total earth care

Job No. J5182

Date: 18/11/2020 Rep: Andrew McGahey

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To	Care of	Site Name and Location
Northern Beaches Council P: 02 8495 6383	Lashta Haidari	181 Allambie Road, Allambie Heights NSW 2100

Dear Lashta,

Re: Response to Natural Environmental Referral Response – Biodiversity

I am writing to provide a response to Northern Beaches Council's (Council) Natural Environmental Referral Response – Biodiversity, dated 17th September 2020, for application DA2020/0052 at 181 Allambie Road, Allambie Heights.

Council: *The proposed development footprint is in proximity to the western portion of the site which is covered with high quality native vegetation. Direct and indirect impacts to native vegetation will result from tree removals, clearing and modification for asset protection zones, sewer infrastructure, passive recreation, with increased and ongoing management of native vegetation and fauna habitat as part of the overall bush fire management measures.*

The application included a Biodiversity Development Assessment Report (BDAR) that has quantified the biodiversity values of the land and applied the avoid, minimise and offset hierarchy and assessed the direct and indirect impacts associated with the proposed development. While the potential impacts of the most recent development design have been reduced from that of the previous application, the development in its current format is not supported due to unacceptable impacts to the natural environment.

Response: Please provide specific details as to what the unacceptable impacts are i.e. impacts to particular species or vegetation communities? Council's response is not specific, including the information below which means it is not possible to rectify issues or provide specific responses.

Council: *The location and design of the proposed development does not satisfy the objectives and/or requirements of the Warringah Development Control Plan 2011, including:*

- *E2 Prescribed Vegetation*
- *E5 Native Vegetation*
- *E6 Retaining unique environmental features, and*
- *E7 Development on land adjoining public open space.*

Response: Please specify which objectives and requirements the proposal does not satisfy.

General comments:

- **E2 Prescribed Vegetation**
  The development has been designed to minimise the impact on prescribed vegetation, including remnant canopy trees, understorey vegetation, and ground cover species as far as is practically possible. The proposal will preserve the area's amenity whilst protecting human life and property.
- **E5 Native Vegetation**
  The proponent has addressed the requirements of E5 Native Vegetation under the DCP and provided a Biodiversity Management Plan and a Biodiversity Development Assessment Report (BDAR) in lieu of a Flora and Fauna Assessment. The proposal will preserve the area's amenity whilst protecting human life and property.
- **E6 Retaining unique environmental features, and**
  The development has been designed to reduce the amount of vegetation to be removed as far as is practically possible.
- **E7 Development on land adjoining public open space.**

The development has been designed to reduce the amount of vegetation to be removed as far as is practically possible ensuring the protection and preservation of bushland adjoining bushland reserves.

Council: *The proposed development will directly and indirectly impact native vegetation and fauna habitat, including threatened species or vegetation communities with potential for a serious and irreversible impact as mapped on the Biodiversity Values Map. The development is located on land adjoining public open space, and should protect, preserve and enhance the native bushland and natural qualities of the adjoining the Park, and not threaten the protection or preservation of the bushland and fauna habitats. Additional impacts that require further assessment, and potentially additional biodiversity offsets, have not been adequately addressed as described below.*

Response: Only one threatened species detected on site is listed as being at risk of a serious and irreversible impact (SAII) under the Biodiversity Offset Scheme. Large-eared Pied Bat (*Chalinolobus dwyeri*) which is listed as Vulnerable under the BC Act and EPBC Act was recorded on site during the current survey. The presence of breeding habitat and breeding individuals for this species is listed as a potential SAII (DPIE 2018). Potential breeding habitat is described as areas within 100m of rocky areas which contain caves, rock overhangs, crevices, cliffs, escarpments, old mines, tunnels, culverts and derelict concrete buildings (DPIE 2020). The National recovery plan for the Large-eared Pied Bat (*Chalinolobus dwyeri*) states that "the structure of maternity roosts appears to be very specific (arch caves with dome roofs). Caves need to be high and deep enough to allow juvenile bats to learn to fly safely inside and have indentations in the roof." (DERM 2011). Suitable breeding habitat was not observed on site or within 100m. There is a culvert under the existing road which will not be directly impacted and there was no evidence of microbats roosting in the culvert. Similarly, the rock outcrops on site are low to the ground with limited crevices and are not considered suitable for microbats. Therefore SAII will not occur.

No other species, populations or ecological communities assessed as present on the site or likely to utilise the site, are listed as a threatened entity at risk of SAII, nor are they considered to be at risk of a serious and irreversible impact following the principles for determining a SAII.

Council: *The Asset Protection Zone (APZ) requirement of 85 metres to the south-west increases the extent and ongoing reliance of vegetation management of land within the adjoining public reserve. The adjoining public reserve has some existing asset protection requirements, both as a result of a historic agreement with the adjoining development and the Fire Management Plan requirements. However, to achieve the full 85m setback (Manly Dam APZ (4) as shown in Map 2 of the Bush Fire Management Plan (Total Earth Care Feb 2020)), the development relies on the modification of native vegetation to create an asset protection zone beyond what currently exists. Parts of the proposed APZ within the Reserve are currently managed as a strategic fire advantage zone, and this does not meet the requirements of an APZ and would result in additional impacts which are not supported.*

Response: The Bushfire Hazard Assessment prepared for Allambie Lutheran Homes in 2004 (Holmes Fire and Safety 2004, Attachment 1) designated the area mapped as APZ 4 in the Bush Fire Management Plan 2020, as an Inner Protection Area (IPA) and Outer Protection Area (OPA). This is consistent with the Fire Regime Management Plan for Manly Warringah War Memorial Park (Eco Logical 2006, Attachment 3) which maps this area as APZ 2 – OPA and APZ 3 – IPA. This area is not mapped as a Strategic Fire Advantage Zone as stated above. Correspondence with Warringah Council in 2009 also confirms the area as an Asset Protection Zone, not a Strategic Fire Advantage Zone (Attachment 2). As a result this area will be subject to the same requirements which are currently in place, resulting in no additional vegetation removal or land management than is currently experienced. Please see Table A2.7 below from Planning for Bushfire Fire Protection 2006 which demonstrates that an OPA width in forest on the 18 degree slope is 30 meters.

Table A2.7 Determining Allowable Outer Protection Areas (m) for forest vegetation within an APZ

	Effective Slopes				
	Upslope/Flat	>0°-5°	>5°-10°	>10°-15°	>15°-18°
Forests FDI 100 - subdivision	10	10	15	25	30
Forests FDI 80 - subdivision	10	5	15	20	20
Forests SFPP	20	20	25	30	25

Council: *In addition, the impacts of the proposed APZ within the adjoining Sydney Water land to the north (APZ (3) of Map 2), relies on the written agreement of Sydney Water, and the impact to native vegetation and threatened species habitat has not been assessed in the BDAR.*

Response: The written support of Sydney Water for a license agreement was provided as an Appendix to the Fire Management Plan (Total Earth Care 2020). The proposal would not result in any change to the current land management practices by Sydney Water and so no additional vegetation clearing would be required beyond that which is already required by Sydney Water.

Council: *A section of the site is mapped by Council as waterways and riparian lands, and any asset protection zone (APZ) should avoid and minimise impacts within the riparian area. However I note that the proposed design and management in this area has been supported by Councils Riparian referral body.*

Response: The works will only occur in an area which contains a high density of weeds. Works will include modifications to the drainage channel including the addition of a sandstone wall near the northern boundary. These works are likely to improve the quality of the surrounding vegetation, the water quality and aquatic habitat.

Council: *Finally, the inclusion of pedestrian walkways into the native bushland area of the site mapped on the Biodiversity Values map is not supported, and these elements should be deleted.*

Response: Agree, plans to be amended.

Please do not hesitate to contact me should you have any questions. My details have been provided below.

Kind Regards,

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References

Department of Environment and Resource Management (DERM) QLD (2011). National recovery plan for the large-eared pied bat *Chalinolobus dwyeri.* Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra.

DPIE (2018). 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method. Department of Planning, Industry and Environment for the NSW Government, Sydney

DPIE (2020). BioNet Threatened Biodiversity Data Collection (TBDC) [online] Available at: https://www.environment.nsw.gov.au/asmslightprofileapp/Account/Login [Accessed 11 May 2020]

Eco Logical (2006). Manly Warringah War Memorial Park Fire Regime Management Plan. Report prepared for Warringah Council

Holmes Fire and Safety (2004). Bushfire Hazard Assessment for Allambie Lutheran Homes, 3 Martin Luther Place, Allambie

NSW Rural Fire Service (2006). Planning for Bush Fire Protection. Prepared by NSW Rural Fire Service in cooperation with the Department of Planning

Total Earth Care (2020). Bush Fire Management Plan for William Charlton Village, Allambie Heights. Prepared for Allambie Heights Village.

Attachment 1. Bushfire Hazard Assessment for Allambie Lutheran Homes (2004)

Bushfire Hazard Assessment

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ALLAMBIE LUTHERAN HOMES
3 MARTIN LUTHER PLACE,
ALLAMBIE

For

Allambie Lutheran Homes Inc

16 June 2004

Version A

REPORT ISSUE AUTHORISATION

Project: Allambie Lutheran Homes, Allambie

Project No. 97820

Version	Date	Status	Prepared	Reviewed
Version A	16 June 2004	Preliminary Issue to Client for Review	GDM	BFE

Version	Extent of revision

The attention of the readers of this report is drawn specifically to the Preface preceding the body of this report.

Written by: G. Mitchell

Glen Mitchell
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Reviewed by: BJ Eadie

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Senior Bushfire Consultant
AFSM, F.I.Fire E, M.Mgt (Public) AFAIM, AIDGC

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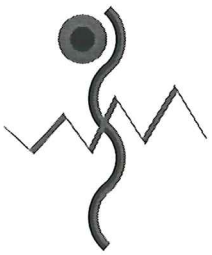


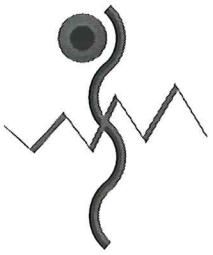
PREFACE

Readers of this report must be aware that the buildings have been in existence since the 1960's and are currently serving a significant social need. While the bushfire mitigation recommendations described in this report will not completely remove the risk of bushfire impacting the site they will significantly improve the level of protection offered to residents and the existing dwellings. Recommendations contained herein provide solutions to bushfire related issues identified as being non-compliant within the Rural Fires and Environmental Assessment Legislation Amendment Act 2002, The Building Code of Australia, AS 3959 and Planning for Bushfire Protection, 2001. With regard to the proposed development, diligent maintenance of Asset Protection Zones, together with the application of recommendations, in their entirety, will provide for a reduction of the bushfire threat and the associated risk.

This report caters specifically for the requirements of this project and the Client. No warranty is intended or implied, or responsibility undertaken by Holmes Fire & Safety Ltd for its use on any other project or by any third party.

This report does not include an environmental assessment, Aboriginal heritage assessment or identify endangered species in the area.

This report is provided in accordance with Holmes Fire & Safety's fee proposal (97820DXC.FFP001) and the Agreement for Provision of Consulting Engineering Services (97820DXC.CA001), both dated 20 April 2004 as executed between Holmes Fire & Safety Ltd and the Client. No obligations in contract exist between Holmes Fire & Safety Ltd and any other party.



1 INTRODUCTION

1.1 Report Purpose

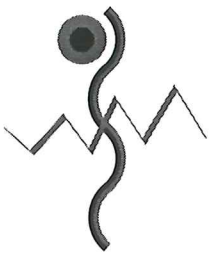
The project involves the upgrading and minor extensions of existing buildings at Allambie Lutheran Homes, 3 Martin Luther Place, Allambie Heights. In the submission of a Development Application for the proposed development, Warringah Council will require a Bushfire Hazard Assessment to be provided due to the classification of the site as 'Bushfire-prone'.

The Bushfire Hazard Assessment has been undertaken to determine the necessary requirements for the development in accordance with:

- NSW Rural Fire Service, Planning NSW, *Planning for Bushfire Protection*, 2001; and
- AS 3959-1999: *Construction of Buildings in Bush Fire Prone Areas.*

The proposed alterations to the existing development will be classified as Special Protection Development for the purposes of the Bushfire Hazard Assessment.

Holmes Fire & Safety have been engaged by Allambie Lutheran Homes Inc. to prepare this Bushfire Hazard Assessment report.



2 BUSH FIRE LEGISLATION IN NSW

The *Environmental Planning and Assessment Act 1979* and the *Rural Fires Act 1997* was amended recently via the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002.*

With regard to the *Environmental Planning and Assessment Act 1979*, the amendments:

a) Require local government councils to record on maps land identified by the Commissioner of the NSW Rural Fire Service as bush fire prone land; and

b) Prevent development consent being granted for the carrying out of development for certain purposes on bush fire prone land unless the consent authority is satisfied that the development conforms to certain documented bush fire protection specifications and requirements (*Planning for Bushfire Protection* and *AS 3959 – Construction of Buildings in Bushfire-Prone Areas*) or has consulted with the Commissioner; and

c) Provide for the integration of procedures to obtain development consent with a requirement to obtain a Bush Fire Safety Authority from the Commissioner under the *Rural Fires Act 1997* with respect to the fire safety of:

   (i) a subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes; or

   (ii) developments for purposes that are particularly vulnerable in bush fires and that require special protection. Such developments may include schools, child care centres, hospitals, hotels, motels, tourist accommodation, homes for mentally incapacitated persons, SEPP 5 developments (housing for older people or people with disabilities), SEPP 9 developments (Permanent and transitional group homes for disabled or socially disadvantaged persons) and retirement villages.

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

3 SITE ASSESSMENT

Holmes Fire & Safety conducted a site inspection of Allambie Lutheran Homes, 3 Martin Luther Lane, Allambie Heights and the surrounding area on 13 May 2004. The following assessment has been undertaken in accordance with the requirements of *Planning for Bushfire Protection*, 2001.

3.1 Site Description

The site of Allambie Lutheran Homes at 3 Martin Luther Lane, Allambie is bounded by Martin Luther Lane to the north, existing residential development to the east and the Manly-Warringah War Memorial Park to the west and south. The site is located within the Warringah Council Local Government Area.

The site area is 14,321 m^2 and contains three Class 9c aged care hostels (Hostels A, B & C), thirteen Class 3 buildings each containing a number of sole-occupancy units (Blocks A, B, C, E, F, G, H, K, L, M, N, O and P), a Community Room, maintenance shed, carports and car parking. The three Class 9c hostels are located in the centre of the site, protected from direct bushfire attack by the Class 3 dwellings provided a degree of screening.

The construction of a Chapel, relocation of the maintenance shed and upgrading and minor extensions to Blocks G, H and K are proposed, and form the basis of this report. As the Chapel and maintenance shed are non-residential developments the requirements of *Planning for Bushfire Protection* are not considered to be applicable. Therefore, the ensuing report will solely address the proposed upgrading and minor extensions to Blocks G, H and K.

The Manly-Warringah War Memorial Park to the west and south is the vegetation presenting the bushfire threat. This is predominantly unmanaged bushland under the control of Warringah Council. A portion of this bushland immediately adjoining the Allambie Lutheran Homes site is being managed to a degree, which Holmes Fire & Safety understand to be by Allambie Lutheran Homes personnel under the guidance of Warringah Council.

Refer to Appendix A for the Site Plan. Figure 1 below shows the site location.

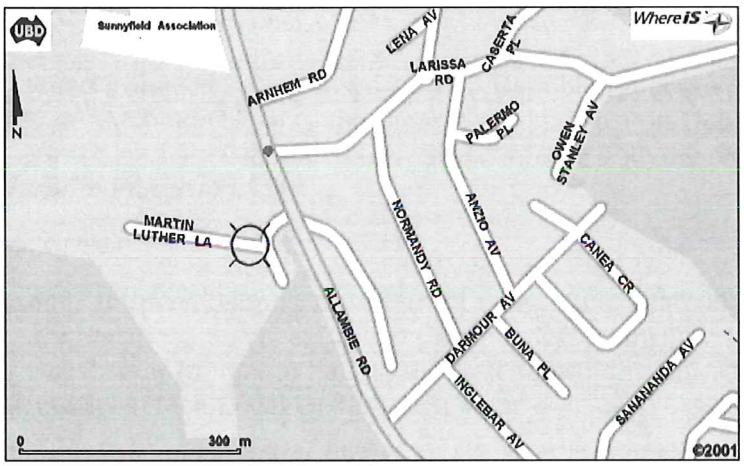


Figure 1 – Location of Allambie Lutheran Homes (www.whereis.com.au)

3.2 Vegetation

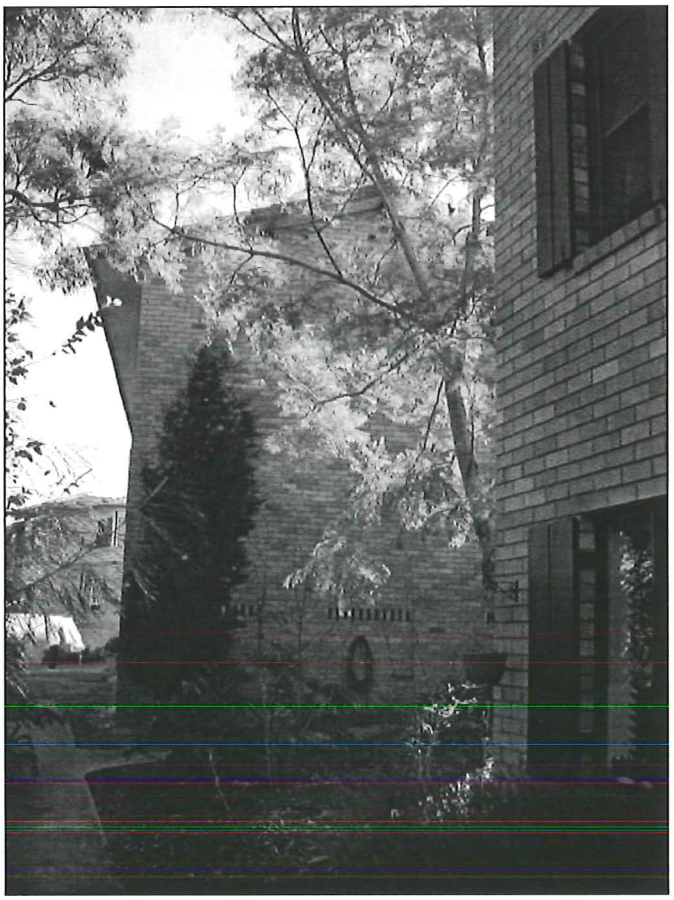
The vegetation has been assessed over a distance of 140 m from the external faces of Buildings G, H and K in all directions, in accordance with Figure A2.2 of *Planning for Bushfire Protection* (refer to Appendix B).

3.2.1 WITHIN SITE BOUNDARY

The vegetation within the boundary of the site consists of only a few isolated trees, shrubs and managed grassland. There is no vegetation within the site presenting a bushfire threat to Buildings G, H and K.

The vegetation located between Buildings H and K, as shown in Photograph 1, will be removed to allow for the extension of Building H, which will connect to Building K.

There are shrubs located along the western face of Buildings G, H and K, refer to Photograph 2. This vegetation will not comply with the Inner Protection Area requirements specified later in this report due to the vegetation touching and overhanging the dwellings. The requirements for the area between the western face of Buildings G, H and K and the western boundary are detailed in Section 3.4.



Photograph 1 – Vegetation between Buildings H and K, which will be removed to allow for extension of Building H.

Photograph 2 – Shrubs located along western face of Building H.

3.2.2 BEYOND SITE BOUNDARIES

Bounding the subject site to the north is Martin Luther Lane, beyond which are existing residential development for a depth of greater than 140 m. There is no vegetation within this area considered to present a bushfire threat to the subject development.

Located to the east of the subject site is an existing residential development and associated grounds, which contain managed grassland. From the eastern boundary of the subject site the managed grassland extends for a depth of approximately 80 m beyond which is vegetation considered to approximate Group 1, Vegetation Structure 5 – Open Forest (M3)[1]. This vegetation is an extension of the Manly-Warringah War Memorial Park, which wraps around the eastern side of the adjacent property. Refer to Photograph 3.

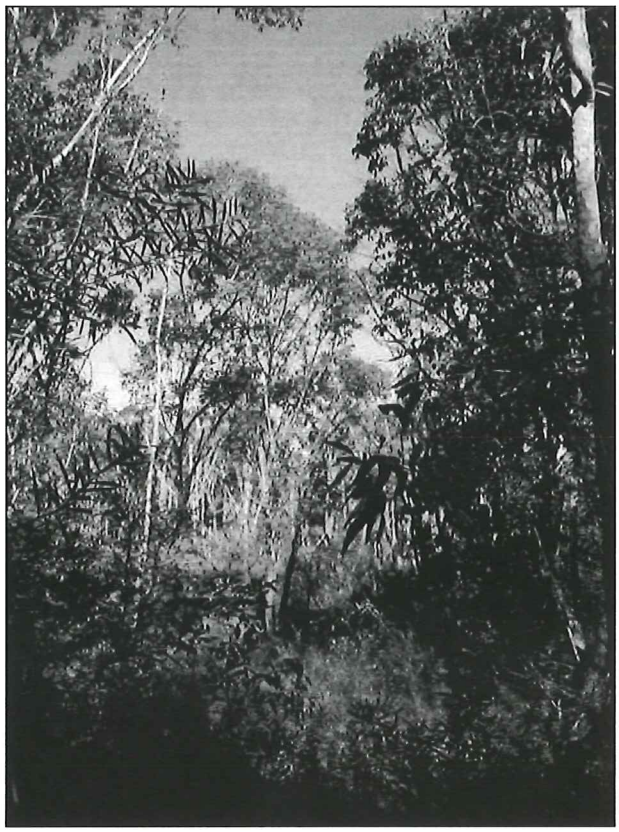
To the west and south of the subject site is the Manly-Warringah War Memorial Park, which contains vegetation considered to approximate Group 1, Vegetation Structure 5 – Open Forest (M3)[1]. It is this vegetation that presents the bushfire threat to the subject site. Refer to Photograph 4.

[1] Vegetation Structure 5 is defined by *Planning for Bushfire Protection* as "Trees 10-30m high; 30-70% foliage cover; understorey of sclerophyllous low trees & tall shrubs or grass. Usually dominated by ecualypts."

