



total **earth** care

**Benedict Site, No.146 Newbridge Road,
Moorebank**

Bushfire Hazard Assessment

Proposed Rezoning

Total Earth Care Pty Ltd
January 2006

Benedict Site, No.146 Newbridge Road, Moorebank

Bushfire Hazard Assessment

Proposed Rezoning

Quality Control	© Total Earth Care Pty Ltd 2006		
Revision/Version No.	4	Date of revision:	December 30, 2006
Prepared by:	N Bauer	Status (Draft/Final):	Final
Prepared for:	Maron Investments Pty Ltd		
TEC Job No.	C318-GP		

Benedict Site, No.146 Newbridge Road, Moorebank Proposed Rezoning

Bushfire Hazard Assessment

Table of Contents

	Page
1 INTRODUCTION	1
1.1 Background	1
1.2 Property Details	1
1.3 Statutory Context	2
1.4 Bushfire Prone Land	2
2 METHODS	2
3 SITE DESCRIPTION	2
3.1 General Description	2
3.2 Topography and Aspect	2
3.3 Vegetation	3
3.4 Environmental Features	5
4 HAZARD ASSESSMENT	5
4.1 Bushfire Threat Assessment	5
4.2 Construction Standards	6
4.3 Analysis of Fire Behaviour	7
5 ACCESS AND SERVICE SUPPLY	7
5.1 Access and Egress	7
5.2 Services	7
6 RECOMMENDATIONS	7
6.1 Construction Standards	7
6.2 Asset Protection Zones	8
6.2.1 Outer Protection Area	8
6.2.2 Inner Protection Area	8
6.3 Access and Egress	9
6.4 Services	9
6.5 Landscaping	9
7 REFERENCES	10

Benedict Site, No.146 Newbridge Road, Moorebank Proposed Rezoning

Bushfire Hazard Assessment

APPENDICES

- A Rezoning Structure Plan
- B Aerial Photograph of Site and Surrounds
- C AS3959 - Key Construction Requirements for Bushfire Protection
- D Asset Protection Zones and Fire Mitigation Measures

Benedict Site, No.146 Newbridge Road, Moorebank Proposed Rezoning

Bushfire Hazard Assessment

1 INTRODUCTION

1.1 Background

Maron Investments Pty Ltd is proposing to change the zoning of land located at No.146 Newbridge Road, Moorebank (referred to herein as the 'subject site'). The site is located on approximately 22 hectares (ha) of land within Liverpool Local Government Area (LGA). Benedict Sand and Gravel is the current occupier of the site, and is using it for the purpose of waste recycling and sand extraction.

A rezoning application is to be lodged with Liverpool Council that will amend the zoning under the current *Liverpool Local Environmental Plan 1997* (LEP). A Rezoning Structure Plan has been prepared to accompany the application, which proposes that the land be rezoned from 'rural' to a combination of commercial, residential and recreational open space uses. A copy of the Plan is provided in Appendix A. The Residential Precinct, as shown in Appendix A, will be sited towards the northern end of the block. It is also proposed that a large portion of the site, south of the Residential Precinct, be landscaped to form a recreational area zoned as Private Open Space.

Total Earth Care Pty Ltd (TEC) has been engaged by Maron Investments Pty Ltd to prepare a *Bushfire Hazard Assessment* to accompany the rezoning application in order to fulfil Liverpool Council's requirements and provide a better understanding to bushfire hazard on and surrounding the site. Additionally, this report has been written with the aim of minimising potential future bushfire threat issues associated with the landscaping of the area to be re-zoned as Private Open Space.

1.2 Property Details

The details of the property at No.146 Newbridge Road, Moorebank are given below in Table 1.

Table 1 Site Details, No.146 Newbridge Road, Moorebank

Client	Maron Investments Pty Ltd)
Ownership	Private
Street Address	146 Newbridge Road, Moorebank
LGA	Liverpool
Lot Number & DP	Lot 1 DP 515738
Size (hectares)	22.59 hectares
Type of Area	Rural
Current Zoning (<i>Liverpool LEP 1997</i>)	1(a) Rural
Proposal	Residential, Commercial and Recreational Rezoning
Development Type (as defined under Planning for Bushfire Protection, RFS 2001)	'Residential Purposes'

1.3 Statutory Context

In August 2002, both the *NSW Rural Fires Act 1997* (RFA Act) and the EP&A Act were amended to improve planning for bushfire protection within NSW. The changes were reflected in the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002*, which includes a requirement for development on bushfire prone land to conform to the guidelines of the NSW Rural Fire Service (RFS) published in *Planning for Bushfire Protection* ('PBP' - RFS 2001).

PBP forms the basis for all planning and development control measures regarding bushfire protection in NSW. Under PBP, development within a designated bushfire prone area, as mapped by the RFS and Local Councils, requires a bushfire hazard assessment and the implementation of measures to control the bushfire threat. Bushfire prone areas are defined as those areas within, or within 100m of, high or medium bushfire hazards; or within, or within 30m of, low bushfire hazard.

