list-style-type: none"> <li>Timber shakes or shingles shall not be used for the roof covering.</li> <li>The roof/wall junction shall be sealed either by the use of fascias and eaves linings, or by sealing the gaps between the rafters with a suitable non-combustible material.</li> <li>Sarking shall have a flammability index of not more than 5 (see AS 1530.2).</li> </ol>		

Building Element	Level 1	Level 2	Level 3
<b>Roofs</b>  <i>(Continued)</i>  <i>(Clause 3.9)</i>	<u>Tiled roofs</u>  Sarking shall be located directly below the tiling battens and shall cover the entire roof area including the ridge.	<u>Tiled roofs</u>  As for Level 1 construction	<u>Tiled roofs</u>  As for Level 2 construction
	<u>Sheeted roofs</u>  a) (Only metal or fibre-cement sheet shall be used. b) (All gaps under the corrugations or ribs of the roofing material where it meets the fascia or wall line shall be sealed or protected— (i) by fully sarking the roof; or (ii) by providing corrosion-resistant steel or bronze mesh, with a maximum aperture size of 1.8 mm, profiled metal sheet, neoprene seal, compressed mineral wool or similar material. c) (Rib caps and ridge capping shall be sealed in accordance with Clause 3.9.1.3(b) (see Figure 3.5(a)), or preformed rib caps or ridge capping shall be used (see Figures 3.5(b) and (c)).	<u>Sheeted roofs</u>  As for Level 1 except  Roof sheeting shall be non-combustible  Sarking shall be installed	<u>Sheeted roofs</u>  As for Level 2 construction except  No fibre-reinforced cement or aluminium sheet shall be used

Building Element	Level 1	Level 2	Level 3
<b>Roofs</b>  <i>(Continued)</i>  <i>(Clause 3.9)</i>	<u>Rooflights</u>  All penetrations of the roof space for the installation of rooflights and associated shafts shall be sealed with a non-combustible sleeve or lining.  Thermoplastic sheet in a metal frame may be used for a rooflight, but the diffuser installed at ceiling level shall be of wired or toughened glass in a metal frame.  Vented rooflights shall be provided with corrosion-resistant steel or bronze mesh having a maximum aperture size of 1.8 mm.  <u>Roof ventilators</u>  All components of roof ventilators, including the rotary type, shall be constructed of non-combustible material and shall be sealed against the entry of sparks and embers with corrosion-resistant steel or bronze mesh having a maximum aperture size of 1.8 mm.  Roof-mounted evaporative cooling units  Roof-mounted evaporative cooling units shall only be used if the openings to the cooling unit are encased in corrosion-resistant steel or bronze mesh with a maximum aperture size of 1.8 mm	<u>Rooflights</u>  As for Level 1 construction except  Rooflight glazing shall be of wired glass  Thermoplastic material or toughened glass shall not be used for the glazing of rooflights  <u>Roof ventilators</u>  As for Level 1 construction  Roof-mounted evaporative cooling units  Manufactured from a non-combustible material.	<u>Rooflights</u>  As for Level 2 construction  <u>Roof ventilators</u>  As for Level 2 construction  Roof-mounted evaporative cooling units  As for Level 2 construction



Building Element	Level 1	Level 2	Level 3
<i>Eaves</i> (Clause 3.10)	Eaves shall be enclosed, and the fascia or the gaps between the rafters shall be sealed (see Clause 3.9.1.1).	As for Level 1 construction except  All timber eaves lining and joining strips shall be of fire-retardant-treated timber.	As for Level 2 construction except  Aluminium shall not be used.
<i>Fascias</i> (Clause 3.11)	No requirements	All materials shall be either non-combustible or of fire-retardant-treated timber.	As for Level 2 except  No fibre-reinforced cement or aluminium sheet shall be used.
<i>Gutters and Downpipes</i> (Clause 3.12)	Any materials or devices used to stop leaves collecting in the gutters shall have a flammability index of not greater than 5 when tested in accordance with AS 1530.2.  An alternative approach would be to build without gutters and downpipes.	As for Level 1	As for Level 1

Building Element	Level 1	Level 2	Level 3
Verandas and Decks (Clause 3.13)	<p>Comply with one, or a combination, of the following:</p> <ul style="list-style-type: none"> <li>a) <u>Slab</u> A reinforced concrete suspended slab floor, supported by posts or columns complying with Clause 3.4 or walls complying with Clause 3.5, or a slab-on-the-ground floor complying with Clause 3.3.</li> <li>b) <u>Sheeted or tongued and grooved solid flooring</u> The requirements for flooring are as follows: <ul style="list-style-type: none"> <li>i. Compliance with the flooring requirements shall be in accordance with Clause 3.3.</li> <li>ii. Where the clearance between the finished ground level and the underside of the floor is not greater than 400 mm above finished ground level, all joints in the flooring shall be covered (above the floor level) or shall be sealed.</li> </ul> </li> <li>c) <u>Spaced decking</u> The requirements for spaced decking are as follows: <ul style="list-style-type: none"> <li>i. The decking timbers shall be fixed with a clearance of not less than 5 mm between adjacent timbers.</li> <li>ii. The external perimeter beneath the decking shall not be enclosed nor shall access to the space beneath the decking be impeded.</li> </ul> </li> </ul> <p><i>NOTE: This requirement is designed to ensure that access to extinguish fires and remove burning material is maintained.</i></p> <ul style="list-style-type: none"> <li>iii. Any supports for the decking shall be treated as set out in Clause 3.4.</li> <li>iv. Decking timbers shall not be allowed to connect with the remainder of the building unless measures are used to prevent the spread of fire into the building</li> </ul>	<p>As for Level 1 construction except</p> <p><u>Spaced decking</u>:- fire-retardant-treated timber shall be used for the decking material.</p>	<p>All materials shall be non-combustible or where timber is used, it shall be fire-retardant-treated (including any balustrades).</p>

