

Appendix 13

Bushfire Impact Assessment

Bushfire Assessment Report

Materials Recycling Facility

**Lot 6 DP1065574
Newbridge Road, Moorebank NSW**

Liverpool LGA

Prepared for
Moorebank Recyclers P/L

May 2011

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Document Control

Document Name	Project Ref	Date	Author	Status
20110430NEX BAR 1.0	20110430NEX	24-May-11	TO	Draft A
20110430NEX BAR 1.1	20110430NEX	25-May-11	TO	Final
20110430NEX BAR 1.2	20110430NEX	25-May-11	TO	Rev A



Abbreviations

APZ	Asset protection zone
AS3959	Australian Standard AS3959-2009 <i>Construction of buildings in bushfire-prone areas</i>
BCA	<i>Building Code of Australia</i>
BFSA	Bush fire safety authority
BPLM	Bushfire Prone Land Map
BPM	Bushfire protection measures
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
FDI	Fire danger index
IPA	Inner protection area
kWm ⁻²	Kilowatts per metre squared (measure of radiant heat)
NCC	<i>National Construction Code 2011</i>
OPA	Outer protection area
PBP2006	<i>Planning for Bush Fire Protection 2006</i>
RF Act	<i>Rural Fires Act 1997</i>
RFS	NSW Rural Fire Service
RHF	Radiant heat flux



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1 Legislative context

On 1 August 2002 the NSW Government enacted amendments to the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Rural Fires Act 1997* (RF Act) to enhance bushfire protection through the development assessment process. The amendments:

- Introduced Bushfire Prone Land Maps as a 'trigger' for the application of bushfire legislation and the application of BCA standards
- Mandated Rural Fire Service concurrence for development applications subject to section 100B of the RF Act (Subdivisions and Special Fire Protection Purposes)
- Required compliance with the provisions of *Planning for Bush Fire Protection*
- Required identification of bushfire prone land on section 149 certificates

The section 149 certificate for this property should identify the lot as bushfire prone land.

This means that an application to develop the lot may be subject to section 79BA of the *Environmental Planning and Assessment Act 1979* and must comply with *Planning for Bush Fire Protection 2006* (PBP2006).

PBP2006 requires that all development applications be accompanied by a Bushfire Assessment Report that demonstrates compliance with the aims and objectives of the guidelines (PBP2006, Appendix 4 A4.1).

The NCC was updated in May 2011 to enable the achievement of nationally consistent, minimum necessary standards for health and safety (including structural safety and safety from fire). This code calls up Australian Standard AS3959-2009 *Construction of buildings in bushfire prone areas* to address deemed-to-satisfy construction specifications.

PBP2006 adopts the construction standards of AS3959-2009 for acceptable solutions within the guideline with the exception of NSW variations detailed in Addendum Appendix 3 of PBP2006.

In 2009, the ABCB was tasked by the Council of Australian Governments (COAG) with producing the National Construction Code (NCC), covering both building and plumbing, for release early in 2011.

This reform has now been realised, with the publication of the National Construction Code (NCC) Series. From 2011, the Building Code of Australia (BCA) will comprise Volume One and Two of the NCC Series. The Building Code of Australia Volume One Class 2 to 9 Buildings is now referenced as the National Construction Code Series Volume One — Building Code of Australia.

PBP2006 also recognises that the NCC for commercial development is acceptable where the aims and objectives of PBP2006 are met.