1.4 Bushfire Prone Land

Land along the western boundary and a section of the middle of the site is mapped as Bushfire Prone Land (Vegetation Buffer) as per Liverpool LGA 'Bushfire Prone Land Map'. This land falls within 100m of higher risk bushland mapped as Bushfire Prone Land (Vegetation Category 1). Parts of the site are therefore considered to be at potential risk from bushfires, and hence a Bushfire Hazard Assessment is required. TEC has sighted Councils 'Bushfire Prone Land Map', however Council does not make the data publicly available and hence it cannot be reproduced in the report.

2 METHODS

A site inspection of the property was conducted on Friday November 4, 2005. The visit involved an assessment of slope, vegetation and general landscape context.

Slope was measured using a clinometer over a distance of 100m from the perimeter of the sites and where significant stands of vegetation occur on the sites. Where the topography varied, the effective slope was calculated by measuring the slope that would have the greatest affect on fire behaviour with respect to the vegetation present.

When assessing the vegetation of a site, PBP requires assessment of the predominant vegetation that would affect fire behaviour. For the purposes of this assessment vegetation was assessed over 140m from the perimeter of the sites and where significant stands of vegetation occur on the sites.

3 SITE DESCRIPTION

3.1 General Description

The subject site, known as Lot 1 DP 515738, is located at No.146 Newbridge Road, Moorebank, within the Liverpool LGA. It is bounded to the north by Newbridge Road, to the east by the Flower Power Nursery and the Georges River, to the south by Moorebank Recyclers. A stormwater drainage channel and access trail runs along the western boundary of the site.

The site is zoned 1(a) Rural under Liverpool LEP and is currently used for the purpose of waste recycling and sand extraction.

3.2 Topography and Aspect

The natural topography of the site has been highly altered by past filling and current sand extraction activities, creating a series of small mounds and hills. The largest hill on site, informally known as 'Mount Echo', has been formed by the piling of unconsolidated fill material. The local relief is generally between 1.7 to 6.5m above sea level. Land surrounding the site is generally flat (<5°) with little

undulation. The site falls within the Georges River catchment, with the River forming part of the eastern boundary of the site.

A constructed stormwater channel emanates from Chipping Norton and flows along the western and southern boundaries of the site to the Georges River. Another small ephemeral drainage line flows in a west to east direction into the Georges River, just south of 'Mount Echo'. A number of constructed dams are located within the southern part of site.

It is proposed that the area of land occupied by the Residential Precinct will be levelled, with the final height to be approximately 4m to 5m higher than the land immediately surrounding this zone. The area to be re-zoned Private Open Space, may be filled to approximately original natural ground level. A battered slope with a 1m retaining wall along the top edge will be constructed between the areas to be zoned Residential Precinct and Private Open Space.

3.3 Vegetation

The vegetation has previously been described in detail in a recent *Flora and Fauna Assessment* (TEC 2005). Three plant communities were identified on or adjacent to the subject site in this *Flora and Fauna Assessment*.

Cleared and Disturbed Land forms the majority of the site, while Riparian Woodland and Riparian Scrub are also found on the site. Most of the subject site is devoid of vegetation with the original native vegetation having been removed or modified over a long period of time as a result of current and past land use practices. The only remaining stands of vegetation border the Georges River, the western and southern aligned drainage line and the northern boundary of the site. The vegetation consists mostly of regenerating plants with a few remnant trees occurring in the far south-eastern corner of the site. Several large infestations of weed species are also present in various places (TEC 2005).

River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (commonly known as River-Flat Eucalypt Forest on Coastal Floodplains and formally known as Sydney Coastal River-flat Forest, SCRFF) has been mapped by NPWS (2003b) and AES (2002) as occurring south of the site along the Georges River. However, the vegetation on the site has been almost entirely modified, with only a few canopy tree species present. In addition, the soils of the site and within the area containing the Riparian Woodland have been substantially disturbed, thereby rendering the natural resilience of the community (based on soil-stored seed) severely depleted. On this basis, and on the fact that the area is not mapped by NPWS (2003b) as containing any Cumberland Plain vegetation (including River-Flat Eucalypt Forest on Coastal Floodplains), it is not assessed as being representative of River-Flat Eucalypt Forest on Coastal Floodplains.

Remnants of the endangered ecological communities Castlereagh Ironbark Forest and Cumberland Plain Woodland were identified on the adjacent Boral site during field investigations by ERM (2002). Remnants of Cooks River/Castlereagh Ironbark Forest were also identified within the Moorebank Recyclers site, to the south of the subject site (AES 2002). There is no evidence, however, of these communities within the subject site.

Riparian Woodland

The Riparian Woodland community occurs adjacent to the Georges River from the south-eastern corner of the site north to an unnamed drainage line that flows west to east into the River on the eastern perimeter of the site. Additionally, Riparian Woodland is also located to the west of the site, on Boral's land. The canopy of the Riparian Woodland extends to 20m with a Foliage Projective Cover (FPC) of 10-30%.