Building Element	Level 1	Level 2	Level 3
<i>Service pipes (Water and Gas)</i>	<p>All exposed piping, for water and gas supplies, shall be metal.</p> <p>Pipes of other materials shall be buried to a depth of at least 300 mm below the finished ground level.</p>	As for Level 1 construction	<i>As for Level 1 construction</i>



## B.4 Landscaping

Landscaping for the purpose of bushfire refers to the location, maintenance and type of plant species used around a building to improve its chance of surviving a bushfire. Correctly managed vegetation can provide many benefits during a bushfire including:

- reducing bushfire intensity;
- reducing wind speed;
- deflecting and filtering embers; and
- providing shelter from radiant heat.

### B.4.6 Fire-resistant Plant Species

When planning gardens and landscaping for bushfire protection, it is important to consider plant species and characteristics. However, no plants are completely “fire-resistant”. Some are more flammable than others but given the right conditions, all plants will burn.

Plants that accumulate dead leaves and twigs will burn more readily, especially if this material is continuous from the ground to the tree crown. If possible, avoid dense clumps of trees or shrubs. If there is a need to retain tree clumps, they should be kept small and ensure they comprise plants that are considered to be more fire-resistant.

#### B.4.6.1 Flammability

There are two factors to be considered in determining a plant’s flammability:

- how readily a particular plant will burn; and
- how the form of the plant will influence the way it burns

Therefore, the practical outcomes of the plant flammability are detailed below.

- Plants with broad fleshy leaves and/or high salt content burn less readily than those with fine hard leaves (such as sclerophyll species). Plants with significant amounts of volatile oils, like the eucalypt family (which includes gums and tea trees) should be avoided in landscaping, particularly close to dwellings; and
- The influence of plant form is a lot more subjective: low growing plants and ground covers are better than shrubs; plants with dense foliage are better than those with open airy crowns; plants that do not retain dead material are better than those that hold up lots of fuel; and plants with smooth bark are better than those with stringy or ribbon bark.

#### B.4.6.2 Role of Fire-Resistant Plants

Fire-resistant plants can absorb more of the heat of the approaching bushfire without burning as opposed to those species that are considered to be more flammable plants. Fire-resistant trees can trap embers and fire brands and reduce



wind speeds near the building/dwelling provided they are correctly positioned and maintained.

#### B.4.6.3 Maintenance

If fire-resistant plants are to be grown, these plants should be regularly maintained or there is a risk that these plants may themselves become a bushfire hazard. Regular maintenance should include sufficient watering (to maintain high leaf moisture content), the removal of dead material and pruning of lower branches.

#### B.4.6.4 Environmental Weeds

All gardeners should be aware that some plants are not wanted in the bush even if they are valued in the garden. Unfortunately there are many ornamental plants that really take off when they get into the bush. Some do so well they choke out the natives, like blackberries, or become a fire hazard, like gorse.

Predicting whether a plant will become an environmental weed is not easy so it is good practice to consult with the local council or the Department of Environment & Conservation to determine a particular plant's suitability for your area. Alternatively, local Landcare or Bushcare groups can provide information on species that are indigenous to your area. These local groups may be able to supply plants propagated from seeds collected locally.

### B.4.7 Landscaping Design and Materials

#### B.4.7.1 Lawns, Pavements & Mulches

##### Location and Design

- mown lawn, grazed green grass or pavements are the most appropriate landscaping that can be adopted immediately surrounding buildings,

#### B.4.7.2 Ground Covers & Shrubs

##### Location and Design

- Shrubs should not be planted under windows or near doors.
- Shrubs should be planted to ensure a continuous canopy is not created.

#### B.4.7.3 Trees

##### Location and Design

- Trees should not be planted close to buildings and powerlines (<5m),
- Trees should be planted to ensure a continuous canopy is not created.



#### B.4.7.4 Other Features

- Locate well-watered fruit trees and vegetable gardens on the side of buildings facing the bushfire hazard.

### B.4.8 Windbreaks

A well-designed and maintained windbreak in a rural area will protect buildings from bushfires by:

- Reducing wind speed,
- Filtering out flying embers, and
- Slowing the spread of the fire.

#### B.4.8.1 Wind speed

When fire winds hit a windbreak they are slowed down and forced up and over the trees, creating a protected area on the leeward side.

#### B.4.8.2 Embers

In a bushfire the greatest risk to any home is not the flames but sparks blown around in the strong winds. Trees may catch many of these sparks before they get to the house. Because green leaves contain water, trees do not usually catch fire from flying embers, although this can happen if there is too much dead material in the trees or on the ground underneath.

#### B.4.8.3 Fire spread

Windbreaks slow the wind speed and help slow the spread of fire. They also provide a shield from radiant heat depending on the density of the trees in the windbreak.

#### B.4.8.4 Designing Windbreaks

For best results:

- plant multiple rows of trees rather than a single row,
- plant on the sides of the property most likely to be impacted by fire, and
- plant an open windbreak that reduces wind speed without causing turbulence.