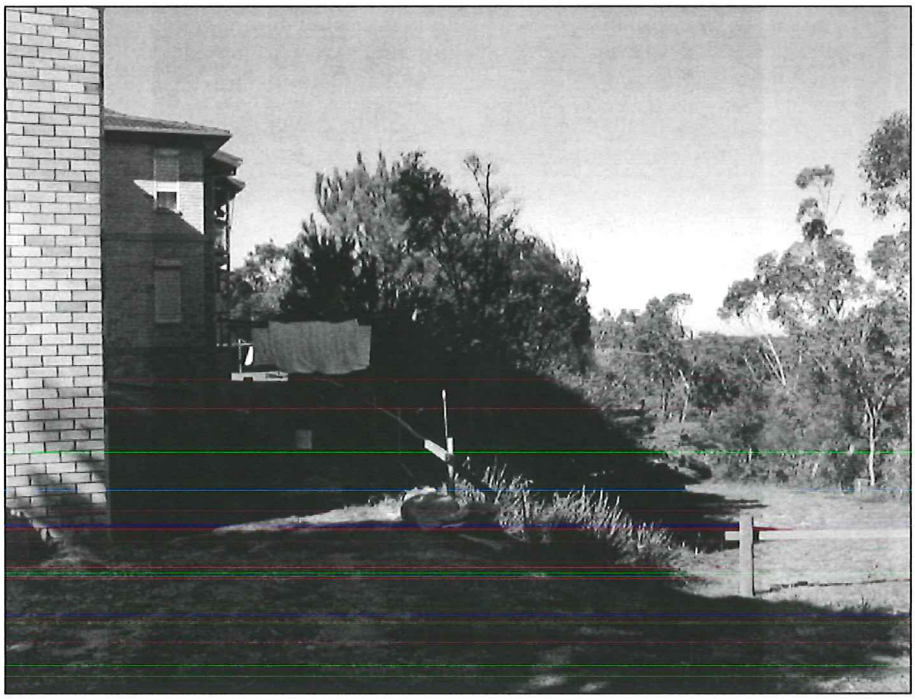
The vegetation immediately beyond the western boundary of the site from the north-west corner of Building N to the near the north-west corner of Building K, is currently undergoing a bushland management/regeneration process, undertaken by Allambie Lutheran Homes under the guidance of Warringah Council. This is being undertaken as a condition placed on the approval of previous extensions to Buildings L and M, as agreed with Warringah Council and the NSW Rural Fire Service prior to the implementation of *Planning for Bushfire Protection*. While the depth of the managed area is approximately 30 m, it is not considered to comply with the requirements of an Inner Protection Area, as detailed in Section 3.4.1 of this report, primarily due to the extent of the ground fuel cover, the partial lack of a discontinuous canopy and the piles of collected dead material. While offering additional protection to the entire site the management/regeneration process has been implemented solely as a result of previous alterations and additions to Buildings L and M.

A vehicular fire trail of approximately 3.5 m width is provided within the Manly-Warringah War Memorial Park adjacent to the site, connecting at the western end of Martin Luther Lane and running around the western side of Building N and parallel to the western boundary up to a point approximately adjacent to the north-west corner of Building H. From this point the fire trail narrows, suitable only for pedestrian access and continues south-west parallel to the site boundary and also branches west deeper into Manly-Warringah War Memorial Park. At a point adjacent to the western side of Building G the fire trail again widens and connects to the southern end of Martin Luther Place, however the trail would only be suitable for use of a 4WD vehicle. Photograph 5 shows where this vehicular fire trail connects to the subject site adjacent to Building N and Photograph 6 shows the 4DW portion of the fire trail.

Photograph 3 – View from the southern corner of the site, adjacent to Building G looking to the south-east showing managed grassland of the adjacent property and the bounding Manly-Warringah War Memorial Park vegetation.



Photograph 4 – View of typical vegetation within Manly-Warringah War Memorial Park.



Photograph 5 – North-west corner of Building N at left of photo and vehicular fire trail within Manly-Warringah War Memorial Park at right of photo.

Photograph 6 – 4WD portion of fire trail which connects to southern end of Martin Luther Place.

3.3 Slope

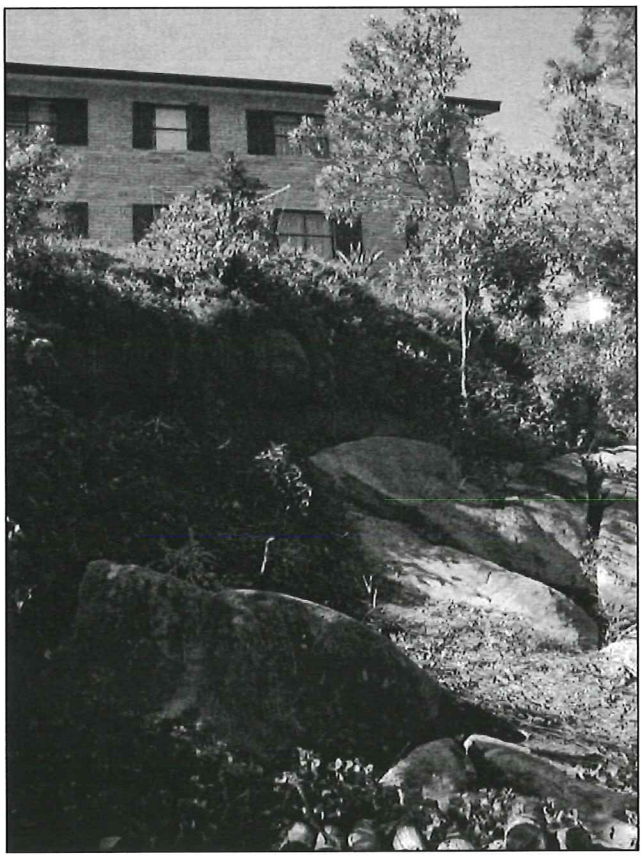
Based on the site inspection the slope of the land over a distance of 100 m from the proposed building lines in all directions has been assessed. In accordance with *Planning for Bushfire Protection*, the slope has been assessed based on the gradient that will most significantly influence the fire behaviour of the site.

The highest elevated point within the site is located at the north-east with the site sloping down to the south-west, however there is no vegetation within the site that presents a bushfire threat.

The managed grassland to the east of the site and the forest vegetation beyond is located on a slope of zero to five degrees upslope.

The forest vegetation within Manly-Warringah War Memorial Park to the west and south of the subject site is located on a slope that averages five to ten degrees downslope to Manly Creek. Immediately beyond the western boundary is a steep downslope varying in the order of 20 to 75 degrees commencing at a point adjacent to the north-west corner of Building N and increasing to a height of approximately 5 m to the west of Building H. The width of this slope varies from zero up to approximately 5 m. At the north-west corner of Building N the commencement of this steep slope is on the boundary line, however adjacent to Buildings G, H and K the commencement of the steep slope is 1.5 to 2 m within the western boundary line.

The topographic drawing presented in Figure 2 has been reproduced with permission from Land and Property Information (LPI). The slope assessment described in this report has not been based on the LPI information, however it is included to provide the reader with a clearer understanding of the slope within the area of the proposed development. The approximate site of the proposed development is hatched and 10 m height intervals are provided.



Photograph 7 – Steep slope within Manly-Warringah War Memorial Park immediately beyond western boundary. Building H in background.

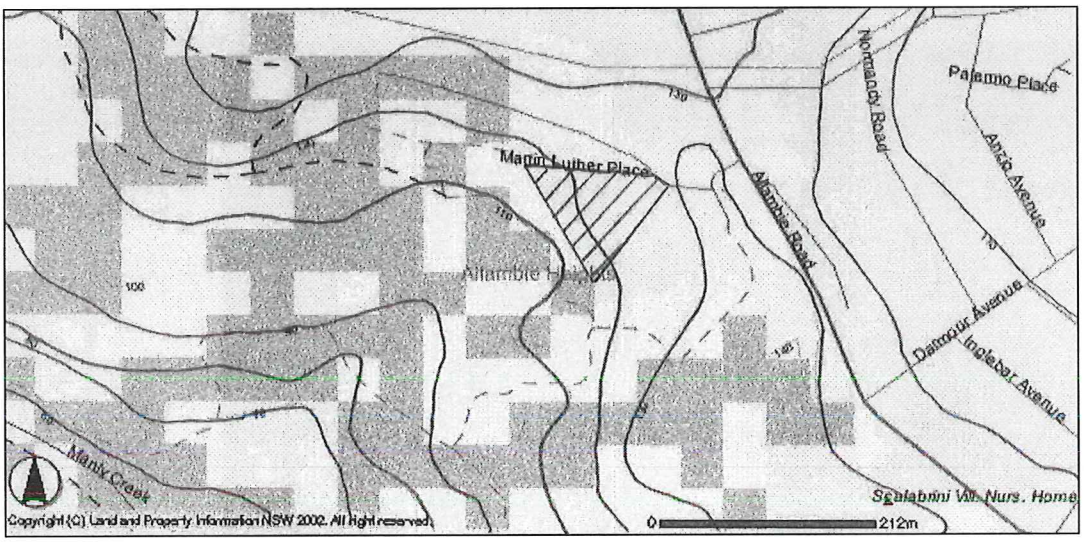


Figure 2 – Topographic diagram of subject site and surrounding area, © Land and Property Information (2002).

3.4 Asset Protection Zone

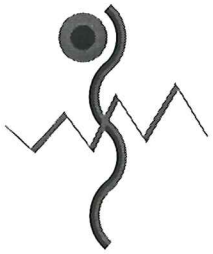
The Asset Protection Zone (APZ) acts as a buffer zone between the residential dwellings and the hazard. The primary purpose of an APZ is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures. The APZs consists of an Inner Protection Area (IPA) and an Outer Protection Area (OPA), refer to Sections 3.4.1 and 3.4.2.

Tables A2.2 to A2.4, *Planning for Bushfire Protection*, specify the minimum APZ required in bushfire-prone areas (refer to Appendix C) with Table A2.3 being relevant in this instance.

In accordance with Table A2.3, vegetation with characteristics of Group 1, Vegetation Structure 5 – Open Forest (M3) located on an upslope of zero to five degrees is required to be provided with an APZ of 75 m, consisting of a 60 m IPA and a 15 m OPA. In accordance with Table A2.4, managed grassland vegetation, irrespective of the slope, is required to be provided with an APZ of 20 m. These are the two situations which exist to the east of the proposed development. In applying the more stringent requirements, a 75 m APZ is applicable to the east. This is currently achieved, however the APZ is not located within the subject site, but rather the neighbouring residential development.

In consideration of the Group 1, Vegetation Structure 5 – Open Forest (M3) located on a downslope of five to ten degrees, Table A2.3 requires an APZ of 90 m, consisting of a 75 m IPA and a 15 m OPA. Existing buildings G, H, K, M and N which are located immediately adjacent to the western boundary are provided with a significantly reduced APZ.

With no bushfire threat to the north APZs are not required to be located within the site boundary in this direction.



3.4.1 INNER PROTECTION AREA

3.4.1.1 Location

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

3.4.1.2 Purpose

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

3.4.1.3 Depth

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

3.4.1.4 Fuel Loadings

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

The performance of the IPA must be such that:

(a) there is minimal fine fuel at ground level which could be set alight by a bushfire; and

(b) any vegetation in the IPA does not provide a path for the transfer of fire to the development – that is, the fuels are discontinuous.

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

(a) do not touch or overhang the building;

(b) are well spread out and do not form a continuous canopy;

(c) are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and

(d) are located far enough away from the house so that they will not ignite the house by direct flame contact or radiant heat emissions.

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

3.4.2 OUTER PROTECTION AREA

3.4.2.1 Location

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

3.4.2.2 Purpose

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

3.4.2.3 Depth

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

3.4.2.4 Fuel Loadings

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

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

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

3.5 Level of Construction

Tables A3.1 and A3.3 of *Planning for Bushfire Protection* allows the determination of the relevant level of construction in accordance with AS 3959-1999: *Construction of Buildings in Bushfire-Prone Areas*. Level 3 construction is the highest level of construction detailed by AS 3959-1999. An extract from AS 3959-1999 is provided in Appendix E detailing the requirements for all levels of construction.

Due to the distance between the dwellings and the forest vegetation to the east being approximately 80 m, *Planning for Bushfire Protection* does not impose any construction requirements as a result of this particular hazard.

With less than 20 m between the existing dwellings and the bushfire hazard to the south, *Planning for Bushfire Protection* classifies the category of bushfire attack as being within the Flame Zone for which it acknowledges that the level of construction required is above Level 3 and beyond the scope of AS 3959. It should be noted, however, that the existing level of construction falls significantly short of Level 3 construction, and in fact short of Level 1, due to:

(i) The provision of timber decorative shutters to all windows;

(ii) Openable windows without the provision of screens;

(iii) Windows provided with standard float glass rather than toughened glass;

(iv) Non-combustible shutters not provided to windows;

(v) Vents and weep holes are not provided with spark guards;

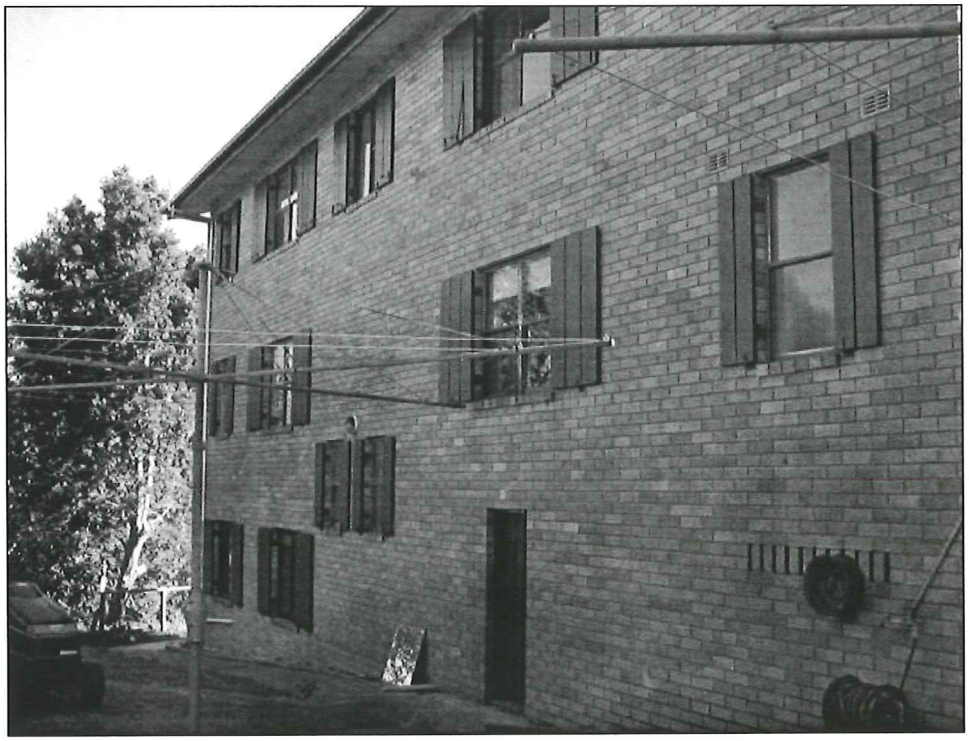
(vi) Timber eaves linings are not fire-retardant treated timber;

(vii) Timber fascias are not fire-retardant treated timber;

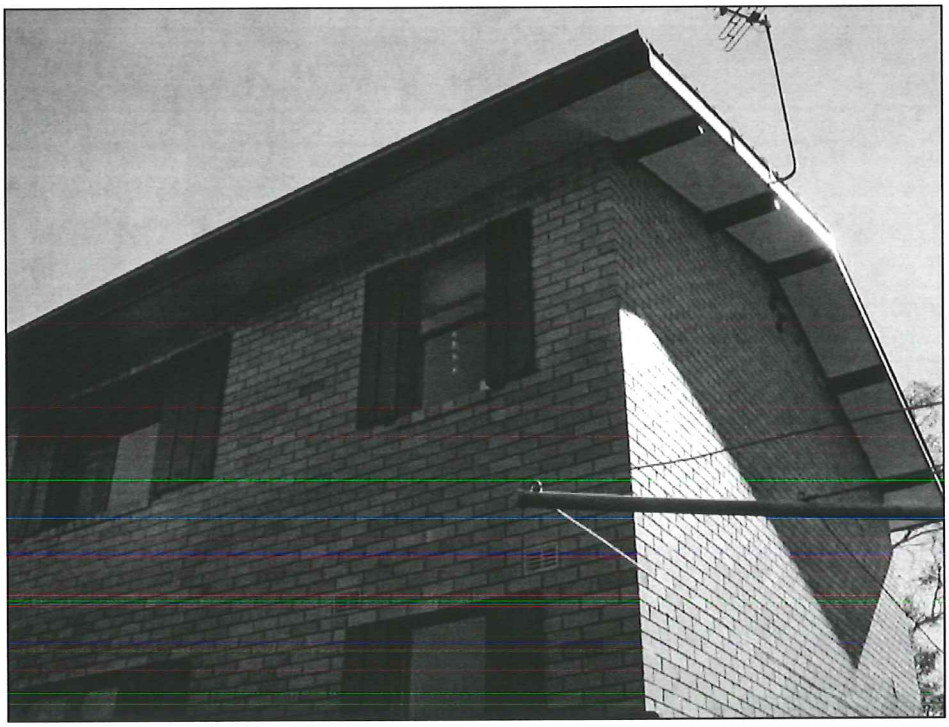
(viii) Gutter guards are not provided; and

(ix) External retractable awnings are of a combustible material.

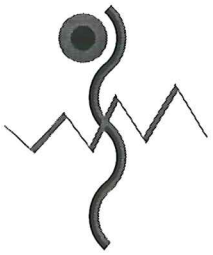
Refer to Photographs 8 and 9 showing these shortcomings.



Photograph 8 – Southern elevation of Building G showing typical construction of Buildings G, H & K.



Photograph 9 – Southern elevation of Building G showing typical construction of Buildings G, H & K.



3.6 Proposed Upgrading and Minor Extensions

The following extensions are proposed to Building G, H and K, as indicated in Appendix A:

(a) Building G:

- Additional bedrooms to the south and west;
- Fully enclosed balconies to the First and Second Floor north; and
- Open balcony to the Ground Floor north.

(b) Building H:

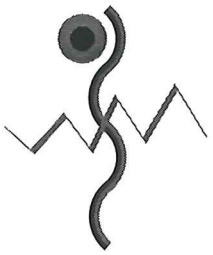
- Fully enclosed balconies to the First and Second Floor west;
- Open balcony to the Ground Floor west;
- Fully enclosed balconies to the Second Floor east;
- Open balconies to the First Floor east; and
- Additional two units per floor (Ground, First and Second) to the north up to existing southern external wall of Building K.

(c) Building K:

- Fully enclosed balconies to the First and Second Floor west;
- Open balcony to the Ground Floor west;
- Additional bedroom to First and Second Floor west;
- Fully enclosed balconies to the Second Floor east; and
- Open balconies to the First Floor east.

The ensuing discussion makes reference to the unmanaged vegetation located to the west of Buildings G, H and K. The western site boundary criss-crosses with the top of the steep incline leading into the Manly-Warringah War Memorial Park. The current APZs provided to the west of Buildings G, H and K are measured to the furthest point of either the western site boundary or the top of the steep incline. This approach is being taken as where the top of the steep incline is beyond the western boundary Allambie Luthern Homes have been maintaining this additional area to the same extent as the area within their boundary. For ease of reference, this point will be referred to as the edge of the unmanaged vegetation.

Existing buildings G, H, K, M and N were constructed prior to the implementation of *Planning for Bushfire Protection* and associated legislation. Their western exterior walls are in a jaggered line, a minimum of 1.5 m from the unmanaged vegetation, thereby falling significantly short of the *Planning for Bushfire Protection* APZ requirements. Of particular note is Building G which is currently located 1.5 m from the unmanaged vegetation, beyond which is vegetation not currently required to be managed. Additionally, the construction of these buildings is to a standard far below that of Level 3 construction in accordance with AS 3959, and below Level 1 construction in numerous instances.



Based upon agreement with Warringah Council, it is proposed to manage the adjacent vegetation to the west of the entire length of the western site boundary, within the Manly-Warringah War Memorial Park, to a depth of 30 m in accordance with the IPA specifications provided in Section 3.4.1. This vegetation management will be an extension to the existing bushland management/regeneration process. Agreement in writing is to be provided by Warringah Council confirming acceptance of this condition.

3.6.1 BUILDING K

Unmanaged vegetation is currently located at a distance of between 3 m to 9 m from the west of Building K, as this vegetation is to the south of that which is currently undergoing a bushland management/regeneration process. The proposed extensions to the western side of Building K will not result in any part of Building K being located closer than 3 m to this vegetation, that is, no closer than the existing building extremities, and further than the worst-case situation that exists with Building G.

While the proposed alterations do not impact upon the entire external façades of the building, the northern and western façades of Building K will be upgraded to Level 3 construction. The eastern façade of Building K, which is not directly exposed to the bushfire threat, will be upgraded to Level 2 construction. An external southern façade will not be provided as Building H is being extended to the north and will adjoin Building K. The construction upgrades will exclude structural elements and roof sarking. Additionally Building K will not be provided with any external timber materials and will be provided with non-combustible shutters, in addition to toughened glass, to all new northern and western windows.

The vegetated area to the north and west of Building K, within the site boundaries, is to be maintained as an IPA in accordance with the specifications provided in Section 3.4.1.

3.6.2 BUILDING H

Unmanaged vegetation is currently located at a distance of 3 m to the west of Building H. The proposed extensions to the western side of Building H will result in the building being 1.5 m from the existing vegetation, however additional clearing up to the western boundary will be provided, thus maintaining a 3 m separation distance and further than the worst-case situation that exists with Building G.

While the proposed alterations do not impact upon the entire external façades of the building, the southern and western façades of Building H will be upgraded to Level 3 construction. The eastern façade of Building H, which is not directly exposed to the bushfire threat, will be upgraded to Level 2 construction. An external northern façade will not be provided as Building H is being extended to the north and will adjoin Building K. The construction upgrades will exclude structural elements and roof sarking. Additionally Building H will not be provided with any external timber materials and will be provided with non-combustible shutters, in addition to toughened glass, to all new western and southern windows.

The vegetated area to the west of Building H, within the site boundaries, is to be maintained as an IPA in accordance with the specifications provided in Section 3.4.1.

3.6.3 BUILDING G

Unmanaged vegetation is currently located at a distance of 1.5 m to the west of Building G. The proposed extensions to the southern side of Building G will not result in any part of Building G being located closer than 1.5 m to this vegetation, that is, no closer than the existing building extremities.

While the proposed alterations do not impact upon the entire external façades of the building, the southern and western façades of Building G, along with the western facing portions of the northern façade, will be upgraded to Level 3 construction. The eastern façade and the remainder of the northern façade of Building G, which are not directly exposed to the bushfire threat, will be upgraded to Level 2 construction. The construction upgrades will exclude structural elements and roof sarking. Additionally Building G will not be provided with any external timber materials and will be provided with non-combustible shutters, in addition to toughened glass, to all new west and south facing windows.

The vegetated area to the west and south of Building G, within the site boundaries, is to be maintained as an IPA in accordance with the specifications provided in Section 3.4.1.

3.7 Vehicular Access

Access is provided to the Allambie Lutheran Homes site from Martin Luther Lane, which is accessed via Martin Luther Place leading off Allambie Road.

All public roads required for site access are sealed roads capable of supporting fully loaded firefighting vehicles. All public roads in the immediate area are two-way, of minimum 8 m width allowing for traffic to pass in opposite directions with road grades allowing for access for fire-fighting vehicles.