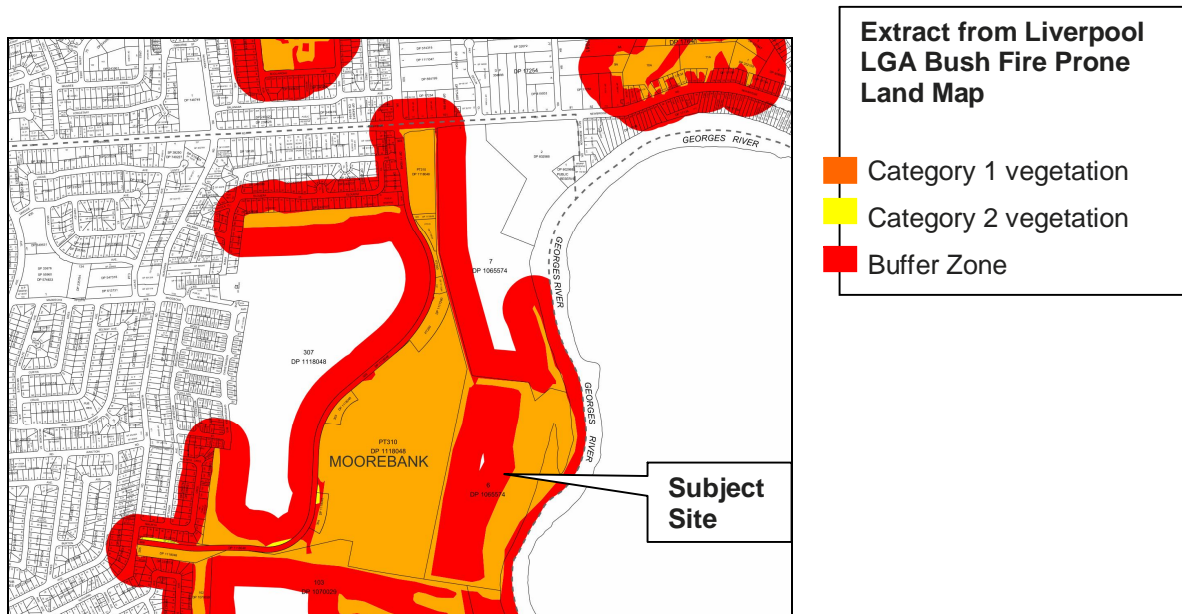
However, this report has been prepared to address a part of the environmental assessment required under Part 3A (Major Infrastructure and Other Projects) and is not subject to Part 4 assessment (above) at this time.



2 Bushfire prone land

The site is within the bushfire prone land on the Liverpool LGA Bush Fire Prone Land Map and is identified as Buffer Zone. The site, when developed, will be within 100m of Category 1 vegetation to the east and west.

- Category 1 vegetation is generally heavily wooded native vegetation
- Category 2 vegetation is generally remnant vegetation, riparian corridors and rainforest
- Buffer Zone is land in proximity to the most significant impacts of bushfire (within 100m of Cat 1 or within 30m of Cat 2)





3 Background

3.1 Description of property

The property subject to this development proposal is identified as

- Lot 6 DP1065574
- Newbridge Road, Moorebank NSW
- Within Liverpool local government area.
- The lot is approximately 22ha, 700m deep, 300m wide and irregular in shape
- The lot is currently cleared with a remnant stand of vegetation along the river side.
- The land was previously a landfill site.
- The lot is bounded by the Georges River to the east and a large bushland site to the west

