BUSHFIRE PROTECTION ASSESSMENT

FOR THE

OAKDALE DISTRIBUTION PARK

ON

Lots 1 & 2 in DP 120673; Lots 82 & 87 in DP 752041
&
Lot 1 in DP 843901,

OLD WALLGROVE ROAD,

HORSLEY PARK/KEMPS CREEK

FOR

GOODMAN INTERNATIONAL LIMITED.

Australian Bushfire Protection Planners Pty Limited

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Report Number	Document	Preparation Date	Issue Date	Directors Approval
B07525 - 2	Final	4.6.2007	19.12.2007	*G.L.Swain*

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EXECUTIVE SUMMARY

Australian Bushfire Protection Planners Pty Limited has been commissioned by *Goodman International Limited,* to undertake the bushfire consultancy to inform the concept planning process, under Part 3A [Major Projects] of the *Environmental Planning & Assessment Act,* on the bushfire protection measures required for the proposed Oakdale Distribution Park on Lots 1 & 2 in DP 120673, Lots 82 & 87 in DP 752041 and Lot 1 in DP 843901, Old Wallgrove Road, Horsley Park & Kemps Creek.

[Lot 1 in DP 120673 and Lots 82 & 87 in DP 752041 are within the Kemps Creek suburb of the Penrith local government area [LGA], while Lot 2 in DP 120673 and Lots 82 & 87 in DP 843901 are within the Horsley Park suburb of Fairfield LGA].

Lot 1 in DP 843901 is located to the east of Old Wallgrove Road, Horsley Park and contains the existing Austral Brickworks, and whilst forming part of the Concept Plan for the site, will remain in operation as a brickworks with future redevelopment of the site undertaken at the cessation of the exiting operations.

An indicative Master Plan has been prepared, as part of the Part 3A Major Projects Application for the Oakdale Distribution Park, being land within Lots 1 & 2 in DP 120673 and Lots 82 & 87 in DP 752041. The land within the proposed distribution park, on these lots, has a total area of 333 hectares and forms part of the Austral Bricks land holdings, and is located to the south of the Sydney Water Pipeline, extending to the west from Old Wallgrove Road, opposite the existing Austral Brickworks, to the Catholic Primary School and College site on Bakers Lane.

The land within the proposed Oakdale Distribution Park has been cleared of native vegetation and contains grassland vegetation [which is used for grazing] except for scattered pockets of retained trees and vegetation within the riparian corridor to Ropes Creek [and its tributaries] which flows south to north across the central portion of the site.

The land within the adjoining Sydney Water Pipeline, to the north of the site, contains mown grassland. Grazed land, within Lot A in DP 392643, adjoins the southern aspect of Lot 2 in DP 120673 and the eastern of Lots 82/87 in DP 752041, in the eastern portion of the site. The land, within Lot 1672 in DP 855001, to the south of Lot 87 in DP 752041, also contains grazed grassland.

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The land, within Lot 44 in DP 708347, to the south of Lot 1 in DP 120673, in the western portion of the site, contains remnant Cumberland Plain Woodland with pockets of remnant Cumberland Plain Woodland located within the Catholic College land [Lot 2 in DP 556036] to the west of this lot.

The vegetated riparian corridor to Ropes Creek crosses the land to the west of Lots 82/87 in DP 752041, within the eastern portion of Lots 41 – 44 in DP 708347, Aldington Road.

An existing dwelling, sheds and ancillary structures occupy the land within Lot 1 in DP 120673 with access provided via a gravel driveway from Bakers Road. The remainder of the land within the proposed distribution park is vacant farmland.

The vegetation within the Ropes Creek corridor on the site and within adjoining the land, and the Cumberland Plain Woodland vegetation on the adjoining lands, has been mapped as Bushfire Prone Vegetation. The site is therefore considered to be bushfire prone.

The Department of Planning [DOP] may, upon receipt of the application for the Oakdale Distribution Park, refer the application to the NSW Rural fire Service.

If referred, the NSW Rural Fire Service will consider matters necessary to comply with the aim and objectives of *Planning for Bushfire Protection 2006* and to provide protection to the future development from the potential impacts that may arise from a bushfire occurrence within the bushfire prone vegetation, both within and adjoining the site.

The objectives of *Planning for Bushfire Protection 2006* are:

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

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Matters considered necessary by the Rural Fire Service will include the provision of a “defendable space” [Asset Protection Zone] between the buildings and the bushfire hazard, to widths necessary to provide a safe working environment for firefighters and the protection of industrial type buildings; fuel management of the vegetation within the stormwater detentions ponds/open space areas and the re-vegetated corridors within the Flood Plain to Ropes Creek; access provisions for emergency services; construction standards to the future industrial buildings; water supplies for fire fighting operations and evacuation provisions.

This Bushfire Protection Assessment undertakes an assessment of the bushfire protection measures required to address the bushfire risk to the future industrial development on the site, consistent with the objectives of *Planning for Bushfire Protection 2006,* and provides a suite of site specific recommendations that address the outcome of the standards regarding setbacks [defendable space], provision of water supply, fuel management protocols and other matters considered necessary to mitigate the potential bushfire threat to persons, property and the environment.

The characteristics of the site as discussed in this report, together with the recommendations contained in this assessment, provide that the site is suitable in terms of its intended use.

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Australian Bushfire Protection Planners Pty Limited.

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SECTION 1

INTRODUCTION

1.1 Development Proposal.

Australian Bushfire Protection Planners Pty Limited has been commissioned by *Goodman International Limited,* to undertake the bushfire consultancy to inform the concept planning process, under Part 3A [Major Projects] of the *Environmental Planning & Assessment Act,* on the bushfire protection measures required for the proposed Oakdale Distribution Park on Lots 1 & 2 in DP 120673, Lots 82 & 87 in DP 752041 and Lot 1 in DP 843901, Old Wallgrove Road, Horsley Park & Kemps Creek.

Lot 1 in DP 843901 is located to the east of Old Wallgrove Road, Horsley Park and contains the existing Austral Brickworks, and whilst forming part of the Concept Plan for the site, will remain in operation as a brickworks with future redevelopment of the site undertaken at the cessation of the exiting operations.

An indicative Master Plan has been prepared, as part of a Major Projects Application for the Oakdale Distribution Park, being land within Lots 1 & 2 in DP 120673 and Lots 82 & 87 in DP 752041.

The plan provides for a through road connection from Old Wallgrove Road, turning along the northern boundary of Lot 2 DP 120673 and extending through the site to the west, connecting with Bakers Road, in the south-western corner of Lot 1 in DP 120673, in the western portion of the proposed estate. Internal feeder roads provide access to the indicative lots within the estate.

The indicative Master Plan also provides advice on the retention and upgrading of the riparian corridor to Ropes Creek and its main tributaries. The re-vegetation of these corridors will increase the area of Bushfire Prone Vegetation within the site.

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1.2 Aims of this Assessment.

The aims of this Bushfire Protection Assessment are to:

- Undertake a detailed site inspection;
- Undertake a visual bushfire hazard assessment of the Bushfire Prone Vegetation within and adjoining the site;
- Determine the formation of the vegetation on and surrounding the site in accordance with the vegetation classification system contained in *Planning for Bushfire Protection 2006*;
- Undertake an assessment to determine the effective slope of the land on and surrounding the development site;
- Undertake a Bushfire Protection Assessment to determine bushfire protection strategies for the proposed development that address the following matters:

  (i) The provision of building setbacks (Defendable Space) from vegetated areas and the siting of buildings to minimize the impact of radiant heat and direct flame contact;
  (ii) Fire fighting water supplies;
  (iii) Access requirements for customers/staff and emergency service vehicles;
  (iv) Construction standards to be used for the future building within the proposed development to minimize the vulnerability of the building to ignition from radiation and ember attack;
  (v) Land management responsibilities; and
  (vi) Evacuation management.

1.3 Statutory Requirements.

This assessment has been prepared having regard to the following legislative and planning requirements:

1.3.1 Legislation.

***(a) Environmental Planning and Assessment Act* (EPA Act)**

Planning and development within NSW is regulated by the *Environmental Planning & Assessment Act, 1979* (EPA Act). Part 3A [Major Projects] of the Act commenced on the 1st August 2005 and consolidated the assessment and approval regime for all major projects previously addressed under Part 4 [Development Assessment] or Part 5 [Environmental Assessment] of the Act.

Under the provisions of Part 3A, proponents of major projects are required to address the requirements of the Environmental Assessment determined by the Director General of the Department of Planning.

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(b) Rural Fires Act 1997

The objectives of the *Rural Fires Act* are to provide:

- The prevention, mitigation and suppression of fires;
- Coordination of bushfire fighting and prevention;
- Protection of people and property from fires; and
- Protection of the environment.