The existing internal road network will remain unchanged and as such vehicular access is provided to the north-west corner of Building N and adjacent to the northern end of the Community Room.

Vehicular access is considered reasonable for both egress of residents and access by fire fighting personnel.

3.8 Gas

Reticulated gas shall be installed and maintained in accordance with AS/NZS 1596-2002: *Storage and Handling of LP Gas* and the requirements of the relevant authorities. If provided, gas cylinders are not to be located on the western side of the dwellings between the dwellings and the bushfire hazard. Release valves must be directed away from the building and away from any hazardous materials such as firewood, so that it does not act as a catalyst to combustion.

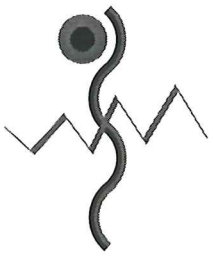
3.9 Electricity Supply

Modifications to the electrical transmission system are not proposed.

3.10 Water Supply

One duel-outlet fire hydrant is currently provided to serve the site, located adjacent to the north-west corner of Building P. The distance from this outlet to the western side of buildings located adjacent to the western boundary is significantly in excess of 90 m. The existing fire hydrant system is therefore required to be extended in accordance with AS 2419, with a minimum of one dual-outlet hydrant provided between Buildings G and H and another located between Buildings K and L. It is also advised that a dual-outlet hydrant is provided to the north of Building N.

In choosing the location of the new hydrants consideration should be given to affording protection to fire-fighting personnel in the connection of hoses to the hydrant outlets.



4 RECOMMENDATIONS

The proposed upgrading and minor extensions to Buildings G, H and K at Allambie Lutheran Homes, 3 Martin Luthern Place, Allambie is indicated on the drawings provided in Appendix A.

Due to the existing nature of the existing development, compliance with *Planning for Bushfire Protection* cannot be achieved.

Therefore, based on Holmes Fire & Safety's site inspection and assessment the following recommendations are required to be implemented to ensure a reduced risk of bushfire attack than currently exists, while allowing upgrading and minor extensions to the existing development.

(a) Building K:

Excluding structural elements and roof sarking:

(i) Northern and western façades to be upgraded to Level 3 construction in accordance with AS 3959. Non-combustible shutters, in addition to toughened glass, to be provided to all new windows within these façades;

(ii) Eastern façade to be upgraded to Level 2 construction in accordance with AS 3959;

(iii) No external timber materials to be provided throughout; and

(iv) The vegetated area to the north and west of Building K, within the site boundaries, is to be maintained as an IPA in accordance with the specifications provided in Section 3.4.1.

(b) Building H:

Excluding structural elements and roof sarking:

(i) Southern and western façades to be upgraded to Level 3 construction in accordance with AS 3959. Non-combustible shutters, in addition to toughened glass, to be provided to all new windows within these façades;

(ii) Eastern façade to be upgraded to Level 2 construction in accordance with AS 3959;

(iii) No external timber materials to be provided throughout; and

(iv) The vegetated area to the west of Building H, within the site boundaries, is to be maintained as an IPA in accordance with the specifications provided in Section 3.4.1.

(c) Building G:

Excluding structural elements and roof sarking:

(i) Southern and western façades and western facing portions of the northern façade to be upgraded to Level 3 construction in accordance with AS 3959. Non-combustible shutters, in addition to toughened glass, to be provided to all new windows within these façades;

(ii) Eastern façade and remainder of the northern façade to be upgraded to Level 2 construction in accordance with AS 3959;

(iii) No external timber materials to be provided throughout; and

(iv) The vegetated area to the west and south of Building G, within the site boundaries, is to be maintained as an IPA in accordance with the specifications provided in Section 3.4.1.

(d) The adjacent vegetation to the west of the entire length of the western site boundary, within the Manly-Warringah War Memorial Park, is to be managed to a depth of 30 m in accordance with the IPA specifications provided in Section 3.4.1. Agreement in writing is to be provided by Warringah Council confirming acceptance of this condition.

(e) Reticulated gas shall be installed and maintained in accordance with AS/NZS 1596-2002: *Storage and Handling of LP Gas* and the requirements of the relevant authorities. If provided, gas cylinders are not to be located on the western side of the dwellings between the dwellings and the bushfire hazard. Release valves must be directed away from the building and away from any hazardous materials such as firewood, so that it does not act as a catalyst to combustion.

(f) The existing fire hydrant system is to be extended in accordance with AS 2419, with a minimum of one dual-outlet hydrant provided between Buildings G and H and another located between Buildings K and L. It is also advised that a dual-outlet hydrant is provided to the north of Building N. Consideration should be given to affording protection to fire-fighting personnel in the connection of hoses to the hydrant outlets in choosing the location of the hydrant outlets.

5 CONCLUSION

Holmes Fire & Safety has conducted a site inspection and assessment of the proposed upgrading and minor extensions of existing Buildings G, H and K at Allambie Lutheran Homes, 3 Martin Luther Lane, Allambie Heights. The assessment has been undertaken in accordance with *Planing for Bushfire Protection* and AS 3959-1999: *Construction of Buildings for Bush Fire Prone Areas.*

Provided the recommendations stated above are implemented in full, Holmes Fire & Safety is of the opinion that the proposed development, while not in full compliance with the relevant legislation, will provided a significantly reduced risk of bushfire attack for the subject dwellings.

6 REPORT BASIS INFORMATION

The report is based on the following:

(i) Site inspection carried out on 13 May 2004 by Glen Mitchell (Holmes Fire & Safety);

(ii) Drawings as listed in Table 2.

Table 2 – Referenced Drawings

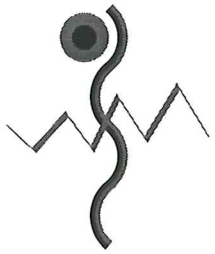
Drawing No.	Title	Date	Drawn By:
DA / 01	Site Plan	Feb 2004	Straesser Architects
DA / 02	Part Site Plan – Building G & H	Feb 2004	Straesser Architects
DA / 03	Part Site Plan – Building K	Feb 2004	Straesser Architects
DA / 04	Elevations – West K & H	March 2004	Straesser Architects
DA / 05	Elevations – North K & H	March 2004	Straesser Architects
DA / 06	Elevations – East K & H	March 2004	Straesser Architects
DA / 07	Elevations – West & South G	March 2004	Straesser Architects
DA / 08	Elevations – East & North G	March 2004	Straesser Architects

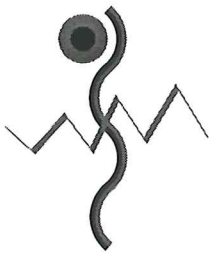
7 REFERENCES

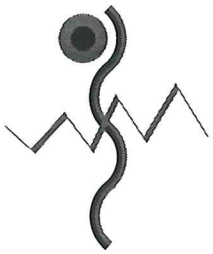
NSW Rural Fire Service, Planning NSW, 2001, *Planning for Bushfire Protection.*

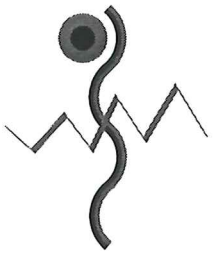
AS 3959-1999: *Construction of Buildings in Bush Fire Prone Areas.*

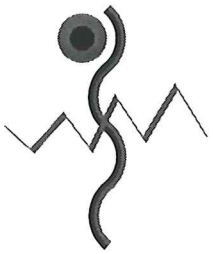
APPENDIX A – SITE PLAN, PART SITE PLANS & ELEVATIONS

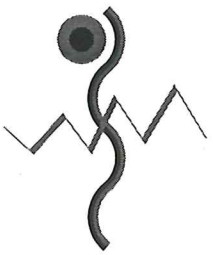


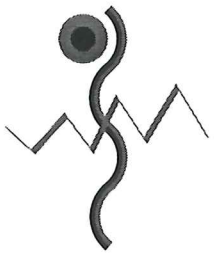


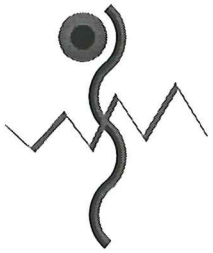












APPENDIX B – VEGETATION ASSESSMENT

Figure A2.2, *Planning for Bushfire Protection:*

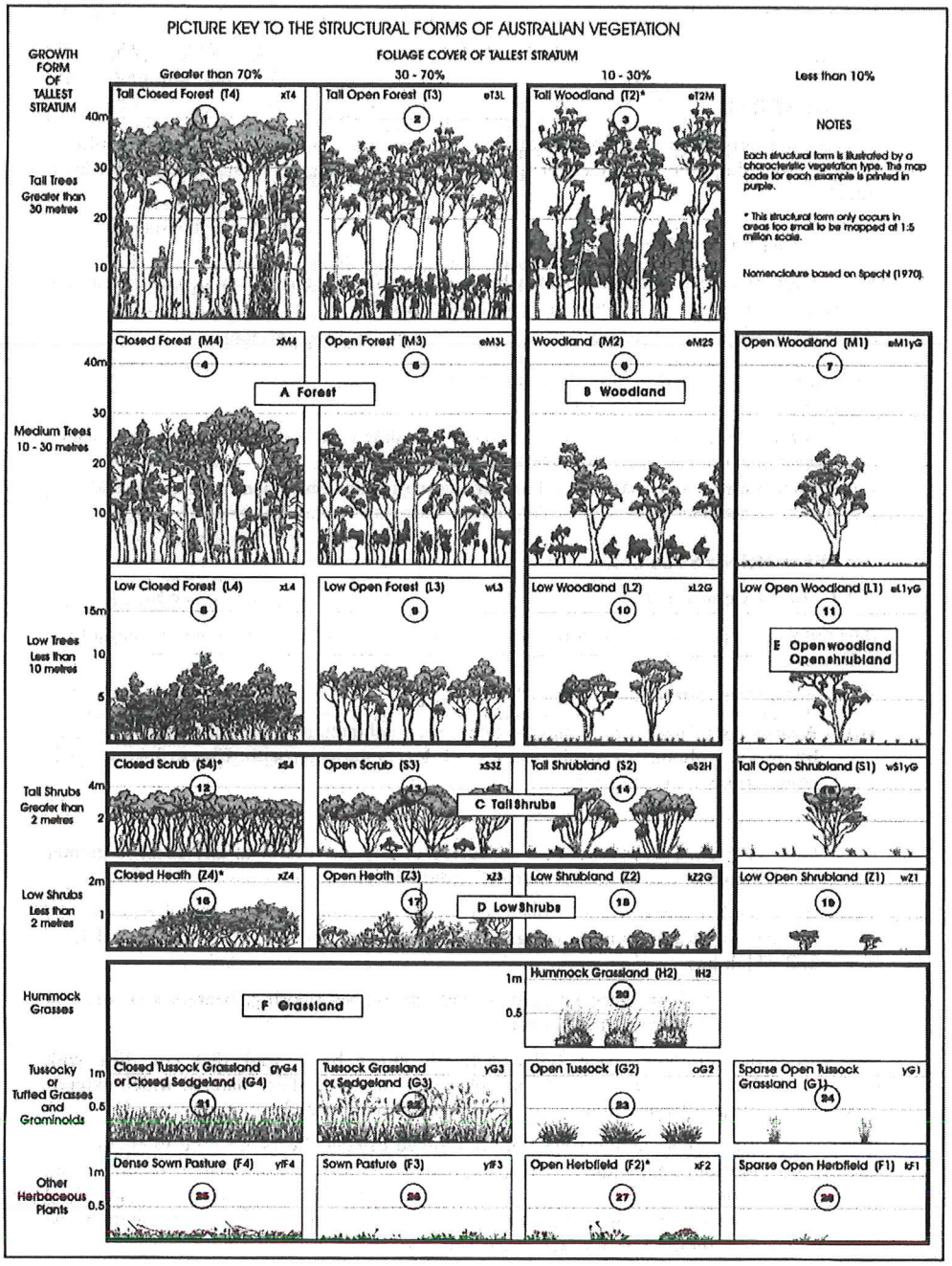


FIGURE 2.1 PREDOMINANT VEGETATION TYPES AND CLASS TYPES 1 TO 28 AND CLASSES A TO F

APPENDIX C – ASSET PROTECTION ZONES

Table A2.2, *Planning for Bushfire Protection* - Minimum Specifications for Asset Protection Zones (APZ) for Residential Purposes in Bushfire-prone Areas:

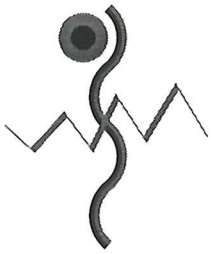
Forests (Group 1 – see Figure A2.2)				
Slope	Direction of Slope	Asset Protection Zone (m)		
		Total (IPA + OPA)	Inner Protection Area (IPA)	Outer Protection Area (OPA)
> 5°	Upslope	20	20	0
5 - 0°		30	20	10
> 0 - 5°	Downslope	40	30	10
> 5 - 10°		50	40	10
>10 - 15°		60	50	10
>15 - 18°		70	60	10
Woodlands, heaths, open scrub (Group 2 – see Figure A2.2)				
Slope	Direction of Slope	Asset Protection Zone (m)		
		Total (IPA + OPA)	Inner Protection Area (IPA)	Outer Protection Area (OPA)
> 5°	Upslope	20	20	0
5 - 0°		30	20	10
> 0 - 5°	Downslope	35	25	10
> 5 - 10°		40	30	10
>10 - 15°		50	40	10
>15 - 18°		60	50	10

Table A2.3, *Planning for Bushfire Protection* – Minimum Specifications for Asset Protection Zones (APZ) for Special Protection Developments in Bushfire-prone Areas:

Forests (Group 1 – see Figure A2.2)				
Slope	Direction of Slope	Asset Protection Zone (m)		
		Total (IPA + OPA)	Inner Protection Area (IPA)	Outer Protection Area (OPA)
> 5°	Upslope	60	50	10
5 - 0°		75	60	15
> 0 - 5°	Downslope	80	65	15
> 5 - 10°		90	75	15
>10 - 15°		100	85	15
>15 - 18°		100	85	15
Woodlands, heaths, open scrub (Group 2 – see Figure A2.2)				
Slope	Direction of Slope	Asset Protection Zone (m)		
		Total (IPA + OPA)	Inner Protection Area (IPA)	Outer Protection Area (OPA)
> 5°	Upslope	30	20	10
5 - 0°		40	25	15
> 0 - 5°	Downslope	50	35	15
> 5 - 10°		60	45	15
>10 - 15°		80	65	15
>15 - 18°		100	85	15

Table A2.4, *Planning for Bushfire Protection* – Minimum Specifications for Asset Protection Zones (APZ) for Residential Purposes and Special Protection Development in Bushfire-prone Areas by Vegetation Group 3:

Rainforests, grasslands, open woodlands, mallee (Group 3 – see Figure A2.1)
Minimum separation distance of 20 m (managed understory or grasses) required regardless of construction level for all slopes.



APPENDIX D – TABLE A3.1 AND A3.3

Table A3.1, *Planning for Bushfire Protection* – Categories Of Bushfire Attack

Category	Description
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.
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. (AS 3959-1999, Level 1 construction applicable)
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. (AS 3959-1999, Level 2 construction applicable)
Extreme	Attack by burning debris is significant and radiant heat levels and flame could threaten building integrity. Specific construction requirements are warranted. (AS 3959-1999, Level 3 construction applicable)
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. (Beyond scope of AS 3959-1999)

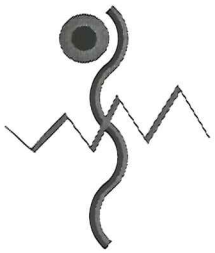


Table A3.3, *Planning for Bushfire Protection* – Determination of Category Of Bushfire Attack For A Site

Distance from vegetation	< 20 m	≥ 20 m to ≤ 30 m			> 30 m to < 50 m			> 50 m to < 80 m			> 80 m to < 100 m		
Slope	All slopes	> 15°	> 5° to ≤ 15°	0 to 5°	> 15°	> 5° to ≤ 15°	0 to 5°	> 15°	> 5° to ≤ 15°	0 to 5°	> 15°	> 5° to ≤ 15°	0 to 5°
Vegetation	Category of Bushfire Attack												
Forest	FZ	FZ	FZ	Ext	FZ	Ext	High	Ext	Ext	Med	Ext	High	Low
Woodland	FZ	FZ	Ext	Med	Ext	High	Low	Ext	Low	Low	Med	Low	Low
Shrub/Heath	FZ	FZ	FZ	Ext	FZ	Ext	High	Ext	High	Med	High	High	Low
Mallee/Mulga	FZ	Med	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Rainforest	FZ	High	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Grassland	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Non-vegetated	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low

Shading indicates situation applicable to Buildings G, H & K, Allambie Lutheran Homes, 3 Martin Luther Place, Allambie.

APPENDIX E – AS 3959-1999, SECTION 3

The following is an extract from Section 3 of AS 3959-1999: *Construction of Buildings in Bush Fire Prone Areas.*

SECTION 3 - BUILDING CONSTRUCTION

3.1 GENERAL

This Section sets out the requirements for the construction of various elements of a building in order to reduce the likelihood of ignition of that building when subjected to bushfire attack.

3.2 LEVELS OF CONSTRUCTION

Three levels of construction are given which correspond to the category of bushfire attack determined for the site of the building (see Section 2):

(a) Level 1 construction for the category of medium bushfire attack.

(b) Level 2 construction for the category of high bushfire attack.

(c) Level 3 construction for the category of extreme bushfire attack.

3.3 FLOORING SYSTEMS

3.3.1 Level 1 construction

The requirements for a floor in a Level 1 construction shall be one, or a combination, of the following:

(a) A concrete slab-on-the-ground.

(b) A suspended floor, which may be one, or a combination of the following, supported by posts, columns, stumps, piers or poles complying with Clause 3.4 or walls complying with Clause 3.5:

  (i) A concrete floor.

  (ii) A framed floor where the underside of any one bearer at any point is greater than 600 mm above the finished ground level.

(c) A suspended timber floor, framed with timber or metal, where the underside of any one bearer, at any point, is not greater than 600 mm above the finished ground level and which has-

  (i) the subfloor space unenclosed and any timber flooring, bearers and joists of fire-retardant-treated timber; or

  (ii) the subfloor space fully enclosed, either by a wall that complies with Clause 3.5.1(a), or by the use of non-combustible sheet material which extends for at least 400 mm above the finished ground level.

  Where non-combustible fire-reinforced cement sheets are used to enclose the subfloor space, the material shall have a minimum thickness of 6 mm and all joints shall be covered or sealed (see Figure 3.1). The non-combustible sheet material shall meet the bottom of the cladding material to ensure there are no gaps on the exterior face of the building.

3.3.2 Level 2 construction

The requirements for a floor in a Level 2 construction shall be as for Level 1 construction (see Clause 3.3.1).

3.3.3 Level 3 construction

The requirements for a floor in a Level 3 construction shall be as for Level 2 construction (see Clause 3.3.2) except that in the case of a framed floor, where any bearer of joist is greater than 600 mm above finished ground level and the floor is not enclosed as described in Clause 3.3.1 (c)(ii), the bearer, joists and flooring shall be of fire-retardant-treated timber or sheeted underneath with non-combustible material.

3.4 SUPPORTING POST, COLUMNS, STUMPS, PIERS AND POLES

3.4.1 Level 1 construction

The requirements for supporting posts, columns, stumps, piers and poles in a Level 1 construction shall be one, or a combination, of the following:

(a) Non-combustible.

(b) Fire-retardant-treated timber for a minimum of 400 mm above the finished ground level.

(c) Timber mounted on galvanized metal shoes with a clearance of not less than 75 mm above the adjacent finished ground level or paving level (see Figure 3.2).

The above do not apply where the subfloor space is totally enclosed as described in Clause 3.3.1 (c) (ii).

3.4.2 Level 2 construction

The requirements for supporting posts, columns, stumps, piers and poles in a Level 2 construction shall be as for Level 1 construction (see Clause 3.4.1).

3.4.3 Level 3 construction

Except in enclosed subfloor spaces, the requirements for supporting posts, columns, stumps, piers and poles in a Level 3 construction shall be as for Level 2 construction (see Clause 3.4.2) except that all timber shall be fire-retardant-treated to full height.

3.5 EXTERNAL WALLS

3.5.1 Level 1 construction

The requirements for external walls in a Level 1 construction shall be as follows:

(a) External walls shall be one, or a combination, of the following:

(i) A wall having an external leaf of masonry, concrete, pisé, rammed earth or stabilized earth.

(ii) A framed wall that incorporates either –

(A) breather-type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS 1530.2) installed immediately behind the external cladding; or

(B) an insulation material conforming to the appropriate Australian Standard for that material.

(iii) A wall of timer logs that have the butting faces of adjacent logs, gauge-planed, and the space between the logs sealed in a manner that prevents the entry of burning debris and which allows for building movement.

(b) Where the external leaf or cladding is of a combustible sheet material and is less than 400 mm above finished ground level, the cladding shall be protected for not less than 400 mm above the adjacent finished ground level (see Figure 3.3)-

(i) by covering it with a suitable non-combustible material, or fire-retardant-treated timber suitably sealed to the existing cladding so as to prevent the entry of burning debris (see Figures 3.3 (a) and 3.3 (b));

(ii) by substituting with a suitable non-combustible sheet material, or fire-retardant-treated timber (see Figure 3.3 (c)); or

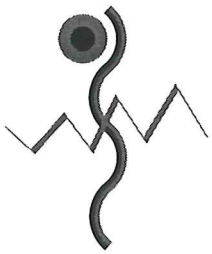
(iii) where the external cladding is timber, by using fire-retardant-treated timber.

3.5.2 Level 2 construction

The requirements for walls in a Level 2 construction shall be as for Level 1 construction (see Clause 3.5.1), except that PVC cladding is not permitted and all external timber wall cladding shall be of fire-retardant-treated timber.

3.5.3 Level 3 construction

The requirements for external walls in a Level 3 construction shall be as for Level 2 construction (see Clause 3.5.2).



3.6 WINDOWS

3.6.1 Level 1 construction

All openable windows, including louvers, in a Level 1 construction shall be screened with corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture size of 1.8 mm in such a way that the entire opening remains screened when the window is open.

3.6.2 Level 2 construction

The requirements for all windows, including louvers, in a Level 2 construction shall be as for Level 1 construction (see Clause 3.6.1) except that aluminium mesh shall not be used.

In addition to the above, the following applies:

(a) Where timber is used, it shall be fire-retardant-treated timber except where protected by non-combustible shutters.

(b) Where leadlight windows are used, they shall be protected by shutters constructed of a non-combustible material or of toughened glass.

3.6.3 Level 3 construction

The requirements for windows in a Level 3 construction shall be as for Level 2 construction (see Clause 3.6.2) except that where the windows are not protected by non-combustible shutters, they shall be glazed with toughened glass.