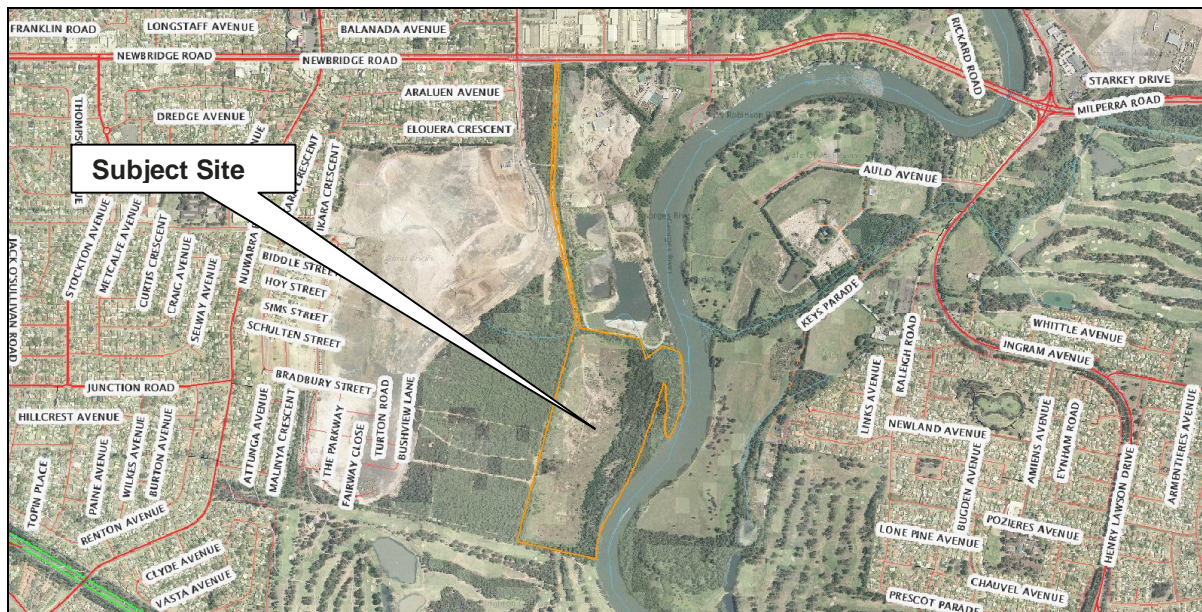


Photo 3.1.1: Aerial view of site and surrounding bushfire hazard



3.2 Type of development

This is a commercial development application on bushfire prone land subject to s.79BA of the EP&A Act.

This development is classified as 'other classes of buildings' within the *Planning for Bush Fire Protection 2006*.

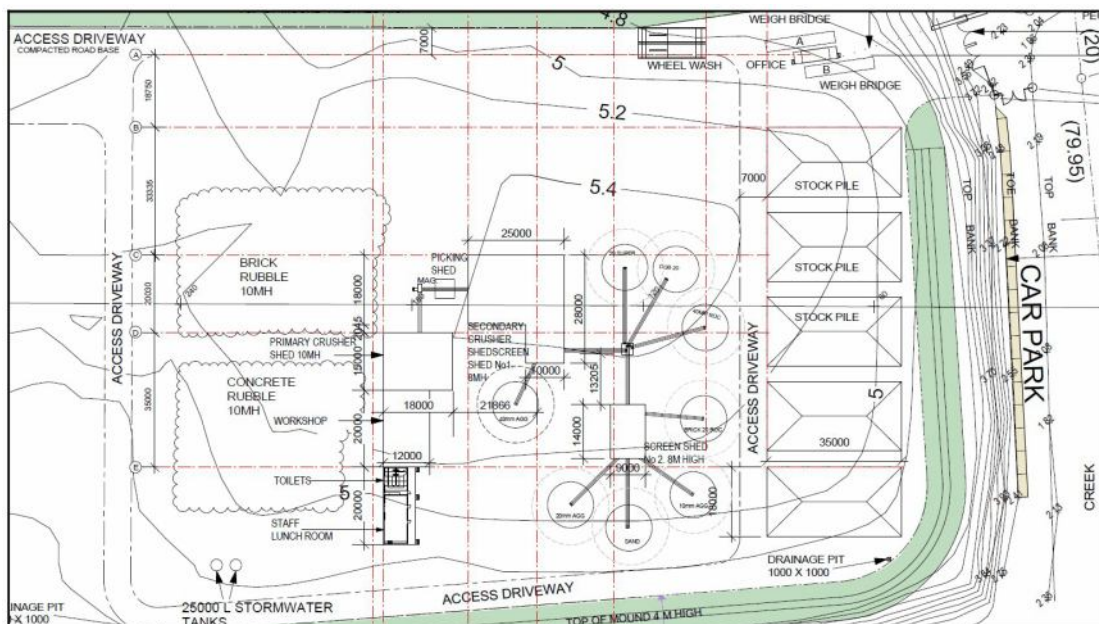
The development application proposes to:

- Construct a new materials recycling facility inc weighbridge, workshop, store and staff rooms
- Primary and secondary crushing and screening facilities are within steel sheds

The aims and objectives of PBP2006

The aim of PBP is to use the NSW development assessment system to provide for the protection of human life (including firefighters) and to minimise impacts on property from the threat of bush fire, while having due regard to development potential, on-site amenity and protection of the environment; more specifically, the objectives are to:

- afford occupants of any building adequate protection from exposure to a bush fire;
- provide for a defensible space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
- ensure that safe operational access and egress for emergency service personnel and residents is available;
- provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ); and
- ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting).



