



# Fire Management Strategy



APZ – Barnunj SCA - Dolphin Point

(M. Kempster)

## Meroo National Park and Barnunj State Conservation Area







# **Fire Management Strategy**

for

## **Meroo National Park**

and

## **Barnunj State Conservation Area**

This Fire Management Strategy has been on public exhibition for a period and members of the public, either individually, or as representatives of community interest groups, and government authorities were invited to comment on its contents.

These comments have been assessed and where they have improved the purpose and intent of the strategy, amendments have been made. A summary of these submissions and the recommendations for change is available at the Ulladulla Area office of the NSW NPWS.

The NPWS appreciates any ongoing feedback on the Fire Management Strategy. This will contribute to the periodic review process.

Comments should be forwarded to:

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Fire Management Strategy  
for  
Meroo National Park  
and  
Barnunj State Conservation Area

South Coast Region  
NSW National Parks and Wildlife Service  
June 2008

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# 1. INTRODUCTION

## **1.1 Scope and purpose of this fire management strategy**

This plan describes the strategies that the National Parks and Wildlife Service (NPWS) will apply to meet fire management obligations under the Rural Fires Act 1997, National Parks and Wildlife Act 1974 and Threatened Species Conservation Act 1995 in both Meroo National Park and Barnunj State Conservation Area between June 2008 and May 2013

This strategy has been prepared in accordance with policies and procedures set out in the NPWS Fire Management Manual (NPWS, 2001 and as revised), the NPWS Strategy for Fire Management (NPWS, August 2003) and Draft Plans of Management for Meroo National Park and Barnunj State Conservation Area (NPWS)

This strategy is supported by:

- Regional Fire Management Works Schedules which are revised annually and list the fire management activities and works proposed for each financial year (July one year to June the next year)
- Bush Fire Operational Maps which identify fire suppression advantages, nearby assets and sites of natural, cultural and community values to be protected. These maps are reviewed periodically.
- NPWS South Coast Region – Regional Incident Procedures, which detail bushfire preparedness and response procedures. These are revised annually.

This Strategy is also supported by reference maps, Geographic Information System (GIS) and other databases maintained at the NPWS South Coast Region office at Nowra. This plan is to be integrated with the Bush Fire Risk Management Plan prepared by the Bush Fire Management Committee (BFMC) for the Shoalhaven Fire District. The NPWS is an active member of this BFMC and seeks to work cooperatively with fellow committee members and the community to achieve coordinated fire management and suppression across the Shoalhaven.

The NPWS South Coast Region would like to acknowledge the extensive and valuable input provided by the community, neighbours, RFS members and other agencies during the consultation, compilation and review for this plan.

## **1.2 Fire Management Objectives**

Consistent with the statutory obligations and policies described in the NPWS Strategy for Fire Management the fire management objectives for Meroo National Park and Barnunj State Conservation Area are:

- Reduce the occurrence in the reserves of unplanned fire caused by people,
- Suppress unplanned fires occurring in the reserves,
- Minimise the potential for the spread of bushfires from the reserves,
- Limit the potential spread of fires into the reserves,
- Protect people and property in, or immediately adjacent to, the reserves from bushfires occurring in the reserves,
- Manage fire regimes to sustain all species and processes known to occur naturally within the reserves and thereby avoid possible extinction or unnatural change,
- Protect from damage by bushfire all Aboriginal sites, historic places, and culturally significant features which are known to exist within the reserves,
- Promote awareness natural and cultural values within the reserves that may be under threat from inappropriate fire regimes or suppression activities.

## **1.3 Description of the Reserves**

### *1.3.1 Location and Terrain*

This strategy applies to the following reserves: Meroo National Park and Barnunj State Conservation Area.

The reserves are some 180km from Sydney on the NSW South Coast. The Meroo National Park is located to the south and west of the coastal villages of Burrill Lake and Tabourie Lake near Ulladulla. Barnunj State Conservation Area is located on the coast just to the south of Dolphin Point, also near Burrill Lake and Ulladulla (See Map 1).

Meroo National Park and Barnunj State Conservation Area lie within the catchments of Burrill Lake, Tabourie Lake, Termeil Lake and Meroo Lake. The catchment and water quality implications for these sometimes closed lake systems needs to be carefully considered within fire management expectations.

In addition to the 3768 hectares within the reserves, this plan also considers bush fire fuels, assets, and fire control advantages that are outside but are continuous with, or adjacent to, those in the reserve.

Topography within the reserves varies from estuaries and wetlands rising to sandstone or shale ridge tops of generally low elevation and relief.

### *1.3.2 Fire Weather and History*

The climate predominant over Meroo National Park and Barnunj State Conservation Area is temperate including a strong maritime influence that interacts with the continental weather patterns. Whilst the latter trends are more predictably forecast, the variability of the more localised effects such as the summer coastal 'nor-easters' and 'southerly busters' with their characteristic sudden wind changes can present difficulties for fire suppression. The deteriorating fire weather conditions associated with hot dry continental winds - usually preceding the passage of frontal systems - are also a feature that has the potential to support extreme fire behaviour.

Regional rainfall is variable both annually and seasonally with a recorded average of approximately 1100mm (Ulladulla). This rainfall is summer dominant, often resulting from thunderstorm activity. As such the rainfall can be quite variable across the landscape. This variability needs to be monitored when prescribing 'burning off' conditions or considered when using regionally based fire weather indices. The summer storms can also present dangerous fire-weather conditions for firefighting crews.

The area is subject to periodic drought both regionally and as part of larger weather trends such as 'El Niño' cycles. These trends can result in drying out the soils and vegetation making more fine fire fuel available than usual as well as promoting intense fire behaviour as observed in the prolonged drought and exceptional summers of 2001/2002 and 2003/2004. Under such conditions, the resultant fire behaviour makes containment and control very difficult and can easily compromise usually sufficient protection measures.

The reserves were gazetted in January 2000. Fire history records for the reserves are maintained by the NPWS. For the period before establishment of the reserves, records are collated from former land management and fire suppression organisations, research findings and historical records. The period and detail of these records are limited but can provide basic information on causes of ignition extent and frequency. Though limited, this history is also sufficient to assess indications for biodiversity conservation and some aspects of fire mitigation over the life of the Fire Management Strategy.

Fire history and related information is available to managers via Geographic Information Systems and organisational records. Fire history for a period up to ten years prior to the

publication of the Fire Management Strategy is mapped on the supporting Operational Maps as an aid to assessing possible fire behaviour and developing suppression tactics. This fire history presentation is updated annually on operational maps to be used by managers and shared with other emergency authorities. This FMS does not include a presentation of fire history as it is anticipated the FMS will cover a period of at least five years and therefore may not reflect a current appraisal of prescribed burning and wildfires.

Most recorded wildfires arise from suspected deliberate ignition, escaped fire and occasional lightning. Most of the suspected deliberate events originate from access routes or adjacent to settled areas. Recorded major fire runs across the reserves are west to east and sustained by exceptional extreme fire-weather. These fires have nevertheless crossed many substantial control features eg Princes Highway, Tabourie Lake, and have not been successfully contained until more favourable weather conditions prevail.

From the available records, it also appears that areas of Meroo National Park and Barnunj State Conservation Area have been burned more frequently than is indicated for the sustainable maintenance of biodiversity. These more frequent fire events could have resulted in the promotion of more fire-prone vegetation. This fire history presents challenges for the maintenance of the biodiversity within the reserves, protection of adjacent assets and enabling community understanding of fire management options and decisions.

### 1.3.3 Natural and Cultural Heritage

The vegetation of the reserves is both diverse and fire-prone. This diversity includes coastal heathlands, taller forests on deeper soils and rainforest patches within sheltered drainage lines of a more eastern or southerly aspect. There are several areas of important littoral, estuarine and foreshore vegetation as well as the catchments and dunes supporting these areas, eg Meroo Lake, Termeil Lake and Wairo Dunes.

The reserves include a number of rare and threatened plant species such as *Cryptostylis hunteriana* (Leafless Tongue Orchid). Within the reserves a number of species are at or near the southern limits of their range. More recently a number of Endangered Ecological Communities (EEC) have been identified within the reserves including Bangalay Sand Forest. Particular management strategies to protect threatened plant species and EEC are outlined in Table 7.

The landforms and vegetation of the reserves include the habitats of a diverse range of fauna. Of particular note are the populations of birds including important heathland and shorebird species.

Over thirty threatened fauna species have been recorded in and around the reserves. These include the Regent Honeyeater, *Xanthomyza phrygia*. A number of these species such as the Glossy Black Cockatoo, *Calyptorhynchus lathami* may be considered at threat if inappropriate fire regimes prevail or unsuitable fire management strategies or control options are applied. Specific fire management strategies for affected threatened fauna species are outlined in Table 7.

The evidence of Aboriginal use and sites of cultural and historic significance are found across the reserves with concentrations of recorded Aboriginal occupation sites along creeklines and foreshores. There are historic features associated with the later European settlement of the area, most being associated with timber getting, processing and transport. Protection measures and suppression options for Aboriginal or historic assets are detailed in Table 8. Few of these are vulnerable to further fire but may be vulnerable to fire suppression activities such as the use of earthmoving machinery.

Most of Meroo National Park is comprised of former State Forests including the legacy of a complex vehicle access network and infrastructure easements. This access network is undergoing assessment of suitability and maintenance for public use, reserve management or fire suppression. Many routes are relatively inaccessible, environmentally unsustainable or

provide little functional use now that logging has ceased. Such routes may require stabilisation and rehabilitation.

While most access routes may have some usefulness for fire management under appropriate conditions, only those tracks primarily maintained by the NPWS for fire suppression are specifically listed in this strategy and shown as such on operational maps.

#### *1.3.4 Infrastructure, assets, and economic values*

There are a few community infrastructure assets within the reserves such as aerial power supply feeder lines to communities and communication infrastructure. The NPWS has also developed or maintained visitor access sites and facilities. There are also sites requiring special evaluation such as the isolated house sites and accommodation leases on Dolphin Point. Access routes to these sites and infrastructure cross extensive bushland including areas within the reserves and may be vulnerable to intense fire. Consequent effects such as safe use of access routes or loss of services can pose a significant problem.

The reserves border sections of Dolphin Point, Burrill Lake and Lake Tabourie villages. A significant proportion of these settlements is holiday accommodation and supporting commercial areas and service industries. The seasonal fluctuation of population and absentee ownership presents particular problems for community information, preparedness and neighbour interaction with regard to bush fire risk management.

A particular concern to the community is the singular main vehicular access routes to many of these coastal settlements which may be readily compromised by bush fire outbreaks under adverse conditions. This includes the Princes Highway. There are also visitor use sites within the reserves that are isolated and may require special public safety considerations in the event of fire outbreaks. eg Meroo Head camping area and holiday cottages on Lagoon Head.