3.7 EXTERNAL DOORS

3.7.1 Level 1 construction

External doors in a Level 1 construction shall be fitted with –

(a) weather strips or draught excluders to prevent the penetration or build-up of burning debris beneath the door; and

(b) tight fitting door screens fitted with corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture size of 1.8 mm.

3.7.2 Level 2 construction

The requirements for external doors in a Level 2 construction shall be as for Level 1 construction except that aluminium shall not be used for the mesh (see Clause 3.7.1). 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.

3.7.3 Level 3 construction

The requirements for external doors in a Level 3 construction shall be as for Level 2 construction (see Clause 3.7.2) except that –

(a) timber doors shall be fire-retardant-treated or shall have a non-combustible covering on the exterior surface; or

(b) doors shall be protected by shutters of non-combustible material; or

(c) doors shall be solid-core having a thickness not less than 35 mm.

3.8 VENTS AND WEEPHOLES

3.8.1 Level 1 construction

Vents and weepholes in a Level 1 construction shall be protected with spark guards made from corrosion-resistant-steel, bronze or aluminium mesh with a maximum aperture size of 1.8 mm (see Figure 3.4).

3.8.2 Level 2 construction

The requirements for Level 2 construction vents and weepholes shall be as for Level 1 construction (see Clause 3.8.1), except that aluminium mesh shall not be used.

3.8.3 Level 3 construction

The requirements for vents and weepholes in a Level 3 construction shall be as for Level 2 construction (see Clause 3.8.2).

3.9 ROOFS

3.9.1 Level 1 construction

3.9.1.1 General

The following general requirements shall apply to all types of roofing systems in a Level 1 construction:

(a) Timber shakes or shingles shall not be used for the roof covering.

(b) The roof/wall junction shall be sealed either by the use of fascias and eaves linings, or by sealing the gaps between the rafters with a suitable non-combustible material.

(c) Sarking shall have a flammability index of not more than 5 (see AS 1530.2).

3.9.1.2 Tiled roofs

Tiled roofs shall be fully sarked (see Clause 3.9.1.1 (c)). The sarking shall be located directly below the tiling battens and shall cover the entire roof area including the ridge.

3.9.1.3 Sheeted roofs

The requirements for sheeted roofs in a Level 1 construction are as follows:

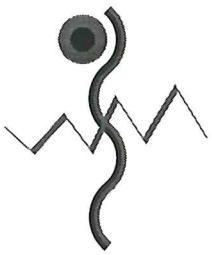
(a) Only metal or fibre-cement sheet shall be used.

(b) All gaps under the corrugations or ribs of the roofing material where it meets the fascia or wall line shall be sealed or protected –

  (i) by fully sarking the roof; or

  (ii) by providing corrosion-resistant steel or bronze mesh, with a maximum aperture size of 1.8 mm, profiled metal sheet, neoprene seal, compressed mineral wool or similar.

(c) Rib caps and ridge capping shall be sealed in accordance with Clause 3.9.1.3 (b) (see Figure 3.5 (a)), or performed rib caps or ridge capping shall be used (see Figures 3.5 (b) and (c)).



3.9.1.4 Rooflights

The requirements for rooflights in a Level 1 construction are as follows:

(a) All penetrations of the roof space for the installation of rooflights and associated shafts shall be sealed with a non-combustible sleeve or lining.

Thermoplastic sheet in a metal frame may be used for a rooflight, but the diffuser installed at ceiling level shall be of wired or toughened glass in a metal frame.

(b) Vented rooflights shall be provided with corrosion-resistant steel or bronze mesh having a maximum aperture size of 1.8 mm.

3.9.1.5 Roof ventilators

All components of roof ventilators, including the rotary type, in a Level 1 construction shall be constructed of non-combustible material and shall be sealed against the entry of sparks and embers with corrosion-resistant steel or bronze mesh having a maximum aperture size of 1.8 mm.

3.9.1.6 Roof-mounted evaporative units

Roof-mounted evaporative cooling units shall only be used if the openings to the cooling unit are encased in corrosion-resistant steel or bronze mesh with a maximum aperture size of 1.8 mm.

3.9.2 Level 2 construction

The requirements for a roof in a Level 2 construction shall be as for Level 1 construction (see Clause 3.9.1), except that all roof sheeting shall be non-combustible and sarked, and rooflight glazing shall be of wired glass. Thermoplastic material or toughened glass shall not be used as the glazing for rooflights. The case of the evaporative cooler shall be manufactured from a non-combustible material.

3.9.3 Level 3 construction

The requirements for roof covering in a Level 3 construction shall be as for Level 2 construction (see Clause 3.9.2) except that no fibre-reinforced cement or aluminium sheet shall be used.

3.10 EAVES

3.10.1 Level 1 construction

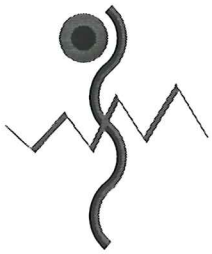
All eaves in a Level 1 construction shall be enclosed, and the fascia or the gaps between the rafters shall be sealed (see Clause 3.9.1.1).

3.10.2 Level 2 construction

The requirements for eaves in a Level 2 construction shall be as for Level 1 construction (see Clause 3.10.1), except that all timber eaves lining and joining strips shall be of fire-retardant-treated timber.

3.10.3 Level 3 construction

The requirements for eaves in a Level 3 construction shall be as for Level 2 construction (see Clause 3.10.2) except that aluminium shall not be used.



3.11 FASCIAS

3.11.1 Level 1 construction

There are no requirements for fascias in a Level 1 construction.

3.11.2 Level 2 construction

All materials used for fascias in a Level 2 construction shall be either non-combustible or of fire-retardant-treated timber.

3.11.3 Level 3 construction

The requirements for fascias in a Level 3 construction shall be as for Level 2 construction (see Clause 3.11.2) except that no fibre-reinforced cement or aluminium sheet shall be used.

3.12 GUTTERS AND DOWNPIPES

3.12.1 Level 1 construction

Any materials or devices used to stop leaves collecting in the gutters of a Level 1 construction shall have a flammability index of not greater than 5 when tested in accordance with AS 1530.2.

3.12.2 Level 2 construction

The requirements for gutters and downpipes in a Level 2 construction shall be as for Level 1 construction (see Clause 3.12.1).

3.12.3 Level 3 construction

The requirements for gutters and downpipes in a Level 3 construction shall be as for Level 2 construction (see Clause 3.12.2).

3.13 VERANDAS AND DECKS

3.13.1 Level 1 construction

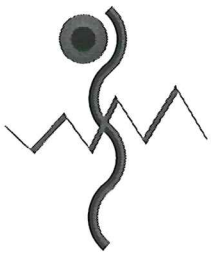
Verandas, decks, and the like, forming part of a building required to be Level 1 construction shall comply with one, or a combination, of the following:

(a) *Slab* A reinforced concrete suspended slab floor, supported by posts or columns complying with Clause 3.4 or walls complying with Clause 3.5, or a slab-on-the-ground floor complying with Clause 3.3.

(b) *Sheeted or tongued and grooved solid flooring* The requirements for flooring are as follows:

  (i) Compliance with the flooring requirements shall be in accordance with Clause 3.3.

  (ii) Where the clearance between the finished ground level and the underside of the floor is not greater than 400 mm above finished ground level, all joints in the flooring shall be covered (above the floor level) or shall be sealed.



(c) *Spaced decking* The requirements for spaced decking are as follows:

(i) The decking timbers shall be fixed with a clearance of not less than 5 mm between adjacent timbers.

(ii) The external perimeter beneath the decking shall not be enclosed nor shall access to the space beneath the decking be impeded.

(iii) Any supports for the decking shall be treated as set out in Clause 3.4.

(iv) Decking timbers shall not be allowed to connect with the remainder of the building unless measures are used to prevent the spread of fire into the building.

3.13.2 Level 2 construction

The requirements for verandas and decks in a Level 2 construction shall be as for Level 1 construction (see Clause 3.11.1) except that if spaced decking is used, fire-retardant-treated timber shall be used for the decking material.

3.13.3 Level 3 construction

The requirements for verandas and decks in a Level 3 construction shall be as for Level 2 construction (see Clause 3.13.2) except that all materials shall be non-combustible or where timber is used, it shall be fire-retardant-treated (including any balustrades).

3.14 SERVICE PIPES (WATER AND GAS)

3.14.1 Level 1 construction

All exposed piping, for water and gas supplies, in a Level 1 construction shall be metal. Pipes of other materials shall be buried to a depth of at least 300 mm below the finished ground level.

3.14.2 Level 2 construction

The requirements for service pipes in a Level 2 construction shall be as for Level 1 construction (see Clause 3.14.1).

3.14.3 Level 3 construction

The requirements for service pipes in a Level 3 construction shall be as for Level 2 construction (see Clause 3.14.2).

APPENDIX F – DEFINITIONS

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

Asset Protection Zone - Often referred to as a fire protection zone. Aims to protect human life, property and highly valued public assets and values. Comprises inner protection area (IPA) and outer protection area (OPA). An area surrounding a development managed to reduce the bushfire hazard to an acceptable level. The width of the Asset Protection Zone will vary with slope and construction level.

Building Line – The extremities of a dwelling.

Bushfire – A fire involving grass, scrub or forest.

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

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

Bushfire-Prone Area - Is an area that can support a bushfire or is likely to be subject to bush fire attack. In general, a bush fire prone area is an area occurring within or within 100m of a high or medium bush fire hazard, within or within 30m of a low bush fire hazard but are not existing urban areas or water bodies (other than wetland vegetation) as identified by a bush fire hazard map produced under an approved Bushfire Risk Management Plan, or such other map certified by the NSW Rural Fire Service for this purpose.

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

Development – For the purpose of this report, the development is considered to be the subdivision and subsequent residential dwelling construction within the defined boundaries of Lot 5.

Inner Protection Area – The inner component of an Asset Protection Zone, consisting of an area maintained to minimal fuel loads and comprising a perimeter road, fire trail, rear yard or reserve, so that a fire path is not created between the hazard and the building.

Outer Protection Area – The outer component of an Asset Protection Zone, where fuel loads are maintained to a level (usually 8t/ha) where the intensity of an approaching bushfire would be significantly reduced.

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

Setback – The distance required through planning provisions to separate a building from the bushfire hazard, street frontage or from adjacent building.

Attachment 2. Correspondence with Warringah Council (2009)

Warringah Council

Civic Centre 725 Pittwater Road
Dee Why NSW 2099
DX 9118
Telephone (02) 9942 2111
Facsimile (02) 9971 4522

Website www.warringah.nsw.gov.au
Email council@warringah.nsw.gov.au

23 April 2009

Mr Ciaran Foley
CEO
Allambie Lutheran Homes Inc
3 Martin Luther Place
ALLAMBIE HEIGHTS NSW 2100

Dear Mr Foley

Re: Allambie Lutheran Homes – DA 2004/0335 – Management Agreement. Consent Condition 5: The Establishment of an Asset Protection Zone.

Thank you for the final instalment cheque of $4373.83 for the establishment of an asset protection zone at the rear of Allambie Lutheran Homes, which brings the overall contribution to the agreed $26,243.00.

The work commenced with Plateau Tree Services removal of trees from the asset protection zone. This was followed by Australian Areas Management and Repair removing other fire prone vegetation and planting out selected areas as required. This project component took some 500 hours of weed control and bush regeneration work. This included mulching and ongoing maintenance as the work progressed.

The NSW Department of Lands carried out significant complementary drainage and fire trail repair work next to the fuel reduction works. This should ensure safe and efficient negotiation of these tracks in the event of a wildfire and during periodic fire hazard reduction work.

The project began in mid 2007 and the principal contract work is now complete as of March 2009. Ongoing maintenance and some "fine tuning" at the site will continue at cost to Council as in all the asset protection zone sites in Manly Dam to bring the asset protection zone to its full potential. Village residents should be aware that this is not a landscaping project hence parts of the work will continue to look partially complete for quite some time before the site fully matures.

Council thanks Allambie Lutheran Homes for their support in this project and the results benefit both the Village and Manly Dam Management needs. Should you have any further enquiries please contact Mr Chris Buckley on 9949 3235.

Yours sincerely

Steven Bax.

Steven Bax
Team Leader
Land Management and Foreshores

Attachment 3. Manly Warringah War Memorial Park Fire Regime Management Plan (2006)

ASSESSMENT | PLANNING | MANAGEMENT

MANLY WARRINGAH WAR MEMORIAL PARK FIRE REGIME MANAGEMENT PLAN

Report prepared for:
Warringah Council
(Project No. 57-14)

June 2006

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Document Tracking

Item	Detail	Signature
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Acknowledgements

This document has been prepared by and is copyright of Eco Logical Australia Pty Ltd. Eco Logical Australia wishes to thank the following people for their input into the project:

Warringah Council: Steve Atkins, Stuart Withington, Chris Buckley, Suzy Tsaprounis.

Rural Fire Service: George Sheppard

Department of Environment and Conservation: Tony Auld

Contents

Tables

Figures

Glossary of Terms

APZ	An Asset Protection Zone (APZ) is an area around a development offering protection to reduce the bush fire hazard. It can consist of an Inner Protection Area (IPA) and an Outer Protection Area (OPA). Hazard reduction techniques can include slashing, raking, bush regeneration and burning.
Biodiversity fire regime thresholds	These thresholds are a range of appropriate fire frequency intervals, intensities and seasons to sustain the ecology of each vegetation community. Where fire regimes are outside the threshold, significant declines in species populations can be expected, particularly if the fire regime prevails over greater than 50% of the community area.
Ecosystem	An interactive system between living organisms (plants and animals) and their non living surroundings.
FEZ	Fire Exclusion Zones (FEZ) are areas that contain fire intolerant species. Fires in these areas should be avoided and quick fire suppression should occur in the case of fire.
Fine fuels	Bark, grass, leaves and twigs less than six millimetres in diameter.
Fire regime	The history of fire in a particular area, including the frequency, intensity and season of burning.
Fuel	Any material capable of being ignited and sustaining fire. Such as grass, live vegetation, leaf litter and bark. Generally measured in tonnes per hectare of dry weight.
Hazard reduction	Works designed to attain planned resource management objectives, primarily the reduction of fire threat. Activities include: • Manual and mechanical thinning of vegetation (NOT broad scale clearing) • Controlled burning of a predetermined area, carried out under specified weather and environmental conditions
Inter-fire period	The period of time between successive burns.
IPA	Inner Protection Areas (IPA) are parts of an Asset Protection Zone (APZ). They are designed to eliminate the threat of fire radiation to the development, and use techniques such as slashing, shrub clearing, and construction of barriers or hazard reduction burning to reduce fuel loads.

LMZ	Land Management Zones (LMZ) are broader areas of the landscape, which do not satisfy the criteria for Strategic Fire Management Zones (SFMZ) or Asset Protection Zones (APZ). Fire in these areas should be managed to meet conservation objectives for species, habitats, populations and cultural heritage values.
Minimum Fire Threshold	The minimum fire frequency permitted before a decline in biodiversity is expected.
Maximum Fire Threshold	The maximum fire frequency permitted before a decline in biodiversity is expected.
OPA	Outer Protection Areas (OPA) are parts of an Asset Protection Zone (APZ). They are designed to reduce the speed and intensity of an approaching bush fire. Techniques such as hazard reduction burning or selective shrub clearing are used to reduce fuel load.
Prescribed burning	A controlled burn to a predetermined area, carried out under specified weather and environmental conditions, designed to achieve planned resource management objectives.
Quick succession	Events occurring within five years of each other.
SFAZ	Strategic Fire Advantage Zones (SFAZ) are usually adjacent to, and compliment, Asset Protection Zones (APZ). They are managed to protect community assets and ecological sustainability.
Treatment Area	Area of land subject to removal or reduction of fuel by manual or mechanical means, or by prescribed burning.
Wildfire	An unplanned fire.

Executive Summary

Manly Warringah War Memorial Park is located in Sydney's Northern Beaches district, within the suburb of Allambie Heights. The park contains the largest fresh water lake (Manly Dam) in Sydney's metropolitan area and consists primarily of native bushland.

Covering an area of approximately 377 hectares, the park provides habitat for a number of flora and fauna species; including three threatened fauna and two threatened flora species. The park also contains Silvertop Ash-Brown Stringybark Forest (listed as Duffys Forest Endangered Ecological Community) as well as *Angophora crassifolia* a significant plant species.

Internal uses within the park include four formal picnic areas, Wakehurst Golf Course, Couvret Tennis Courts, the Warringah Aquatic Centre, and the adjacent sports fields. Surrounding land uses include low density urban development, independent and assisted care for senior citizens, primary schools, an industrial area and Garigal National Park.

In addition to ongoing maintenance of existing fire trails, creation of a new fire trail between Wakhurst Parkway and the top of Wakehurst Golf Course, is recommended, in order to provide adequate access to primarily fire break areas. It is further recommended that fire trails at Roosevelt Avenue (adjacent to the tennis courts) and behind Lutheran Homes be upgraded / maintained in accordance with the requirements for Planning for Bush Fire Protection (RFS 2001).

The Management Plan divides the park into management zones which include Asset Protection Zones (APZ), Fire Exclusion Zones (FEZ), Land Management Zones (LMZ) and Strategic Fire Advantage Zones (SFAZ). Existing tracks, natural features and cleared areas have been used for fire management boundaries where available, with proposed management zones covering both Council managed and privately owned land.

The Plan contains a Prescribed Operations Schedule that specifies treatments, timing and other characteristics. It prescribes numerous hazard reduction burns between 2006 and 2016, as well as fire exclusion / quick suppression, weed control and hand removal of fuels within areas of build up.

1 Introduction

Eco Logical Australia was contracted by the Warringah Council in March 2004 to prepare a 10 year Fire Regime Management Plan from 2006 to 2016 for Manly Warringah War Memorial Park.

1.1 Reserve Outline

Manly Warringah War Memorial Park (referred to as 'the Park') is located in Sydney's Northern Beaches district, within the suburb of Allambie Heights, in the Warringah Local Government Area (LGA). Covering an area of approximately 377 hectares, the park contains the largest fresh water lake (Manly Dam) in Sydney's metropolitan area and consists primarily of native bushland. See Figure 1 for site location.

The Park is Crown Land, reserved for public recreation and is managed by Warringah Council, zoned under 'existing Recreation' and 'Open space' under the Warringah Local Environmental Plan (LEP) 1985.

Internal uses within the park include the Warringah Aquatic Centre, the sports fields adjacent to the Aquatic Centre, four formal picnic areas, Wakehurst Golf Course and Couvret Tennis Courts (near Wakehurst Golf Course)

Surrounding land uses include low density urban development, independent and assisted care for senior citizens, primary schools, an industrial area and Garigal National Park.

1.2 Management Plan Objectives

- To provide recommendations for:
    - New fire management zones
    - Suitable alternatives for fuel management
    - Strategies to protect the existing infrastructure located within the park
    - Strategies to protect persons and property within, or immediately adjacent to the park
- Creation of:
    - Comprehensive fire history for the park
    - A plan that is acceptable to and can be implemented by Council and the NSW Rural Fire Service (RFS)
    - An ecologically based strategy for fuel management, incorporating the requirement for:
        - Mosaic burn patterns
        - Fire regimes in line with vegetation community thresholds, endangered ecological communities and identified threatened species, as well as locally or regionally significant species

- A strategy to enable the effective planning of Hazard Reduction (HR) burns with regard to:
  - Endangered ecological communities
  - Endangered populations
  - Threatened, locally or regionally significant species
  - Aboriginal sites and culturally significant features known to exist within the park
  - Assets and infrastructure

1.3 Report Structure

The Fire Regime Management Plan for Manly Warringah War Memorial Park comprises two separate documents:

1) This report
2) An A0 sized poster showing a series of relevant maps and tables

This report identifies the fire management framework, fire related issues and risks within the park, and provides an operational schedule and performance measures. It is intended that this written report be used in conjunction with the "Manly Warringah War Memorial Park Fire Regime Management Poster" (ELA 2006).

1.4 Assumptions

Vegetation fuel loads and structure were derived from Vegetation Mapping by P & J Smith (2003). Whilst limited opportunistic on-ground validation of vegetation communities was undertaken, it was assumed that this mapping was generally accurate.

Figure 1 Site Location

2 Legislative and Planning Instruments

Fire management activities on the site are constrained by numerous Acts, plans and guidelines. The most relevant documents are reviewed below.

The majority of the legislation and planning instruments listed below impact HR planning requirements. Further information regarding this process may be seen in the 'Warringah Local Government Area Hazard Reduction Guidelines' (Appendix 4).

2.1 Crown Lands Act 1989 & Local Government Act 1993

This Plan of Management will meet the requirements of the Local Government Act 1993, with regards to:

- Defining objectives and performance targets
- Stating the means by which objectives and performance targets will be met
- Stating the means by which performance will be measured
- Observing the requirements of any threat abatement plans and recovery plans made under the Threatened Species Conservation Act 1995

All plans of management for this park require consideration of the Crown Lands Act 1989. This includes the requirement that the following principles be followed:

- Environmental protection principles are observed in relation to the management and administration of Crown land
- Natural resources of Crown land (including water, soil, flora, fauna and scenic quality) are conserved wherever possible
- Where appropriate, Crown land should be used and managed in such a way that both the land and its resources are sustained in perpetuity
- Crown land be occupied, used, sold, leased, licensed or otherwise dealt with in the best interests of the State consistent with the above principles

2.2 Manly Warringah War Memorial Park Plan of Management

This plan was created July 1998 and provides a frame work for managing Manly Warringah War Memorial Park. Providing a back ground, management strategies and work schedules for the following issues:

- Vegetation management
- Feral and introduced animal control
- Water quality
- Aboriginal sites
- Education and research
- Visitor facilities
- Safety and standards

The plan refers to past fire history and the Bush Fire Control Plan as written by ES & S Consultants (1981).

2.3 Management Strategy for Weed Control and Fire Management Access Zones[1]

This document, created in 1996, sets out aims and objectives for the management of fire and weeds within the Warringah Council Local Government Area (LGA).

Fire management objectives include:

- Ensuring that fire management access zones are of dimensions that can be maintained in the long term
- Ensuring that methods of construction and maintenance of fire management access zones are environmentally sensitive
- Carrying out of community education in conjunction with Fire Control, and of fire hazard reduction techniques
- Co-ordinating with Fire Control on the fire hazard reduction issues

These objectives have been considered during the creation of this plan.

2.4 Rural Fires Act 1997

The objectives of the *Rural Fires Act (RF Act) 1997* are to provide for:

- The prevention, mitigation and suppression of fires
- Coordination and prevention of bush fire fighting
- Protection of people and property from fires
- Protection of the environment

The RF Act requires the creation of a Bush Fire Co-ordinating Committee and a Bush Fire Risk Management Plan (outlined below).