In relation to the management of bushfire fuels on public and private lands within NSW, the following section of the Act applies:

- Sections 63(1) and 63(2) require public authorities and owners / occupiers of land to take all practicable steps to prevent the occurrence of bushfires on, and to minimize the danger of the spread of bushfires.

(c) Rural Fires Regulation 2002.

The *Rural Fires Regulation 2002*, August 2002, repeals the *Rural Fires Regulation 1997* and restates with some modifications the provisions of the old Regulation and contains new provisions relating to bushfire prone land and bushfire hazard reduction.

(d) Threatened Species Conservation Act 1995 (TSC Act).

The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities as listed under the Act. The TSC Act is integrated with the EP&A Act and requires consideration of whether a development or an activity (such as the implementation of hazard reduction and asset protection) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

(e) Native Vegetation Act 2003 (NV Act).

The *NV Act* states indigenous vegetation within 20 metres of the bed or bank of a river or lake, or on slopes over 18 degrees, requires clearing consent under the *NV Act,* unless during an emergency fire event as authorized under the *Rural Fires Act 1997.*

1.3.2 Planning Policies.

(a) Planning for Bushfire Protection – 2006. **[Rural Fire Service]**

This document provides guidance on the planning and development control processes in relation to bushfire protection measures for rural residential and residential subdivision, “Special Fire Protection” and Commercial, Industrial and Public buildings in bushfire prone areas.

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The document provides deemed-to-satisfy specifications on the provision of Asset Protection Zones to residential and "Special Fire Protection" developments; defendable space requirements to other developments and access/water supply provisions for developments in bushfire prone areas. Provision for the assessment of construction standards to buildings and management /maintenance of the Asset Protection Zones/defendable space to buildings is also provided in the document.

1.4 Documentation Reviewed.

The following documents were reviewed in the preparation of this assessment:

- Aerial Photograph of the Development Site and adjoining lands;
- Eastern Creek to Erskine Park [Southpipe] Location Aerial, Plan SPSK19(A) dated 28.11.2006
- Master Plan of proposed Oakdale Distribution Park prepared by Macquarie Goodman; Drawing No. SP SK31 (I), dated 5 November 2007;
- Plan of Riparian Buffers prepared by GHD; Job No. 21 – 151001 Figure 1 Rev. A, dated April 2007;
- Fairfield and Penrith Council Certified Bushfire Prone Land Map;
- *Planning for Bushfire Protection 2006* prepared by the NSW Rural Fire Service;
- Aboriginal Heritage Assessment & Impact Statement prepared by Godden Mackay Logan – June 2007;
- Historical Archaeological Assessment prepared by Australian Museum Business Services [AMBS];
- Ecological Assessment prepared by Cumberland Ecology.

1.5 Site Inspection.

Graham Swain of *Australian Bushfire Protection Planners Pty. Limited* inspected the development property on the 24th May 2007 to assess the topography, slopes, vegetation classification and land use within and adjoining the development site. Visual assessment was undertaken to determine likely fire runs, influence of terrain on wind patterns within the bushfire prone vegetation and an assessment of access and egress to the development site. Adjoining properties were also inspected to determine the surrounding land use / land management.

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SECTION 2

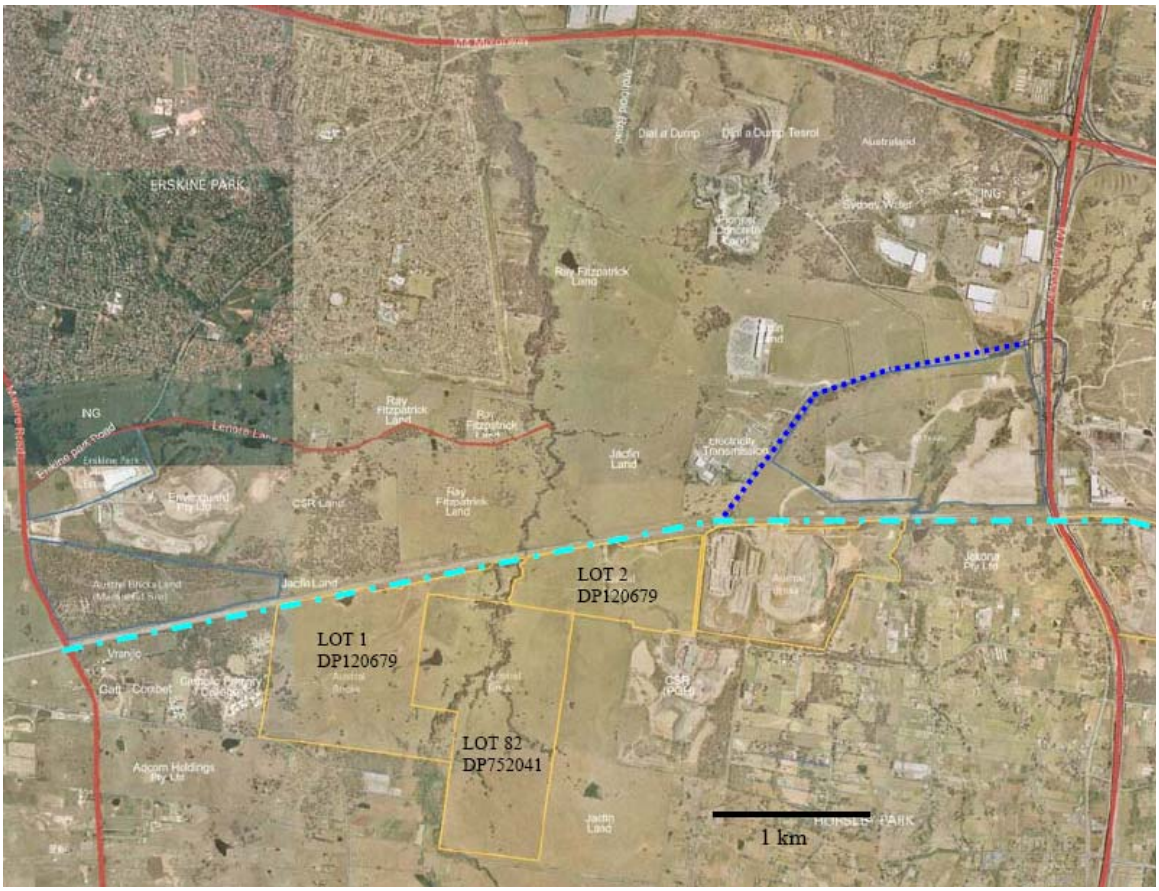
DESCRIPTION OF DEVELOPMENT SITE

2.1 Location & Description.

The land within the proposed Oakdale Distribution Park [Lots 1 & 2 in DP 120673 and Lots 82 & 87 in DP 752041], has a total area of 333 hectares and forms the Austral Bricks land holdings which are located to the south of the Sydney Water Warragamba - Prospect Pipeline, extending to the west from Old Wallgrove Road, opposite the existing Austral Brickworks, to the Trinity Catholic Primary School and Emmaus College site [Lot 2 in DP 556036] on Bakers Lane.

Existing access to the eastern portion of the site [Lot 2 in DP 120673] is available off the southern terminus of Old Wallgrove Road and off Bakers Lane/Aldington Road, to the southwest of Lot 1 in DP 120673, to the western portion of the site.

Figure 1 Location Plan



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2.2 Existing & Proposed Land Use.

The land within the development site forms part of the Austral Brick landholding and has been grazed for many years. Lot 1 in DP 120673, being the land within the western portion of the site, contains an existing dwelling and associated sheds. The remaining lots are vacant land.

An application is being lodged with the Department of Planning [DOP], under Part 3A [Major Projects] of the *Environmental Planning & Assessment Act 1979,* for approval to develop an industrial estate on the site.

2.3 Adjoining Land Use.

The land to the north of the development site consists of the Sydney Water Supply Pipeline. The land to the north of the pipeline consists of vacant grazing land, in the ownership of CSR, Ray Fitzpatrick and Jacfin, which is future "employment land".

The land to the south of Lot 2 in DP 120673 consists of "employment land" within the PGH Brickworks and vacant grazing land in the ownership of Jacfin [Lot A in DP 392643]. The vacant grazing land owned by Jacfin also extends to the east of Lots 82/87 in DP 752041. Lot 1672 in DP 855001, to the south of Lot 87 in DP 752041, contains vacant grazing land.

The land to the south of Lot 1 in DP 120673, within the western portion of the site, contains an existing dwelling, sheds and vegetated vacant land on Lot 44 in DP 708347 Aldington Road.

The land to the west of Lot 1 in DP 120673 contains the Trinity Catholic Primary School, Emmaus College and Retirement Village [within Lot 2 in DP 556036].