Plan 3.2.1: Extract from plan of proposed development



Plan 3.2.2: Proposed plan within site context



4 Assessment

4.1 Vegetation

4.1.1 Explanation

The predominant vegetation that will influence the behaviour of a bushfire impacting on the site is classified by structure using the system adopted by Keith (2004) and by the general description using table A2.1 of *Planning for Bush Fire Protection* 2006.

The vegetation assessed is that vegetation that is unmanaged or presents a structure and fuel load with the potential to support a bushfire.

4.1.2 Assessment

The bushfire hazard vegetation for the area is predominantly located to the east and west of the subject site.

The vegetation to the east adjoining the Georges River is Alluvial woodland, which is now called River-Flat Eucalypt Forest on Coastal Floodplain. It is a variety of Sydney Coastal River Flat Forest. It grows along minor watercourses and on flat areas next to riparian forest. This area also supports a small stand of mangroves (M).

The vegetation to the west contains a mosaic of floodplain forest communities including Alluvial Woodland, Castlereagh Swamp Woodland and Cooks River Castlereagh Ironbark Forest.

Alluvial Woodland (AW) or River Flat Eucalypt Forest has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple). A layer of small trees may be present, including *Melaleuca decora*, *M. styphelioides* (prickly-leaved teatree), *Backhousia myrtifolia* (grey myrtle), *Melia azaderach* (white cedar), *Casuarina cunninghamiana* (river oak) and *C. glauca* (swamp oak). This community is associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.

Castlereagh Swamp Woodland (CSW) is generally woodland or may occur as remnant trees. Characteristic tree species in the community are *Eucalyptus parramattensis* subsp. *parramattensis* and *Melaleuca decora*. It has an understorey that may be either grassy or herbaceous with many annual and ephemeral species that respond to wet conditions. The shrub layer can be mid-dense to sparse depending on frequency and period since the last fire. It is typically associated with poorly-drained depressions and creeklines on clay soils associated with Tertiary alluvium.

Cooks River/Castlereagh Ironbark Forest (CRCIF) is predominantly of open-forest to low woodland structure usually with trees of *Eucalyptus fibrosa* and *Melaleuca decora*, sometimes with *Eucalyptus longifolia*. A relatively dense shrub stratum is typical, commonly with *Melaleuca nodosa* and *Lissanthe strigosa*, and to a lesser extent *Melaleuca decora*. A variety of shrub species may occur, including *Acacia pubescens*, *Dillwynia tenuifolia*, *Daviesia ulicifolia*, *Pultenaea villosa* and *Grevillea juniperina*. Commonly occurring species in the ground stratum include *Entolasia stricta*, *Lepidosperma laterale*, *Opercularia diphylla*, *Dianella revoluta*, *Themeda australis*, *Microlaena stipoides* and *Pratia purpurascens*.

Although these communities are predominantly called woodland types they are structurally similar to the description for forests in PBP2006. Sydney Coastal River-flat Forests are broadly classified in Keith (2004) as Forested Wetland. Keith classes Cooks River/Castlereagh Ironbark Forest and Castlereagh Swamp Woodland as Dry Sclerophyll Forests. PBP2006 classifies each of these as **Forest** for the purposes of assessing the bushfire behaviour.



Plan 4.1.2.1: Aerial photo (Nearmap 15 July 2010) showing vegetation in relation to site.



Table 4.1.2.1: Vegetation assessment for each aspect (fuel loads derived from AS3959-2009 Table B2)

Aspect	Formation	Surface fuel (t/ha)	Overall fuel (t/ha)	Height (m)
North	Managed (Quarry)			
East	Forest (AW & M)	25	35	-
South	Managed (Golf course)			
West	Forest (AW, CSW & CRCIF)	25	35	-

4.1.3 Recommendation

Vegetation should be classified as described in Table 4.1.2.1 for the purposes of assessment using the methodology detailed in PBP2006 and AS3959-2009.