Obligations are imposed on Council and other land management agencies to:

- Protect life and property
- Prevent fire from leaving land vested in or under its control
- Implement the provisions of Bush Fire Management Plans

2.5 Warringah Pittwater Bush Fire Risk Management Plan

Required under Section 52 of the RF Act, the Warringah Pittwater Bush Fire Risk Management Plan outlines the importance of bush fire management zones to assist in reducing bush fire risk and damage to assets. The plan also emphasises fire management priorities. Where areas are faced with an extreme bush fire risk, it will be given the highest management priority and allocation of resources.

[1] Council has acknowledged that this document is outdated and that changes are required to bring it up to current standards.

The plans are required to consider threatened species conservation and may restrict or prohibit the use of fire and other fire hazard reduction activities. This is particularly relevant for threatened species habitat.

The responsibility to implement asset protection is placed on the owners of the land which is subject to the bush fire threat. It is also Council's responsibility to ensure that the owners or occupiers of private property have taken the required steps to reduce bush fire hazards on their land. This can be enforced by the RFS through Section 66 of the RF Act.

Council is responsible for environmental assessment of land prior to commencing any fire management activities (on Council owned or managed land). This is achieved through issuing a Bush Fire Hazard Reduction Certificate, obtained under the *Environmental Planning and Assessment Act 1979* (EP&A Act), or through the Bush Fire Environment Assessment Code (RFS 2006).

Areas along the northern, eastern and southern boundaries of Manly Dam Warringah War Memorial Park are zoned as Asset Protection zones (APZ). The rest of the park is zoned as an environmental Land Management Zone (LMZ) (under WPBFMC 2000).

2.6 Bush Fire Environment Assessment Code

This code provides a stream-lined environmental assessment process for use in determining applications for Bush Fire Hazard Reduction Certificates and provides standards for the conduct of HR works for areas zoned under the Bush Fire Risk Management Plan (WPBFMC 2000).

The code consists of and refers to standards and guidelines that relate to the conduct and planning of managed hazard reduction activities.

Requirements for the code are specified under Section 100J of the RF Act, including land restrictions and exclusions for environmentally sensitive areas (Sections 2 and 3, BFEAC 2006).

The land covered by Manly Dam is mapped as Asset Protection Zone (APZ) and Environmental Land Management Zone (LMZ) under the Bush Fire Risk Management Plan (WPBFMC 2000). The existing Bush Fire Environment Assessment Code (RFS 2006) does apply to this park, with restrictions within areas of Freshwater Lagoon Swamp.

2.7 Planning for Bush Fire Protection 2001

Planning for Bush Fire Protection (PBP), prepared by the Rural Fire Service and Planning NSW is the key bush fire planning document for the state. The document identifies requirements and strategies for new developments to help protect from bush fire hazards. It details the location and depth of asset protection zones, fire trails and perimeter roads, water supply and building standards in bush fire risk areas.

2.8 National Parks and Wildlife Act 1974

Aboriginal and cultural heritage sites are protected under this Act, as well as threatened flora, fauna and endangered ecological plant communities. The Department of Environment and Conservation (DEC) are named as the responsible authority under the Act, which extends to the protection of items outside the reserve system.

2.9 Environment Protection & Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) stipulates that approval from the Commonwealth Environment Minister is required if a development is likely to have a significant impact on matters considered to be of National Environmental Significance.

2.10 Environmental Planning and Assessment Act 1979

The NSW EP&A Act is the principal planning legislation for the state, providing a framework for the overall environmental planning and assessment of development proposals.

2.11 Threatened Species Conservation Act 1995

The NSW *Threatened Species Conservation Act 1995* (TSC Act) aims to protect and encourage the recovery of threatened species, populations and communities 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 mechanical hazard reduction) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

The Atlas of NSW Wildlife (DEC 2004) was utilised to identify known threatened flora within 5km and threatened fauna within 10km of the park (see Appendix 2). Fire ecology requirements of recorded species considered.

2.12 Noxious Weed Act 1993

This Act requires Council to control noxious weeds and destroy notifiable weeds within areas under its control; and ensure that private landholders do the same.

This plan has been prepared in conjunction with the Bushland Management Plan For Manly Warringah War Memorial Park (ELA 2005e). Management of noxious weeds observed within the park is required under this Act.

2.13 Rivers and Foreshores Improvement Act 1948

The NSW *Rivers and Foreshores Improvement Act 1948* (RFI Act) aims to provide effective controls on activities that could harm sensitive waterway and foreshore environments. The Act has provisions that require a permit for excavations, fill and other works within 40m of the top of the bank for rivers, estuaries and lakes as it is recognised that they can have significant detrimental environmental impacts on habitat, water quality, flooding and erosion. This Act exempts 'local authorities' from the need to obtain a permit.

A Part 3a permit would be required under the RFI Act for works listed above. The RFI Act is soon to be repealed and replaced by the *Water Management Act, 2002* but the provisions under this Act are likely to be similar to the RFI Act. A notable exception, however, is that 'local authorities' will no longer be exempt from the need to obtain a permit.

2.14 State Environmental Planning Policy 19 (SEPP 19) – Bushland in Urban Areas

SEPP 19 is designed to protect bushland in public open space zones and reserves, as part of preservation for natural heritage, or for recreational, educational and scientific purposes. It ensures that bush preservation is given a high priority when local environmental plans for urban development are prepared. Under SEPP 19 'bushland' means land on which there is vegetation that is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristic integrity of the natural vegetation.

This park is zoned as public open space. As such future Hazard Reduction work must address this legislation.

3 Bush Fire Risk

3.1 Bush Fire History

Fire history mapping including both Wildfire and Hazard Reduction burning was supplied by Warringah Council and the NSW Rural Fire Service. Field validation, completed in January 2005, was undertaken to increase the reliability of the data. Spatial accuracy for data was found to be low, particularly for older fires.

Additional fire history data was assessed, including:

- Digital data from the Department of Environment and Conservation (incorporated into fire mapping, post site validation)
- Written information derived from Nelson Consulting (1998), (incorporated into fire mapping, post site validation)
- Written data from the NSW Fire Brigade, consisting of records for Hazard Reduction burning over the last 5 years and unplanned vegetation fires for the past 10 years (provided to Council)

Fire history data from all sources ranged in date from 1952 to 2005.

Fire history mapping prior to 2000 was often not undertaken or consisted of approximate desktop estimates. As such, past fire history data may be incomplete.

Fires recorded within Manly Warringah War Memorial Park boundaries occurred between 1971 and 2005. Small spot fires mapped outside the park were not included in the analysis.

An analysis of available mapped fire history data showed that 76% of Manly Warringah War Memorial Park has been burnt since 1952, with the major source of fire emanating from the adjacent Garigal National Park. The most recent fire events occurred in 2005.

See "Manly Warringah War Memorial Park Fire Regime Management Poster" (Appendix 8, ELA 2006) for a map of recorded fire history.

3.2 Adjacent areas

Manly Warringah War Memorial Park is located adjacent to Garigal National Park; there by increasing the fire threat to the park.

The Ku-ring-gai and Garigal National Parks Fire Management Plan (DEC 2005) has classified the areas surrounding the reserve and adjoining Community Land as Heritage Area Management (see NPWS 2005a for prescriptions). The plan states that prescribed burning schedules will be developed in consultation with relevant Bush Fire Management Committees, as such no burning has been proposed at this stage.

Further fire management planning within this area may be seen within the Garigal National Park Draft Fire Management Strategy (DEC 2005a).

3.3 Fuel Load Assessment

An assessment of fuel loads has been undertaken in ArcView GIS, using a program add-on to predict fuel loads, based on vegetation type and time since fire. This software, prepared for NPWS (Conroy 1994), uses fuel accumulation curves for structural vegetation types. The information was then analysed in relation to time since last fire to provide an estimate of fuel loads across the study area.

This information has been used to assist in the identification of priority areas for hazard reduction burns. As new fires occur and vegetation regenerates fuel loads will vary.

Fuel modelling has been based on fire history data from 1952-1953 to 2004-2005 fire seasons and Warringah Vegetation Mapping (P & J Smith 2003) (See Figure 3).

It should also be noted that high levels of weed infestation currently exist within the park. The occurrence of these weeds has the potential to alter fuel loads and fire response.

3.3.1 Limitations

The following is a basic list of the limitations of the fuel model:

- The model is based on topography, vegetation mapping and fire history. Any inaccuracies or gaps in the data will be persistent throughout the fuel model
- Current fire history records do not include any indication of fire intensity. The model assumes a starting fuel load of 0 tonnes per hectares. After any fire this is unlikely and in the case of a cool burn, much of the available fuel may remain
- Fire history records before the mid 1980s were not systematically recorded
- Years of drought and very poor ridge-top soil conditions may result in a much slower rate of vegetation growth and fuel accumulation
- Areas of cleared or highly disturbed vegetation, were excluded from the fuel load assessment
- In some areas manual Hazard Reduction (HR) works have not been mapped. This has resulted in higher fuel load predictions than that which is actually on the ground
- Hazard reduction burns undertaken in 2005 – 2006 fire season were not included within fuel load assessments

3.3.2 Algorithms

The following vegetation fuel classes are used:

1 = grass (not included in model at this stage)
2 = shrub / heathland
3 = woodland
4 = open forest
5 = rainforest (not included in model)

0 = cleared, disturbed, not vegetated, swamp, reedland, saltmarsh (not included in model)

The following fuel accumulation algorithms are used:

Shrubland: $F = 40 – (e^{-0.01169 * t} * 36.6345)$

Woodland: $F = 22.3 - (e^{-0.1634 * t} * 16.878)$

Forests: $F = 23 - (e^{-0.112 * t} * 16.346)$

Where:
F = Fuel Load measured in tonnes/hectare
T = Time since last fire (in years)

3.4 Assets at Risk from Fire

3.4.1 Built and Cultural Assets

The park contains numerous built assets including, Couvret Tennis Courts, the Warringah Aquatic Centre, the sports fields adjacent to the Aquatic Centre, Wakehurst Golf Course, four formal picnic areas, a Council Park Office, storage sheds, and workshops. Protection of these assets have been included within zone management. The park also contains lower level assets such as walking and bike tracks, bridges, drains, fencing and signage. Consideration for the protection of such assets should be given prior to the conduct of HR burning.

Identification of cultural assets including known European and Aboriginal heritage sites have been identified from the Aboriginal Heritage Information Management System (AHIMS – DEC 2004a), Council data and the parks management plan (Nelson Consulting 1998). This information has been provided in digital GIS format and is intended to flag known cultural heritage issues for consideration during the HR planning process.

Manly Warringah War Memorial Park and Manly Dam are formally listed as heritage items, within the National Estate Database, with 11 items of Aboriginal cultural heritage occurring within the park.

3.4.2 Natural Heritage Assets

Information on natural heritage values has been sourced from the following:

- Atlas of NSW Wildlife (DEC 2004)
- Warringah Vegetation Mapping (P & J Smith 2003, supplied in digital format by Council)
- Warringah Natural Area Survey: Vegetation communities and Plant Species (P & J Smith 2003)
- Manly Warringah War Memorial Park Plan of Management (Nelson Consulting 1998)

3.4.2.1 Vegetation Communities

The park contains one vegetation type listed under the TSC Act as one Endangered Ecological Community (EEC) - Duffys Forest Ecological Community. No Nationally listed communities (under the EPBC Act) occur within the park.

Table 1 contains a list of communities, their legal status in NSW, and their priority within Warringah LGA (P & J Smith 2003). See Figure 2 for vegetation communities, Appendix 1 for an explanation of vegetation priority. A Transparent overlay of vegetation communities may also bee seen in Appendix 7.

Duffys Forest vegetation within the northern section of the park, adjacent to Warringah Aquatic Centre is likely to cover a greater area due to regeneration works undertaken. Future revision of mapping within this area should be considered, providing follow up weed work is undertaken.

Table 1 Vegetation Communities of Manly Warringah War Memorial Park

Vegetation Community	State Legislative Status (TSC Act 1995)	LGA Priority
Bloodwood-Scribbly Gum Woodland	Not listed	3
Freshwater Lagoon Swamp	Not listed	1
Peppermint-Angophora Forest	Not listed	3
Sandstone Heath	Not listed	3
Sandstone Swamp	Not listed	2
Silvertop Ash-Brown Stringybark Forest	Duffys Forest vegetation community in the Sydney Basin Bioregion	1

Figure 2 Vegetation Communities

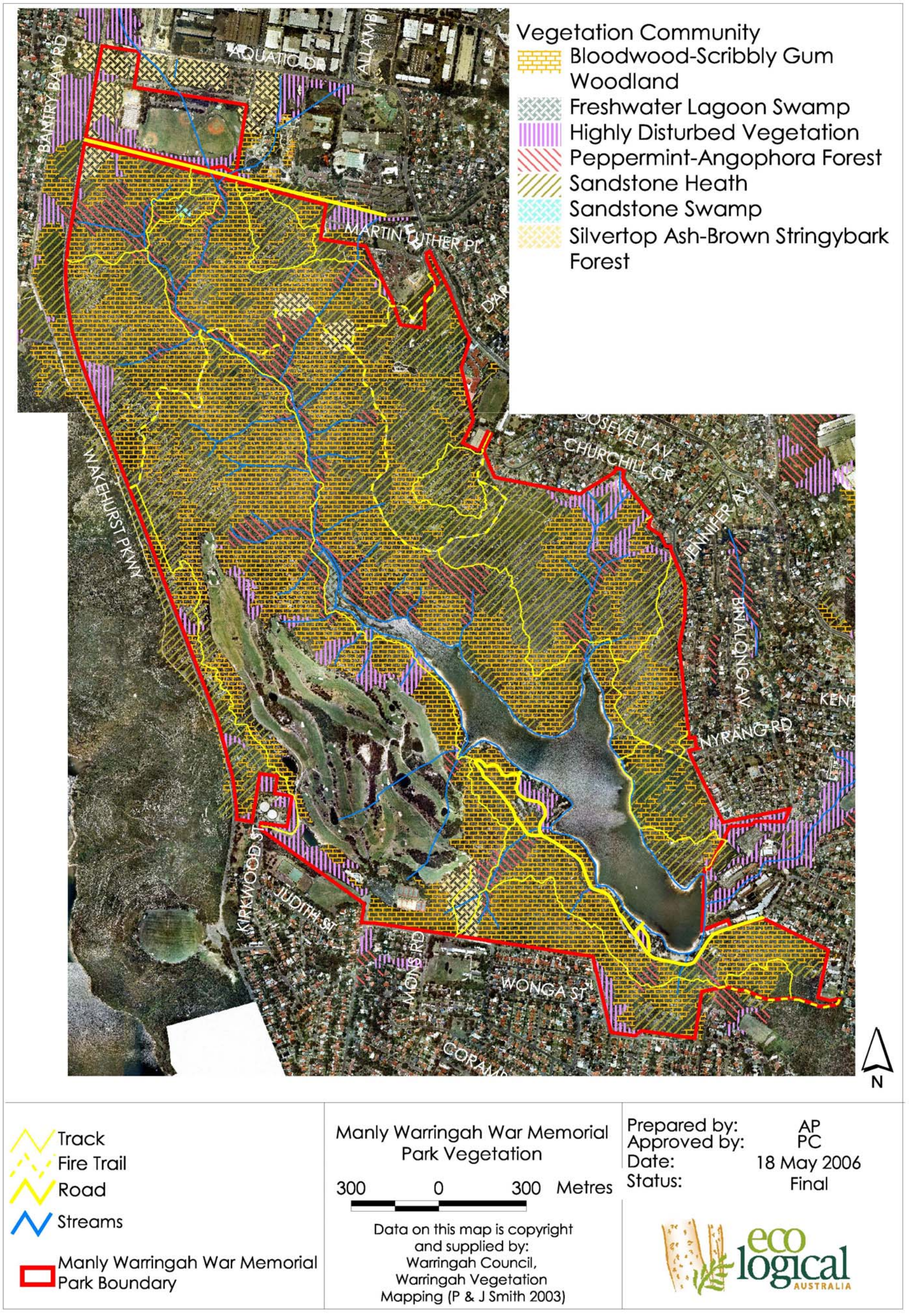
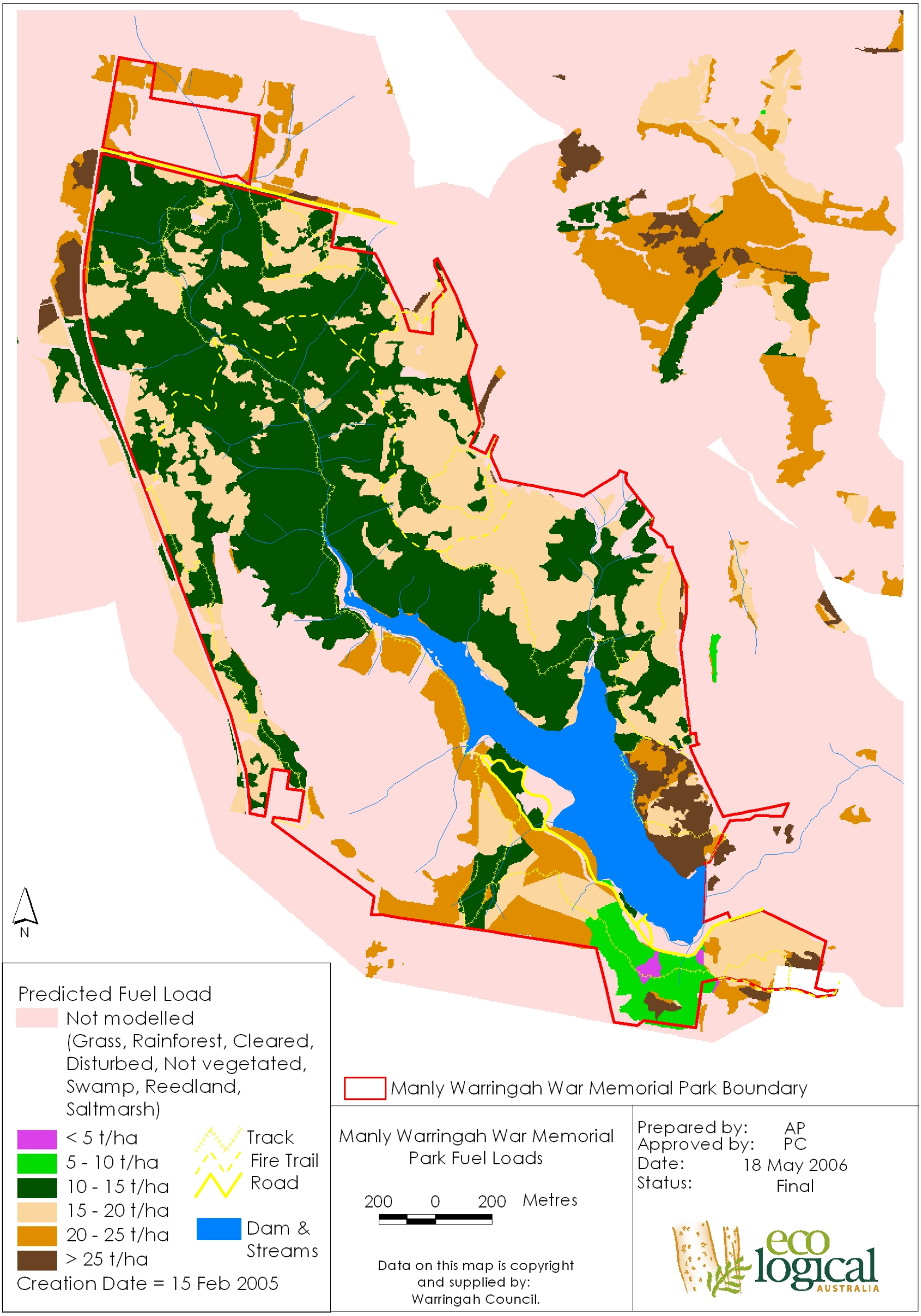


Figure 3 Predicted Fuel Loads



3.4.2.2 Managed Regeneration Areas

Consideration should be given to the vulnerability of bush regeneration areas within the park at HR planning stage as well as during wildfire response, where possible.

3.4.2.3 Threatened Flora and Fauna

A search of the Atlas of NSW Wildlife was conducted for:

- Threatened flora listed under the TSC Act 1995, and flora indicated by P & J Smith (2003) as being nationally, regionally or locally significant. Search area was within 5km of the Park; and
- Threatened fauna listed under the TSC Act 1995, and fauna indicated by P & J Smith (2005) as being nationally, regionally or locally significant. Search area was within 10km of the Park.

Species identified within the radius' above may be seen in Appendixes 2 - 3 and includes:

- 42 threatened fauna species
- 47 national, regional or locally significant fauna species
- 9 threatened flora species
- 24 national, regional or locally significant flora species

Threatened species identified within the park include the Rosenberg's Goanna, the Grey-headed Flying-fox, the Eastern Bent-wing Bat, *Microtis angusii* and an *un-named Prostanthera* species. *Angophora crassifolia* a significant plant species was also recorded within the park.

Fire requirements for threatened species identified within the park were considered during creation of the operational schedule. These included requirements identified within relevant recovery plans for each species.

Protection of locally and regionally significant species as well as threatened species identified as occurring outside the park is aimed at maintaining the structure and floristic integrity of the plant communities within which they occur.

Additional management requirements for all species identified (see Appendix 2) should be considered during HR planning including fire intensity, burn season, escape routes and internal burning boundaries to ensure protection of breeding areas and habitat.

Fire ecology requirements of threatened flora within 5km and threatened fauna within 10km of the park have been assessed and provided to Council within the Warringah Reserve Threatened Flora / Fauna Fire Ecology spreadsheets (ELA 2005a, ELA 2005b).

Additional information including species habitat distribution / condition and population age (for flora species) is required to enable effective HR planning. As such field assessment at HR planning stage is advised.

To assist in future management, it is recommended that Council obtain mapping of:

- Potential refuge areas for amphibians, reptiles and mammals (considering the existence of barriers such as fences).
- Distribution and abundance of habitat features for which protective measures can be implemented, including:
    - Ephemeral areas
    - Hollow bearing trees/ significant stands

4 Fire Management Issues

4.1 Fire Management Boundaries

The park boundary used within this plan has been compiled from both cadastral and park management boundaries (as proposed by Nelson Consulting (1998). Areas where the park management boundary is seen to deviate outside of the cadastral boundary have been included.

Normally, a fire management plan would only apply to the subject park. However due to the occurrence of special purpose developments such as primary schools and retirement villages and the desire to manage based on logical boundaries this plan includes some zone areas that are outside the Park.

4.2 Management Responsibilities

Fire management within the areas is co-ordinated on a landscape scale by the Warringah Pittwater Bush Fire Management Committee (BFMC). This committee is responsible for providing a coordinated, agreed approach to major issues in preparing plans for operations, and bush fire risk management within the district and is made up of Warringah Council, DEC and other key stakeholders.

Overall management of the park is the sole responsibility of Warringah Council. The NSW Fire Brigade and the NSW RFS are responsible for fire suppression efforts in the park and for mapping any fires that occur.

This plan has divided the park into a number of different management zones. Zones adjoining or including private/commercial may require landowner's co-operation. Council have no responsibility for land not under their management.

The Warringah Aquatic Centre, retirement dwellings and schools adjacent to the park also require an active evacuation plan.