An area directly south of the site along the Georges River has been mapped by Tozer (2003), NPWS (2003) and AES (2002) as River-Flat Eucalypt Forest on Coastal Floodplains sub unit Alluvial Woodland. The riparian woodland community is characterised by a canopy of Swamp She-oak *Casuarina glauca*, Cabbage Gum *Eucalyptus amplifolia*, Forest Red Gum *Eucalyptus tereticornis*,

Broad-leaved Apple *Angophora subvelutina*, River Peppermint *Eucalyptus elata*, Blue Box *Eucalyptus baueriana* and Sydney Green Wattle *Acacia decurrens*. Due to the dominance of the Sydney Green Wattle it is likely that it has been directly seeded along the banks of the Georges River.

There are no significant understorey plants other than a few individuals of Blackthorn *Bursaria spinosa* and Castor Oil Plant *Ricinus communis*. The groundcover layer is dominated by native and exotic grasses and herbs including: Kikuyu, Common Couch, *Paspalum dilatatum*, Weeping Grass *Microlaena stipoides*, Common Verbena, Mat Rush *Lomandra longifolia* and New Zealand Spinach *Tetragonia tetragonioides*. Balloon Vine *Cardiospermum grandiflorum* and Wandering Jew *Tradescantia albiflora* are dominant along the drainage line that forms the northern boundary of this community.

Riparian Scrub

The Riparian Scrub vegetation occurs along the drainage line that runs along the western and southern boundary of the site. The canopy extends to 15m with an FPC of 10-30%. This community is devoid of structured native vegetation and is comprised of a mixture of native and exotic species.

The canopy is composed of Swamp She-Oak, River She-Oak *Casuarina cunninghamiana* (apparently planted), Golden Wreath Wattle *Acacia saligna* (a weed species) and Sydney Green Wattle. There are also sporadic occurrences of White Feather Honeymyrtle *Melaleuca decora*, Blue Box and Cabbage Gum.

The understorey contains a range of exotic species that commonly colonise disturbed ground, including Castor Oil Plant, Boneseed, Montpellier Broom *Genista monspessulana*, Senna *Senna pendula* and Common Verbena. Scattered individuals of Sydney Golden Wattle *Acacia longifolia* subsp. *longifolia* occur, forming the only representation of native shrubs in the area. Large stands of Fennel *Foeniculum vulgare* exist along the banks of the western channel.

The groundcover is largely dominated by weed species such as Bridal Creeper *Myrsiphyllum asparagoides*, Spear Thistle, Cobbler's Peg's *Bidens pilosa*, Crofton Weed *Ageratina adenophora*, Common Vetch *Vicia sativa*, Kikuyu, Common Couch, Turkey Rhubarb *Acetosa sagittata*, Spotted Knotweed *Persicaria decipiens* (a native) and Balloon Vine.

The drainage line contains a significant infestation of the aquatic noxious species Alligator Weed. Common native rushes are growing on the banks of the watercourse, including Cumbungi *Typha orientalis*, Native Reed, and aquatics such as Common Rush *Juncus usitatus*, Sea Rush *Juncus kraussii* and Water Ribbons *Triglochin procera*.

Cleared and Disturbed

Cleared and disturbed land occurs over most of the site, in areas where sand extraction and waste recycling have taken place. Vegetation recorded throughout this community exhibits high levels of disturbance and a dominance of weed species.

The vegetation structure within the centre of the site primarily consists of a groundcover layer composed of common exotic species such as Kikuyu *Pennisetum clandestinum*, Common Couch *Cynodon dactylon*, Panic Veldt Grass *Ehrharta erecta*, Cleavers *Galium aparine*, Common Verbena *Verbena officinalis*, Spear Thistle *Cirsium vulgare*, Redflower Mallow *Modiola caroliniana*, Flaxleaf Fleabane *Conyza bonariensis* and Paddy's Lucerne *Sida rhombifolia*.

The vegetation along the northern boundary of the site is characterised by a canopy of Swamp She-Oak *Casuarina glauca*, River She-Oak *Casuarina cunninghamiana*, Spotted Gum *Corymbia maculata*, and Grey Box *Eucalyptus moluccana*. The age class and species composition of much of the native vegetation on this part of the site indicates that it has been planted rather than being remnant or regrowth.

The understorey comprises exotic shrubs and vines, including Broad-leaf Privet *Ligustrum lucidum*, Boneseed *Chrysanthemoides monilifera* subsp. *rotundata*, Asthma Weed *Parietaria judaica*, Blue Morning Glory *Ipomoea indica* and Coastal Morning Glory *Ipomoea cairica*. The groundcover stratum

consists of *Nasturtium Tropaolum majus*, *Centella Centella asiatica* and Buffalo Grass *Stenotaphrum secundatum*.

3.4 Environmental Features

The environmental features of relevance to the site are provided in Table 2 below.