A number of rural residential blocks adjoin Meroo National Park to the west with most containing a large proportion of natural vegetation. Most of the portions within these subdivisions are of sufficient size to accommodate measures to protect existing dwellings - without the demand to carry out fire protection works on adjacent reserves. The scattered placement and access to these assets presents particular challenges for fire suppression and protection in this area.

There are also areas adjoining the reserves that have the potential for further subdivision or development. At present some of these areas are naturally vegetated and are included in planning for fire management zones and strategies especially where they adjoin built up areas. Current legislation and guidelines include the need to address the risk from bushfire in subdivision design and building approval processes. This is the responsibility of Shoalhaven City Council for areas surrounding the reserves. The approach of current planning legislation and design guidelines to improve the intrinsic bushfire safety of these developments will also lessen the expectation and consequence of further demands for fire protection to take place within the reserves.

Whilst the NPWS will undertake its responsibilities to reasonably limit the possible spread of bush fire from adjacent lands, it cannot be expected that fire management regimes and conservation outcomes on existing reserves will be altered to accommodate future adjacent development. Consistent with planning requirements of the Rural Fires Act, development options for these lands will need to recognise the inherent risk from bush fire in such landscapes and continue to include sufficient protective design options.

#### *1.3.5 Recreational Use and Facilities*

Most of the reserves recreational use is focussed on the coastal areas and along public access routes through or adjacent to the reserves. This use is highly seasonal with the focus on summer and holiday periods and largely emanates from the adjacent settlements of Ulladulla, Burrill Lake, Lake Tabourie, Bawley Point and surrounding areas. These towns and villages are often swelled with visitors or non-permanent residents unfamiliar with the locality and the associated risks from bush fire.

Recreational uses of the reserve include foreshore and waterway use for beach activities, fishing, as well as vehicle-based touring and informal bushwalking.

Visitor use facilities are limited in number eg Meroo Head bush camping, but may present both fire source and visitor protection issues. Visitor use is highly seasonal and greatest use coincides with the bush fire danger period.

There are several implications for fire management from this dispersed and seasonal use. These include

- the primary need to consider visitor safety within initial fire suppression response,
- communication of risks and appropriate response for visitors,
- preparedness information and action for adjacent neighbours and communities, and
- opportunity for unplanned ignition from the dispersed use and access network.

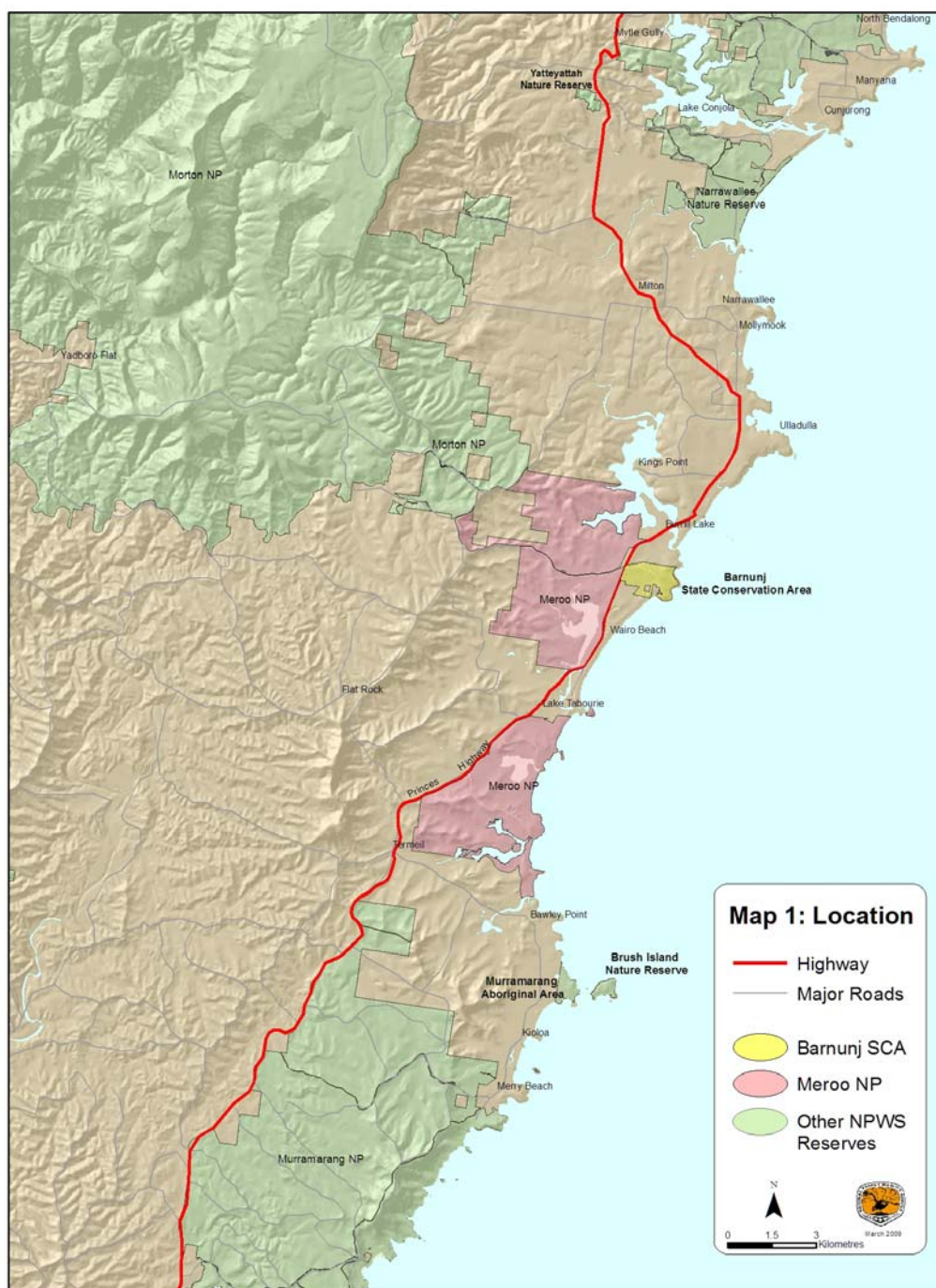
### *1.3.6 Summary of Key Fire Issues*

There are a number of key fire management issues across these reserves and adjacent areas.

Of note are:

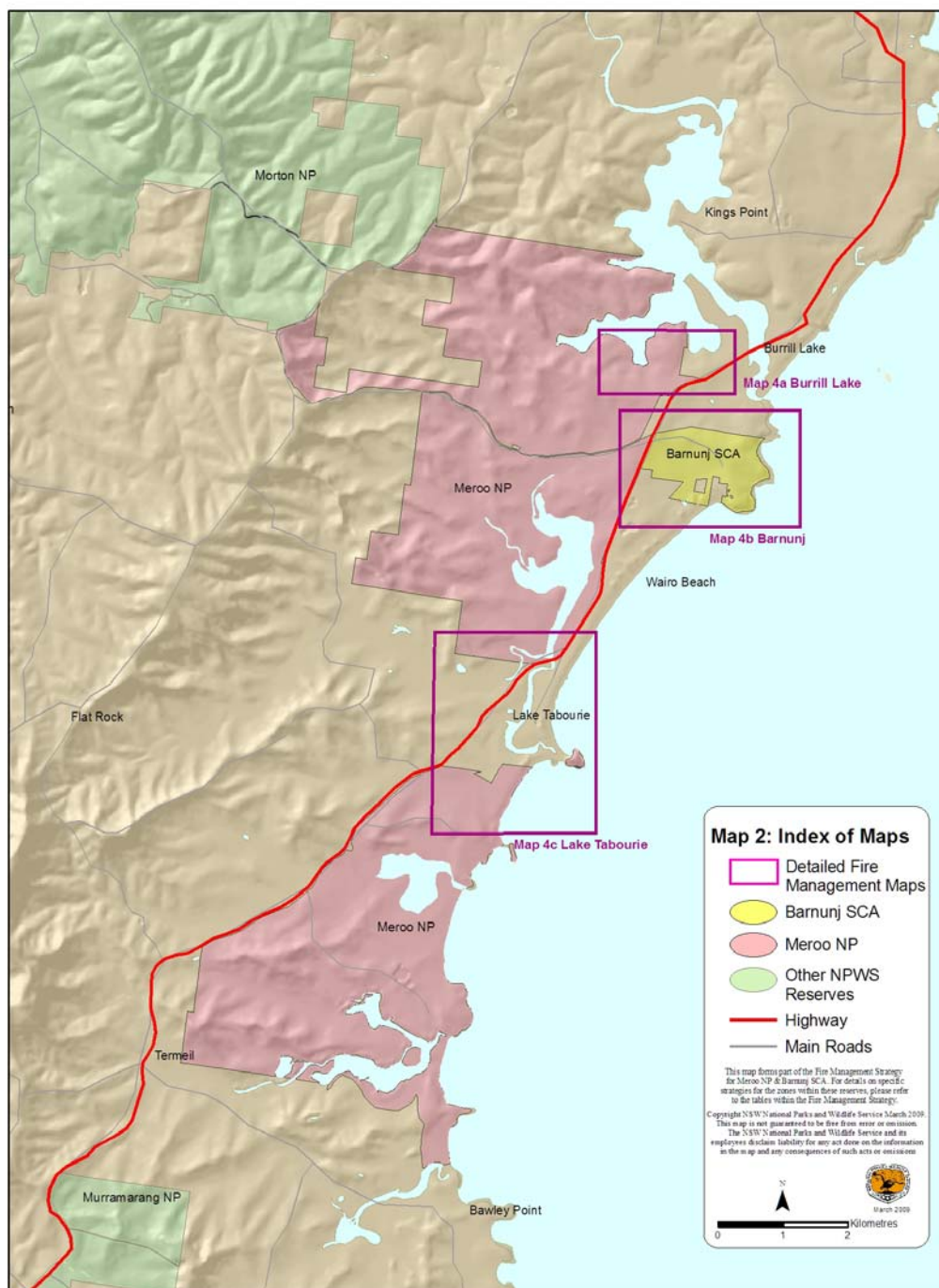
- The neighbouring urban settlement within fire-prone bushland north and east of the reserves. Associated with this is a complex mix of land ownership and management along the urban / bushland interface.
- The mix of public and privately managed bushland areas adjacent to the reserves.
- The vulnerable access routes for vehicle / emergency access to some communities. eg Bawley Point and Lake Tabourie.
- The vulnerability of key infrastructure routes across bushland areas. eg power supply.
- The dispersed arrangement of access and dwellings in rural subdivision areas, eg off Woodburn, Wheelbarrow and Woodstock Roads.
- The planning for and development of bushland areas adjacent to the reserves and nearby settlements having regard to bush fire risk eg Dolphin Point / Burrill Lake.
- The protection of existing developments that may not have sufficient regard to the ever present bush fire risk in planning and construction standards. eg near Lagoon Head and Wairo Beach
- Community understanding and acceptance of the asset protection measures and preparedness that is required to live with the inherent bush fire risk within these settings.
- The considerable biodiversity found in these areas that may be at risk from inappropriate fire regimes.
- The high incidence of 'unplanned fire' arising from arson or careless use of fire.