4.3 Fire Trails and Tracks

The following actions should be undertaken in order to ensure adequate access and egress to primarily fire break areas within the park:

- All existing official trails be maintained

- Creation of a new fire trail between Wakhurst Parkway and the top of Wakehurst Golf Course (see Figure 6 and 7, for approximate location).
- Maintenance/upgrade the following trails in accordance with the requirements for Planning for Bush Fire Protection (RFS 2001):
    - fire trail at Roosevelt Avenue adjacent to the tennis courts
    - fire trail behind Lutheran Homes

Slip rail gate locks on either side of the pipeline easement should be the same. This will require co-operation with Sydney Water.

Fire trail management should be undertaken in accordance with the Bush Fire Coordinating Committees' Policy (no. 1/03), Guidelines for the Classification of Fire Trails and Guidelines for Fire Trail Signage (BFCC 2003). Additionally a Fire Trail Register is maintained by the BFMC.

4.4 Introduced Species Management

Weed management

Interactions between fire and weed species include:

- Increased fuel levels, with some weed species being particularly flammable (Eg. Pampas grass)
- Decreased likelihood of effective burn intensities, due to fire retardant species (Eg. Privet and mesic species)
- Potential for weed mortality by fire
- Encouraged proliferation of weeds, due to seed stimulation and ecological conditions post fire

To ensure appropriate weed management, weed control should be considered during HR planning. This should include an assessment of:

- Removal of weed species over natives during creation of APZ areas
- Pre-fire weed preparation requirements. Factors to consider include weed type, species, moisture content and desired fire intensity

Management of weeds within APZ areas must incorporate ecological, stabilisation, and fire considerations.

Appropriate techniques are to be employed to prevent weed dispersal by mowers etc and the removal of dead vines from trees, as these features can act as wicks for fire to spread into the tree canopy.

Due to the parks adjacency to Garigal National Park, co-ordination between Council and DEC is recommended for effective weed control. This is in particularly important for the control of *Acacia saligna.*

This plan has been prepared in conjunction with the Bushland Management Plan

For Manly Warringah War Memorial Park (ELA 2005e).

The Bushland Management Plan (ELA 2005e) recommends that a small area trial burn along Wakehurst Parkway be conducted, within highly infested areas of *Acacia saligna*. This burn is not addressed within this plan. Exclusion of the trial burn from this plan should not be used as a reason for not undertaking the burn.

Feral fauna management

Fire may increase the impact of feral fauna species through a reduction in protective ground cover for prey species. As such, control of feral species should be considered during HR planning works.

The implementation of a co-ordinated fox and feral cat control program is recommended within Nelson Consulting (1998).

4.5 Fire Management Zones

The Fire Management Zones used in this plan are based on those used in the Warringah Pittwater Bush Fire Risk Management Plan (WPBFMC 2000). The description, aims and prescription for these zones are described below.

4.5.1 Asset Protection Zones (APZ)

Description

- Area surrounding a development and managed to reduce the bush fire hazard
- Often has Inner Protection Area (IPA) and Outer Protection Area (OPA)
- APZ widths and fuel reduction treatment will be determined by slope and existing nature of assets
- Reduction techniques will include:
    - raking and slashing
    - bush regeneration, involving initial weed removal and long term weed management. This method should be combined with hand removal of ground fuels and manual removal of shrub and middle storey layers
    - burning

Aims

- To protect human life and property
- To protect highly valued assets

Prescriptions

- APZ areas may be burnt as appropriate dependant on management issues

IPA:

- To maintain minimum ground fuel loads by raking and slashing to less than 40cm in height, with discontinuous shrub and canopy layers. Reduction techniques will include:
    - removal/ suppression of weeds
    - thinning of regrowth
    - hand removal
    - raking and slashing
    - Trees should not over-hang buildings

OPA:

- To maintain reduced ground fuel loads and maintain understorey to less than 50cm in height. Reduction techniques will include:
    - removal/ suppression of weeds
    - thinning of regrowth
    - hand removal
    - raking and slashing

4.5.2 Land Management Zone (LMZ)

Description

- Broader areas of the landscape, incorporating those areas not satisfying the criteria for inclusion in Strategic Fire Management Zones or Asset Protection Zones
- Reduction techniques will include:
    - burning
    - weed control

Aims

- Protection of natural and cultural heritage values
- Maintenance of ecological processes

Prescription

- Fire management to meet conservation objectives for species, habitats, populations and cultural heritage values, including:
    - to control breaches in minimum fire thresholds and address maintenance of fire age (vegetation age) mosaic, including maximum fire thresholds
    - implementation of cultural heritage and threatened species management within areas where cultural heritage and threatened species sites are known or likely to occur

4.5.3 Strategic Fire Advantage Zones (SFAZ)

Description

- Usually adjacent to and complementing asset protection zones
- Managed to protect community assets and ecological sustainability
- Reduction techniques will include:
    - burning
    - manual fuel reduction techniques such as raking, slashing, hand removal of ground fuels and manual removal of shrub and canopy layers; emphasis placed on weed species where appropriate
    - weed control

Aims

- To restrict fire movement into and out of parks
- Reduce the speed and intensity of fire
- Reduce the potential for spot fire development

Prescription

- Two SFAZ prescriptions have been used. These include:
    - **Low fuel SFAZ**: general prescription for maximum fine fuel loading within a range of 8 – 15 tonnes per hectare
    - **SFAZ**: general prescription for maximum fine fuel loading within a range of 8 – 18 tonnes per hectare
- To be managed consistently with the following applications:
    - to provide fuel reduced areas which enable the protection of assets by fire fighters when Asset Protection Zones are not in place
    - to complement Asset Protection Zones where insufficient protection is provided
    - to provide fuel reduced zones in areas of high ignition potential (Eg. along roads, rail lines, power lines etc) to slow the development of fires, reduce their spread, and provide for safe suppression
    - to provide strategically located fuel reduced areas to reduce the vulnerability of assets which are susceptible to fire
    - to attain a fire regime consistent with the requirements for the preservation of biodiversity within vegetation communities

4.5.4 Fire Exclusion Zones (FEZ)

Description

- Areas containing fire intolerant species and assets

Aims

- To exclude fires (both wildfires and hazard reduction burning) due to the presence of fire intolerant assets, including:
    - fire intolerant vegetation communities
    - riparian buffers
    - cultural/historic sites

Prescription

- Exclude fire and quick fire suppression to maintain fire intolerant species and assets

4.6 Biodiversity Fire Regime Thresholds

Biodiversity fire regime thresholds are intended to ensure there is no loss of biodiversity through senescence or insufficient recruitment as a result of fires being too frequent. Additionally, varying inter-fire periods across the landscape ensures greater heterogeneity of lifecycles and growth stages, enhancing habitat value.

Minimum and maximum inter-fire periods have been defined for vegetation communities known to occur within the park. These are shown in Table 3.

Revegetation areas within the Park have not been included within this assessment process. Due to the potentially young age of these communities it is noted that prescribed biodiversity thresholds may have detrimental effects. These factors need to be considered during future HR planning conducted prior to burning.

An evaluation of fire history and biodiversity fire regime thresholds for mapped vegetation communities has been undertaken for the entire park. This assessment did not include hazard reduction burns undertaken in 2005 – 2006 fire season.

The current fire threshold status and resultant ecological fire requirements for vegetation within the park have been determined and may be seen in Figures 4 and 5 respectively. An explanation of these categories can be seen in Table 2.

The information above has been considered in determining the operation schedule (see Section 5).

Where the minimum inter-fire threshold has not been reached (i.e. it has not been burnt too frequently), an indication of the number of burns permitted within the life of the plan has been provided.

Fire should be excluded from areas where the minimum inter-fire threshold has been reached.

Where the minimum inter-fire threshold has been exceeded (that is, it has been burnt too frequently), strategies to facilitate recovery should be implemented. These may include:

- If wildfire occurs, the area burnt should be minimised through immediate response and rapid suppression.
- Use of prescribed burning to reduce the threat of wildfire whilst maintaining varying fire ages.

When identifying if an area had breached, reached or not reached its minimum inter-fire threshold the precautionary approach was adopted. It was not possible, with the data available to identify whether a fire had occurred at the start or end of a calendar year. This is due to the fact that some fires are recorded by fire season, which actually occurs over 2 calendar years. Therefore, when calculating the minimum inter-fire threshold, areas on the fringe of the threshold were included. For example, if an area had a minimum threshold of >2 fires in <5 years, and was burnt in

1999, and 2004, we would identify this area as having reached its minimum threshold, even though the fires may have actually occurred 6 years apart (Eg. January 1999 and December 2004). This precautionary approach means areas for future burning were not identified if they were on the verge of reaching their minimum threshold.

Where frequent fire is identified in a Recovery Plan as a threatening process, relevant pre-existing Threat Abatement Plans should be implemented.

Table 2 Ecological Threshold and Ecological Fire Requirement Explanation

Ecological Thresholds	Explanation	Ecological Fire Requirements • Actions for areas will depend upon whether the minimum threshold (i.e. burnt too frequently) or the maximum threshold (i.e. not burnt frequently enough) has been reached.
Threshold breached	This includes areas of vegetation where fire frequency has either been too infrequent, or too frequent for the maintenance of optimum biodiversity, as recommended within vegetation community fire thresholds.	<u>Minimum threshold breached:</u> Suppression priority. Exclude prescribed burning for a minimum of 10 years in forest, heathland / tall shrubland and woodland. For other community types prevent successive fires until community is within threshold. <u>Maximum threshold breached:</u> Prescribed burning to be undertaken ensuring sufficient areas of old age class communities are left within the park. Managed as for Prescribed Fire Management Zone (see Section 5.1).
Threshold reached	This includes areas of vegetation where fire occurrence has reached the limit of identified vegetation community fire thresholds.	<u>Minimum threshold reached:</u> Prevent successive fires until community is within threshold. <u>Maximum threshold reached:</u> Monitor vegetation community to determine age distribution. Prescribed burning may be undertaken, ensuring sufficient areas of old-age class communities are left within the park. Managed as for Prescribed Fire Management Zone (see Section 5.1).
Threshold not reached	This includes areas of vegetation where fire has occurred at a frequency within the identified vegetation community fire thresholds.	An indication of the number of fires permitted within the life of the plan before threshold is reached is provided.

Ecological Thresholds	Explanation	Ecological Fire Requirements • Actions for areas will depend upon whether the minimum threshold (i.e. burnt too frequently) or the maximum threshold (i.e. not burnt frequently enough) has been reached.
Nearing maximum, no fire recorded	This includes areas of vegetation where a fire has not been recorded in the data provided. Area should be managed to ensure that a mosaic of fire ages within the area exist.	Prescribed burning to be undertaken, ensuring sufficient areas of old age class communities are left within the park. Managed as for assigned fire management zone - see Section 5.1).
Threshold not reached (reached >10 years ago)	This includes areas of vegetation where a fire has occurred at a frequency within the identified vegetation fire thresholds, however the threshold was reached in the past (i.e. >10 years ago).	An indication of the number of fires permitted within the life of the plan before threshold is reached is provided.
Threshold not reached (breached >10 years ago)	This includes areas of vegetation where a fire has occurred at a frequency within the identified vegetation fire thresholds, however the threshold was breached in the past (i.e. >10 years ago).	An indication of the number of fires permitted within the life of the plan before threshold is reached is provided.
Not addressed	This includes water bodies and areas mapped as highly disturbed or cleared vegetation. These areas have no identified vegetation community fire thresholds.	Not applicable.

Figure 4 Vegetation Fire Threshold

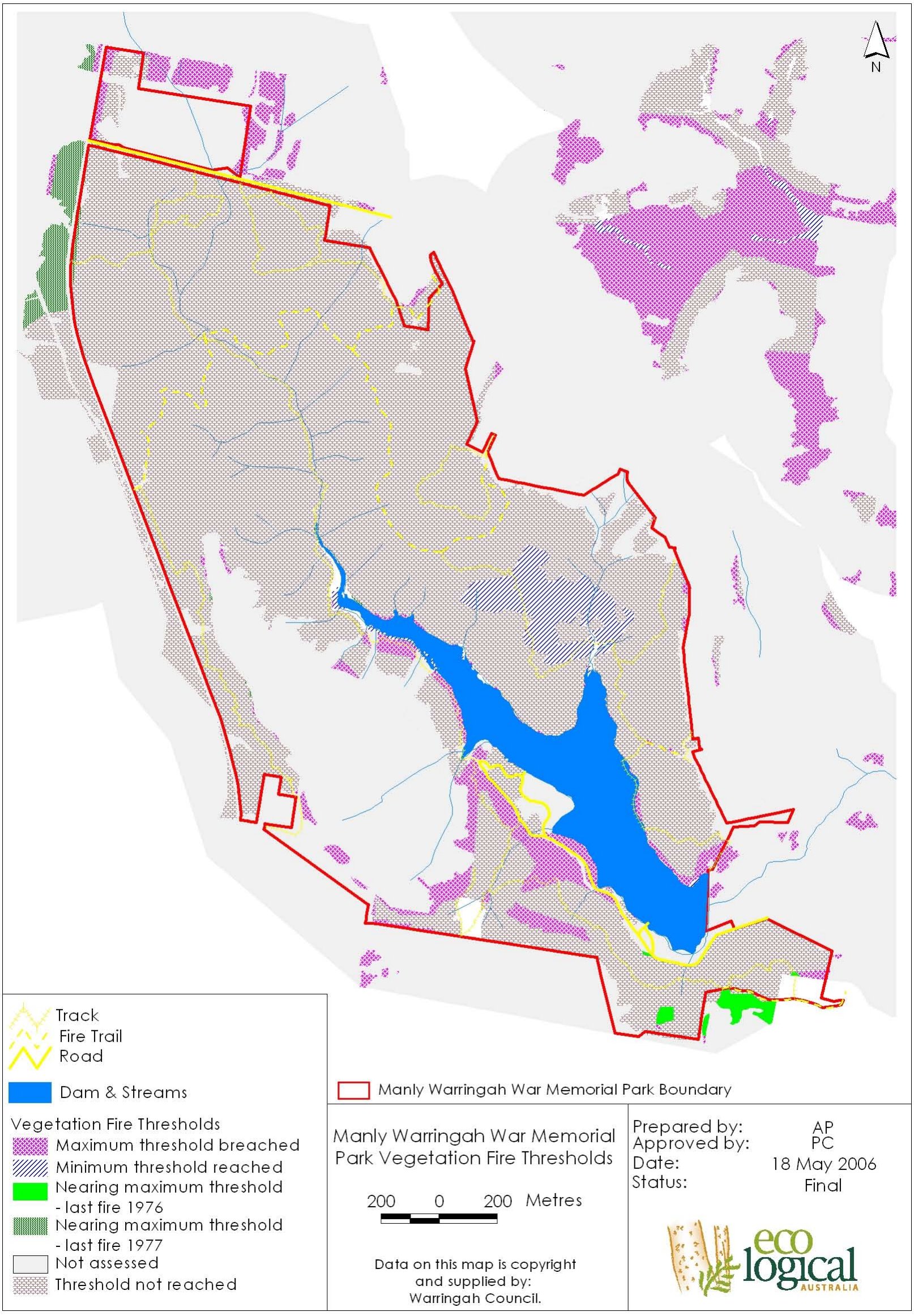


Figure 5 Ecological Fire Requirements

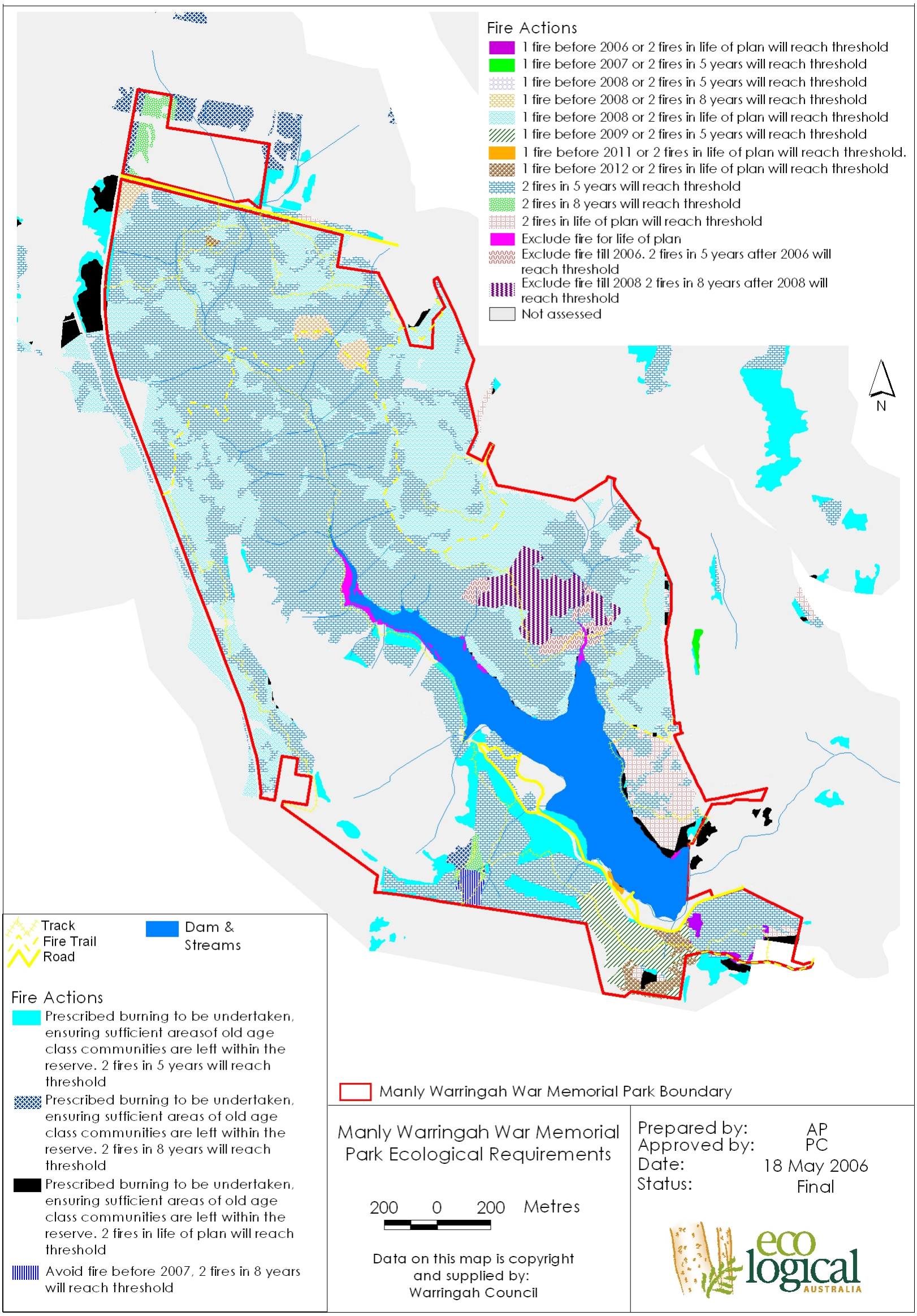


Table 3 Biodiversity Fire Regime Thresholds for Vegetation Communities identified within the Manly Warringah War Memorial Park

Vegetation Community	Priority	Minimum Fire Interval	Maximum Fire Interval	Fire Restrictions	Reference
Bloodwood-Scribbly Gum Woodland	3	> 2 successive fires in < 5yr intervals	>30	Decline predicted if successive fires occur which totally scorch or consume the tree canopy. Avoid successive fires of intensity sufficient to scorch or consume dominant tree crown	(Bradstock NPWS 1996 cited in Conacher Travers Pty Ltd 2002), (WPBFMC 2000)
Freshwater Lagoon Swamp	1	No fires acceptable	No fires acceptable		
Peppermint-Angophora Forest	3	> 2 successive fires in < 5yr intervals	>30	Decline predicted if successive fires occur which totally scorch or consume the tree canopy. Avoid successive fires of intensity sufficient to scorch or consume dominant tree crown	(Bradstock NPWS 1996 cited in Conacher Travers Pty Ltd 2002), (WPBFMC 2000)
Sandstone Heath	3	>2 in quick succession in 8 yr interval, 3 in quick succession each 15 to 30yrs interval	>30		(WPBFMC 2000)
Sandstone Swamp	2	Variable frequency, >2 in quick succession in 8 yr interval, 2 consecutive fires >15 yrs apart. No more than 2 consecutive fires where < 10 t/ha fuel consumed.	>30		(Bradstock NPWS 1996 cited in Conacher Travers Pty Ltd 2002)
Silvertop Ash-Brown Stringybark Forest	1	> 2 successive fires in < 5yr intervals	>30		(WPBFMC 2000)

5 Operational Schedule

The operational schedule is explained below and is made up of the:
- Prescribed Fire Management Zones; and
- Prescribed Works Schedule.

This may be seen:
- Figure 6 and 7;
- Table 4
- The "Manly Warringah war Memorial Park Fire Regime Management Poster" (Appendix 8, ELA 2006).

5.1 Prescribed Fire Management Zones

The following fire management zones have been applied (see Figure 6, Section 4.5):
- Asset Protection Zones (APZ)
- Land Management Zones (LMZ)
- Strategic Fire Advantage Zones (SFAZ)
- Fire Exclusion Zones (FEZ)

Prescribed APZ widths may be seen in Table 4 (see Appendix 6 for detailed APZ maps).

SFAZ and LMZ have been divided up into fire management zones, to ensure the maintenance of mosaic fire age and required threshold regimes.

In order to minimise impacts and to allow for effective management, existing tracks, natural features and cleared areas have been used for fire management boundaries where available.

Zones cover both Council owned / managed and privately owned land. Cooperation of all landowners will be required for the successful implementation of this plan.

5.2 Prescribed Works Schedule

The prescribed works schedule lists the actions required by Council to facilitate implementation of this Plan's objectives.

Prescribed burning within LMZ has been proposed for selected areas for the management purposes including weed control, asset protection and where biodiversity fire regime thresholds are near to or have been exceeded (that is, if the vegetation has not been burnt for a long time and is in danger of senescing and losing biodiversity values).

In order to maintain SFAZ within prescribed fuel load limits whilst maintaining ecological integrity:
- Dominant vegetation types were identified within each SFAZ

- The maximum prescribed fuel load for each SFAZ was entered into the fuel accumulation model to provide a guide for required burn year
- The burn year was evaluated against identified ecological fire thresholds (see Section 4.6) and known threatened species fire intervals (see ELA 2005a and ELA 2005b)

Two types of SFAZ have been implemented based upon asset protection requirements. These include:

- **SFAZ** (with an 8-18 tonnes per hectare fuel prescription)
- **SFAZ – low fuel** (with an 8-15 tonnes per hectare fuel prescription)

These zones were designed to minimise impacts upon incompatible thresholds where possible. For areas identified as **SFAZ-low fuel**, adherence to prescribed fuel loads have been assigned priority over maintenance of ecological fire thresholds. Assessments should be conducted prior to burning any of these areas to determine if fuel levels have reached maximum tonnage prior to burning as proposed.