4.2 Slope

4.2.1 Explanation

Slope is a significant factor in determining bushfire behaviour. The slope influences the rate of preheating. A fire moving up a steep slope will direct the greater quantity of heat directly into the preceding vegetation with the convective air currents. This means the fuel will combust faster and with a greater intensity. Whereas a fire moving down a slope will lose a great deal of heat to the atmosphere and subsequently burn slower and with a lesser intensity.

The predominant slope is measured over a distance of up to 140m from the building envelope and is taken as the slope that will most influence the bushfire behaviour rather than a simple average.

Planning for Bush Fire Protection 2006 provides five (5) classes of slope to simplify assessment.

4.2.2 Assessment

The site is located on floodplains on the western bank of the Georges. Aside from minor depressions the site and adjoining hazards to the east and west are essentially on flat terrain.

Any bushfire run would be across the slope (0°).

Table 4.2.2.1: Slope influencing bushfire behaviour about the site

Aspect	Description	Distance measured (m)	Angle	Class
East	Cross slope	100	0°	0°
West	Cross slope	100	0°	0°

4.2.3 Recommendation

Slope should be classified as described in Table 4.2.2.1 for the purposes of assessment using the methodology detailed in PBP2006.



4.3 Fire danger index

Also known as Forest Fire Danger Index is a bushfire behaviour factor derived from environmental conditions particular to a weather region in NSW. It rates the credible worst case scenario conditions assumed for a 1:50 year bushfire event.

Table A2.3 of *Planning for Bush Fire Protection* 2006 provides a list of regions and local government areas.

Liverpool LGA falls within Region 4 – Greater Sydney Region (100)

4.4 Setback

The setback is the actual distance provided by the development between the building line and the bushfire hazard vegetation. Setback may also describe the limits of maintainable space about the development (defendable space).

- No setbacks determined as the location of structures are not defined at the time of this report.

4.5 Asset protection zone

4.5.1 Explanation

The asset protection zone is a bushfire fuel and vegetation structure managed space between the assets of the development and the unmanaged bushfire hazard vegetation or native bushland.

- It provides a safe space for firefighters to conduct bushfire mitigation measures in the defence of a dwelling or other asset
- It reduces the intensity of radiant heat impacting on the dwelling or asset
- It reduces the turbulence of convection driven winds in the vicinity of the dwelling
- It reduces ember viability limiting impact of ember attack on the dwelling or asset
- It permits the dispersal of smoke that may otherwise severely impact on occupants health

APZs may be increased to reduce the intensity of RHF impacting on the dwelling or asset to achieve lower construction levels under AS3959.

4.5.2 Assessment

PBP2006 provides an assessment methodology to determine the appropriate asset protection zone dimensions to complement specific construction standards in AS3959-2009. However, as commercial developments are outside the scope of AS3959-2009 and the relevant standards in the NCC for commercial buildings generally provide a higher level of performance than standards for residential buildings, the methodology in PBP2006 can not be applied to this development.



Should any of the proposed buildings be constructed of a similar design to that of a residential building then the following APZ dimensions may be appropriate or be used as a guide to minimizing potential bushfire impacts.

Table 4.5.2.1: APZ for compliance with PBP2006 & AS3959-2009 for infill development

Aspect	FDI	Slope	Vegetation Class	APZ	Level
East & West	100	0°	Forest	<19m	FZ
East & West	100	0°	Forest	19-<25m	BAL-40
East & West	100	0°	Forest	25-<35m	BAL-29
East & West	100	0°	Forest	35-<48m	BAL-19
East & West	100	0°	Forest	48-<100m	BAL-12.5

The APZ within the lot will provide suitable defensible space about the proposed structures. There should be clear access about the structures to provide access for defence.

4.5.3 Recommendation

None

4.6 Performance assessment

4.6.1 Explanation

Planning for Bush Fire Protection 2006 allows submissions proposing variations to acceptable solutions where they provide substantial evidence that the specific objectives (see 3.2) and performance criteria can be met.