## Map 1 – Location of Reserves





**Map 2. Index for maps used within this fire management strategy.**





## 2. BUSHFIRE RISKS

### 2.1 Introduction

The number and complexity of assets in and around the reserves means it is not realistically possible to implement active fire management strategies to protect all assets that could be damaged by extreme wildfire events or inappropriate fire regimes. Bush fire risk analysis has been undertaken to identify those assets most at risk from fire of higher intensity and therefore most in need of the application of active fire management strategies.

For the purpose of this strategy, bush fire risk is defined as the chance of a bushfire occurring or the imposition of inappropriate fire regimes causing damage to assets within or adjacent to the reserve.

'Assets' include life and property, cultural heritage – such as historic or aboriginal sites, and natural heritage – such as flora, fauna, catchment values and natural ecosystems.

The method of grading the bush fire behaviour potential and consequent risk of damage is described in the *NPWS Strategy for Fire Management (NPWS Aug 2003)*. Whilst these methods are based on available climatic, vegetation and terrain data, it is stressed that periods of extreme fire weather and prolonged drought will considerably increase the potential behaviour and damage from bush fire. Under these exceptional conditions the potential risk to the community's property, natural and cultural assets will therefore increase significantly.

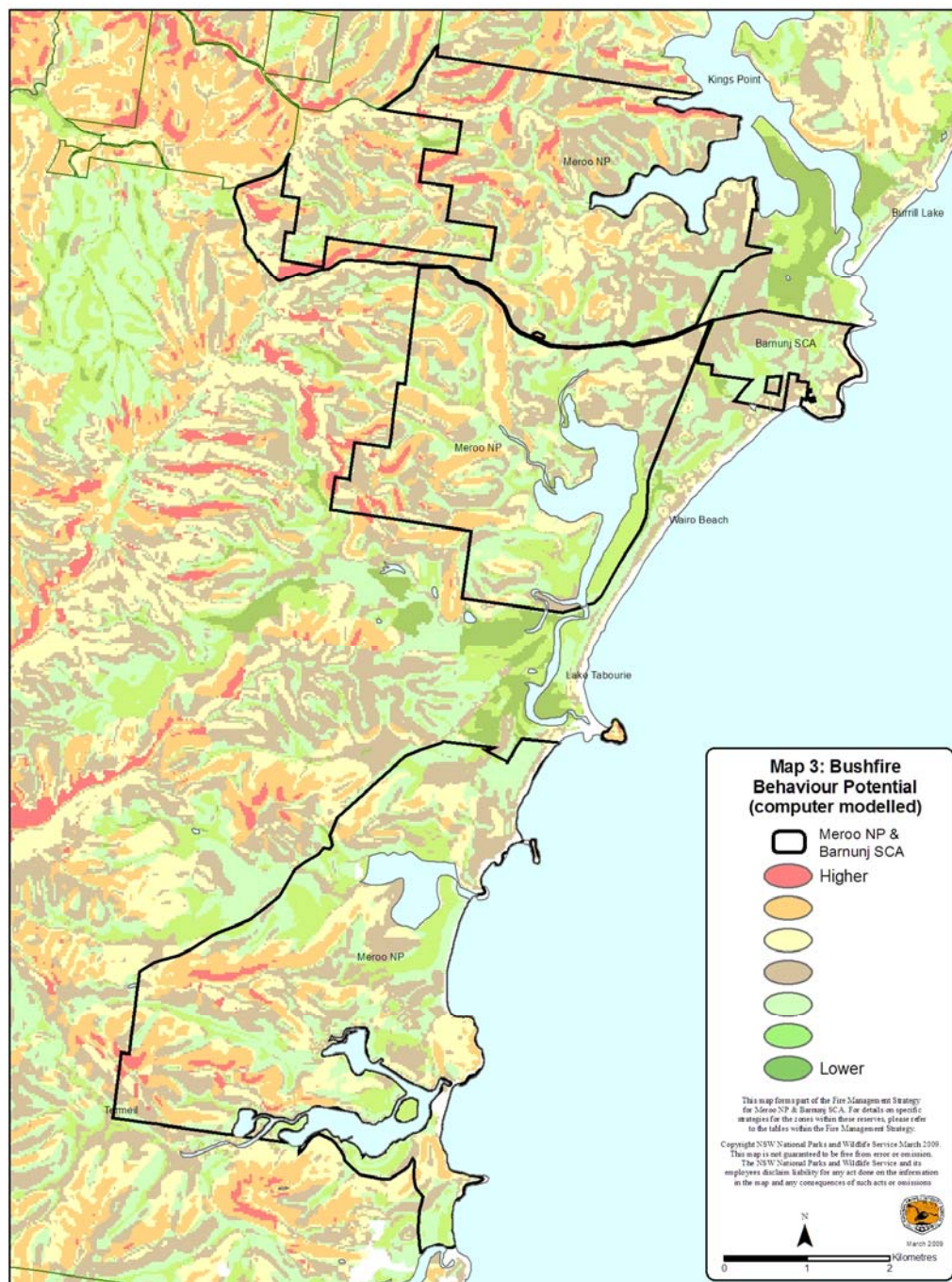
This risk assessment method has been applied to the area within and adjacent to Meroo National Park and Barnunj State Conservation Area. Life and property, natural and cultural assets within these areas have been sorted into one of the following fire potential / risk classes - *higher, moderate, or lower*.

This fire management strategy will focus on all assets within or adjacent to the reserves where identified in areas of **higher** bush fire potential.

Areas of comparatively **higher** potential bush fire behaviour have been illustrated in Map 3 and identified in the following sections.



**Map 3 – Potential Bush Fire Behaviour map**





## 2.2 Life and Property

Based on the criteria set out in the *NPWS Strategy for Fire Management (NPWS 2003)*, there are few specific locations within Meroo National Park and Barnunj State Conservation Area that are identified as areas of 'higher' bush fire behaviour potential.

Map 3 indicates the areas of higher bush fire behaviour potential across the reserves and surrounding areas. From this it can be seen there are no areas of concentrated occupation and few key assets in proximity to areas of higher fire potential within the reserves. These assets are listed in Table 1a.

Nevertheless, as has been demonstrated in events of extreme fire weather coupled with prolonged drought, there can be exceptional fire behaviour that can readily breach commonly accepted fire mitigation measures. Under such circumstances, bush fire fuels not normally available such as swampy areas may carry intense fire whilst the occurrence of spot fires can increase to considerable distances.

The risk of life and property damage is exacerbated where there is a concentration of people and assets such as the interface between built-up areas and adjoining bushland or during holiday periods. Similarly, key community infrastructure located within fire prone areas such as electricity supply lines are also vulnerable and damage to such facilities may have significant effects on wide areas not directly concerned with fire events.

**Table 1a. - Sites and Community Infrastructure in or near Meroo National Park and Barnunj State Conservation Area identified at higher risk from bush fire.**

(using criteria for fire risk factors in NPWS Strategy for Fire Management 2003)

Map	Feature / Location	Tenure
4	Integral / Transgrid power lines off Wheelbarrow Road	NPWS & Private
4	Integral / Transgrid power lines near Termeil	NPWS & Private

Though many assets do not directly adjoin the reserves, in places there is a continuum of bushland from the reserves to areas near the assets. For this reason at some locations, the NPWS has identified the management or ownership of such bushland areas. Enquiries as to fire management practices and maintenance measures for such areas should be directed to the owners or managers. In such areas the NPWS will support the cooperative approach to managing bush fire risk currently being promoted by the Shoalhaven Bush Fire Management Committee of which the NPWS is a member.

Such sites include areas listed in Table 1b:

**Table 1b, Locations near Meroo National Park and Barnunj State Conservation Area where detailed cooperative planning for asset protection will be required.**

Map	Feature / Location	Tenure
4b	Urban / bushland interface – southern side of Dolphin Point urban area.	NPWS, Shoalhaven City, Crown lands and private
4a	Urban / bushland interface – south-western Burrill Lake built-up area.	NPWS, Shoalhaven City, Crown lands and private
4b	Urban / bushland interface – southern side of Lake Tabourie village	NPWS, Shoalhaven City, Crown lands and private
4b	Bush Mission Society camping ground – Wairo and isolated houses on the southern side of Lagoon Head	NPWS, Crown Lands, leaseholders and private.

## 2.3 Cultural Heritage

Although there are a large number of aboriginal cultural sites within Meroo National Park and Barnunj State Conservation Area not all sites are at risk from bush fire. Based on the criteria set out in the *NPWS Strategy for Fire Management (NPWS 2003)*, an assessment of the type and location of recorded Aboriginal and Historic cultural sites was undertaken.

A variety of Aboriginal occupation sites have been recorded in the reserves including stone tool scatters, and middens. This indicates widespread use of the landscape. No recorded sites were assessed as being directly vulnerable from the effects of bush fire in areas of higher fire potential within Meroo National Park and Barnunj State Conservation. However, a significant threat to sites in all areas can arise from fire suppression operations such as disturbance created by vehicles, earthmoving plant, and creation of hand-tool firebreaks.

To limit the risk of this disturbance a number of locations including cultural sites that could be vulnerable to fire control operations have been identified on Operational Maps. Operational guidelines for firefighters and planners aimed at avoiding such disturbance are also included.

The types of site are not indicated but all sites that are indicated on maps are considered at risk from usual methods of creating control lines. The operational maps have been referred to relevant interests and the information is provided with permission and conditions for appropriate use. **(These maps are not for wider circulation to non-operational personnel.)**

**NB - Not all cultural sites will be indicated.** Where operations are planned, especially in areas near indicated sites or along routes not previously used, then incident planning and operational staff should, where possible, allow time and resources for preliminary assessment by suitably knowledgeable personnel.

The indicated cultural site locations may only be approximate. Where there may be limited options for control routes in areas that may compromise an indicated site, then field personnel should seek appropriate guidance from skilled and relevant personnel. These concerns should be relayed to the divisional commander and Incident Management Team and where disturbance is likely, alternatives should be considered or - where possible - works delayed until appropriate assessment is completed.

It is recognised that there will at times be circumstances where quick action is required under certain conditions to implement control measures. Where possible and if safer success of control is likely, then unnecessary disturbance should be avoided and control options less likely to disturb sites should be employed eg. the use of hose lays and wetlines as opposed to earthmoving machinery as a site-specific option.

Where likely strategic control options are identified beforehand then these should be assessed and mapped as time and resources allow in non-operational periods. These options are to be recorded in databases available to incident planning teams and where suitable marked on operational map revisions. Similarly, those historic cultural assets at risk from control operations may be identified on operational fire maps and strategy options identified.