Table 2 Environmental features within and adjacent to the site

Environmental Features	Description
Threatened Species, Endangered Populations and Endangered Ecological Community	No Threatened Species, Endangered Populations or Endangered Ecological Community as listed in the TSC Act were found on the site (TEC 2005). Two Endangered Ecological Communities, River-Flat Eucalypt Forest on Coastal Floodplains and Cooks River/Castlereagh Ironbark Forest, have been recorded in areas adjacent to the site.
Aboriginal Sites or Relics	No known Aboriginal Sites or Relics have been recorded on or adjacent to the sites.
State Forests, National Parks, Regional Parks and Nature Reserves	No State Forests, National Parks, Regional Parks and Nature Reserves occur adjacent to the sites.
Wetlands, Waterbodies and Riparian Zones	An open stormwater channel is located on the site. A riparian zone is located adjacent to Georges River on the eastern part of the site. Several constructed dams are located towards the southern end of the site.
Planning Instruments	State Environmental Planning Policy (SEPP) Seniors Living 2004, SEPP 19 - Bushland in Urban Areas, SEPP 44 - Koala Habitat Protection.

4 HAZARD ASSESSMENT

4.1 Bushfire Threat Assessment

This section follows the methodology set out in Appendices 2 and 3 of PBP, which apply to development proposals for 'residential purposes'. This methodology assists in determining the minimum setbacks required for any habitable buildings that occur within bush fire prone land.

The setbacks, referred to as 'Asset Protection Zones' (APZs), are intended to provide a distance of low or no fire fuel between any proposed building and the hazard (ie adjacent bushland), in order to reduce the risk of bush fire attack on a building. APZs comprise an 'Inner Protection Area' (IPA) of minimum fire fuel adjacent to the dwelling and an 'Outer Protection Area' (OPA) of reduced fuel (RFS 2001). Wherever possible, an APZ must be implemented within the boundaries of the parcel of land on which the development is taking place. APZs should not be located on slopes greater than 18°, as the management of fuels on these lands becomes extremely difficult. Furthermore, the environmental consequences of increased erosion through ground clearing may not be acceptable on such steep slopes.

The APZs quoted in Appendix 2 of PBP are based on the assumption that any of the building(s) are to be constructed to Level 3 construction standards (Australian Standard 3959 *Construction of Buildings in Bushfire Prone Areas* 1999) for a Class 1 or 2 building, as defined under the *Building Code of Australia*. For more information on APZs, see Section 4.2 of PBP.

An assessment of the bushfire threat for the Residential Precinct within the Rezoning Structure Plan is provided below in Table 3.

Table 3 Bushfire threat assessment for the proposed Residential Precinct within the Rezoning Structure Plan for No.146 Newbridge Road, Moorebank¹.

Zone	Effective Slope Category	Dominant Vegetation Group	PBP Recommended APZ (IPA, OPA)	Achievable APZ ²	Category of Bushfire Attack
North	No significant threat of bushfire currently affects the Residential Precinct from this direction.				
South	No significant threat of bushfire currently affects the Residential Precinct from this direction.				
East	>0-5° (Downslope)	Group 2 (Woodland)	35m (25,10)	35m	Extreme
West	>0-5° (Downslope)	Group 1 (Forest)	40m (30,10)	40m	Extreme

4.2 Construction Standards

Table 5 describes the expected fire behaviour that the proposed additions are likely to experience in the event of a bush fire. The category of bush fire attack determines what level of construction, if any, of Australian Standard 3959 (*Construction of Buildings in Bushfire Prone Areas 1999*) is applicable.

Table 4 Expected Fire Behaviour and Construction Level.

Category of Bushfire Attack ³	Expected Fire Behaviour	AS 3959 – Level of Construction
Low	Minimal attack from radiant heat and flame due to the distance of the site from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements.	None
Medium	Attack by burning debris is significant with radiant heat and flame attack insufficient to threaten building elements (unscreened glass). Specific construction requirements are therefore warranted.	Level 1
High	Attack by burning debris is significant with radiant heat levels and flame threatening some building elements (screened glass). Specific construction requirements are therefore warranted.	Level 2
Extreme	Attack by burning debris is significant and radiant heat levels and flame could threaten building integrity. Specific construction requirements are warranted.	Level 3
Flame Zone	Flames and radiant heat levels likely to significantly threaten building integrity and result in significant risk to residents who will not be adequately protected.	Outside scope of Standard

¹ Measurements calculated from Tables A2.2 and PBP (RFS 2001).

² Achievable APZ includes the APZ that can be implemented within the boundaries of the site and any additional areas outside the property that would assist in mitigating the threat of wildfire (eg roads, fire trails, rivers, maintained gardens, buildings and APZ's on adjoining lands that have an ongoing management programme).