Lots 41 – 44 in DP 708347 occupy land to the west of the southern portion of Lots 82/87 in DP 752041. The existing landuse on these lots ranges from vacant vegetated land, shade houses, rural residential development to market gardens.

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Figure 2 – Aerial Photograph of Oakdale Site

2.4 Topography.

Appendix 2 of *Planning for Bushfire Protection 2006* states that slopes should be assessed, over a distance of at least 100m from a development site and that the gradient of the land should be determined which will most significantly influence the fire behaviour on the site.

2.4.1 Topography of the Land within the Development Site.

The topography of the land within development site is characteristic of the gently sloping flood plain lands formed by the creek catchments of the Cumberland Plain of Western Sydney. Gradients across the eastern and central portion of the site fall to the Ropes Creek corridor at < 5 degrees.

The land on Lot 1 in DP 120673, in the western portion of the site, rises to the west and southwest to form a ridgeline that splits into a series of spur-lines that extend to the north, southwest [in the Catholic College land] and southeast across Aldington Road. Gradients on these spur-lines range between 5 – 10 degrees.

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2.4.2 Topography of the Land beyond the Development Site.

The land to the north of the development site, beyond the Sydney Water Pipeline, slopes towards the Ropes Creek corridor at < 5 degrees.

The land to the south of the site slopes to the Ropes Creek corridor at < 5 degrees whilst falling to the north at < 2 degrees. The land to the south of the western portion of the site falls beyond Aldington Road to a valley that runs to the southwest. Gradients in this valley range between 5 – 10 degrees.

The land within the Catholic Primary School/College falls to the northwest, west and southwest from the spur-line located to the north of Bakers Lane, with an effective slope to the western edge of the site of < 10 degrees.
The land within the northern portion of the Catholic Primary School/ College/Retirement Village falls to the west at < 5 degrees to the site.

2.5 Vegetation Communities on the land within the Development Site.

Appendix A2.3 of *Planning for Bushfire Protection 2006* provides a methodology for determining the predominant bushfire prone vegetation for at least 140 metres in all directions from the proposed building.

Vegetation is classified using Table A2.1 of *Planning for Bushfire Protection 2006,* which classifies vegetation types into the following groups:

(a) Forests [wet & dry sclerophyll forests];
(b) Woodlands;
(c) Plantations – being pine plantations not native plantations;
(d) Forested Wetlands;
(e) Tall Heaths;
(f) Freshwater Heaths;
(g) Short Heaths;
(h) Alpine Complex;
(i) Semi – arid Woodlands;
(j) Arid Woodlands; and
(k) Rainforests.

The development site has been cleared of natural vegetation and contains grassland, except for the Swamp Oak Forest throughout the riparian corridor to Ropes Creek and scattered pockets of Cumberland Plain Woodland within the western portion of Lot 1 in DP 120673.

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The Swamp Oak Forest in the riparian corridor is made up of primarily *Casuarina glauca,* restricted to the immediate stream corridor. Other native vegetation identified in the riparian corridor included *Acacia parramattensis, Lomandra longiflia, Glycine clandestine* and *Clamatis aristate* within the canopy of the *C.glauca.*

An ecological study for the site has been prepared by Cumberland Ecology Pty Limited.

A Riparian Area Assessment has been undertaken by GHD. This assessment has identified that a number of steam categories exist on the site with the Ropes Creek corridor being defined as Category 1, necessitating retention and rehabilitation of the riparian corridor to a width of 40 metres to both sides of the creekline.

Three Category 2 streams exist on the side and form tributaries to Ropes Creek. These streams will be rehabilitated to provide a vegetated corridor of 20 metres to both sides of the stream

Both stream categories require a 10 metre wide buffer zone to the vegetated corridor. The Indicative Master Plan identifies the riparian corridor setbacks to Ropes Creek and its tributaries and allows for the 10 metre wide buffer zone. This buffer zone, in most cases, also acts as the “defendable space” to the future industrial development adjoining the riparian corridors to the Category 2 streams.

2.6 Vegetation Communities adjoining the land within the Development Site.

The development site is adjoined to the north by the mown grassland within the Sydney Water Pipeline corridor. The eastern aspect to Lot 2 in DP 120673 consists of the carriageway to Old Wallgrove Road, beyond which is the managed vegetation on the existing Austral Brickworks site. The PGH Brickworks Site and the grazing land to the south of Lot 2 contain grassland vegetation with similar vegetation adjoining the eastern and southern aspects of Lots 82 & 87 in DP 752041.

The vegetation in the riparian corridor to the west of Lots 82/87 consists of Swamp Oak Forest. The vegetation to the south of the western portion of the site [Lot 1], consists of Cumberland Plain Woodland with the vegetation within the Catholic College/Retirement Village land to the west of the site consisting of remnant Cumberland Plain Woodland, some of which, particularly within the curtilage to the buildings, is managed.

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2.7 Significant Environmental Features on the land within the Development Site.

The development site does not contain any significant environmental features such as SEPP 14 – Coastal Wetlands; SEPP 26 Littoral Rainforests; SEPP 44 – Koala Habitat; Areas of Geological interest; Steep Lands [>18 degrees]; Land slip areas or National Parks Estate. The site does contain the riparian corridor to Ropes Creek and its tributaries. These corridors are proposed to be retained/re-vegetated.

2.8 Known Threatened Species, Populations, Endangered Ecological Communities or Critical Habitat within the Development Site.

The site has been cleared of vegetation, except for the Swamp Oak Forest and Cumberland Plain Woodland; both being listed as endangered ecological communities [EEC]. The Swamp Oak vegetation is proposed to be retained along the Ropes Creek Corridor with new planting occurring in this and the tributary corridors.

The Cumberland Plain Woodland in the northwestern corner of the site [Lot 1] is proposed to be retained with further planting in the north-western corner of the industrial development [as shown on the Indicative Master Plan].

2.9 Details of Aboriginal/European Heritage within the Development Site.

An Aboriginal Heritage Assessment and Impact Statement have been undertaken by Godden Mackay Logan. This assessment has determined that a number of Aboriginal archaeological sites were identified on the site. These sites are predominantly located within Lot 2 in DP120673 and within the north-eastern portion of Lot 1 in 120673. *[Refer to Report by Godden Mackay Logan].*

A Historical Archaeological Assessment has been undertaken on the site by the Australian Museum Business Services and reveals that the land within the study area comprises the western portion of the Lockwood Estate granted to George Johnston Junior; most of the Razeville Estate granted to Nicholas Bayly and the southern section of the grant to Henry Kable. *[Refer to AMBS Report].*

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SECTION 3
FIRE MANAGEMENT RESPONSIBILITIES

Fire management within the development site is the responsibility of:

3.1 Penrith & Fairfield Councils.

The Penrith and Fairfield Councils have responsibility, under Section 66 of the *Rural Fires Act*, to issue a notice in writing requiring an owner / occupier of any land within the Local Government Area [LGA] to carry out bushfire hazard reduction works on that land. Section 100E of the *Rural Fires Act* requires Council to issue bushfire hazard reduction certificates for hazard reduction to be undertaken on private lands.

3.2 New South Wales Rural Fire Service.

The NSW Rural Fire Service (RFS) has the responsibility for undertaking fire suppression activities, hazard management activities and other functions relative to emergency management, within its areas of operation. *Section 73* of the *Rural Fires Act 1997* enables the Commissioner to carry out bush fire hazard reduction works on any land as required by a bush fire risk management plan if the work has not been carried out satisfactorily. Incurred costs can be recovered as a debt owed to the Crown.

3.3 New South Wales Fire Brigade.

The NSW Fire Brigade has the responsibility for undertaking fire suppression activities, and other functions relative to emergency management, within its area of operation and through Mutual Aid Agreements, provide assistance to the NSW Rural Fire Service, particularly for structural fire operations within the NSW Rural Fire Brigade Districts. Hazmat management within New South Wales is the responsibility of the NSW Fire Brigade.

3.4 Penrith and Fairfield Bush Fire Management Committees.

The Penrith and Fairfield Bushfire Management Committees have the responsibility for planning for co-ordinated fire fighting activities / hazard management activities in their local government area. The Committees are not an operational organization, a fire fighting organization or a funding source for fire management activities. The Bush Fire Management Committee for each LGA is supported by the following provisions of the *Rural Fires Act 1997*:

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- ***Section 50*** *of the Act requires the Bush Fire Co-ordinating Committee to constitute a Bush Fire Management Committee for the whole of the area of any local Council area for which a rural fire district is constituted.*

- ***Section 51 (1A)*** *requires a Bush Fire Management Committee to report to the Bush Fire Co-ordinating Committee on the implementation of the requirements of the Bushfire Risk Management Plan.*

- ***Section 52*** *requires each Bush Fire Management Committee to prepare a draft bush fire management plan for their local areas which includes a plan of operations and a bush fire risk management plan.*

- ***Section 54*** *of the Act specifies that a draft bush fire risk management plan is to 'set out schemes for the reduction of bush fire hazards in the rural fire district or other part of the State'. A draft bush fire risk management plan may also restrict or prohibit the use of fire or other fire hazard reduction activities in all or specified circumstances or places to which the plan applies.*

3.5 Private Land Owners / Occupiers.

The Rural Fires Act, 1997 provides several legislative opportunities to require land owners and occupiers to manage hazardous fuels. These are listed below:

- ***Section 63(2)*** states that *'it is the duty of the owner or occupier of land to take the notified steps (if any) and any other practicable steps to prevent the occurrence of fires on, and to minimise the danger of the spread of fires on or from that land'.*

In this section; '*notified steps*' means:

(a) any steps that a bush fire risk management plan (or the Co-ordinating Committee) advises a person to take;

(b) that are included in a bush fire risk management plan applying to the land.