If there is any doubt as to the appropriate measures to be taken or should further cultural assets be identified then avoid all disturbance where possible and contact the NPWS.

### ***Table 2 – Cultural sites considered at higher risk from bush fire***

NB As no specific sites have been identified at higher risk – Table 2 is reserved for possible sites identified during ongoing survey and evaluation in the reserves.

## 2.4 Natural Heritage

Based on the criteria set out in the *NPWS Strategy for Fire Management (NPWS 2003)*, there are vegetation communities in Meroo National Park and Barnunj State Conservation Area at higher risk from inappropriate fire regimes. (see Table 3)

Some of the complex and diverse vegetation communities found within the reserve are at risk from being burned too frequently (*overburnt*). This may potentially affect longer-term biodiversity values.

Based on limited fire history information there are conversely a few communities in the reserves where the time since fire exceeds the indicated fire / biodiversity thresholds and may require fire to be introduced in order to conserve biodiversity. Such areas are considered *underburnt*.

In some areas, where ignitions have been more frequent there are sites recently burned that although within the desirable thresholds, are *vulnerable* to being 'overburnt' if fire is introduced too soon after these events.

Most of the biodiversity concerns related to fire frequency are addressed in the strategies to manage fire within Land Management Zones (LMZ) where a range of 'times-since-fire' can be managed for. To better identify appropriate and site-specific fire regimes within the reserves, fire monitoring plots are being established across the region to cover a variety of vegetation types and fuel characteristics including a focus on sites where rare or threatened plant species are found. Over the life of this strategy the range of species and communities within Meroo National Park and Barnunj State Conservation Area will be assessed as to the suitability of locating vegetation/fuel monitoring sites.

Within Strategic Fire Advantage Zones (SFAZ) where a closer watch may be kept on bush fire fuel conditions, fire may be introduced towards the lower end of the required biodiversity thresholds.

In Asset Protection Zones (APZ) fuel conditions are most closely monitored and provided there are not specific identified plant communities, habitats or species at risk, lower thresholds may be exceeded where fire is considered the best way to manage bushfire fuel conditions.

In summary, at June 2008 less than 5% of the vegetation within the reserves had been burned within the last five years. None of these areas are considered overburnt but some of the reserve vegetation is vulnerable if fire is applied again within the next five years. The data to confirm appropriate biodiversity / fire frequency thresholds is limited. Fire history records and analysis of reserve vegetation and abundance are being reviewed and the application of this information will be reflected in applied fire or protection measures.

Table 3 identifies those vegetation communities where biodiversity is indicated to be at risk from inappropriate fire regimes. Specific locations for these communities will be identified within detailed planning for various fire management zones and works programming.

**Table 3. Biodiversity at threat within the reserves.**

Vegetation Communities within the reserves affected by inappropriate fire regimes	Area of vegetation community within reserves (ha.)	% Affected by in-appropriate fire regimes	% Vulnerable to inappropriate fire regimes
Coastal hinterland - Ecotonal gully rainforest	25.37	5%	75%



## 3. BUSH FIRE RISK MANAGEMENT STRATEGIES

### 3.1 Introduction

The fire management strategies identified and illustrated in maps 4 to 4c in this plan will be implemented over the life of this plan and have been designed to reduce the bush fire risk to assets within and adjacent to the reserves (as outlined in section 2 of this strategy) as well as conserve the natural and cultural values within the reserve.

A Fire Management Works Schedule for works to apply these strategies is being prepared and will be reviewed annually. (see section 3.7 of this strategy)

### 3.2 Fire Management Zones

Meroo National Park and Barnunj State Conservation Area have been divided into fire management zones according to the zoning system described in the *NPWS Strategy for Fire Management (NPWS 2003)*. These zones are set out in Maps 4 - an overall map of Fire Management Zoning in the reserves, Map 4a: Burrill Lake Area Fire Management Zones, Map 4b: Barnunj State Conservation Area Fire Management Zones, and Map 4c: Detailed bush fire management zones – Lake Tabourie village

#### *Fire management zone types*

The zone types applied within these NPWS managed reserves are:

- Asset Protection Zones, (APZ),
- Strategic Fire Advantage Zones, (SFAZ),
- Land Management Zones – (Heritage), (LMZ)
- Fire Exclusion Zones, (FEZ)

These fire management zones are consistent with bush fire risk management planning zones used by other fire authorities across NSW within cooperative fire management frameworks. Land Management Zones – (Heritage) replace the former Heritage Management Zones (HMZ) indicated within NPWS policy and are applied within NPWS reserve fire management strategies to indicate their primary focus on conservation of natural and cultural heritage values.

As far as possible the boundaries of fire management zones have been defined by fire control 'advantages' or useful operational boundaries such as roads, water, or areas of lower bush fire behaviour potential.

#### *- Size of Asset Protection Zones and Development Control matters on adjacent lands.*

It should be noted that the width of Asset Protection Zones (APZ) as mapped and nominated in this strategy will vary according to specific site conditions. This includes the consideration of the distance from the dwelling to the boundary ('setback') for existing dwellings (ie -in place at the introduction of revised fire planning and development control legislation - 2001). These distances are described in the revised guidelines *Planning for Bush Fire Protection (2006)* but local conditions such as steep terrain, sensitive habitat or State Environmental Planning Policy (SEPP) may give reason to vary these recommended distances at times. The width of APZ – including the areas on private property is intended to create a 'defendable space' between the dwelling and the bush fire hazard. Newer developments are subject to these fire planning and development control constraints. Please refer to Shoalhaven City Council concerning development and building control matters with regard to bush fire protection.

#### *- Fire management and zoning of bushland adjacent to the reserves*

To provide useful boundaries for fire management operations the logical boundary to some fire management zones should extend off the reserve onto other land tenures. An example of this is where bushland may cover lands between the reserve and adjacent dwellings. Here, the usefulness of any Asset Protection Zones placed within the reserve may be compromised by a lack of appropriate measures in the bushland between the reserve and the assets.

**The zone boundaries proposed in this plan cover only NPWS managed reserves.** For zoning and bush fire management across adjacent non-reserve lands please refer to the Shoalhaven City Council or Rural Fire Service for guidance.

Where Private Property is identified then ownership or management details can be sought via the Department of Lands or Shoalhaven City Council.

Identification of these adjacent lands within the tables or maps does not imply any fire management practice similar to those prescribed for the adjacent reserves.

*- Bush fire hazard complaints - within reserves*

Where bush fire fuel or bush fire access conditions within the reserves may be considered not to meet the objectives as set out in this fire management strategy then enquiries should at first be directed to the NPWS area office managing the reserve i.e.

Area Manager - NPWS Ulladulla Area

Coller Road - Ulladulla Industrial Estate (off Kings Point Road)

(PO Box 72 Ulladulla NSW 2539)

Fire hazard complaints about such areas can also be referred to the Rural Fire Service via the Shoalhaven office or RFS website.

*- Bush fire hazard complaints - lands adjoining the reserves*

These areas may be zoned within the Shoalhaven Bush Fire Risk Management Plan. This Plan outlines cooperative bush fire strategies across the landscapes of the Shoalhaven.

Bush fire hazard complaints about such areas should be directed in the first instance to the manager / owner of the lands concerned or referred to the Rural Fire Service.

*- Integration with bush fire risk planning across the Shoalhaven*

During the life of this strategy, the NPWS will endeavour to seek consistency with other fire management plans and agencies so that a common understanding of fire management expectations may be understood by the community, neighbours, land managers and firefighters alike. The NPWS or neighbours may seek the assistance of the Shoalhaven Bush Fire Risk Management sub-committee (BFMC - RMS) to facilitate these matters.

The NPWS South Coast Region will be submitting the fire management zones and their applied strategies for inclusion as part of the Shoalhaven Bush Fire Risk Management Plan. This planning contribution and works commitment by the NPWS becomes part of the overall strategy for the Shoalhaven community to better understand and accept the risks associated with bush fires in this region.

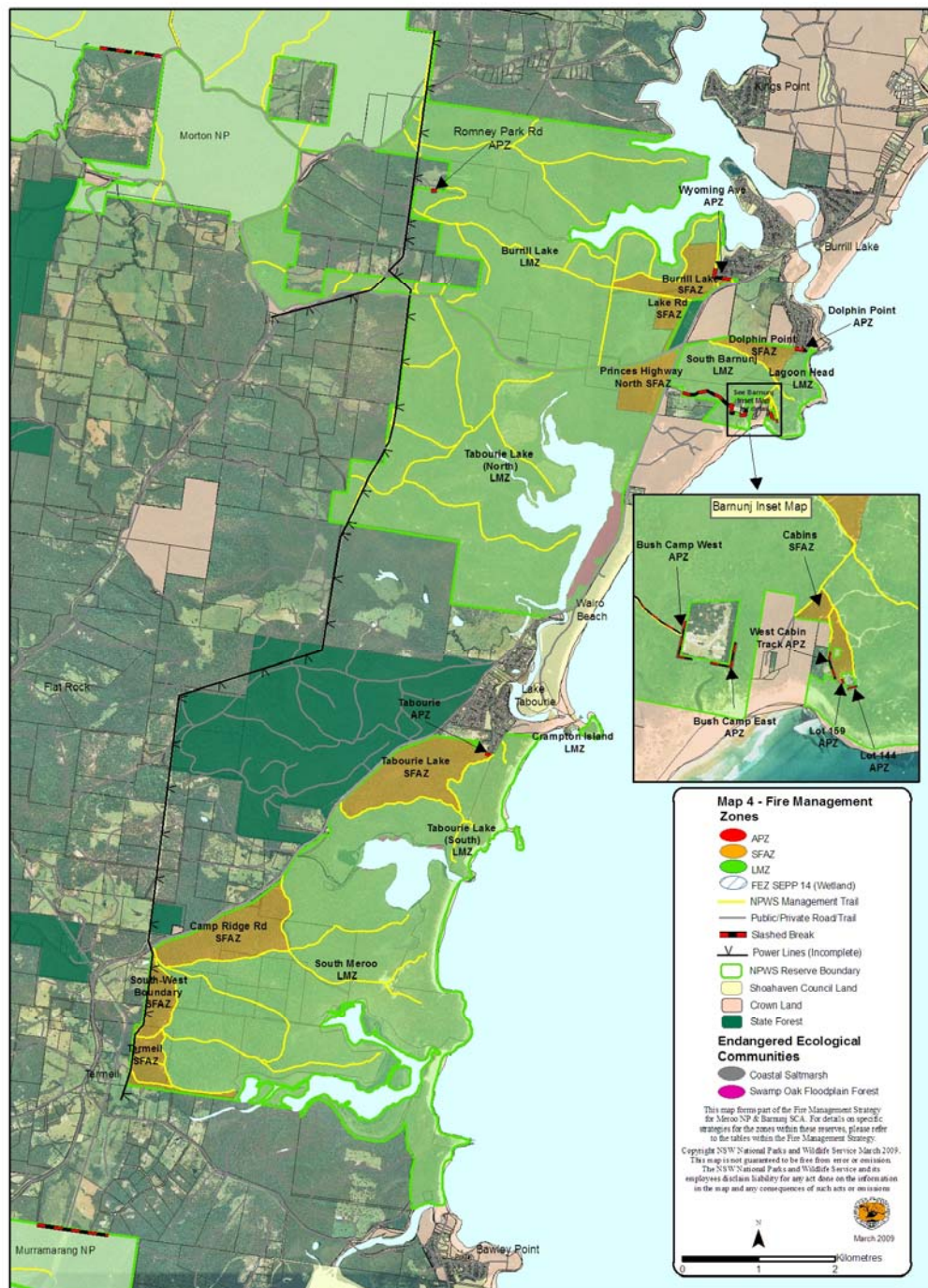
*-Detailed zone mapping – Asset Protection Zone areas*

Given the complexity of land tenures and fire management strategy options along the extensive urban/bushland interface adjoining the reserves, the mapping within this overall fire management strategy for Meroo National Park and Barnunj State Conservation Area has been divided into detailed subsections addressing particular communities or areas. Map 4. Fire Management Zones, illustrates all fire management zones across the reserves whilst maps 4a to 4c offer more detailed illustrations of APZ within the Burrill, Wairo/Dolphin Point and Lake Tabourie areas.