³ Categories of Bushfire Attack are based upon a Fire Danger Index (FDI) of 80 and fuel loads for NSW vegetation. Information from Table A3.3 in PBP

4.3 Analysis of Fire Behaviour

Overall the current threat of bushfire to the proposed Residential Precinct is generally regarded as low to medium. At present the area of bushland to the west of the site would have the greatest potential to impact upon the proposed development in the event of a bushfire. Despite this potential threat that a bushfire originating from this direction would pose, it is unlikely to be of sufficient intensity to warrant an 'Extreme' Category of Bushfire Attack (i.e. $>21 \text{ kWm}^{-2}$). The following reasons are given in support of this:

- the dimensions of the area of bushland are approximately 100m (east-west) and 350m (north-south). As such it is unlikely that a fire originating in this bushland would have the opportunity to reach full intensity before burning itself out;
- an existing open stormwater drainage channel, located approximately 15m west of the proposed inner ring road and 25m from any building footprint the Residential Precinct, is likely to effectively stop the horizontal spread of a fire and eliminate potential direct flame contact with structures. The stormwater channel is also likely to minimise the impact of ember and radiant heat attack;
- the area of bushland will be easily accessible on all four sides via sealed and unsealed roads with hydrants water available. In the event of a bushfire occurring it is likely that fire-fighting crews could rapidly contain or extinguish the blaze;
- the area between the bushland in the adjacent Boral site and any proposed building in the Residential Precinct will be approximately 40m wide. This corridor will be largely fuel free and contains an existing unsealed access road just west of the stormwater channel that lead to the concrete recyclers, a stormwater channel, a battered landscaped slope (with a 1m high retaining wall along the top edge), a sealed inner ring road and maintained gardens.

A fire approaching from the east or south is likely to burn less intensely as it will be driven by winds with higher moisture levels and of lower air temperature. Even under extreme conditions the existing vegetation to the east of the proposed Residential Precinct is likely to be too small in area to generate a fire of sufficient intensity to justify an 'Extreme' Category of Bushfire Attack (i.e. $>21 \text{ kWm}^{-2}$).

5 ACCESS AND SERVICE SUPPLY

5.1 Access and Egress

The Rezoning Structure Plan proposal includes a central ring-road with several intersecting streets. The ring-road will connect, via a road bridge, to the southern extension of Governor Macquarie Drive that is currently being built to serve the Boral land. The ring road may connect to a service road shared with the Flower Power site and connecting with Davy Robinson Drive to the east.

5.2 Services

The property is currently serviced by a reticulated water mains system. Electricity is currently supplied to the site via overhead cables from Newbridge Road. A full range of services, including reticulated water, electricity and gas is proposed for the site. These will be installed and managed as per the relevant standards and planning requirements.

6 RECOMMENDATIONS

6.1 Construction Standards

The Category of Bushfire Attack and recommended level of construction, as per Australian Standard 3959, for each of the zones in the proposal is provided in Table 5. The recommended level of construction for each of the zones (north, south east west) applies to the first row of dwellings/structures located on the boundary of the Residential Precinct. The recommended level of construction stated here is given on the assumption the APZ and other recommendations within this

report are adopted. The *Key Construction Requirements for Bushfire Protection* (as adapted from Australian Standard 3959) are provided in Appendix C. It should be noted that the construction requirements outlined in Appendix C are intended as a guide only and the full copy of the Australian Standard 3959 should be consulted.

Table 5 Recommended level of construction and Asset Protection Zone (APZ).

Structure	PBP Level of Construction (AS 3959)	Recommended Level of Construction (AS 3959)	Recommended APZ (IPA, OPA)
Residential Precinct (North)	Nil	Nil	Nil
Residential Precinct (South)	Nil	Level 1	60m (50,10)
Residential Precinct (East)	Level 3	Level 1	25m (25,0)
Residential Precinct (West)	Level 3	Nil	40m (25,0)

The 'downgrading' of the level of construction required for both the east and west zones is based upon reasons outlined in Section 4.3. Additionally, the 'upgrading' of the south zone is based on the potential future bushfire threat posed to the Residential Precinct from the area to be revegetated as Private Open Space.

6.2 Asset Protection Zones

APZ are to be implemented according to the specifications in Table 5.

6.2.1 Outer Protection Area

Fuel loadings within the OPA should be maintained in such a manner that the vegetation is not continuous. Fine fuel loadings within the OPA should be kept to a level where the fire intensity expected will not impact on adjacent developments (8 tonnes per hectare if fuel is commonly used).

6.2.2 Inner Protection Area

Fuel loadings within the IPA should ensure that (PBP - RFS 2001):

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

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

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

Woodpiles, combustible materials, large areas/quantities of garden mulch, stacked flammable building materials etc should not be located in the IPA.

6.3 Access and Egress

A perimeter road/track (at least 4m wide) providing suitable access for fire fighting vehicles should be implemented on the edge of the southern and south-eastern boundary of the Residential Precinct (see Appendix D). The perimeter track can be unsealed. See sections 4.2.2 (c) and 4.3.3 of Planning for Bushfire Protection for more detail (RFS 2001). Additionally, a larger road/track should extend to the southern boundary of the Benedict site forming a ring within the Private Open Space portion of the site (see Appendix D). This road/track will provide additional access for fire-fighting personnel and vehicles.

Access gates should be installed on all 'no-through roads' within the Residential Precinct that adjoin the area to be zoned Private Open Space.

Evacuation of the site in the event of a bushfire should be conducted as early as possible, as there is likely to be increased vehicle and pedestrian traffic in the area.