- ***Section 87*** allows the removal of hazards in the bush fire danger period by the provision of a permit system. The permits are valid for 21 days, excluding TOBAN days. Section 10 permits are not required to adhere to *Part V* provisions of the *EPA Act 1979* in the assessment of impact, except for public authorities.

  An owner/occupier of private land must obtain from the NSW Rural Fire Service, a bushfire hazard reduction certificate before undertaking hazard reduction works on that land (Section 100E of the *Rural Fires Act 1997*).

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SECTION 4

BUSHFIRE HAZARD ASSESSMENT

4.1 Definitions.

Planning for Bushfire Protection 2006 defines *Bushfire Hazard* as the "*potential severity of a fire"* and is usually measured in terms of intensity [kW/m] with the factors influencing a bushfire hazard being climate and weather patterns, fuel [quantity, distribution and moisture content] and the effective slope of the land.

Planning for Bushfire Protection 2006 defines bushfire risk as *"the chance of a bushfire igniting, spreading and causing damage to assets of value to the community. Risk may be rated as extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset".*

4.2 Precinct Level Assessment of Bushfire Prone Vegetation.

Planning for Bushfire Protection 2006 provides the following procedure for assessing a development at a defined precinct level in order to determine whether the development is bushfire prone and if so, be the need to provide appropriate setbacks:

(a) Determine vegetation distance, type and class as follows:
Identify all vegetation in each direction from the site for a distance of 140 metres, and then consult Table A2.1 to determine the vegetation formation which predominates.

(b) Determine the average slope of the land between the predominant vegetation class and the development.

Table 1 summarises the information provided in Section 2 of this report to undertake a precinct level assessment to determine those aspects of the development deemed to be prone to bushfire threat and therefore subject to the provision of Asset Protection Zones/Defendable Spaces.

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Table 1. Precinct Level Assessment

Aspect	Existing Land Use	Vegetation within 140 m of Development	Predominant formation class from Table A2.1, *PfBFP 2006*	Effective Slope of land to distance of 100m.	Comments
North	Sydney Water Pipeline + vacant agricultural land	Managed Grassland	Nil	< 5 degrees downslope to the Ropes Creek; < 5 deg. downslope to the north	The northern aspect of the site is not bushfire prone.
East of Lot 2	Existing Industrial development	Managed curtilage for > 100 metres	Nil	< 5 degrees upslope	The eastern aspect is not bushfire prone.
South of Lot 2; East of Lots 82/87	Vacant agricultural land	Grazed grassland	Nil	< 5 degrees upslope to the east	These aspects are not deemed to be bushfire prone
South of Lot 87	Vacant agricultural land	Grazed grassland	Nil	< 5 degrees upslope to the southeast	The vegetation on the land to the south is not deemed to be bushfire prone
West of the southern portion of Lots 82/87	Rural residential land	Swamp Oak Forest in Ropes Creek corridor	Forest	< 5 degrees downslope to creek; < 5 degrees upslope beyond creek	The vegetation within the Ropes Creek corridor is deemed to be bushfire prone
South of Lot 1	Rural residential land	Cumberland Plain Woodland	Woodland with a grassy understorey	Varies between , 5 degrees upslope to < 10 degrees downslope	The Cumberland Plain Woodland is bushfire prone
West of Lot 1	Catholic School 7 Retirement Village	Remnant Cumberland Plain Woodland	Woodland with a grassy understorey	Varies between 5 - 10 degrees downslope	The unmanaged Cumberland Plain Woodland is bushfire prone

4.3 Bushfire Hazard Assessment.

Planning for Bushfire Protection 2006 does not provide a methodology for determining bushfire hazard – it defers instead to Bushfire Prone Land determined in accordance with the "*Bushfire Prone Land Mapping Guideline"*, issued by the Rural Fire Service on the 7th April 2004. To be able to undertake a bushfire hazard assessment the *Department of Planning* document *Circular C10 (1983)* provides a suitable methodology.

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This methodology rates the vegetation and slope and provides an index value to each. The overall Bushfire Hazard Score [low, medium and high] is determined by multiplying the Vegetation Index by the Slope Index.

4.3.1 Assessment to Determine the Bushfire Hazard to the Development.

The vegetation that presents the potential bushfire threat on the property is Swamp Oak Forest in the riparian corridors. These corridors are proposed to be re-vegetated to increased widths which will in turn, increase the potential fire intensity and resultant impact of those buildings adjoining the corridors.

The Cumberland Plain Woodland on the properties adjoining the southern aspect of future development on Lot 1 and the re-vegetated north-western corner of Lot 1 have the potential to support future bushfire/grass fires with resultant impact on the future buildings adjoining this vegetation.

The following assessment confirms the bushfire hazard to the future industrial development in the estate, for both the Swamp Oak Forest vegetation and the Cumberland Plain Woodland:

Vegetation Classification – Swamp Oak Forest:
This Forest vegetation has a vegetation index score of 2.8.

Slope Classification;
The effective slope is < 5 degrees downslope from the development precincts to the creek line. The slope index for a < 5 degree downslope is 1.5.

Therefore the Bushfire Hazard Score for the Swamp Oak Forest vegetation in the riparian corridors is 2.8 x 1.5 = 4.2, which equates to a High Bushfire Hazard rating. This hazard rating will vary, depending on the length of fire run either across or along the riparian corridor.

Vegetation Classification – Cumberland Plain Woodland:
This vegetation has a vegetation index score of 1.3.

Slope Classification;
The effective slope varies between 5 - 10 degrees downslope from the development precincts to the adjoining vegetation. The slope index for a 5 degree downslope is 1.5 whilst the slope index score for < 10 degrees downslope is 2.

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Therefore the Bushfire Hazard Score for the Woodland vegetation is 1.3 x 1.5 = 1.95 for 5 degrees downslope, which equates to a Moderate Bushfire Hazard rating and 1.3 x 2 = 2.6 for a < 10 degree downslope, which also equates to a Moderate Bushfire Hazard rating.

4.4 Assessment of Bushfire Threat.

Bushfire Threat is the "*measure of scale of impact or significance in terms of hazard and risk*".

The bushfire hazard to the future development on the site, from the unmanaged Forest vegetation within the riparian corridors, will vary depending on the widths of vegetation available to burn, the fire behaviour potential of the day and the defendable space setback widths provided between the vegetation and the future buildings and the type of construction of the buildings.

Never-the-less, there will remain the threat from a fast moving high intensity fire which has the potential to burn across the widest portion of the riparian corridor/flood plain to Ropes Creek. Similarly, the potential exists for a moderate intensity fire to occur in the Cumberland Plain Woodland on the land adjoining the site, and as an extension to a fire that may start in the vegetation on the Catholic Primary School/College land to the west.

The bushfire threat to the future development in the estate requires that measures be implemented to provide "defendable spaces" and construction methods that will mitigate the potential bushfire threat.

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SECTION 5

BUSH FIRE PROTECTION ASSESSMENT

5.1 Introduction.

Chapter 1 of *Planning for Bushfire Protection 2006* states that the aim of the document is to use the NSW development assessment system to provide for protection of human life [including firefighters] and to minimize impacts on property from the threat of bushfire, while having due regard to development potential, on-site amenity and protection of the environment.

The objectives of the document are:

- *Afford occupants of any building adequate protection from exposure to the impacts of a bushfire;*
- *Provide for a defendable space to be located around buildings;*
- *Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;*
- *Ensure that safe operational access/egress for emergency service personnel and occupants relocating is provided and/or available;*
- *Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads within the Asset Protection Zone/s;*
- *Ensure that utility services are adequate to meet the needs of firefighters [and others assisting in bushfire fighting operations].*

Chapter 1, Section 1.3 of *Planning for Bushfire Protection 2006* states that the construction of Class 5 – 8 buildings on bushfire prone land, or land impacted by bushfire prone land, must meet the aim and objectives of the document.