*- Land tenure, ownership or fire management responsibility information*

It should be noted that information regarding land ownership and management responsibility for any areas identified off the reserves was obtained from Department of Lands and Shoalhaven City Council records at the time of publication. Where tenure or management responsibility was not clear from these sources the NPWS may refer to such areas within this strategy as "management unknown". Enquiries for these areas should be directed to the Department of Lands then Shoalhaven City Council to determine bush fire management responsibility.

**Map 4. - Map of Fire Management Zoning – Meroo National Park and Barnunj State Conservation Area**





**Map 4a – Detailed Bush Fire Management Zones – Burrill Lake area**



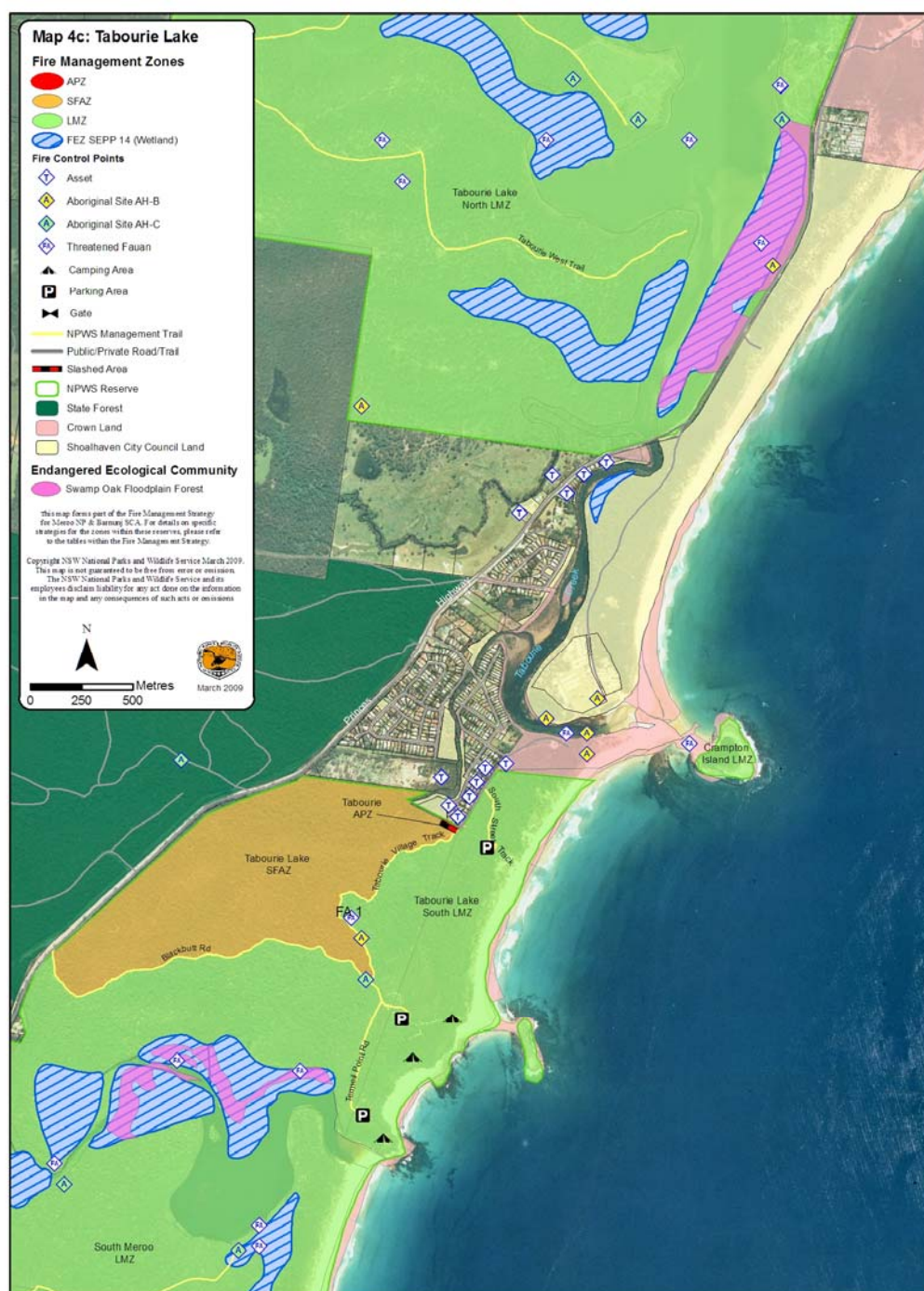


**Map 4b – Detailed Bush Fire management zones – Barnunj State Conservation Area - (includes areas adjoining Dolphin Point, Wairo and inholdings)**





**Map 4c – Detailed Bush Fire management zones – Lake Tabourie village**





### **3.2.1 Asset Protection Zones (APZs)**

Eight Asset Protection Zones have been identified within Meroo National Park and Barnunj State Conservation Area - (see Maps 4 and 4a to 4c). The primary fire management objective for asset protection zones is the protection of life and property that may be achieved by applying the strategies as outlined in Table 4 sections below. Note that the slashed breaks described in Table 10 also contribute to the protection of life and property from the risk of bush fire.

The management responsibility for bushlands adjoining the reserve and adjacent urban areas / facilities have been identified where relevant on the detailed planning maps and Tables covering Asset Protection Zones (APZ). This is to assist in clearly defining bushland ownership and bush fire management responsibility. The Fire Management Zones (FMZ) shown in this strategy cannot be applied to adjacent lands. FMZ for adjoining lands may be prescribed in the Shoalhaven Bush Fire Risk Management Plan and will as much as possible integrate NPWS zones and other bushfire management activities detailed in this strategy.

Table 4 outlines the specific fire management objectives and strategies to be applied in each of the Asset Protection Zones (Maps 4, and 4a to 4c)

Asset Protection Zone descriptions are detailed for:

Meroo National Park APZs - Burrill Lake area

- Wyoming Avenue APZ
- Romney Park APZ (Lot 33)
- Tabourie APZ

Barnunj State Conservation Area APZs – Dolphin Point Area

- Dolphin Point APZ
- West Cabin Track APZ (Lot 131 & Lot 138)
- Lot 144 & Lot 159 APZ
- Bush Camp East APZ  
(Lot 160 and 161)
- Bush Camp West APZ

**Table 4. The specific fire management objectives and strategies to be applied in each of the Asset Protection Zones (Maps 4 to 4c)**

**Meroo National Park APZs - Burrill Lake area**

Meroo National Park APZs - Burrill Lake area					
Zone ID	Map/s	APZ Name	Zone Area (ha)	Specific Objectives	Strategies
			in reserve		
	4a	Burrill Lake section adjoining urban areas			
MER A1	4a	<b>Wyoming Avenue APZ</b>  - NPWS section in the reserve to the south and west of dwellings off Wyoming Avenue	<b>0.76ha.</b>	<p>To aid in the protection of dwellings and occupants adjoining the reserve between Wyoming Avenue and tracks in the reserve i.e. Burrill Lake Drive &amp; Princes Highway</p> <p>To aid firefighters in the protection of life and property in these adjoining areas.</p> <p>To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.</p>	<ul style="list-style-type: none"><li>Maintenance of a slashed area – variable width up to 20m wide at rear of properties adjoining Meroo NP on the southern side of Wyoming Avenue.</li><li>Maintenance of a fuel reduced zone (by slashing understorey) up to about 15m wide to the west of properties on Wyoming Avenue that adjoin Meroo NP. The fuel reduced zone includes Burrill Lake Drive management track and a slashed area up to 10m wide immediately west of Burrill Lake Drive . Note that the APZ finishes at a drainage line to the north of the APZ where lower fire hazard potential occurs along the margins of the drainage feature.</li><li>Annual bush fire fuel and slashed area assessment for maintenance and fuel management works required prior to October.</li><li>Enable clear access for firefighters and limit available fire fuels by removal of property / debris from the APZ and controlling vehicle access from tracks within the APZ.</li><li>Seek cooperation of local RFS brigades and neighbours in watching for unauthorised use of the APZ that may lead to arson, rubbish dumping or compromise emergency vehicle access.</li></ul>

### Merero National Park APZs – Lot 33, Romney Park Area

Zone ID	Map/s	APZ Name	Zone Area (ha) in reserve	Specific Objectives	Strategies
	4	Romney Park Area – Rural residence near Romney Park Road, west of Burrill Lake			
MER A2	4	Romney Park APZ (Lot 33)	<1ha.	<p>To aid in the protection of dwelling and occupants on Lot 33, west of Burrill Lake, adjoining Merero National Park.</p> <p>To aid firefighters in the protection of life and property in this adjoining area.</p> <p>To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.</p>	<ul style="list-style-type: none"><li>• Authorised consent (as per consent conditions 22 July 2004) from NPWS for current landowners of Lot 33 to maintain a fuel reduced zone by slashing – max width 5m and extending for max 75m – on the southern side of residence where it adjoins Merero NP.</li></ul>

## Merero National Park APZs - Tabourie Lake area

Zone ID	Map/s	APZ Name	Zone Area (ha) in reserve	Specific Objectives	Strategies
	4c	Lake Tabourie area - to east and south of village			
MER A3	4c	Tabourie APZ  - NPWS area in the reserve - at the rear of properties off the southern end of Paterson Close	0.24 ha.	<p>To aid in the protection of dwellings and occupants adjoining the reserve at the south-eastern end of Paterson Close</p> <p>To aid firefighters in the protection of life and property in these adjoining areas.</p> <p>To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.</p>	<ul style="list-style-type: none"><li>Maintenance of a slashed area – up to 10 m wide (by NPWS) at rear of properties adjoining Meroo NP at the south-eastern end of Paterson Close west to margins of wetland.. This slashed break ties into two existing 10m slashed breaks on SCC Land to the north-west and on Crown Land that runs north-east to Surf Street at the rear of properties. Contact SCC and the Department of Lands regarding maintenance of these breaks.</li><li>Annual bush fire fuel and slashed area assessment for maintenance and fuel management works required prior to October.</li><li>Enable clear access for firefighters and limit available fire fuels by removal of property / debris from the APZ and controlling vehicle access to the APZ and reserves.</li><li>Seek cooperation of local RFS brigades and neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access.</li></ul>

## Barnunj State Conservation Area APZs

Dolphin Point Area, Lagoon Head isolated lots, Bush Mission Society (Lagoon Head Conference Centre)

### 1) - Dolphin Point Area -

It is observed that further subdivision and development is likely adjacent to the reserve west of the existing Dolphin Point residential area..