6.4 Services

Reticulated water will be made available to the sites via a ring hydrant system. Fire hydrants must be accessible and located such that a tanker can park within a distance serviceable by a 20m hose and the habitable building must be located such that a fire at the furthest extreme can be attacked by the tanker using a 60m hose and 10m jet of water. A clear unobstructed path between the hydrant and most distant point of the building cannot exceed 90m allowing for the tanker to be parked inline. Obstructions to the path will reduce the distances (RFS, 2001).

External fire hydrants should be installed in accordance with Australian Standard 2419-1 (1994). The locations of hydrants are to be delineated by blue reflective pavement markers in the centre of the road.

Electricity cabling should be installed underground where feasible.

6.5 Landscaping

The following recommendations are made for soft and hard landscaping on the site:

- steel fencing or other similar non-combustible fencing is to be used at the rear of those properties on the southern and eastern boundaries of the Residential Precinct;
- the slope batter surrounding the Residential Precinct be terraced using a retaining wall in order to reduce the continuity of the slope and minimise radiant heat and ember attack from a potential bushfire. This can be done in accordance with the *Proposed Regrading Plan* for the site, and
- the planting of large trees at the rear of those properties on the southern and eastern boundary of the Residential Precinct be minimised or avoided.

7 REFERENCES

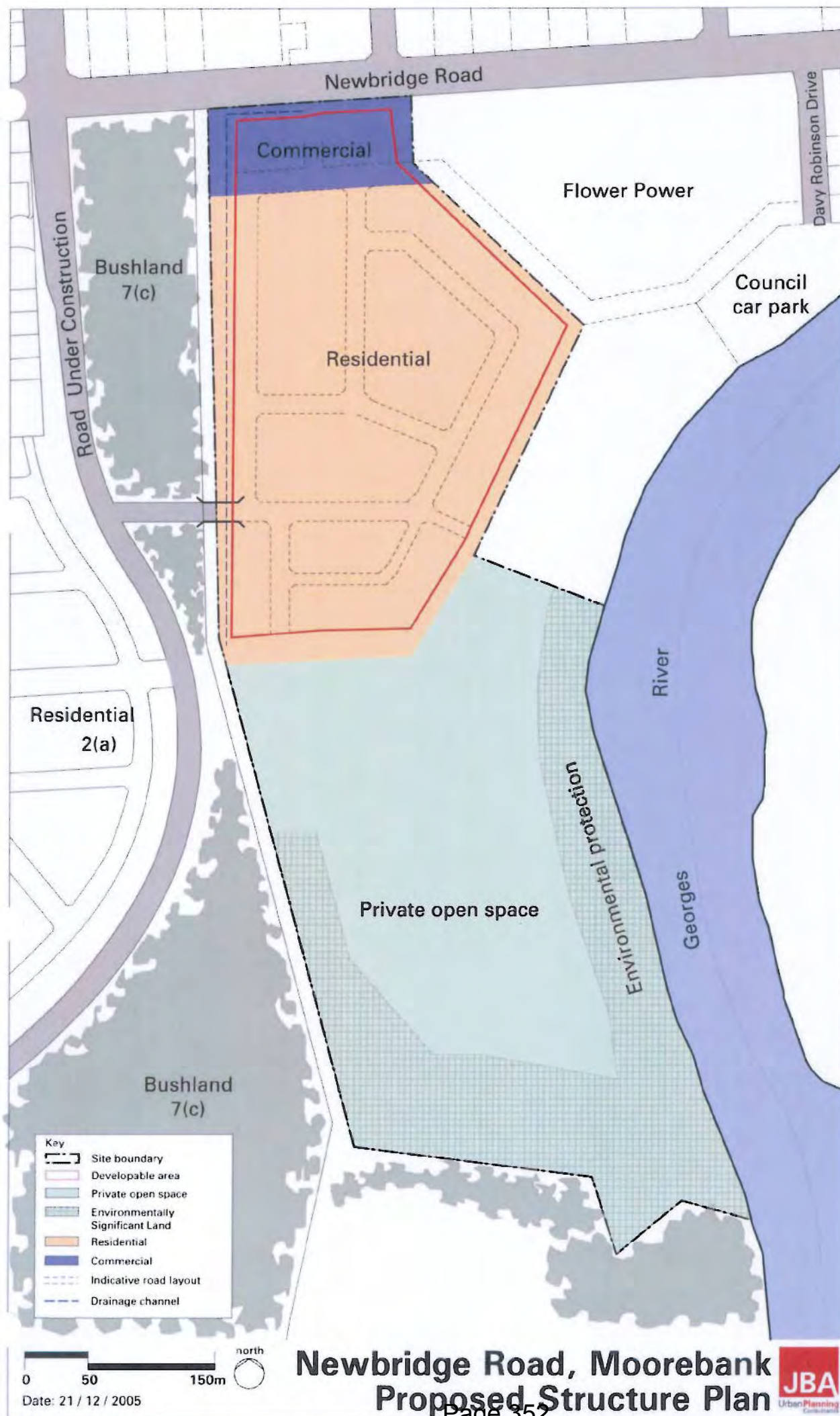
- AES Environmental Consultancy. 2002. *Flora and Fauna Assessment, Proposed Rezoning of Lot 1 DP 336613 Newbridge Road, Moorebank*. AES, Cowan.
- Australian Building Codes Board. 2000. *Building Code of Australia*.
- Benson D and Howell J. 1994. The natural vegetation of the Sydney 1:100,000 map sheet. *Cunninghamia* 3(4) 677-787.
- Environmental Resources Management Australia. 2002. *Boral Moorebank. Flora and Fauna Assessment – Technical Report*. Environmental Resources Management Australia.
- Liverpool City Council. 2005. *Bushfire Prone Land Map*. Liverpool City Council, Liverpool.
- Liverpool City Council. 1997. *Local Environment Plan 1997*. Liverpool City Council, Liverpool.
- NPWS. 2003b. Native Vegetation of the Cumberland Plain, Western Sydney. 1:100,000 map sheet. Map accompanying Tozer (2003). NSW National Parks & Wildlife Service, Hurstville.
- RFS. 2001. *Planning for Bushfire Protection 2001: A Guide for Councils, Planners, Fire Authorities and Home Owners*. NSW Rural Fire Service, Sydney.
- RFS. 2004. *Development Control Note 05 Development Consent in Bushfire Prone Areas Section 79BA Environmental Planning and Assessment Act 1979 (EP&A)*. NSW Rural Fire Service, Sydney.
- RFS. 2004. *Building in Bushfire Prone Areas. Guidelines for Subdivision Applications*. NSW Rural Fire Service, Sydney.
- Specht RL & Specht A. 1999. *Australian Plant Communities. Dynamics of Structure, Growth and Biodiversity*. Inkata Press, Melbourne.
- Standards Australia. 1999. *AS 3959 - Construction of buildings in bushfire prone areas*.
- Total Earth Care. 2005. *Flora & Fauna Assessment, Proposed Rezoning of the Benedict Site, No.146 Newbridge Road, Moorebank*. Unpublished report Total Earth Care Pty Ltd, Sydney.
- Tozer MG. 2003. The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities. *Cunninghamia*. Vol 8 (1) pp 1-75.