4.6.2 Assessment

Not required for this project

4.7 Construction

4.7.1 Explanation

The BCA calls up AS3959 to prescribe construction standards for class 1, 2 and 3 buildings and parts of class 4 buildings and some class 10 structures on designated bushfire prone land.

These construction levels are based on increasing levels of protection to mitigate the increased level of bushfire attack and the various forms of bushfire impact. (Smoke, Wind, Ember, Heat, Flame).

The BCA provides a NSW variation to adopt the assessment methodology detailed within Addendum: Appendix 3 of *Planning for Bush Fire Protection* 2006 rather than the methodology within AS3959.

AS3959-2009 does not address construction standards for commercial buildings.



4.7.2 Assessment

Compliance with the APZ distances in Table 4.5.2.1 and Plans 4.5.3.1 will ensure compliance with AS3959-2009 construction standards and PBP2006 planning provisions.

As a commercial development the construction standard AS3959 does not apply. However as the NCC does not provide an equivalent bushfire construction standard for commercial development, then AS3959 can be utilized as a guide to assess the impact of bushfire on particular building elements.

No specific construction has been proposed at the time of preparing this report.

Proposed buildings that may be used as refuges for personnel should be designed and constructed to resist the impacts of bushfires.

Although all the elements of a buildings construction should be considered for their vulnerability to the impacts of bushfire, the most significant element will be windows and glazing elements. The failure of a glazed element can allow penetration of embers into the highly flammable interior. AS3959 provides specific standards for glazing that should be adopted for any proposed building based on the setback distance from the bushfire hazard (Table 4.5.2.1).

The design of the buildings should also include screening all openings to prevent ember penetration.

4.7.3 Recommendation

None

4.8 Water and services

4.8.1 Explanation

Access to sufficient water supplies may be critical for the effective defence of a property during a bushfire event. Consideration should be given to the distances between hydrants or tanks and the building or asset to be protected.

Planning for Bush Fire Protection 2006 (Table 4.2) provides a specification for onsite water storage capacities where reticulated water is unavailable or unreliable.

4.8.2 Assessment

The proposal includes the installation of 2 x 250,000L stormwater storage tanks. It is expected that these tanks will not be storing any water for bushfire suppression purposes.

The site is situated adjacent to the Georges River and properties to the north and south contain large dams

The site is serviced by reticulated mains water supplies. This mains will be extended into the site to provide water onsite.

Hydrants were identified along the road reserve to the north of the lot on Newbridge Road (near site entry driveway). No hydrants are within the required 70m described in PBP2006.

PBP2006 states that hydrant location, size and pressure should comply with AS2419.1-2005 or a test report should be provided. Sydney Water will not provide a guarantee that standard pressures will be available. No particular deficiencies are apparent in the supply.



4.8.3 Recommendation

Water, electricity and gas are to comply with the following requirements of section 4.1.3 of *Planning for Bush Fire Protection* 2006.

1. Two onsite water storage tanks shall be provided; each with a maintained capacity of 5000L. One shall be located near the weighbridge offices and another near the staff lunch rooms and workshop.
2. Where an onsite water supply is provided, a suitable connection for firefighting purposes shall be made available and located within the inner protection area (IPA) and away from the building. An RFS standard 65mm metal Storz outlet with a gate or ball valve should be provided. The gate or ball valve, pipes and tank penetration are adequate for full 50mm inner diameter water flow through the Storz fitting and are metal rather than plastic.
3. Exposed above ground tanks should be manufactured of concrete or metal and raised tanks are to have their stands protected. Polycarbonate/plastic tanks can be used but shall be shielded from the impact of radiant heat and direct flame contact and maintain safe access to the water supply for firefighters.
4. Underground tanks shall have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is to be supplied within 4 metres of the access hole.
5. A Pump should be provided to supply water for fire suppression activities and be a minimum 5hp or 3kW (petrol or diesel powered).
6. Pumps for the water tank shall be adequately shielded from potential bush fire threat.
7. All above ground water and gas service pipes/outlets/fittings external to the building shall be metal, including and up to any taps.
8. Electrical transmission lines are to be located underground.
9. Overhead electrical transmission lines are to be installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and no part of a tree is to be closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).
10. Reticulated or bottled gas is to be installed and maintained in accordance with Australian Standard AS/NZS 1596:2002: 'The storage and handling of LP gas' and the requirements of relevant authorities. Gas cylinders kept close to the building shall have release valves directed away from the building and be located at least 2 metres away from any combustible material. Connections to and from gas cylinders are to be metal.
11. Polymer sheathed flexible gas supply lines to gas meters adjacent to building are not to be used.