Any measures undertaken by the NPWS under current site use and conditions should not be considered as ongoing commitments to enable approval of further development adjacent to the reserve. The NPWS supports the objectives of current development control and assessment with regard to bush fire risk management i.e. that fire protection on new subdivisions and developments be self contained and inherently safe.

### Barnunj State Conservation Area APZs – Dolphin Point Area

Zone ID	Map/s	APZ Name	Zone Area (ha)	Specific Objectives	Strategies
			in reserve		
	4b	section of reserve adjoining urban areas of Dolphin Point			
BAR A1	4b	Dolphin Point APZ  - NPWS area at the southern side of properties off Highview Drive and Seaside Parade	0.43 ha.	<p>To aid in the protection of dwellings and occupants adjoining the reserve at Dolphin Point on the southern side of properties off Highview Drive and Seaside Parade.</p> <p>To aid firefighters in the protection of life and property in these adjoining areas.</p> <p>To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.</p>	<ul style="list-style-type: none"><li>• Maintenance of a slashed area – up to 25 m wide (by NPWS) – south of properties off Highview Drive and Seaside Parade that adjoin Barnunj SCA .</li><li>• Annual bush fire fuel and slashed area assessment for maintenance and fuel management works required prior to October.</li><li>• Enable clear access for firefighters and limit available fire fuels by removal of property / debris from the APZ and controlling vehicle access to the APZ.</li><li>• Seek cooperation of local RFS brigades and neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access.</li></ul>

## **2) Lagoon Head isolated lots**

There are a number of isolated portions north of Wairo Beach on the southern side of Lagoon Head, four of which have a cabin or holiday dwelling. These lots and four existing dwellings are surrounded by the reserve.

Vehicle access is via the Pot Holes Road off the Princes Highway opposite the Wheelbarrow Road junction, as well as, the Point Nor-East Track and two other minor roads that exist solely to access the cabins. Vehicular access is limited by the condition of these tracks and given their length, condition, and exposure may not be accessible at all times to emergency vehicles - heavy or light - during fire outbreaks in the vicinity. Negotiations continue with the lot owners concerning condition and maintenance of access roads to the properties.

The size of portions on which the dwellings are sited, the close proximity of dwellings to portion boundaries, the high visibility of the lots from popular beaches, and the fragile sand dune substrate and associated vegetation communities makes bush fire fuel management in the surrounding reserve problematic at all sites. However, as much as practicable the NPWS will continue to meet its fire management obligations as a neighbour and contribute to mutual fire protection efforts. This includes the maintenance of APZs within the reserve as recommended in *Planning for Bush Fire Protection (2006)*. Due to environmental constraints the total APZ width (i.e. from the dwelling/cabin to the outer limit of the APZ) recommended in this strategy may sometimes differ from that recommended by the guidelines. Fire protection within the private properties remains the responsibility of the dwelling owners however the isolation and restricted access to these sites highlights the need for a cooperative approach to fire protection maintenance and bush fire season preparedness.

The NPWS believes that the best outcome will include the implementation of measures as set out in the table below and the recognition of residual fire risk by property owners within the current use of the sites, their continuing improvement and any future developments. Any further development of these sites will be subject to appropriate planning and assessment regimes especially bush fire risk management dwellings and intrinsic occupant safety.

Such measures may include the enhancement of the dwellings structural capacity to withstand fire/ember attack - especially when unattended. This includes the provision of basic firefighting infrastructure (eg. dedicated water storage and hose fittings) and the preparation of fire response procedures for any occupants on site at the time. Special consideration needs to be given to providing on-site information and procedures to casual visitors. A priority consideration is the warning of occupants and the use of access tracks during fire events in the vicinity. These latter activities lie within the scope of the Shoalhaven Bush Fire Risk Management Plan. The NPWS is prepared to assist in providing information and links to local RFS and NSWFB / RFS Brigades concerning bush fire preparation and response activities.

It should be recognised that any measures undertaken by the NPWS under current use and conditions should not be considered as ongoing commitments to enable further development of the private property lots. The NPWS supports the objectives of current development control and assessment processes with regard to bush fire risk i.e. that fire protection for new developments should be self contained and inherently safe.

The following measures have been discussed with the dwelling owners in 2007.

## Barnunj State Conservation Area APZs – Lagoon Head / Wairo area -

Zone ID	Map/s	APZ Name	Zone Area (ha) in reserve	Specific Objectives	Strategies
		<b>Specifically:</b>			
<b>BAR A2</b>	<b>4b</b>	<p><b>West Cabin Track APZ</b> (Lot 131 &amp; Lot 138)</p> <p>- NPWS within the reserve adjacent to the dwellings.</p> <p>These properties, accessed by the West Cabin Track, have an exposed southerly aspect. They are surrounded by low dune heath vegetation to the south and woodland/forest to the north and west</p>	<b>0.1 ha.</b>	<p>To aid in the protection of the dwelling and occupants and enhance any protection measures undertaken by property owners</p> <p>To aid firefighters in the protection of life and property at the sites and in adjoining areas.</p> <p>To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.</p>	<ul style="list-style-type: none"> <li>• Maintenance of a slashed or under-scrubbed area – up to 15m wide (includes existing access road) – east of buildings on Lot 138</li> <li>• Maintenance of a slashed or underscrubbed area up to 15m wide (including cleared area on private land) north-east of buildings on Lot 131.</li> <li>• APZs will not be constructed in the reserve south of these lots due to ;               <ul style="list-style-type: none"> <li>- the sensitivity of the dune substrate and associated vegetation communities less than 100m from the beach.</li> <li>- the existing cleared break &gt;10m on private land,</li> <li>- the occurrence of low heath vegetation (&lt;2m) that carries a lower bush fire risk than tall heath or forest.</li> <li>- the generally lowered risk of severe bush fire behaviour on southerly aspects.</li> </ul> </li> <li>• Define limits to zone with permanent markers to guide future maintenance and limit further encroachment into the reserve.</li> <li>• Annual bush fire fuel and slashed area assessment for maintenance and fuel management works required.</li> <li>• Seek the assistance of dwelling owners and occupants in watching for unauthorised use of APZ that may lead to arson, rubbish dumping or further compromise emergency vehicle access.</li> <li>• Provide information to neighbours on bush fire season preparedness and enable links to local RFS brigades and cooperative bush fire Community Education activities.</li> </ul>

**Barnunj State Conservation Area APZs - southern area - continued**

Zone ID	Map/s	APZ Name	Zone Area (ha)	Specific Objectives	Strategies
			in reserve		
<b>BAR A3</b>	<b>4b</b>	<b>Lot 144 &amp; Lot 159 APZ</b>  - NPWS (within the reserve) adjacent to the dwellings.  These sites also have an exposed southerly aspect and are surrounded by dense headland vegetation to the south and woodland/forest to the north and west	<b>0.1 ha.</b>	<p>To aid in the protection of the dwelling and occupants and enhance any protection measures undertaken by property owners</p> <p>To aid firefighters in the protection of life and property at the sites and in adjoining areas.</p> <p>To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.</p>	<ul style="list-style-type: none"> <li>• Maintenance of a slashed area – up to 15m wide – south-east of buildings on Lot 144. . (Note that a cleared APZ of &gt;15m south-west of buildings on Lot 144 occurs on private land and therefore further APZ construction in the reserve is not required.)</li> <li>• Maintenance of a slashed break –up to 15m wide – south-west of buildings on Lot 159.</li> <li>• Define limits to clearing with markers to guide future maintenance and limit encroachment into the reserve.</li> <li>• Annual bush fire fuel and slashed area assessment for maintenance and fuel management works required.</li> <li>• Seek the assistance of dwelling owners and occupants in watching for unauthorised use that may lead to arson, rubbish dumping or further compromise emergency vehicle access.</li> <li>• Provide information to neighbours on bush fire season preparedness and enable links to local RFS brigades and cooperative bush fire Community Education activities.</li> </ul>



### **3) Bush Mission Society - (Lagoon Point Conference Centre and Campground)**

This facility is accessible from the rear of the Burrill Pines Motel off the Princes Highway approximately 400m south of the Wheelbarrow Road junction. The facility encompasses three lots (Lot 157, 160 and 161) but is managed as a single entity. The site presents fire safety and management concerns as it is surrounded by the bushland of the reserve and there is single lane vehicle access for some distance through this bushland from the west. The site is also subject to peak use for temporary camping, caravans and motel style accommodation during holiday and higher fire danger times.

At January 2008 this area included one dwelling, motel style accommodation buildings and visitor amenities close to the boundary in the south east corner of the site (Lot 160 and 161). A number of relocatable caravan based temporary accommodation structures are located to the east of the entrance with a larger communal conference facility in the south-west corner (Lot 157). Other facilities and structures such as toilet and shower blocks are scattered across the site and much of the remaining area is used for tent camping (Lot 157).

The site relies on locally sourced water supplies with responsibility for fire protection on site being provided by the site manager. The manager also directs the placement of temporary accommodation so as to enable sufficient separation and emergency access.

Most understorey vegetation has been removed from within the site. Tree canopy cover remains over the north-western half of the site. Some large Casuarina trees and other vegetation grow in a drain constructed along the eastern boundary and also occur within Lot 160 and 161 close to buildings. The site is surrounded by fire prone forest and swamplands to the north and west with less fire prone communities such as littoral rainforest, wetland and sand dune communities to the south-east. These south-east communities and landforms are particularly sensitive to fire. The forest to the east is also an Endangered Ecological Community – Bangalay Sand Forest. Therefore, important fire management outcomes - apart from the protection of people and assets - include the protection of fire sensitive dune vegetation and littoral rainforest, minimising disturbance to dune formations, protecting the margins of the lagoon to the south and Bangalay Sand Forest to the east.