Appendix A

Rezoning Structure Plan

Benedict Site, No.146 Newbridge Road, Moorebank Proposed Rezoning

Bushfire Hazard Assessment



Appendix B

Aerial Photograph of Site and Surrounds

**Benedict Site, No.146 Newbridge Road, Moorebank
Proposed Rezoning**

Bushfire Hazard Assessment



Appendix B - Key Construction Requirements for Bushfire Protection
Adapted from Australian Standard 3959 – Construction of Buildings in Bushfire Prone Areas

	LEVEL 1	LEVEL 2	LEVEL 3	FLAME ZONE ¹
Flooring systems	<ul style="list-style-type: none"> • Concrete slab on ground • Enclosed suspended floors - no requirements • Open subfloors; <p>Bearer greater than 600mm above ground – no requirements</p> <p>Bearer less than 600mm above ground require either the floor frame to be protected by non-combustible sheets or timber floor frame to be fire retardant</p>	As for level 1.	As for level 2 except that for open subfloors timber floor framing is required to be fire retardant.	All floors are to be fully enclosed with a non-combustible material
Supporting posts, columns, stumps, piers and poles	<ul style="list-style-type: none"> • Non-combustible • Fire retardant treated timber treated up to 400mm above finished ground level • Timber mounted on galvanised metal shoes that provide a clearance of 75mm above finished ground or paving 	As for level 1.	As for level 2 except that timber in unenclosed floor spaces shall be fire retardant-treated to full height.	<p>All floors are to be fully enclosed with non-combustible material</p> <p>All other posts on attached or adjacent structures shall be non-combustible</p>
External Walls	<p>Must have an external leaf with either one or a combination of;</p> <ul style="list-style-type: none"> • Masonry, concrete, pise, rammed earth or stabilised earth • A frame wall that incorporates 	<p>As for level 1 except that;</p> <ul style="list-style-type: none"> • PVC cladding is not permitted • External timber wall cladding shall be of fire retardant-treated timber 	As for level 2	<ul style="list-style-type: none"> • External walls shall not include any combustible material • Additional radiant heat protection such as non-combustible fencing or shielding and or a drenching

¹ Note; Reference to additional site requirement will be necessary for this category. For example; water supply, access, shielded egress