It is recommended that in 2012 Council, RFS and DEC consult regarding the need for additional management within the southern and western section of the park in order to assist with fire management for:

- The threat posed by major fires
- Protection of environmental assets (I.e. Freshwater Lagoon Swamp)
- Areas east of the golf course to support APZs within the vicinity and maintain SFAZ within fuel load prescriptions

Water quality within the park should be protected by restricting, or limiting the intensity, of fire from within 20m of watercourses where possible.

Figure 6 Prescribed Fire Management Zones

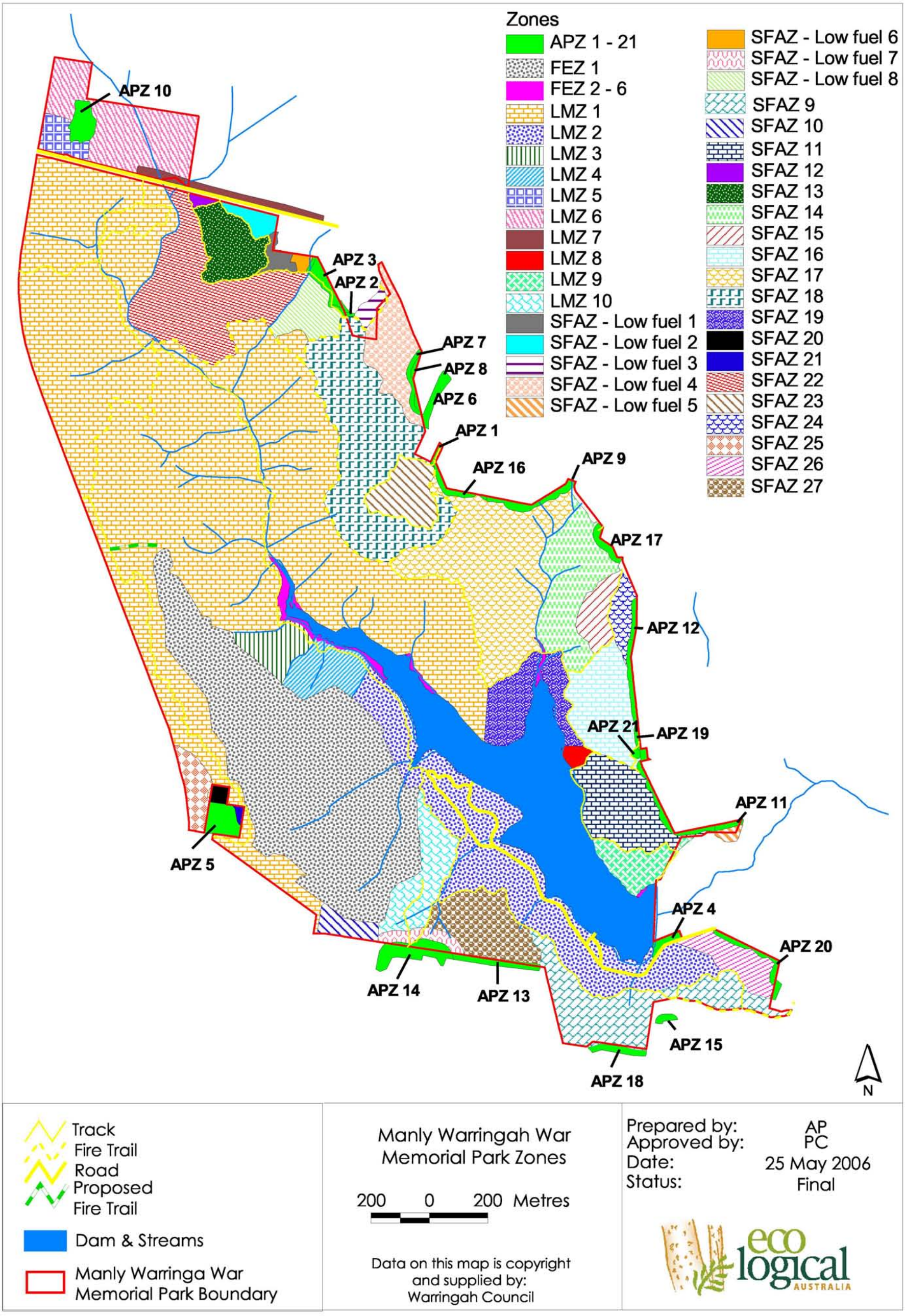


Figure 7 Prescribed Works Schedule

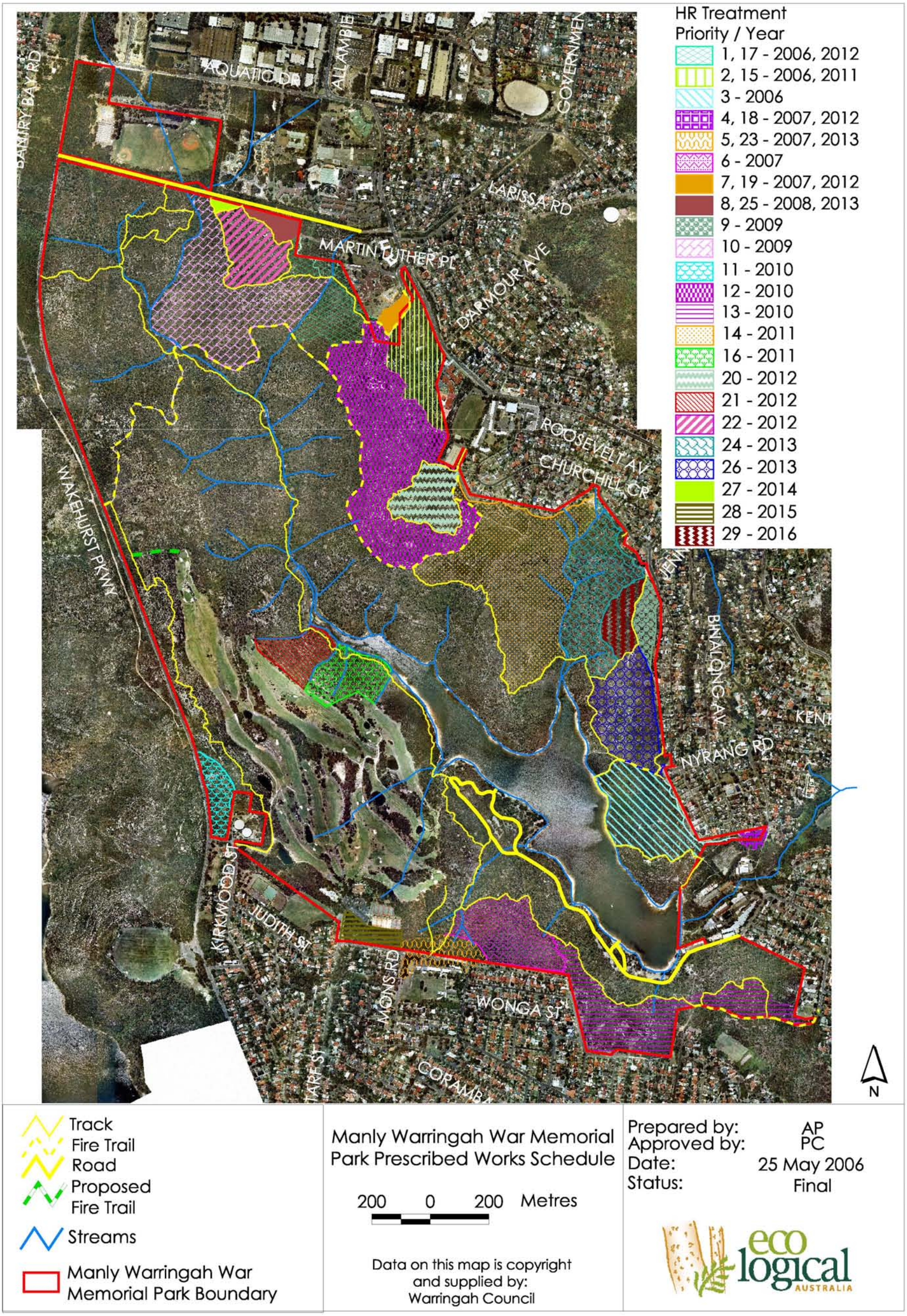


Table 4 Operation Schedule for Manly Warringah War Memorial Park

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
APZ 1	APZ	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	Maintain fire trail to specifications	-	Subject to Council's FMAZ program priorities♦	Sewer Pipe, Fire trail, Storm water pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	APZ - Applied in accordance to development/ landownership boundary
APZ 2	APZ (OPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up. Treatment to be undertaken for Priority 4 & 19 - Burning.	Maintain fire trail to specifications. A current Active Evacuation Plan required for adjacent retirement village	1,17	2006, 2012	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	OPA - 10m
APZ 3	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up. Treatment to be undertaken for Priority 4 & 19 - Burning.	Maintain fire trail to specifications. A current Active Evacuation Plan required for adjacent retirement village	1,17	2006, 2012	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	IPA - Applied to logical Boundary

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
APZ 4	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Sewer Pipe, Car park, Park Office, Road	-	Historically significant area	Crown land CCM Warringah Council	IPA - Applied in accordance to development/ landownership boundary
APZ 5	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Sydney Water Infrastructure	-	Historically significant area	Sydney Water	IPA - Applied in accordance to development/ landownership boundary
APZ 6	APZ	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Storm water pipe	-	Historically significant area	Scalabrini Village	APZ - Applied to logical Boundary
APZ 7	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up. Treatment to be undertaken for Priority 5 & 17 - Burning.	-	2,15	2006, 2011	-	-	Historically significant area	Crown land CCM Warringah Council	IPA - 25m

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
APZ 8	APZ (OPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up. Treatment to be undertaken for Priority 5 & 17 - Burning.	-	2,15	2006, 2011	-	-	Historically significant area	Crown land CCM Warringah Council	OPA - 15m
APZ 9	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Sewer pipe, Play equipment, Wooden Bridge, Storm water pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	IPA - 30m
APZ 10	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	Reduce loads between Building and Rd. A current Active Evacuation Plan required	-	Subject to Council's FMAZ program priorities♦	Warringah Aquatic Center, Storm water pipe	-	-	Crown land CCM Warringah Council	IPA - Applied in accordance to development/ landownership boundary , to a minimum of 10m

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
APZ 11	APZ	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up. Treatment to be undertaken for Priority 7 & 22 - Burning.	-	4,18	2007, 2012	Storm water pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	APZ - 20m
APZ 12	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	-	-	Historically significant area	Crown land CCM Warringah Council	IPA - 20m
APZ 13	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	IPA - 25m
APZ 14	APZ	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up. Treatment to be undertaken for Prioity 8 - Burning & Priority 27 - Manual fuel reduction.	Burn area to be restricted to the Northern side of Manning St	5,23	2007, 2013	Storm water pipe, Track	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest	Historically significant area	Crown land CCM Warringah Council, Balgowlah North Public School	APZ - 60m

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
APZ 15	APZ	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Track	-	Historically significant area	Crown land CCM Warringah Council	APZ - 25m
APZ 16	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Fire trail , Track	-	Historically significant area	Crown land CCM Warringah Council	IPA - 25m
APZ 17	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	IPA - 30m
APZ 18	APZ	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Track	-	Historically significant area	Crown land CCM Warringah Council	APZ - 20m
APZ 19	APZ (IPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Track	-	Historically significant area	Crown land CCM Warringah Council	IPA - 25m

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
APZ 20	APZ	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	APZ - 20m
APZ 21	APZ (OPA)	Initial weed removal and long term weed suppression, hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Track	-	Historically significant area	Crown land CCM Warringah Council	OPA - Applied to logical Boundary
FEZ 1	FEZ	Exclude fire/quick suppression	-	-	-	Wakehurst Golf Course	-	Aboriginal art, Unknown historical feature	Crown land CCM Warringah Council and leased by Wakehurst Golf Club Limited	-
FEZ 2	FEZ	Exclude fire/quick suppression	-	-	-	-	-	Historically significant area	Crown land CCM Warringah Council	-
FEZ 3	FEZ	Exclude fire/quick suppression	-	-	-	Track	-	Historically significant area	Crown land CCM Warringah Council	-
FEZ 4	FEZ	Exclude fire/quick suppression	-	-	-	-	-	Historically significant area	Crown land CCM Warringah Council	-

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
FEZ 5	FEZ	Exclude fire/quick suppression	-	-	-	-	-	Historically significant area	Crown land CCM Warringah Council	-
FEZ 6	FEZ	Exclude fire/quick suppression	-	-	-	Track	-	Historically significant area	Crown land CCM Warringah Council	-
LMZ 1	LMZ	-	-	-	-	Fire trail, Storm water pipe, Track	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest, Red-crowned Toadlet, *Microtis angusii*	Historically significant area, Aboriginal art, Unknown historical feature	Crown land CCM Warringah Council	-
LMZ 2	LMZ	-	-	-	-	Track, Road, Car park, Picnic Equipment	-	Historically significant area, Aboriginal art	Crown land CCM Warringah Council	-
LMZ 3	LMZ	Burning	-	21	2012	Track	-	Historically significant area	Crown land CCM Warringah Council	-
LMZ 4	LMZ	Burning	-	16	2011	Track	-	Historically significant area, Aboriginal art	Crown land CCM Warringah Council	-

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
LMZ 5	LMZ	-	-	-	-	Power lines, Storm water pipe	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest	-	Crown land CCM Warringah Council	-
LMZ 6	LMZ	-	-	-	-	Sports Fields, Car Park, Sewer Pipe, Power Lines, Storm water pipe	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest	-	Crown land CCM Warringah Council	-
LMZ 7	LMZ	-	-	-	-	Sewer Pipe, Power Lines, Storm water pipe	-	-	Crown land CCM Warringah Council	-
LMZ 8	LMZ	-	-	-	-	Track	-	Historically significant area	Crown land CCM Warringah Council	-
LMZ 9	LMZ	-	-	-	-	Track	-	Historically significant area	Crown land CCM Warringah Council	-
LMZ 10	LMZ	-	-	-		Track	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest, un-named *Prostanthera spp*	Historically significant area	Crown land CCM Warringah Council	

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
SFAZ - Low fuel 1	SFAZ - Low fuel	Burning	Maintain fire trail to specifications	1,17	2006, 2012	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ - Low fuel 2	SFAZ - Low fuel	Burning	-	8,25	2008, 2013	Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ - Low fuel 3	SFAZ - Low fuel	Burning	-	7,19	2007, 2012	Fire trail	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ - Low fuel 4	SFAZ - Low fuel	Burning	-	2,15	2006, 2011	Sewer Pipe, Fire trail	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ - Low fuel 5	SFAZ - Low fuel	Burning	-	4,18	2007, 2012	Storm water pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ - Low fuel 6	SFAZ - Low fuel	Burning	Maintain fire trail to specifications	1,17	2006, 2012	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ - Low fuel 7	SFAZ - Low fuel	Treatment to be undertaken for Prioity 8 - Burning & Priority 27 - Manual fuel reduction	Burn area to be restricted to the Northern side of Manning St	5,23	2007, 2013	Storm water pipe, Track	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest	Historically significant area	Crown land CCM Warringah Council	-

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
SFAZ - Low fuel 8	SFAZ - Low fuel	Burning		1,17	2006, 2012	Sewer Pipe, Fire trail, Track	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 9	SFAZ	Burning	-	13	2010	Track, Storm water pipe, Sewer Pipe	Grey-headed Flying-fox, Eastern Bent-wing Bat	Historically significant area	Crown land CCM Warringah Council	
SFAZ 10	SFAZ	Burning	-	28	2015	Sewer Pipe, Storm water pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 11	SFAZ	Burning	-	3	2006	Fire trail , Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 12	SFAZ	Burning	-	27	2014	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 13	SFAZ	Burning	-	22	2012	Sewer Pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 14	SFAZ	Burning	-	24	2013	Sewer Pipe, Storm water pipe, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 15	SFAZ	Burning	-	29	2016	Track	-	Historically significant area	Crown land CCM Warringah Council	-

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
SFAZ 16	SFAZ	Burning	-	26	2013	Fire trail , Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 17	SFAZ	Burning	-	14	2011	Sewer Pipe, Fire trail, Track	Rosenberg's Goanna	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 18	SFAZ	Burning	-	12	2010	Sewer Pipe, Fire trail, Track	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 19	SFAZ	-	-	-	-	Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 20	SFAZ	-	-	-	-	-	-	Historically significant area	Sydney Water	-
SFAZ 21	SFAZ	-	-	-	-	-	-	Historically significant area	Sydney Water	-
SFAZ 22	SFAZ	Burning	-	10	2009	Sewer Pipe, Fire trail, Track	Duffys Forest EEC: Silvertop Ash-Brown Stringybark Forest	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 23	SFAZ	Burning	-	20	2012	Fire trail , Track	-	Historically significant area	Crown land CCM Warringah Council	-

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Threatened Species and Endangered Ecological Communities (EEC)	Aboriginal or Cultural Sites	Land Tenure	Zone Widths
SFAZ 24	SFAZ	Burning	-	9	2009	Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 25	SFAZ	Burning	-	11	2010	Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 26	SFAZ	-	-	-	-	Sewer Pipe - Road, Track	-	Historically significant area	Crown land CCM Warringah Council	-
SFAZ 27	SFAZ	Burning		6	2007	Track		Historically significant area, Aboriginal art	Crown land CCM Warringah Council	

***** Year of burn may vary due to weather and environmental conditions and resource availability

♦ Fire Management Access Zone (FMAZ) priorities dependent on available funds

Note:

- Significant species *Angophora crassifolia* found within APZ 14

6 Performance measures

6.1 Environmental Assessment of Scheduled Works

All works proposed within the fire management plan will be assessed for environmental and heritage impacts at the HR planning stage. This will be conducted either under the EP&A Act through a Review of Environmental Factors (See Section 2.5) or under the Bush Fire Environmental Assessment Code (See Section 2.5). The "Warringah Local Government Area Hazard Reduction Guidelines" (Appendix 4) may be used to assist this process.

6.2 Monitoring Fire Regimes and Changes to Biodiversity

Fire records should be updated as fire incidents occur.

Alteration to fire threshold status resultant from fire occurrences after June 2005 should be assessed annually and at the beginning of HR planning to determine potential management requirements.

This assessment should involve a comparison of required and actual vegetation community and threatened species thresholds and requires:

- Updated fire records
- Determination of fire age
- Consideration of required threshold
- Assessment of current threshold status

Assessment of vegetation community threshold status was undertaken in 2005 (see Section 4.6) and is included within:

- Figure 5, 6
- The "Manly Warringah War Memorial Park Fire Regime Management Poster" (Appendix 8, ELA, 2005).
- Digital data provided to Council.

6.3 Fire Management Plan Review

The goal of this plan is to guide the management of fire within the Manly Warringah War Memorial Park for the next 10 years and to provide a sustainable balance between asset protection and ecosystem management.

Prescribed works schedule assessment

Assessment of the prescribed works schedule (Section 5.2) and the Warringah Reserve Threatened Flora/Fauna Fire Ecology spreadsheets (ELA 2005a, ELA 2005b) should be undertaken on an annual basis and during HR planning. This should include:

- Incorporation of additional developments in the management of native flora and fauna with respect to fire
- Alterations in fire thresholds (see Section 6.2)

Fire management plan evaluation

It is recommended that an evaluation of this plan be conducted at the end of 10 years. The evaluation should involve stakeholder (RFS and DEC) assessment and include:

Quantitative assessment:

- Minimum fire thresholds not exceeded
- Number of hectares burnt outside ecological threshold for HR and wildfires
- Maintenance of a mosaic of fire age (vegetation age)
- Maintenance of fuel free and fuel reduced APZ's
- All activities proposed within the prescribed work schedule accepted by the NSW Rural Fire Service (RFS)

Qualitative assessment

- Provision of effective and user friendly instructional guidelines to enable other planning processes. Including:
    - Proficient/successful HR planning
    - Prevention of fire damage to infrastructure
    - Protection of aboriginal and culturally significant sites from fire damage
    - Prevention of fire damage to threatened, locally or regionally significant species, endangered populations and endangered ecological communities
    - Visitation of current social attitudes to determine success of proposed management strategies
    - Evaluate reasonableness of prescribed operational schedule

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Appendix 1 – Vegetation Priority Explanation

Priority 1	EEC (under *TSC Act 1995),* or represent potentially important habitat for threatened flora or fauna species (listed under TSC Act 1995). Particularly if the community is absent or poorly represented in Garigal and Ku-ring-gai Chase National Parks.
Priority 2	Important for conservation of biodiversity at the local level. Communities with a restricted distribution in the Warringah LGA and are absent or poorly represented in Garigal and Ku-ring-gai Chase National Parks. Stands of these communities warrant first priority if they support populations of threatened fauna or flora species.
Priority 3	Communities that are well represented in Garigal and Ku-ring-gai Chase National Parks and common in Warringah. Stands of these communities warrant first priority if they support populations of threatened fauna or flora species.