Apart from occasional fire introduced for land management purposes, all recorded unplanned ignitions in the vicinity are concentrated along the highway corridor to the west and are suspected as arson. Historically the greatest fire threat to the site has been from the west and as well as the south where it jumps the lagoon and moves towards the sites southern boundary. Fire prone forest also occurs to the north and east of the site. However the fire risk in these areas is significantly less as there are few fixed assets situated close to the northern boundary. Fire behaviour in the east is likely to be substantially lower due to the close proximity of the beach, occurrence of rainforest pockets and the upward slope of land away from the site.

The isolation and restricted access to this site highlights the need for a cooperative and proactive approach to fire management. The NPWS believes that the best outcome will include the implementation of measures as set out in the table below and the recognition of residual fire risk within the site's current operation, its continuing improvement and any future developments.

Management of on-site fire risk may include the safer placement of tents and caravans to enhance separation from each other and the bushland interface, access for emergency vehicles, preparation of site safety plans and response procedures, improvement of fire safety infrastructure, identification of refuge areas and active promotion of visitor awareness of bush fire safety.

It should be recognised that any measures undertaken by the NPWS under current site use and conditions should not be considered as ongoing commitments to enable further development at the site. The NPWS supports the objectives of current development control and assessment processes with regard to bush fire risk i.e. that fire protection for new developments should be self contained and inherently safe.

The following measures have been discussed with the site managers in 2007.

**Barnunj State Conservation Area APZs - Bush Mission Society area**

Zone ID	Map/s	APZ Name	Zone Area (ha)	Specific Objectives	Strategies
			in reserve		
<b>BAR A4</b>	<b>4a</b>	<b>Bush Camp East APZ (Lot 160 and 161)</b>  - adjacent to the dwelling and other buildings located in the south-east corner of the site (Lot 160 and 161).  Lot 161 has a southerly aspect and is not expected to sustain a high intensity fire due to only limited understorey vegetation cover between the boundary and the beach and nearby lagoon. Ember attack remains an issue for fire protection.  Lot 160 has an easterly aspect and adjoins a significant area of littoral rainforest vegetation.	<b>0.2 ha.</b>	To aid in the protection of buildings, occupants and campers and enhance the protection measures and management of the site.  To aid firefighters in the protection of life and property on site and in adjoining areas.  To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.	<ul style="list-style-type: none"> <li>• Identification, definition and maintenance of a slashed or under-scrubbed fire vehicle route roughly parallel to the southern boundary of Lot 161 where a dwelling is located. In order to protect the margins of the lagoon and fragile dune formations the trail will be located &gt;20m from the lagoon to the south and as close to the boundary as possible whilst avoiding large trees. Removal of understorey vegetation between this trail and dwellings may also be undertaken by hand.</li> <li>• Identification, definition and maintenance of a slashed or under-scrubbed fire-vehicle route on the eastern side of Lot 161 and 160 adjoining the dwelling and other accommodation buildings / facilities – up to 3.0m wide. This work must avoid disturbance to the littoral rain forest and Bangalay Sand Forest by avoiding damage to trees or canopy cover. The area between this slashed vehicle route and assets (except rainforest patches) may also be periodically burnt to reduce fuel loadings if required..</li> <li>• Define limits to slashed zones using permanent markers to guide future maintenance and limit further encroachment or illegal use of the reserve.</li> <li>• Wherever possible avoid disturbance to dune vegetation or littoral rainforest elements/canopy and margins of watercourse / lagoon.</li> <li>• Annual bush fire fuel and slashed area assessment for maintenance and fuel management works required.</li> <li>• Seek the assistance of site users and management in watching for unauthorised access and use that may lead to arson, rubbish dumping or compromise emergency vehicle access. This includes bush camping in sensitive areas within the reserve near the facility.</li> </ul>

**Barnunj State Conservation Area APZs - Lagoon Head / Wairo section**

Zone ID	Map/s	APZ Name	Zone Area (ha)	Specific Objectives	Strategies
			in reserve		
<b>BAR A5</b>	<b>4a</b>	<b>Bush Camp West APZ</b>  -adjoining the western and south-western boundary of the facility (Lot 157) where caravans and the conference facility are situated.	<b>0.24 ha.</b>	<p>To aid in the protection of the conference facility, caravans, occupants, campers and any other relocatable accommodation facilities adjacent to the western boundary of the site.</p> <p>To aid firefighters in the protection of life and property on site and in adjoining areas.</p> <p>To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.</p>	<ul style="list-style-type: none"> <li>• Maintenance of a slashed area – variable width according to access conditions up to 10m - located as close to the boundary as practicable to the west of caravans and to the west and south of the conference facility.</li> <li>• Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required.</li> <li>• Seek the assistance of site users and management in watching for unauthorised access and use that may lead to arson, rubbish dumping or compromise emergency vehicle access. This includes bush camping in sensitive areas within the reserve near the facility.</li> </ul>

### **3.2.2 Strategic Fire Advantage Zones (SFAZ)**

Nine Strategic Fire Advantage Zones (SFAZ) have been defined within the reserves (Maps 4a, b, c). Primary fire management objectives in Strategic Fire Advantage Zones are to reduce the occurrence of human caused unplanned fires in the reserves and to limit the spread of fire within, from and into the reserves.

SFAZ also contribute to biodiversity conservation by limiting the possibility of extinction of species which are known to occur naturally within the reserves. This may be achieved by affording some measure of control over the spread of unplanned fires that might otherwise result in fire regimes that can lead to the extinction of species. This will be achieved by implementing the strategies prescribed in Table 5 in each SFAZ.

Note that the slashed breaks described in Table 10 and any tracks and roads maintained for fire management purposes also serve an important role in preventing the spread of wildfire in the reserves. The Shoalhaven Bush Fire Risk Management Plan may complement this strategy where fire management strategies are specified on private or Crown lands.

In some instances, it would be logical to extend SFAZ boundaries off the reserves in order to incorporate external practical operational boundaries or adjoining bushland fire hazards. The SFAZ prescriptions apply only within the reserve. Details on fire management options for adjoining lands should be sought from the landowner / manager. Some details may be contained in the Bush Fire Risk Management Plan for the Shoalhaven – contact the Rural Fire Service for details.

SFAZ are similar in purpose to Strategic Fire Management Zones (SFMZs) described in the NPWS approach to Fire Management (2003). To promote a landscape-wide approach to bush fire management planning this fire management strategy adopts the same intent and naming for these strategic zones as used in the Shoalhaven Bush Fire Risk Management Plan. The SFAZ described in this Fire Management Strategy for Meroo National Park and Barnunj State Conservation Area will be proposed for inclusion as SFAZ within that management plan.

The word 'Advantage' in SFAZ refers to the advantage that the zones and their management will provide for firefighters in the suppression of wildfire and bush fire fuel management.

The following tables identify each SFAZ and outline the objectives and strategies to be applied in that zone. Maps 4 and 4a to 4c show the location and extent of these zones

These SFAZ include:

**Strategic Fire Advantage Zones - Meroo National Park**

Burrill Lake SFAZ

Lake Road SFAZ

Lake Road SFAZ

Princes Highway North SFAZ

Tabourie Lake SFAZ

Camp Ridge Road SFAZ

South-West Boundary SFAZ

Termeil SFAZ

**Strategic Fire Advantage Zones – Barnunj State Conservation Area**

Cabins SFAZ

Dolphin Point SFAZ

**Table 5. Specific fire management objectives and strategies for each of the Strategic Fire Advantage Zones (Maps 4, 4a to 4c)**

**Strategic Fire Advantage Zones - Meroo National Park**

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>MER S1</b>	<b>4 &amp; 4a</b>	<b>Burrill Lake SFAZ</b>  <b>NPWS</b>  - an area north of Romney Park Road East and north to Burrill Lake Drive - west of the Burrill Lake urban area near Wyoming Avenue. (Adjoins SCC land between Wallaroy Drive and Burrill Lake Drive and Forests NSW managed land adjoining the Princess Highway and Romney Park Road)	<b>51.0 ha.</b>	<p>To complement the Wyoming Ave. APZ and works undertaken along the urban/bushland interface near Wyoming Avenue</p> <p>To restrict the movement of fires between neighbouring lands and NPWS managed areas</p>	<ul style="list-style-type: none"> <li>• Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches.</li> <li>• Maintain identified fire access routes and slashed breaks within the SFAZ and adjoining properties for use under appropriate conditions - see Table 10</li> <li>• Consider the safety of travellers along the Princes Hwy. (visibility and traffic management) in any initial response to wildfire in the area.</li> <li>• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, gates, information signs, identified water points, etc.</li> <li>• Restrict unauthorised vehicle access off Romney Park Road and Burrill Lake Drive in order to help limit arson, rubbish dumping, and to avoid damage to identified tracks that may prevent ready access by emergency vehicles.</li> <li>• Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies.</li> <li>• Seek cooperation of local RFS brigades in the monitoring and reporting of SFAZ fuel and access conditions.</li> <li>• Maintain cooperative management and communication with adjoining land management agencies so that effective bush fire risk management is maintained across the SFAZ and adjoining lands i.e. Dept of Lands</li> </ul>

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
		Burrill Lake SFAZ continued – adjoining areas			
<b>MER</b> <b>S1</b>	<b>4a</b>	<b>Shoalhaven City</b> managed areas - to west of residences off Wallaroy Drive, and part of Wyoming Avenue		<ul style="list-style-type: none"> <li>Contact Shoalhaven City Council or RFS for details of fire management activities</li> </ul>	

### Strategic Fire Advantage Zones - Meroo National Park - Burrill Lake area - continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>MER S2</b>	<b>4 &amp; 4a</b>	<b>Lake Road SFAZ</b>  <b>NPWS</b> (– within the NPWS managed reserve)  - an area north of Wheelbarrow Road to Romney Park Road East and east of Lake Road.	<b>18.48 ha.</b>	<p>To assist in the strategic control and containment of bush fires to the west of Burrill Lake and Dolphin Road.</p> <p>To complement the use of Wheelbarrow Road and Princes Hwy as strategic firefighting advantages for fire fighters.</p>	<ul style="list-style-type: none"> <li>• Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches. Care should be taken to avoid introduction of fire into wetlands within the zone.</li> <li>• Consider the safety of travellers along Wheelbarrow Road and the Princes Highway in any initial response to wildfire in the area. (incl. smoke hazard/traffic management)</li> <li>• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>• Restrict unauthorised vehicle access off Wheelbarrow Road in order to help limit arson, rubbish dumping, and to avoid damage to identified tracks that may prevent ready access by emergency vehicles.</li> <li>• Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies.</li> <li>• Seek cooperation of local RFS brigades in the monitoring and reporting of SFAZ fuel and access conditions.</li> <li>• Maintain cooperative management and communication with adjoining land management agencies so that effective bush fire risk management is maintained across the SFAZ and adjoining lands i.e. Dept of Lands &amp; Forests NSW- strips on western side of Princes Hwy.</li> </ul>