Chapter 4, Section 4.3.6(f) discusses the bushfire protection to buildings of Class 5 to 8 and 10b of the Building Code of Australia and states:

"The BCA does not provide for any bushfire specific performance requirements and as such A.S.3959 – 1999 does not apply as a set of 'deemed to satisfy provisions'. The general fire safety construction provisions for this class of building are taken as acceptable solutions, but the aim and objective of Planning for Bushfire Protection 2006 apply in relation to access and water supply for firefighting operations, emergency planning [evacuation] and landscaping / vegetation management".

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Planning for Bushfire Protection 2006 provides a methodology to determine the Asset Protection Zones [defendable space] and Bushfire Attack [Construction Standards] required for **habitable buildings** in development for **residential purposes** that are designated as bushfire prone. The document does not provide deemed to satisfy solutions for Class 5 – 8 buildings constructed in bushfire prone areas but states that where the aim and objectives of the document are not met, then the construction requirements for bushfire protection will need to be considered on a case by case basis.

Sections 5.2 and 5.3 of this report examine the layout of the Estate, as shown on the indicative Master Plan, in relation to the provision of a suitable "defendable space" between the bushfire hazard and the structures and the protection of these structures against the potential impacts of a future fire occurrence in the bushfire prone vegetation, and provides recommendations on the construction standards required to be implemented in the buildings to mitigate the likely impact.

The provision of access and water supplies for firefighting operations; management of the defendable space [Asset Protection Zone] and evacuation planning are examined in Sections 5.4 – 5.9 of this report.

5.2 The Provision of a Defendable Space/s [Asset Protection Zones] to the future Commercial/Industrial Development on the Site.

Appendix 2 of *Planning for Bushfire Protection 2006* provides the following procedure for determining setback distances (Asset Protection Zones) for **residential development** in bushfire prone areas:

(a) Determine vegetation formations as follows:

- Identify vegetation in all directions from the site for a distance of 140 metres;
- Consult Table A2.1 to determine the predominant vegetation type; and
- Select the predominant vegetation formation as described in Table A2.1.

(b) Determine the effective slope of the land under the predominant vegetation Class.

(c) Determine the appropriate fire [weather] area in Table A2.2.

(d) Consult Table A2.3 and determine the appropriate setback [APZ] for the assessed land use, vegetation formation and slope range.

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Table 2 examines the defendable space provisions of the proposed development using the above assessment methodology.

Table 2. Examination of Defendable Space requirements to the future Industrial Development in the Estate.
Fire Danger Index [FDI] 100

Location	Vegetation within 140m of buildings	Predominant Vegetation Formation Class *[Table A2.1 PfBFP]*	Effective Slope of Land	Recommended Width of Asset Protection Zone *[Table A2.4 PfBFP]*	Width of Defendable Space recommended
Ropes Creek riparian corridor [> 80 metres wide]	Swamp Oak Forest	Forest	< 5 degrees down slope	25 metres Asset Protection Zone for **Residential Development**	20 metres defendable space to both sides of corridor [Provided by managed stormwater management ponds/roads and open space areas
Tributaries to Ropes Creek [< 50 metres wide]	Swamp Oak Forest	Forest – downgraded to Rainforest vegetation [narrow corridor < 50 metres wide]	< 5 degrees down slope	10 metres Asset Protection Zone for **Residential Development** [Narrow riparian corridor]	10 metres defendable space to both sides of corridor [Provided by managed setback from riparian corridor vegetation [including perimeter access]
South of Lot 1 in DP 120673 [western portion of site]	Cumberland Plain Woodland	Woodland – grassy understorey	5 - 10 degrees down slope	15 - 20 metres Asset Protection Zone for **Residential Development**	10 metres defendable space provided by setback from southern boundary [including perimeter access]
West of Lot 1 in DP 120673 [western portion of site]	Cumberland Plain Woodland	Woodland – grassy understorey	5 - 10 degrees down slope	15 - 20 metres Asset Protection Zone for **Residential Development**	10 metres defendable space provided by setback from western boundary and boundary of vegetation. [including perimeter access]

Review of Defendable Space Provisions:

The assessment provided in Table 2 identifies the requisite widths of Asset Protection Zones required for a **residential development** on the site. The widths of the defendable spaces provided in Table 2 are those deemed necessary to mitigate the potential fire behaviour to the future industrial buildings in the estate and to provide a safe working platform from which fire fighting operations can be undertaken, following the initial passage of fire through the bushfire prone vegetation i.e. after the fire intensity has abated.

Given that the minimum defendable space widths normally accepted by the NSW

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Rural Fire Service for non-habitable development such as Class 5 – 8 buildings is 10.00 metres, the setbacks recommended in Table 2 comply with the minimum required by the NSW Rural Fire Service.

The protection of the building/s against the impact of bushfires burning in the bushfire prone vegetation is discussed in the following section.

5.3 Assessment of Bushfire Attack (Construction Standards).

Australian Standard A.S. 3959 -1999 is the enabling standard that addresses the performance requirements of both Parts 2.3.4 and Part GF5.1 of the Building Code of Australia for the construction of the Class 1, 2 and Class 3 buildings within a designated Bushfire Prone Area. The Standard does not give advice on the bushfire construction standards required to Class 5 – 8 buildings however Appendix A3.6 of *Planning for Bushfire Protection 2006* provides the following procedure for determining bushfire attack at construction stage for a building within a designated bushfire prone area:

(a) Determine vegetation formation types and sub-formation types around the building;

(b) Determine the separation distance between each vegetation formation and the building in accordance with the following classifications:

- *Less than 20 metres*
- *From 20 metres but not greater than 30 metres*
- *Greater than 30 metres but not greater than 50 metres*
- *Greater than 50 metres but not greater than 80 metres*
- *Greater than 80 metres but not greater than 100 metres.*

(c) Determine the effective slope of the ground for each vegetation formation;

(d) Determine the relevant FDI for the Council Area;

(e) Match the relevant FDI, appropriate vegetation formation, separation distance and effective slope to determine the category of bushfire attack.

Five categories of Bushfire Attack are determined. They are:

- Low

Minimal attack from radiant heat and flame due to the distance of the site from vegetation, although some attack by burning debris is possible. No construction standards apply.

- Medium

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Significant ember attack with radiation heat not greater than 12.5 KWm². Specific construction requirements for ember protection. (Level 1 Construction AS3959-1999).

- High

Significant ember attack and possible flame contact, radiation heat greater than 12.5 KWm² and no greater than 19 KWm² threatening some building elements. Specific construction requirements for ember protection and radiant heat. (Level 2 Construction AS3959-1999).

- Extreme

Significant burning debris attack and possible flame contact, radiation heat greater than 19 KWm² and no greater than 29 KWm² may threaten building integrity. Specific construction requirements for ember and higher radiant heat levels. (Level 3 Construction AS3959-1999).

- Flame Zone

Within the Flame Zone and / or greater than 29 KWm² (Construction outside scope of AS3959-1999 with radiant heat levels and flame contact likely to significantly threaten building integrity and result in significant risk to residents/firefighters).

Table 3 provides a summary of the Bushfire Attack Assessment and determines the level of potential radiant heat on the future Industrial buildings adjoining the bushfire prone vegetation within the estate and on adjoining lands.

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Table 3. Bushfire Attack Assessment – Determination of Potential Levels of Radiant Heat on the future Industrial Buildings in the Estate. Fire Danger Index 100.

Location	Vegetation within 140m of buildings	Predominant Vegetation Class *[Table A2.1 PfBFP]*	Effective Slope of Land	Minimum Width of Asset Protection Zone/ Defendable Space	Level of Bushfire Attack. Radiant Heat ratings on the Building
Ropes Creek riparian corridor [> 80 metres wide]	Swamp Oak Forest	Forest	< 5 degrees downslope	> 20 metres of defendable space	Flame Zone – potential flame impact; Radiant heat > 29 kWm2 radiant heat, ember attack
Tributaries to Ropes Creek [< 50 metres wide]	Swamp Oak Forest	Forest, downgraded to Rainforest [narrow riparian corridor < 50 metres wide]	< 5 degrees downslope	10 metres of defendable space	Extreme – Radiant heat up to 29 kWm2. Protection required to windows. Potential impact to lightweight materials e.g. steel wall cladding
South of Lot 1 in DP 120673 [western portion of site]	Cumberland Plain Woodland	Woodland – grassy understorey	5 - 10 degrees downslope	> 10 metres of defendable space	Flame Zone – potential flame impact; Radiant heat > 29 kWm2 radiant heat, ember attack
West of Lot 1 in DP 120673 [western portion of site]	Cumberland Plain Woodland	Woodland – grassy understorey	5 - 10 degrees downslope	> 10 metres of defendable space	Flame Zone – potential flame impact; Radiant heat > 29 kWm2 radiant heat, ember attack

Assessment Results:

The theoretical level of radiant heat on the buildings adjoining the Ropes Creek riparian corridor has been determined as greater than 29kWm2 and the buildings are likely to be impacted by direct flame with a defendable space width of 20 metres. These buildings will need to address this level of attack in the construction methodology and material selection. Alternatively, a wider defendable space [>25 metres] maybe required if the future buildings, particularly on the eastern side of the corridor, are constructed with windows facing the bushfire hazard.