4.9 Access

4.9.1 Explanation

Roads to new developments should facilitate rapid and safe access for fire fighters and emergency services vehicles. These should also permit evacuation of the residential population without obstructing the passage of emergency services vehicles.

Sections 4.1.3(1-3) and 4.2.7 of *Planning for Bush Fire Protection* 2006 detail the requirements for safe access.



4.9.2 Assessment

The existing public access road meets the specifications of PBP2006. There is no foreseen impediment to access by a Cat 1 tanker on this road.

The proposed access road will be designed to cater for heavy transport vehicles (>20t) and as such would meet any and all requirements for Cat 1 Tankers.

Access to the site will be off Governor Macquarie Drive.

4.9.3 Recommendation

None

4.10 Landscaping

4.10.1 Explanation

The impact of bushfires on property and life can be reduced by the responsible preparation and management of bushfire hazards. Effective strategies will involve maintenance of properties to limit the impact of ember, radiant heat and flame attack.

Appendix 5 of *Planning for Bush Fire Protection* 2006 provides principles for landscaping in bushfire prone areas but provides no specific requirements.

4.10.2 Assessment

No landscaping has been identified

4.10.3 Recommendation

None

4.11 Emergency planning

4.11.1 Explanation

The decision to stay and defend a property or to relocate to a safe refuge during the fire should be made early. The most effective way to make and implement this decision is by pre planning. The RFS provide a guideline to assist development of a comprehensive emergency and evacuation management plan.

Special Fire Protection Purposes developments are required to prepare an emergency/evacuation plan that is approved by the RFS as detailed in section 4.2.7 of *Planning for Bush Fire Protection* 2006

4.11.2 Assessment

Not applicable to this development



4.11.3 Recommendation

None

4.12 *Threatened species and aboriginal relics*

4.12.1 Explanation

Although threatened species and communities or aboriginal relics do not contribute to the bushfire risk they may impose a constraint to the application of bushfire protection measures and bushfire management strategies adopted for the development.

4.12.2 Assessment

Not applicable to this development.

4.12.3 Recommendation

None

5 Conclusion

The proposed commercial development is required to meet the aims and objectives of PBP2006 without necessarily complying with any of the specific planning provisions in the guideline.

The site is large and will accommodate suitable asset protection zones and defensible spaces for any buildings that may be occupied (office, staff rooms, store, workshop etc.). The NCC will require high construction standards that should exceed the performance targets of AS3959. Where vulnerabilities are identified then AS3959 can be used as a guide to direct appropriate protection measures or construction solutions.

The setback distances in Table 4.5.2.1 will ensure that there is appropriate separation from the bushfire hazard to prevent flame contact and material ignitions.

The access to the site will be designed to cater for heavy vehicles which will meet all the requirements for a Cat1 Tanker to safely access and egress the site.

The site should continue to be maintained in its current fuel free state to ensure that APZ maintenance levels are achieved for the life of the development.

The site is serviced by reticulated mains water but the distance to hydrants require the provision of an onsite water storage tank to ensure an available supply. Two separate 5000L tanks will be provided near occupied buildings.

These measures will ensure compliance with the aims and objectives as required by PBP2006 for commercial development.



6 References

Australian Building Codes Board (2011) *National Construction Code*. Commonwealth of Australia

Keith D. (2004) *Ocean Shores to Desert Dunes*. Department of Environment and Conservation, Sydney

Rural Fire Service NSW (2005) *Standards for asset Protection Zones*

Rural Fire Service NSW (2006) *Planning for Bush Fire Protection*

Standards Australia (2009) AS3959 *Construction of buildings in bushfire-prone areas*