Source: P & J Smith 2003

Appendix 2 – Known Threatened Flora Within 5km and Threatened Fauna Within 10km of Manly Warringah War Memorial Park

Table 1: Known threatened flora within 5km of Manly Warringah War Memorial Park

Scientific Name	Common Name	Recorded Within Park	Source
Acacia bynoeana	Bynoe's Wattle		DEC 2004
Eucalyptus camfieldii	Heart-leaved Stringybark		DEC 2004
Genoplesium baueri			DEC 2004
Grevillea caleyi			DEC 2004
Pimelea curviflora var. curviflora			DEC 2004
Syzygium paniculatum			DEC 2004
Tetratheca glandulosa			DEC 2004
Microtis angusii		X	Warringah Council
un-named Prostanthera spp		X	Warringah Council

Table 2: Known threatened fauna within 10km of Manly Warringah War Memorial Park*

Scientific Name	Common Name	Recorded Within Park
Botaurus poiciloptilus	Australasian Bittern	
Calidris alba	Sanderling	
Calidris tenuirostris	Great Knot	
Callocephalon fimbriatum	Gang-gang Cockatoo	
Calyptorhynchus lathami	Glossy Black-Cockatoo	
Cercartetus nanus	Eastern Pygmy-possum	
Charadrius leschenaultii	Greater Sand Plover	
Charadrius mongolus	Lesser Sand Plover	
Dasyurus maculatus	Spotted-tailed Quoll	
Diomedea exulans	Wandering Albatross	
Esacus neglectus	Beach Stone-curlew	
Gygis alba	White Tern	
Haematopus fuliginosus	Sooty Oystercatcher	
Haematopus longirostris	Pied Oystercatcher	
Heleioporus australiacus	Giant Burrowing Frog	
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	
Ixobrychus flavicollis	Black Bittern	
Lathamus discolor	Swift Parrot	
Litoria aurea	Green and Golden Bell Frog	
Macronectes giganteus	Southern Giant-Petrel	
Macronectes halli	Northern Giant-Petrel	
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	X
Mormopterus norfolkensis	Eastern Freetail-bat	
Ninox strenua	Powerful Owl	
Pandion haliaetus	Osprey	
Phascolarctos cinereus	Koala	
Phoebetria fusca	Sooty Albatross	
Polytelis swainsonii	Superb Parrot	
Pseudophryne australis	Red-crowned Toadlet	X
Pteropus poliocephalus	Grey-headed Flying-fox	X
Ptilinopus magnificus	Wompoo Fruit-Dove	
Ptilinopus superbus	Superb Fruit-Dove	
Puffinus assimilis	Little Shearwater	
Puffinus carneipes	Flesh-footed Shearwater	
Scoteanax rueppellii	Greater Broad-nosed Bat	
Sterna albifrons	Little Tern	
Sterna fuscata	Sooty Tern	
Thalassarche cauta	Shy Albatross	
Thalassarche melanophris	Black-browed Albatross	
Tyto novaehollandiae	Masked Owl	
Varanus rosenbergi	Rosenberg's Goanna	X
Xanthomyza phrygia	Regent Honeyeater	

***Source:** DEC 2004

Appendix 3 – Known Significant Flora Within 5km and Significant Fauna Within 10km of Manly Warringah War Memorial Park

Table 1 Known significant flora within 5km of Manly Warringah War Memorial Park*

Scientific Name	Common Name	Significance	Recorded Within Park
Acacia brownii	Heath Wattle	Threatened in northern Sydney	
Angophora crassifolia		Nationally significant species	X
Angophora hispida	Dwarf Apple	Biogeographically significant	
Arthrochilus prolixus		Threatened in northern Sydney	
Boronia fraseri		Nationally significant species	
Boronia thujona		Biogeographically significant	
Callistemon salignus	Willow Bottlebrush	Threatened in Warringah	
Corybas undulatus	Tailed Helmet Orchid	Nationally significant species	
Crowea saligna		Biogeographically significant	
Darwinia diminuta		Nationally significant species	
Darwinia procera		Nationally significant species	
Eucalyptus luehmanniana	Yellow-top Ash	Nationally significant species	
Eucalyptus robusta	Swamp Mahogany	Threatened in northern Sydney	
Eucalyptus stricta	Mallee Ash	Threatened in northern Sydney	
Gonocarpus salsoloides		Nationally significant species	
Grevillea speciosa	Red Spider Flower	Biogeographically significant	
Hibbertia nitida		Nationally significant species	
Lomandra brevis		Nationally significant species	
Lomandra fluviatilis		Nationally significant species	
Melaleuca thymifolia		Threatened in northern Sydney	
Melichrus procumbens	Jam Tarts	Threatened in northern Sydney	
Persoonia pinifolia	Pine-leaved Geebung	Biogeographically significant	
Rulingia hermanniifolia		Nationally significant species	
Symphionema paludosum		Threatened in northern Sydney	

***Source:** DEC 2004

Table 2 Known significant fauna within 10km of Manly Warringah War Memorial Park*

Scientific Name	Common Name	Significance
Acrobates pygmaeus	Feathertail Glider	Threatened in Warringah
Amphibolurus muricatus	Jacky Lashtail	Threatened in Warringah
Anous stolidus	Common Noddy	Migratory
Antechinus swainsonii	Dusky Antechinus	Threatened in northern Sydney
Apus pacificus	Fork-tailed Swift	Migratory
Arenaria interpres	Ruddy Turnstone	Migratory
Boiga irregularis	Eastern Brown Tree Snake	Threatened in northern Sydney
Calidris ruficollis	Red-necked Stint	Migratory
Charadrius bicinctus	Double-banded Plover	Migratory
Chlidonias leucopterus	White-winged Black Tern	Migratory
Diplodactylus vittatus	Eastern Stone Gecko	Threatened in northern Sydney
Egretta sacra	Eastern Reef Egret	Migratory
Furina diadema	Red-naped Snake	Threatened in northern Sydney
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory
Heteroscelus brevipes	Grey-tailed Tattler	Migratory
Heteroscelus incanus	Wandering Tattler	Migratory
Hirundapus caudacutus	White-throated Needletail	Migratory
Lialis burtonis	Burton's Snake-lizard	Threatened in Warringah
Limnodynastes dumerilii	Bullfrog	Threatened in northern Sydney
Limnodynastes tasmaniensis	Spotted Marsh Frog	Threatened in northern Sydney
Limosa lapponica	Bar-tailed Godwit	Migratory
Monarcha melanopsis	Black-faced Monarch	Migratory
Myiagra cyanoleuca	Satin Flycatcher	Migratory
Notechis scutatus	Mainland Tiger Snake	Threatened in northern Sydney
Numenius madagascariensis	Eastern Curlew	Migratory
Origma solitaria	Rockwarbler	Biogeographically Significant
Philomachus pugnax	Ruff	Migratory
Phyllurus platurus	Broad-tailed Gecko	Biogeographically Significant
Plegadis falcinellus	Glossy Ibis	Migratory
Pluvialis squatarola	Grey Plover	Migratory
Pogona barbata	Eastern Bearded Dragon	Threatened in Warringah
Pseudomys novaehollandiae	New Holland Mouse	Threatened in northern Sydney
Pseudophryne bibronii	Bibron's Toadlet	Threatened in northern Sydney
Puffinus griseus	Sooty Shearwater	Migratory
Puffinus pacificus	Wedge-tailed Shearwater	Migratory
Puffinus tenuirostris	Short-tailed Shearwater	Migratory
Rattus lutreolus	Swamp Rat	Threatened in northern Sydney

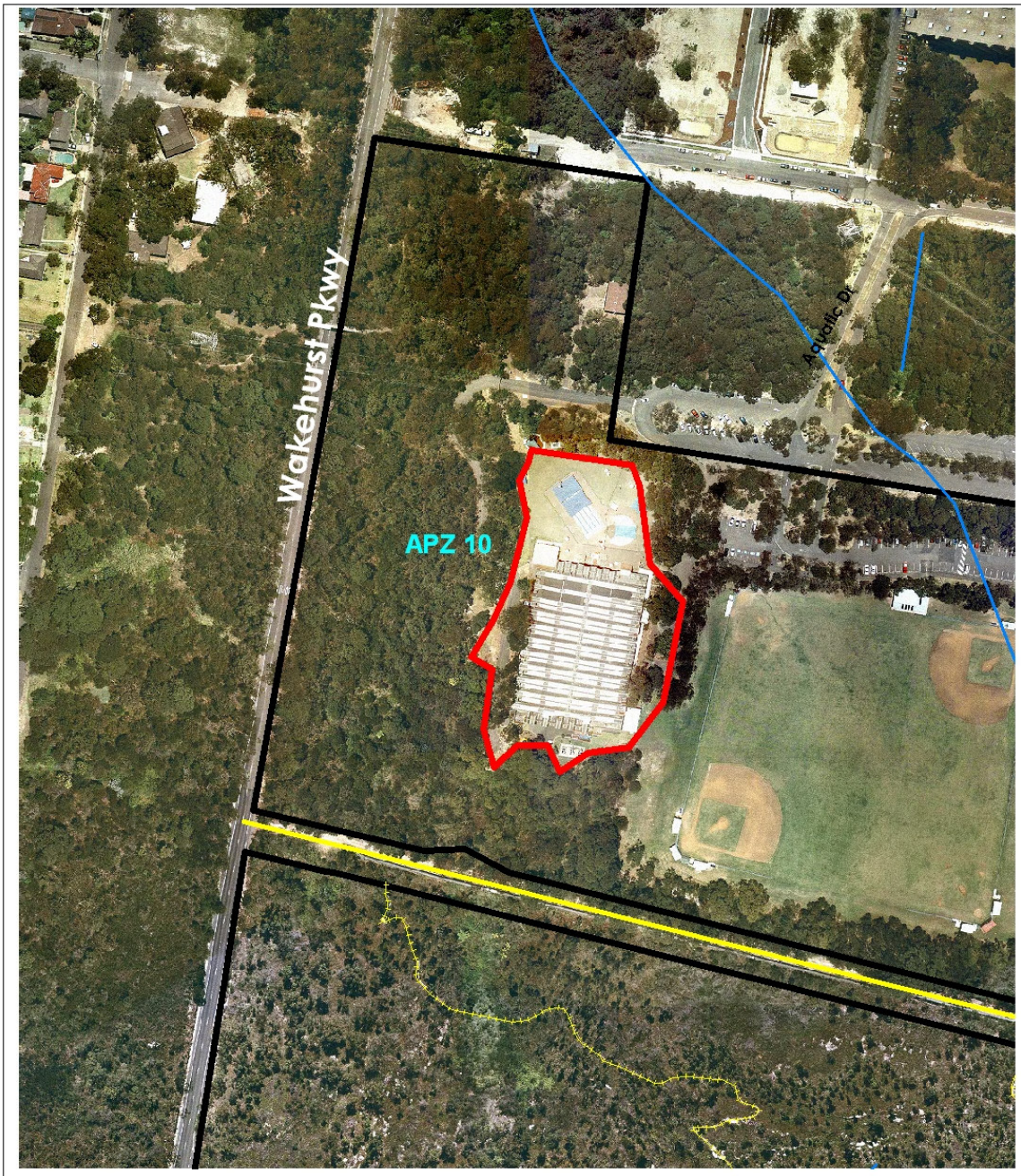
Scientific Name	Common Name	Significance
Rhipidura rufifrons	Rufous Fantail	Migratory
Sericornis magnirostris	Large-billed Scrubwren	Threatened in northern Sydney
Stercorarius longicaudus	Long-tailed Jaeger	Migratory
Stercorarius parasiticus	Arctic Jaeger	Migratory
Stercorarius pomarinus	Pomarine Jaeger	Migratory
Sterna caspia	Caspian Tern	Migratory
Sterna hirundo	Common Tern	Migratory
Sterna paradisaea	Arctic Tern	Migratory
Tringa nebularia	Common Greenshank	Migratory
Tringa stagnatilis	Marsh Sandpiper	Migratory

* Source: DEC 2004 * No significant species identified within the park

Appendix 4 – Warringah Local Government Area Hazard Reduction Guidelines

Appendix 5 – Fire Management Plan Methodology

Appendix 6 – Detailed APZ Maps



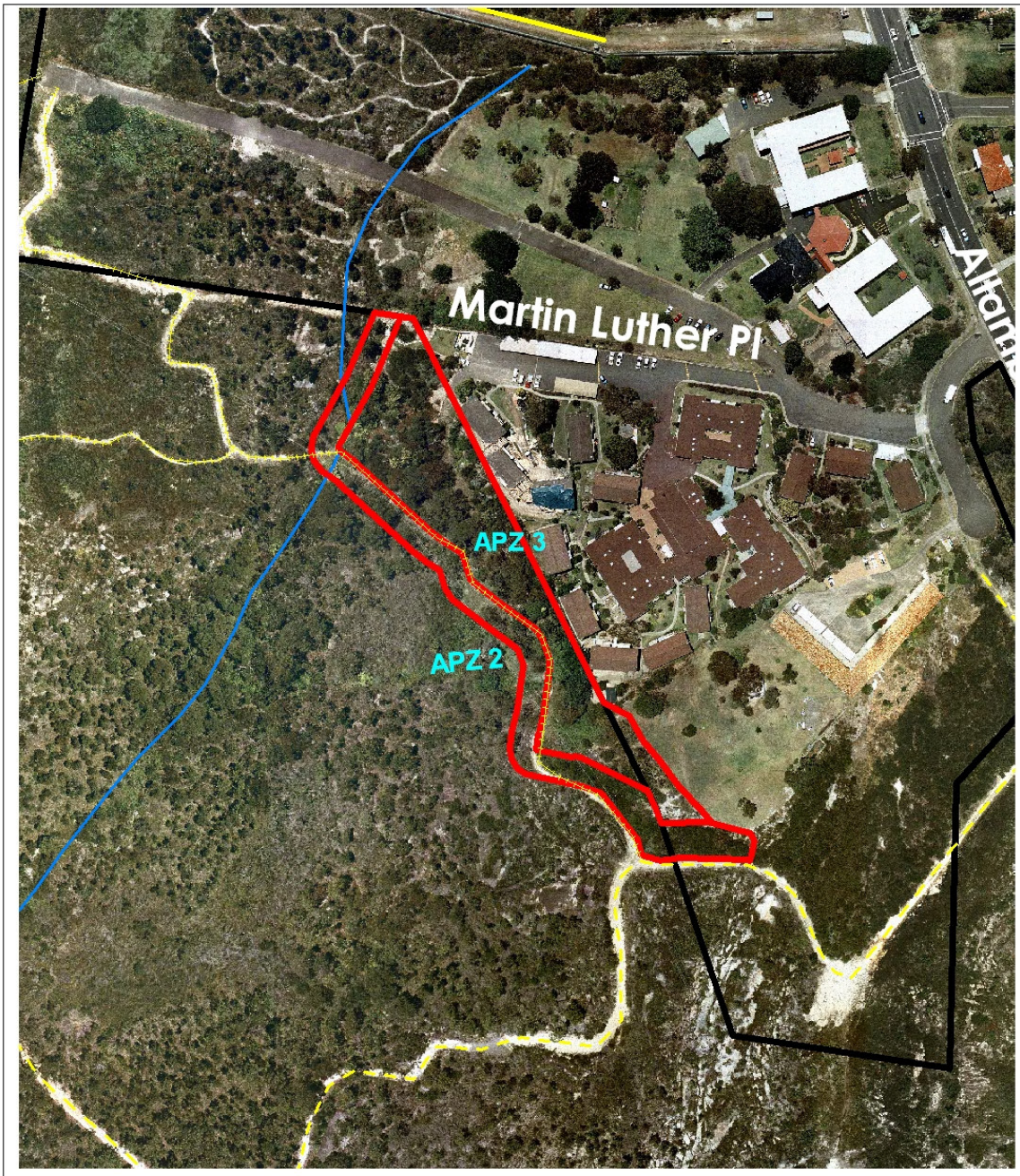
Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ
N

Detailed APZ Map 1

40 0 40 Metres

Prepared by: AP
Approved by: PC
Date: 18 May 2006
Status: Final

eco logical AUSTRALIA



Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ

N

Detailed APZ Map 2

40 0 40 Metres

Prepared by: AP
Approved by: PC
Date: 18 May 2006
Status: Final

eco logical AUSTRALIA

Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ
N

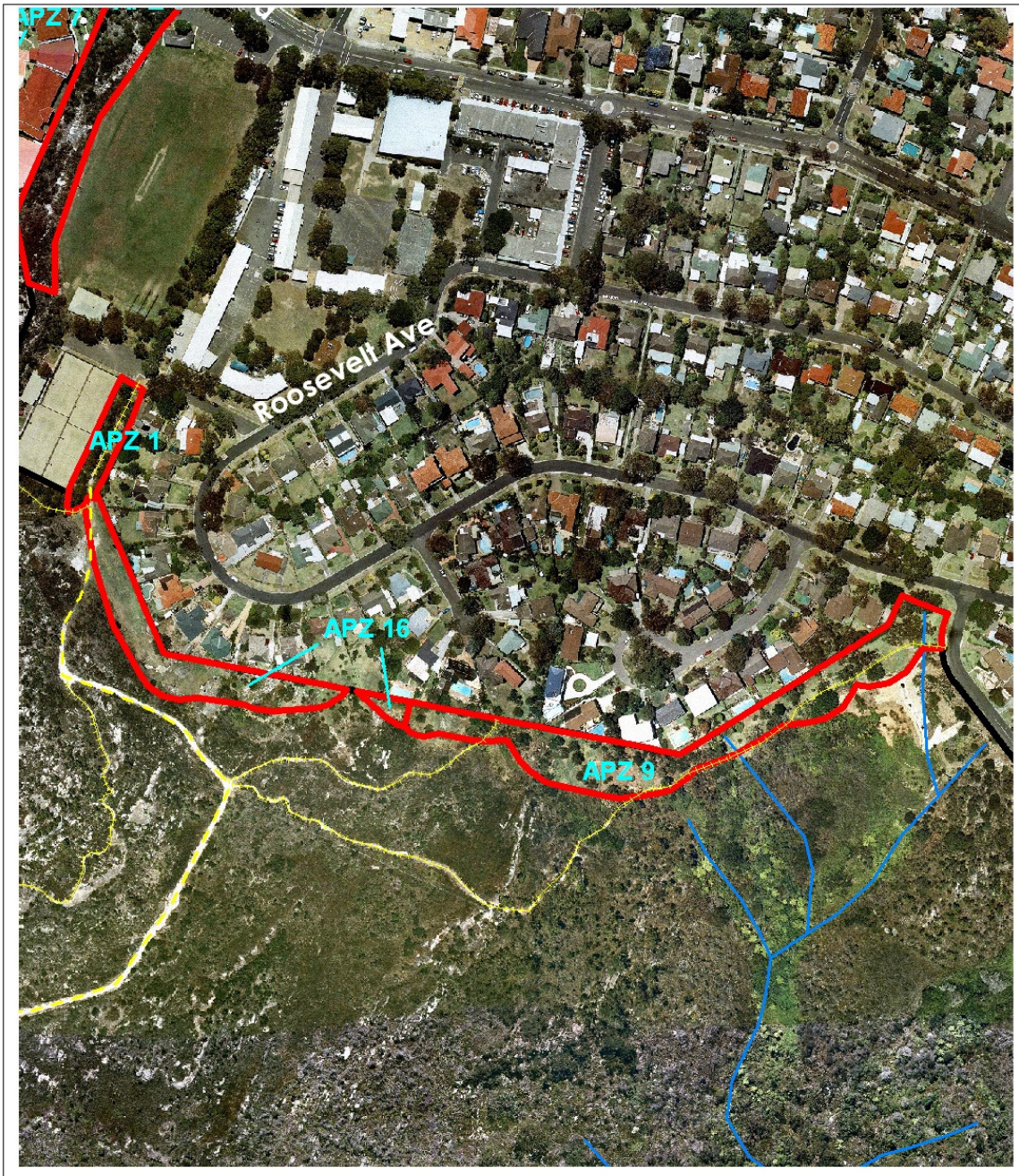
Detailed APZ Map 3

40 0 40 Metres

Data on this map is copyright and supplied by: Warringah Council.

Prepared by: AP
Approved by: PC
Date: 18 May 2006
Status: Final

eco logical AUSTRALIA



Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ
N

Detailed APZ Map 4

40 0 40 Metres

Prepared by: AP
Approved by: PC
Date: 18 May 2006
Status: Final

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Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ
N

Detailed APZ Map 5

40 0 40 Metres

Prepared by: AP
Approved by: PC
Date: 18 May 2006
Status: Final

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Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ
N

Detailed APZ Map 6

40 0 40 Metres

Prepared by: AP
Approved by: PC
Date: 18 May 2006
Status: Final

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Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ
N

Detailed APZ Map 7

40 0 40 Metres

Prepared by: AP
Approved by: PC
Date: 18 May 2006
Status: Final

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Manly Dam and Streams
Manly Warringah War Memorial Park Boundary
Road
Fire Trail
Official Track
APZ
N

Detailed APZ Map 8

40 0 40 Metres

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Prepared by:	AP
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Date:	18 May 2006
Status:	Final

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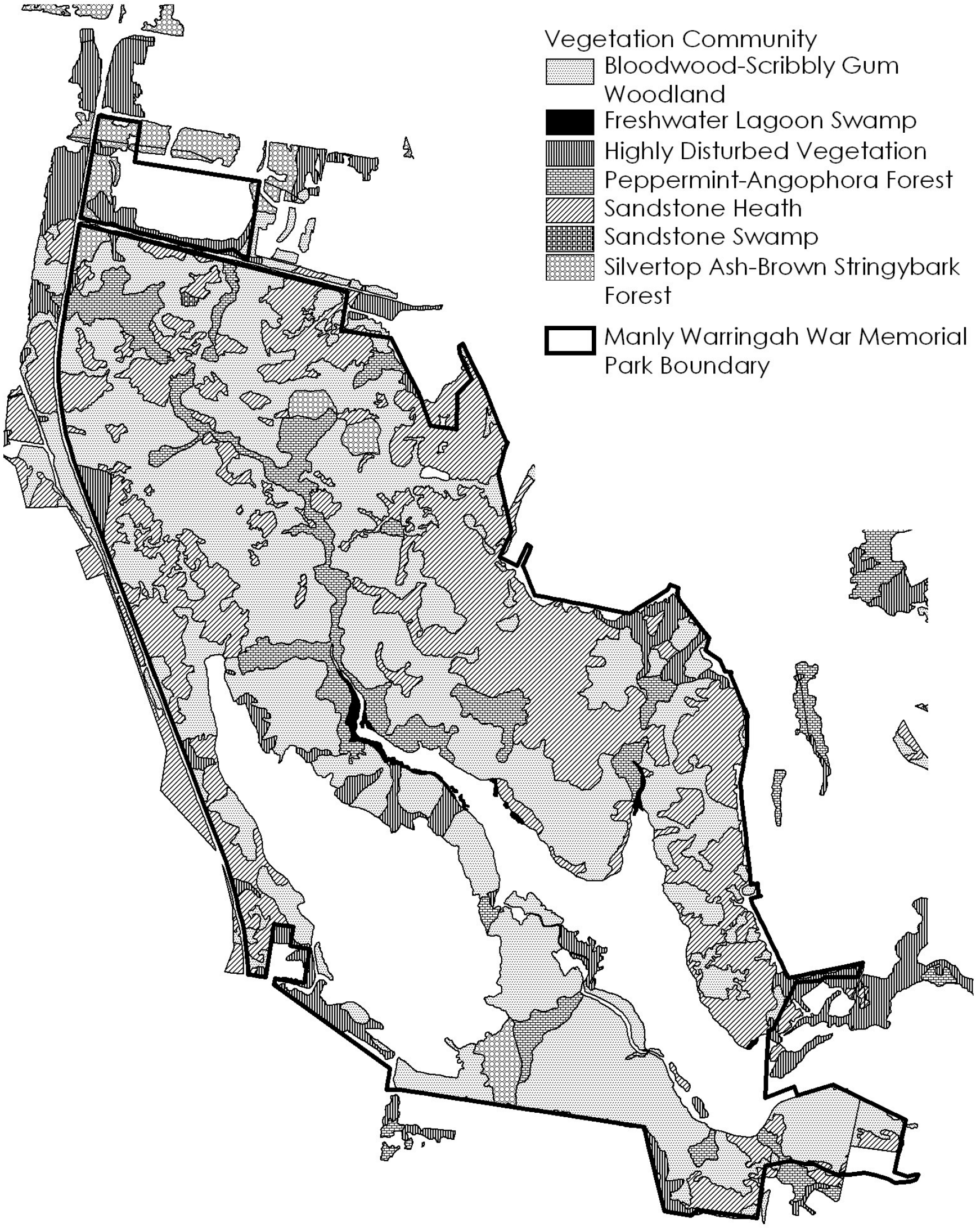
Appendix 7 –Vegetation Community Overlay



Appendix 8 – Manly Warringah War Memorial Park Fire Regime Management Poster