The buildings located adjacent to the narrower riparian corridor to the tributaries to Ropes Creek will also be impacted by levels of radiant heat that warrant construction of the exposed elevations to standards which will address radiant heat levels up to 29 kWm2 [toughened glass to windows, no external timber] External lightweight cladding may also be damaged.

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The buildings located adjacent to areas of Cumberland Plain Woodland which pose an upslope fire run through more than 100 metres of unmanaged vegetation will be impacted, with a defendable space width of 10 metres, by direct flame attack and levels of radiant heat greater than 29 kWm2. The elevations of these buildings, that have exposure to the bushfire hazard, will need to address this level of attack in the construction methodology and material selection or by increasing the width of the defendable space.

Future fires burning in the bushfire prone vegetation in the Ropes Creek riparian corridor to produce embers which have the potential to attack the buildings exposed to this bushfire hazard. The embers have the capacity to ignite garden beds and combustible building components and accumulated combustible materials in roof gutters.

Preference should therefore be given to the design of roofs/gutter systems that do not have the potential to accumulate combustible material [even when the building is seemingly remote from native vegetation]. To address the threat from ember attack, the construction of buildings shall comply with the following recommendations:

- External doors to the Loading Docks shall be protected against the entry of embers – threshold, stile and head seals shall be fitted to doors;

- Any external vents or grilles and air-conditioning intake grilles shall have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers through the opening; and

- No combustible materials are to be stored external to the building.

5.4 Access Standards for Firefighting Operations.

Chapter 4, Section 4.2 “Access” of *Planning for Bushfire Protection 2006* provides specifications on the access provisions for firefighting operations within developments which are subject to bushfire attack.

The following provide the general specifications for Public and Private Road access to bushfire prone developments:

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5.4.1 Public Roads.

Section 4.2.7 [Access] of *Planning for Bushfire Protection 2006* provides advice on the design and construction of Public Roads providing access to and internal roads within a development which is deemed to be bushfire prone.

The specifications for public roads are:

- *Roads shall be designed for two-wheel drive all weather access;*
- *Perimeter roads shall be two-way with a minimum carriageway width of 8.0 metres, kerb to kerb, with shoulders on each side to allow traffic to pass in opposite directions;*
- *Roads shall be through roads. Dead ends shall not be more than 200 metres in length and incorporate a 12m outer radius turning circle;*
- *The capacity of road surfaces/bridges in a subdivision with reticulated water supply shall be 15 tonnes;*
- *Curves of roads shall have a minimum inner radius of 6 metres and a minimum outer radius of 12 metres;*
- *Vertical clearance above the road surface shall be 4.0 metres;*
- *All public roads eight metres wide shall locate services outside parking reserves to ensure accessibility to the reticulated water supply;*
- *All public roads between 6.5 & 8 metres in width shall be No Parking on one side with services (hydrants) located opposite the parking side;*
- *Public Roads less than 6.5 metres in width shall provide parking bays clear of the road formation and locate services outside the parking bays;*
- *Single lane one-way roads shall be no less than 3.5 metres in width with parking bays provided clear of the road formation;*
- *Parking Bays shall be 2.6 metres wide from kerb to the edge of the road formation;*
- *All access roads directly interfacing the bushfire hazard shall provide roll top kerbing to the hazard side of the road.*

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The following provide the general specifications for Private Road access to bushfire prone developments:

5.4.2 Property [Internal] Access Roads.

The specifications for property [Internal] access roads within a development are:

- *Internal roads are two-wheel drive capable, sealed, all-weather roads;*

- *Internal perimeter roads are provide with at least two traffic lane width [carriageway 8 metres minimum kerb to kerb] and shoulders to each side to allow traffic to pass in opposite directions;*

- *Roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metre outer radius turning circle or "T" turning head suitable for a 10.0m rigid truck, and are clearly sign posted as a dead end road;*

- *Speed humps/chicanes are not used to control traffic speed;*

- *A minimum carriageway width of 6 metres with a minimum road width of 4 metres;*

- *Passing bays shall be provided at approximately 200 metre intervals on internal roads. Passing bays shall be 20 metres long and 3 metres wide, clear of the road formation;*

- *The carrying capacity of the road surface/bridges shall be 15 tonnes for reticulated areas and 28 tonnes for non-reticulated areas;*
- *Curves shall have an inner radius of 6 metres and an outer radius of 12 metres;*

- *Maximum grades shall be 15 degrees (10 degrees preferred);*
- *A minimum vertical distance of 4.0 metres and a minimum width of 6 metres shall be provided clear of overhanging branches, trees and shrubs.*

The indicative Master Plan for the Oakdale Distribution Park provides a public road layout that extends a new two-way through road from the existing terminus of Old Wallgrove Road, through the estate to junction with the existing Bakers Lane. Secondary roads provide access to the lots in the estate, with road widths, curves and turning circles suitable for heavy articulated vehicles, including B Doubles.

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The indicative road layout complies with the deemed-to-satisfy specifications of Section 4.1.3 of *Planning for Bushfire Protection* 2006 for the provision of suitable access for fire fighting vehicles.

Private road access to the proposed allotments shall comply with the deemed-to-satisfy provisions for Private Roads as defined by *Planning for Bushfire Protection* 2006 including the provision of firefighting access to the riparian corridors to the tributaries to Ropes Creek.

Either perimeter road access or fire trail access shall be provided within the defendable space setback to the riparian corridor to Ropes Creek and to the Cumberland Plain Woodland vegetation.

[Refer to Attachment A for indicative locations of fire access roads]

5.5 Water Supplies for Firefighting Operations.

A reticulated water supply will be provided to service the future industrial development in accordance with the specifications of Australian Standard A.S 2419.2. Hydrants shall have a flow rate of 10 litres / second.

Fire hydrants shall be accessible and located such that a fire appliance can park within a maximum distance of 20 metres from the hydrant and the habitable building must be located such that a fire at the furthest extremity can be attacked by fire-fighters using two 30 metre hose lines and a 10 metre water jet. A clear unobstructed path between the hydrant and the most distant point of the building cannot exceed 90 metres.

Blue hydrant markers shall be provided to locate the positions of the hydrants.

The markers shall be positioned on the hydrant side of the centreline of the road pavement.

The Industrial buildings within the estate will be connected to this supply and will be fully compliant with the provisions of the Building Code of Australia, including the provision of hose reels/hydrants within the building and booster valves at the street entry point.
It is recommended that a “layby” parking bay be provided at the booster assembly and that external “Millcock” valves [Landing Valve] Hydrants be provided in locations which will assist in the extinguishment of bushfires that occur in the Ropes Creek riparian corridor.

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5.6 Emergency Management for Fire Protection / Evacuation.

The management of evacuation of the Staff/Customers in the future industrial developments in the estate will be addressed by the preparation of a site specific Evacuation Plan for each development in the estate. The individual Evacuation Plans shall address the protocols for the timely relocation of Staff/Customers in the event that an emergency occurs, both within the site or within the local area.

A copy of the Evacuation Plan will be provided to the Local Emergency Management Committee/Police, NSW Fire Brigade and NSW Rural Fire Service.

The Evacuation Plan shall comply with AS 3745 -2002 *"Emergency Control Organisation and Procedures for Buildings, Structures and Workplaces".*

5.7 Bushfire Hazard Management.

The intention of bushfire hazard management is to prevent flame contact with a structure, reduce radiant heat to below the ignition thresholds for various elements of a building, to minimize the potential for wind driven embers to cause ignition and to reduce the effects of smoke on occupants and firefighters.

However, careful attention shall be given to species selection within the landscaping, their location relative to their flammability, avoidance of continuity of vegetation [separation horizontally and vertically] and ongoing maintenance to remove flammable fuels. Management of the landscaped areas within the development shall comply with the following:

- Maintain a clear area of low cut lawn or pavement adjacent to the building;
- Keep areas under shrubs and trees raked and clear of combustible fuels; and
- Utilise non-flammable materials such as concrete paths, Scoria, pebbles and recycled crushed bricks as ground cover to landscaped gardens in close proximity to the building.