	<p>either a sarking or insulation material immediately behind the cladding</p> <ul style="list-style-type: none"> • A wall of timber logs gauge planed and the space between the logs sealed to prevent burning debris and to allow for building movement <p>Combustible leaf or cladding must be greater than 400mm above finished ground</p>			water system
Windows <i>Note:</i> A vertical dormer window or clerestory is regarded as a normal window, not a rooftop	<p>Openable windows shall be screened with mesh max. aperture 1.8mm that remains in place while the window is open;</p> <ul style="list-style-type: none"> • Aluminium • Bronze • Corrosion resistant steel 	<p>As for level 1 except that aluminium shall not be used</p> <p>In addition, timber shall be fire retardant-treated timber except where protected by non-combustible shutters. Leadlight windows are to be protected by shutters</p>	<p>As for level 2 except that where windows are not protected by non-combustible shutters they shall be glazed with toughened glass.</p>	<p>As for level 3 except that non-combustible shutters or windows constructed to withstand 40kw/m² radiant heat exposure for 3 minutes shall be provided on the elevation exposed directly to the hazardous vegetation</p>
External Doors	<p>External doors shall be fitted with;</p> <ul style="list-style-type: none"> • Draught excluders, and • Tight fitting door screens fitted with; <ul style="list-style-type: none"> - Aluminium - Bronze - Corrosion resistant steel 	<p>As for level 1 except that aluminium shall not be used</p> <p>If leadlight glazing panels are incorporated in the doors, they shall be protected by shutters constructed of a non-combustible material or of toughened glass</p>	<p>As for level 2 except that;</p> <ul style="list-style-type: none"> • Timber doors shall be fire retardant treated timber or covered in a non-combustible covering <p>OR protected with non-combustible shutters</p> <p>OR shall be solid core having a thickness of not less than 35mm</p> <ul style="list-style-type: none"> • Sliding glass doors may be treated as for windows • If glazing panels are incorporated they shall be of 	<p>As for level 3 except that non-combustible shutters or glazing constructed to withstand 40kw/m² radiant heat exposure for 3 minutes shall be provided on the elevation exposed directly to the hazardous vegetation</p>

Vents and Weepholes	Vents and weepholes shall be protected with spark guards made from 1.8mm mesh that is either; <ul style="list-style-type: none"> • Aluminium • Bronze • Corrosion resistant steel 	As for level 1 except that aluminium shall not be used	toughened glass	As for level 3
Roofs	<p>Sheeted roofs –Only metal or fibre-cement sheet shall be used. Gaps to be sealed or protected by;</p> <ul style="list-style-type: none"> • Fully sarking the roof with sarking with a flammability index of not more than 5 or • Providing corrosion resistant steel or bronze mesh, profiled metal sheet, neoprene seal, compressed mineral wool or similar material • Rib caps and ridge caps shall be sealed using methods outlined in the AS3959 • Tiled roofs shall be provided with sarking • Shingles and shakes shall not be used • All roofing shall be non-combustible 	As for level 1 construction except that all roof sheeting shall be non-combustible and sarked	As for level 2 construction except that fibre-reinforced cement or aluminium shall not be used.	As for level 3
Roof lights <i>Note: A vertical dormer window or clerestory window</i>	All penetrations of the roof space for the installation of roof lights and associated shafts shall be sealed with a non-combustible	As for level 1 except that rooflight glazing shall be of wired glass Thermoplastic or toughened	As for level 2	As for level 2 except that glazing shall be required to withstand 40kw/m2 radiant heat exposure for 3 minutes

is regarded as a normal window, not a rooflight	sleeve or lining Thermoplastic sheet in a metal frame may be used for a roof light, but in a diffuser installed at ceiling level shall be wired or toughened glass in a metal frame. Vented rooflights shall be provided with corrosion resistant steel or bronze mesh.	glazing shall not be used		
Ventilators	All components must be non-combustible and shall be protected against the entry of sparks and embers with corrosion resistant steel or bronze mesh.	As for level 1	As for level 2	As for level 3 except that roof ventilators shall not be permitted on the plane of the roof nearest to the unmanaged vegetation
Roof mounted evaporative cooling units	Roof mounted evaporative cooling units shall only be used if openings to the cooling unit are encased in corrosion resistant steel or bronze mesh	As for level 1 except that the case of the evaporative cooler shall be of non-combustible material	As for level 2	As for level 3 except that roof mounted evaporative cooling units shall not be permitted on the plane of the roof nearest to hazardous vegetation
Eaves	Eaves shall be enclosed and the fascias or the gaps between the rafters shall be sealed	As for level 1 except that all timber eaves lining and joining strips shall be of fire-retardant treated timber	As for level 2 except that aluminium shall not be used	As for level 3 except that all materials shall be non-combustible
Fascias	No requirements	Fascias are to be either non-combustible or fire-retardant treated timber	As for level 2 except that no fibre-reinforced cement or aluminium sheet shall be used.	As for level 3 except that all materials shall be non-combustible
Gutters and Downpipes	Any materials or devices used to stop leaves collecting in the gutters shall have a flammability index of not greater than 5 when tested in accordance with AS1530.2	As for level 1	As for level 2	As for level 3
Service Pipes	All exposed piping, for water and	As for level 1	As for level 2	As for level 3

	<p>point shall be enclosed. This enclosure shall be non-combustible where it is within 400mm of the finished ground level.</p> <p>SPACED DECKING: shall have a clearance of at least 5mm between adjacent timbers. The external perimeter of the decking shall not be enclosed nor shall access to the space beneath the decking be impeded.(see protection for supports above)</p>			
--	---	--	--	--