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SECTION 6

BUSHFIRE MANAGEMENT STRATEGIES

Strategies to mitigate the potential bushfire risk to the future industrial buildings in the estate are as follows:

6.1 Strategy 1 – Provision of Defendable Space to the Buildings.

The provision of defendable spaces to the future industrial buildings in the estate shall comply with Table 4. *[Refer to Attachment B – Plan of Bushfire Protection Measures – Defendable Spaces].*

Table 4. Defendable Space requirements to the future Industrial Development in the Estate.

Location	**Vegetation within 140m of buildings**	**Predominant Vegetation Formation Class *[Table A2.1 PfBFP]***	**Effective Slope of Land**	**Width of Defendable Space recommended**
Ropes Creek riparian corridor [> 80 metres wide]	Swamp Oak Forest	Forest	< 5 degrees downslope	20 metres defendable space to both sides of corridor [Provided by managed stormwater management ponds/roads and open space areas
Tributaries to Ropes Creek [< 50 metres wide]	Swamp Oak Forest	Forest – downgraded to Rainforest vegetated [narrow corridor < 50 metres wide]	< 5 degrees downslope	10 metres defendable space to both sides of corridor [Provided by managed setback from riparian corridor vegetation [including perimeter access]
South of Lot 1 in DP 120673 [western portion of site]	Cumberland Plain Woodland	Woodland – grassy understorey	5 - 10 degrees downslope	10 metres defendable space provided by setback from southern boundary [including perimeter access]
West of Lot 1 in DP 120673 [western portion of site]	Cumberland Plain Woodland	Woodland – grassy understorey	5 - 10 degrees downslope	10 metres defendable space provided by setback from western boundary and boundary of vegetation. [including perimeter access]

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6.2 Strategy 2 – Management of Defendable Space.

The landscaping within the boundary setbacks shall be maintained as an Inner Protection Area, in accordance with Appendix A5.4 & Appendix A5.5 of *Planning for Bushfire Protection 2006* and the Rural Fire Service *"Standards for Asset Protection Zones"* so as to provide a defendable space to the building.

6.3 Strategy 3 – Landscape Management.

Management of the Inner Protection Area [landscaped gardens] within the development site shall comply with the following:

- Ensure that vegetation does not provide a continuous path to the buildings;
- Plant or clear vegetation into clumps rather than continuous rows;
- Prune low branches two metres from the ground;
- Locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- Maintain a clear area of low cut lawn or pavement adjacent to the building;
- Ensure that shrubs and other plants do not directly abut the dwelling
- Keep areas under shrubs and trees raked and clear of combustible fuels; and
- Utilise non-flammable materials such as Scoria, pebbles and recycled crushed bricks as ground cover to landscaped gardens in close proximity to building/s.

6.4 Strategy 4 – Construction Standards of Buildings located adjacent to the Ropes Creek Corridor.

The construction of the buildings sited adjacent to the Ropes Creek corridor will need to address flame contact and radiant heat levels greater than 29kWm2. Alternatively, a wider defendable space [> 25 metres] maybe required if the future buildings, particularly on the eastern side of the corridor, are constructed with windows and light weight wall construction facing the bushfire hazard.

6.5 Strategy 5 – Construction Standards of Buildings located adjacent to the Tributaries to Ropes Creek Corridor.

The construction of the buildings sited adjacent to the tributaries to Ropes Creek will be impacted by levels of radiant heat that warrant construction of the exposed elevations to standards which will address radiant heat levels up to 29 kWm2 [toughened glass to windows, no external timber, no external lightweight cladding].

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6.6 Strategy 6 – Construction Standards to Buildings located adjacent to the Cumberland Plain Woodland.

The construction of the buildings sited adjacent to the Cumberland Plain Woodland will need to address flame contact and radiant heat levels greater than 29kWm2. Alternatively, a wider defendable space [> 25 metres] maybe required if the future buildings, particularly where elevations are constructed with windows and light weight wall construction is facing the bushfire hazard.

6.7 Strategy 7 – Construction Standards to Buildings to safeguard against ember attack.

To address the threat from ember attack from fires that occur in the riparian corridor vegetation, the construction of buildings shall comply with the following recommendations:

- Preference should be given to the design of roofs/gutter systems, to the buildings that adjoin the Ropes Creek riparian corridor, that do not have the potential to accumulate combustible material [even when the building is seemingly remote from native vegetation].

- External doors to the Loading Docks shall be protected against the entry of embers – threshold, stile and head seals shall be fitted to doors;

- Any external vents or grilles and air-conditioning intake grilles shall have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers through the opening; and

- No combustible materials are to be stored external to the building.

6.8 Strategy 8 – Water Supplies for Firefighting Operations.

A reticulated water supply shall be extended to service the future industrial development in accordance with the specifications of Australian Standard A.S 2419.2. Hydrants shall have a flow rate of 10 litres / second.

Fire hydrants shall be accessible and located such that a fire appliance can park within a maximum distance of 20 metres from the hydrant and the habitable building must be located such that a fire at the furthest extremity can be attacked by fire-fighters using two 30 metre hose lines and a 10 metre water jet. A clear unobstructed path between the hydrant and the most distant point of the building cannot exceed 90 metres.

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Blue hydrant markers shall be provided to locate the positions of the hydrants. The markers shall be positioned on the hydrant side of the centre line of the road pavement.

It is recommended that a "layby" parking bay be provided at the booster assembly [when installed] and that external "Millcock" valves [Landing Valve] Hydrants be provided in locations which will assist in the extinguishment of bushfires that occur in the Ropes Creek riparian corridor.

6.9 Strategy 9 – Evacuation Planning.

A site specific Evacuation Plan shall be prepared for each of the future developments that occupy the Distribution Park. The Evacuation Plans for each facility will include the protocols for the evacuation of the individual buildings within the estate during bushfire and other emergencies. The individual Evacuation Plans shall address the protocols for the timely relocation of Staff/Customers in the event that an emergency occurs, both within the site or within the local area.

A copy of the individual Evacuation Plans shall be provided to the Local Emergency Management Committee/Police, NSW Fire Brigade and NSW Rural Fire Service.

The Evacuation Plans shall comply with AS 3745 -2002 *"Emergency Control Organisation and Procedures for Buildings, Structures and Workplaces".*

6.10 Strategy 10 – Construction of Public & Private Access Roads.

The public road network within the estate and the Private road access to the proposed allotments shall comply with the deemed-to-satisfy provisions of Section 4.1.3, "Public Roads" and "Private Roads" as defined by *Planning for Bushfire Protection* 2006, including the provision of firefighting access to the riparian corridors to the tributaries of Ropes Creek.

Either perimeter road access or fire trail access shall be provided within the defendable space setback to the riparian corridor to Ropes Creek and to the Cumberland Plain Woodland vegetation.

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SECTION 7

CONCLUSION

This report has been undertaken to inform the concept planning process, under Part 3A [Major Projects] of the *Environmental Planning & Assessment Act,* on the bushfire protection measures required for the proposed Oakdale Distribution Park on Lots 1 & 2 in DP 120673, Lots 82/87 in DP 752041 and Lot 1 in DP 843901, Old Wallgrove Road, Horsley Park & Kemps Creek.

Lot 1 in DP 843901 is located to the east of Old Wallgrove Road, Horsley Park and contains the existing Austral Brickworks, and whilst forming part of the Concept Plan for the site, will remain in operation as a brickworks with future redevelopment of the site undertaken at the cessation of the exiting operations.

An indicative Master Plan has been prepared for the Distribution Park. The indicative Master Plan confirms that the corridor to Ropes Creek will support bushfire prone vegetation to a minimum width of 80 metres and the vegetated width of the tributaries will be 40 metres. It is also likely that additional planting will occur across the flood plain to Ropes Creek, increasing the availability of the bushfire prone vegetation on the site.

Adjoining properties to the south and west contain areas of Cumberland Plain Woodland which is also deemed to be bushfire prone vegetation.

This report has examined the likely bushfire threat from a fire which may occur in the identified bushfire prone vegetation and recommends strategies that should be considered in the design and construction of the future estate and the industrial buildings so as to address the provision of setbacks [defendable spaces] from the bushfire prone vegetation, commensurate with the level of threat and the type of development.

It also provides strategies to address access and water supply provisions for fire fighting operations and construction standards to the industrial buildings located adjacent to the bushfire hazard.

If these strategies are adopted in the planning of the estate, the development proposal will provide defendable spaces, access provisions, water supplies for fire-fighting operations and construction standards which address the aim and objectives and the deemed-to-satisfy provisions of *Planning for Bushfire Protection 2006* for commercial and industrial development.

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The assessment of the bushfire protection requirements and potential levels of bushfire attack on the future buildings indicates that the development of the site can be undertaken in a manner that balances development opportunities and the protection of life, property and the environment from the bushfire threat.

Graham Swain,
Director,
Australian Bushfire Protection Planners Pty Ltd

REFERENCES:

- N.S.W Rural Fire Service – *Planning for Bushfire Protection 2006*;
- N.S.W Rural Fire Service – Draft Threatened Species Hazard Reduction List for the Bushfire Environmental Code (2003);
- *Environmental Planning & Assessment Act – 1979;*
- *Rural Fires Act – 1997;*
- *Rural Fires and Environmental Assessment Legislation Amendment Act 2002;*
- *Rural Fires Regulation 2002;*
- NSW Rural Fire Service – *Guideline for Bushfire Prone Land Mapping 2002;*
- *Threatened Species Conservation Act 1995;*
- *Native Vegetation Act;*
- *Bushfire Environmental Assessment Code 2003;*
- Building Code of Australia;
- Australian Standard A.S 3959-1999 "*Construction of Buildings in Bushfire Prone Areas".*
- *Penrith & Fairfield Bushfire Prone Land Maps.*

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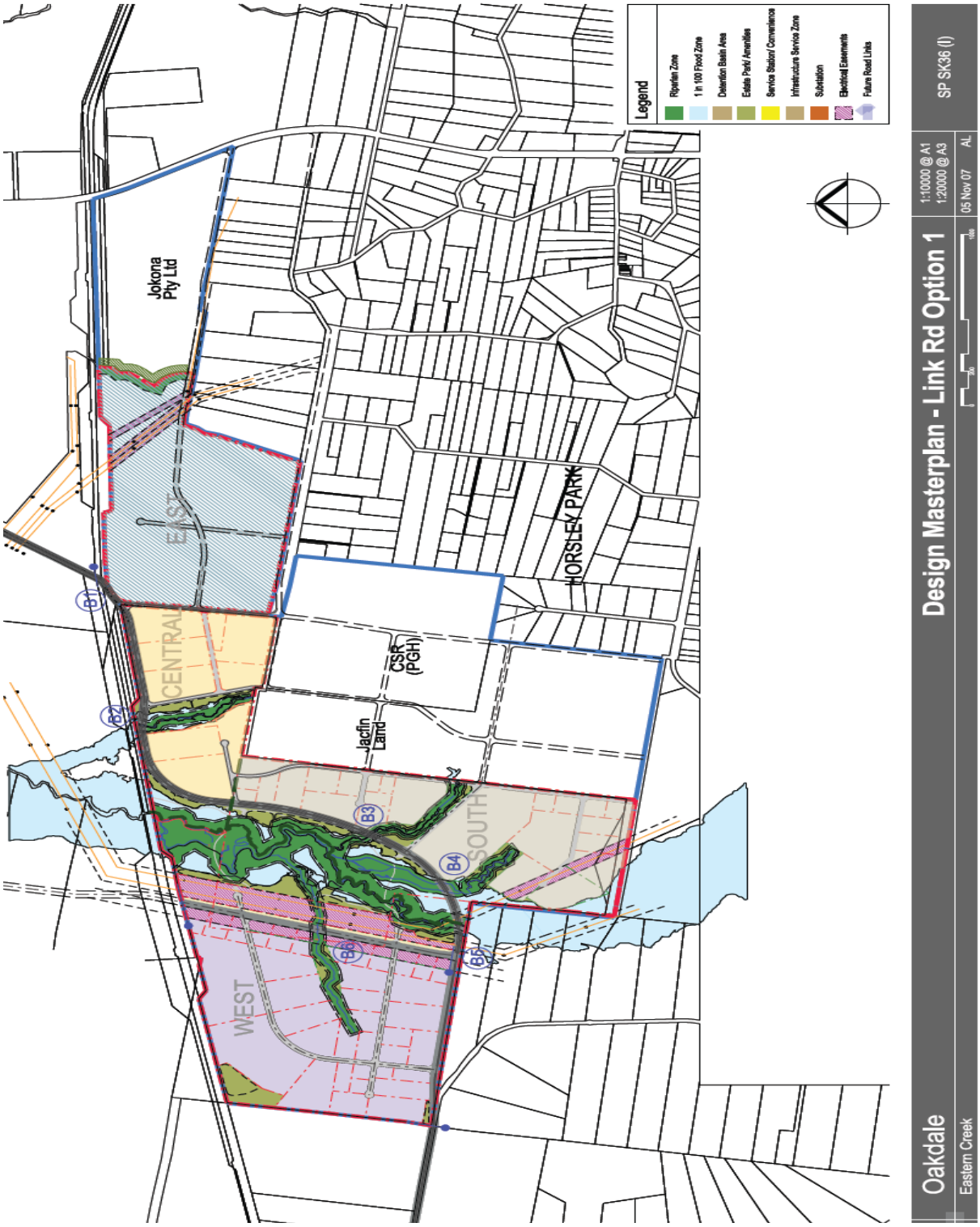
SECTION 8

ATTACHMENT A – PLAN OF DESIGN MASTERPLAN



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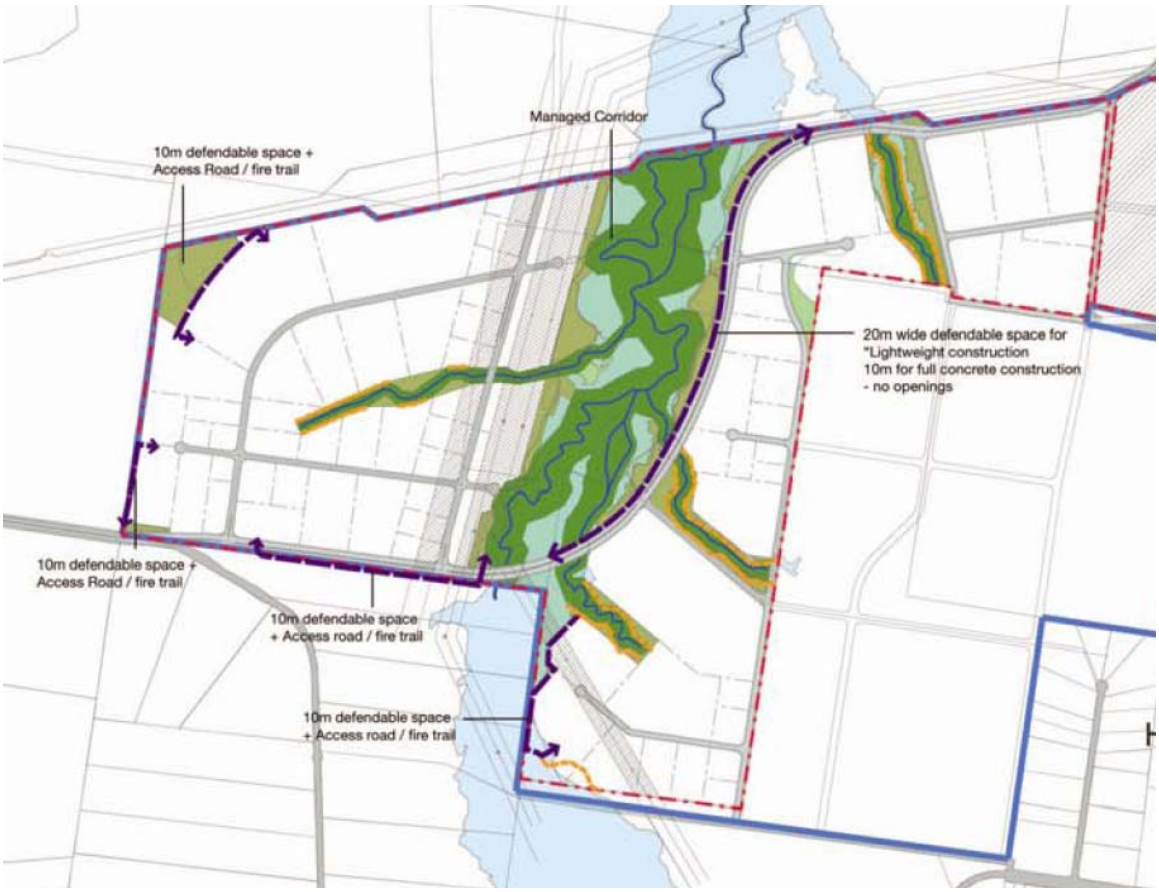
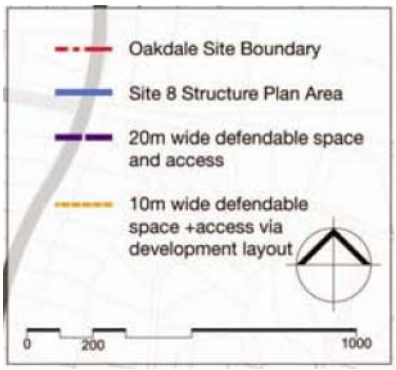
ATTACHMENT B

PLAN OF RECOMMENDED BUSHFIRE PROTECTION MEASURES [DEFENDABLE SPACES]





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