**Strategic Fire Advantage Zones - Meroo National Park - continued - Burrill to Wairo area**

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>MER S3</b>	<b>4</b>	<b>Princes Highway North SFAZ</b>  <b>NPWS</b> (i.e. within the reserve)  - an area west of the Princes Hwy. south of Wheelbarrow Road towards Lake Tabourie.	<b>41.2 ha.</b>	To restrict the movement of fires between neighbouring lands and NPWS managed areas  To complement the use of the Princes Hwy. as a strategic fire advantage for firefighters.	<ul style="list-style-type: none"> <li>• Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches within the zone and along the western side of the Princes Highway. Special consideration may need to be given to Pine wildling control and revegetation of former plantation areas.</li> <li>• Consider the safety of travellers along Wheelbarrow Road and the Princes Highway in any initial response to wildfire or during fuel/vegetation management burning in the area. (incl. smoke hazard/traffic management)</li> <li>• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>• Restrict unauthorised vehicle access across the zone in order to help limit arson, rubbish dumping, and to avoid damage to identified tracks that may prevent ready access by emergency vehicles.</li> <li>• Undertake a pre-season review of reserve access tracks and other fire suppression advantages such as water points, refuge areas etc. with advice on conditions to local and regional fire emergency agencies.</li> <li>• Seek cooperation of local RFS brigades in the monitoring and reporting of SFAZ fuel and access conditions.</li> <li>• Consider the use of fire to control wildlings from former pine forest areas within the zone where it can be used to meet strategic fire control objectives.</li> </ul>

**Strategic Fire Advantage Zones - Meroo National Park - continued - Tabourie to Termeil area**

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>MER S4</b>	<b>4 &amp; 4c</b>	<p><b>Tabourie Lake SFAZ</b></p> <p><b>NPWS</b> (– within the NPWS managed reserve)</p> <p>- north of Blackbutt Road to Tabourie Lake Village and east of the Princess Highway to a management trail that leads to Tabourie APZ.</p> <p>N.B. The most practical means of implementing strategies within this SFAZ requires the consideration of SCC land west of Paterson Close and possibly bushland on adjoining private property.</p>	<b>104.68 ha.</b>	<p>To complement Tabourie APZ and measures undertaken on adjoining SCC and Crown Lands</p> <p>To restrict the movement of fires between neighbouring lands and NPWS managed areas.</p>	<ul style="list-style-type: none"> <li>Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches.</li> <li>Maintain identified slashed breaks within the SFAZ and adjoining properties for use under appropriate conditions - see Table 10.</li> <li>Consider the safety of travellers along Princes Highway (visibility) and visitors on walking tracks in any initial response to wildfire or burning operations in the area.</li> <li>Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>Restrict unauthorised vehicle access off tracks in the area in order to help limit arson, rubbish dumping and to avoid damage to identified tracks that may prevent ready access by emergency vehicles.</li> <li>Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies.</li> <li>Seek cooperation of local RFS brigades in the monitoring and reporting of SFAZ fuel and access conditions.</li> <li>Maintain cooperative management and communication with adjoining land management agencies so that effective bush fire risk management is maintained across the SFAZ and adjoining lands i.e. Shoalhaven City, Crown Lands and private Property.</li> </ul>
	<b>4c</b>	<b>Shoalhaven City Council</b> managed areas	<ul style="list-style-type: none"> <li>(- reserve at rear of properties east of Paterson Close) - contact Shoalhaven City Council for details of fire management activities</li> </ul>		

**Strategic Fire Advantage Zones - Meroo National Park - continued - Tabourie to Termeil area**

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>MER S5</b>	<b>4</b>	<p><b>Camp Ridge Road SFAZ</b></p> <p><b>NPWS</b>(– within the NPWS managed reserve)</p> <p>- an area east of the Princes Highway and north of Camp Ridge Track and west of Meroo Point Road.</p>	<b>97.75 ha.</b>	<p>To restrict the movement of fires between neighbouring lands and NPWS managed areas</p> <p>Reduce the risk of fires originating from the Princes Highway or adjoining lands from impacting on Meroo Lake littoral environment or public use areas.</p>	<ul style="list-style-type: none"> <li>• Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches.</li> <li>• Maintain identified fire access routes and slashed breaks within the SFAZ for use under appropriate conditions</li> <li>• Consider the safety of travellers along the Princes Hwy (visibility), Meroo Point Road or campsites in any initial response to wildfire or burning operations in the area.</li> <li>• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>• Restrict unauthorised vehicle access off tracks in order to help limit arson, rubbish dumping, and to avoid damage to identified routes (this damage may prevent ready access by emergency vehicles).</li> <li>• Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies</li> <li>• Seek cooperation of local RFS brigades in the monitoring and reporting of SFAZ fuel and access conditions.</li> <li>• Maintain cooperative management and communication with adjoining land management agencies so that effective bush fire risk management is maintained across the SFAZ and adjoining lands i.e. RTA - Princes Highway corridor.</li> </ul>

### Strategic Fire Advantage Zones - Meroo National Park - continued - Termeil area

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>MER S6</b>	<b>4</b>	<p><b>South-West Boundary SFAZ</b></p> <p><b>NPWS</b>(– within the NPWS managed reserve)</p> <p>- an area along the southwest corner of the reserve near Termeil</p> <p>NB. The most practical implementation of strategies within this SFAZ requires access to the powerline easement and any bushland between the easement and the reserve boundary.</p>	<b>32.92 ha.</b>	<p>To restrict the movement of fires between neighbouring lands and NPWS managed areas</p> <p>Reduce the risk of fires originating from the Princes Highway or adjoining lands from impacting on Meroo Lake littoral environment or public use areas.</p>	<ul style="list-style-type: none"> <li>• Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches along the south-western boundary of the reserve</li> <li>• Maintain identified fire access routes and slashed breaks within the SFAZ and adjoining properties for use under appropriate conditions - see Table 10.</li> <li>• Seek improvement for the protection of essential infrastructure within the SFAZ i.e. slashing along powerline routes and around poles.</li> <li>• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>• Restrict unauthorised vehicle access in order to help limit arson, rubbish dumping, and to avoid damage to identified tracks that may prevent ready access by emergency vehicles.</li> <li>• Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies.</li> <li>• Seek cooperation of local RFS brigades in the monitoring and reporting of SFAZ fuel and access conditions.</li> <li>• Maintain cooperative management and communication with adjoining land management agencies so that effective bush fire risk management is maintained across the SFAZ and adjoining lands</li> <li>• Contact TransGrid / Integral for details of easement maintenance / powerline operation on western side of zone.</li> </ul>

### Strategic Fire Advantage Zones - Meroo National Park - continued - Termeil area

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>MER</b>  <b>S8</b>	<b>4</b>	<b>Termeil SFAZ</b>  <b>NPWS</b> (– within the NPWS managed reserve)  - an area along the southwest corner of the reserve near Termeil  - NB. The most practical implementation of strategies in this SFAZ requires access to the powerline easement and any bushland between the easement and the reserve boundary.	<b>35.8 ha.</b>	To restrict the movement of fires between neighbouring lands and NPWS managed areas  Reduce the risk of fires originating from the Princes Highway or adjoining lands from impacting on Meroo Lake littoral environment and public use areas.	<ul style="list-style-type: none"> <li>• Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches along the south-western boundary of the reserve</li> <li>• Maintain identified fire access routes and slashed breaks within the SFAZ and adjoining properties for use under appropriate conditions - see Tables 10.</li> <li>• Seek improvement for the protection of essential infrastructure within the SFAZ i.e. slashing along powerline routes and around poles.</li> <li>• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>• Restrict unauthorised vehicle access in order to help limit arson, rubbish dumping, and to avoid damage to identified tracks that may prevent ready access by emergency vehicles.</li> <li>• Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies.</li> <li>• Seek cooperation of local RFS brigades in the monitoring and reporting of SFAZ fuel and access conditions.</li> <li>• Maintain cooperative management and communication with adjoining land management agencies so that effective bush fire risk management is maintained across the SFAZ and adjoining lands</li> <li>• Contact TransGrid / Integral for details of easement maintenance / powerline operation.</li> </ul>

### Strategic Fire Advantage Zones – Barnunj State Conservation Area

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>BAR</b>  <b>S1</b>	<b>4</b>  <b>&amp; 4b</b>	<p><b>Cabins SFAZ</b></p> <p>Area north and east of cabins on Lagoon Head,</p> <p>Bound by Point Northeast Road, East Cabin Track, West Cabin Track and private lot boundaries.</p> <p>A dwelling is located on private property (Lot 158) within adjacent Crown Land</p>	<b>2.13 ha.</b>	<p>To complement West Cabins APZ and East Cabins APZ.</p> <p>To assist in the strategic control and containment of bush fires in the vicinity of private property at Dolphin Point and private property lots with cabins on Lagoon Head</p> <p>To restrict the movement of fires between neighbouring lands and NPWS managed areas.</p>	<ul style="list-style-type: none"> <li>Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches. Care should be taken to avoid introduction of fire into wetlands within the zone.</li> <li>Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>Restrict unauthorised vehicle access onto East Cabin and West Cabin track in order to help limit arson, rubbish dumping, and to avoid unnecessary damage to identified tracks that may prevent ready access by emergency vehicles.</li> <li>Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies.</li> <li>Liaise with Department of Lands regarding inclusion of adjacent Crown Land in SFAZ fire management activities.</li> </ul>
	<b>4b</b>	<b>Private Property</b> area to north of zone and inholdings - Lagoon Head		<ul style="list-style-type: none"> <li>Contact owners or managers for details of fire management activities. - see Shoalhaven City Council or Department of Lands for ownership / details</li> </ul>	
	<b>4b</b>	<b>Department of Lands</b> managed areas		<ul style="list-style-type: none"> <li>- Contact Department of Lands or RFS for details of fire management activities N.B. The most practical means of implementing fire management within this SFAZ indicates the cooperative inclusion of Crown Land adjoining the southern and northwest boundary of the reserve in any planned activities.</li> </ul>	

Zone ID	Map/s	SFAZ Name	Zone Area (ha.) in reserve	Specific Objectives	Strategies
<b>BAR S2</b>	<b>4 &amp; 4b</b>	<b>Dolphin Point SFAZ</b>  Area within reserve south of Dolphin Point urban area and north of Pot Holes Road.	<b>24.04 ha.</b>	<p>To complement West Cabins APZ, East Cabins APZ and Dolphin Pt. APZ.</p> <p>To assist in the strategic control and containment of bush fires in the vicinity of private property at Dolphin Point</p> <p>To restrict the movement of fires between neighbouring lands and NPWS managed areas.</p>	<ul style="list-style-type: none"> <li>• Undertake burning under prescribed conditions where required within the reserve - as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to provide a mosaic of more recently burned patches. Care should be taken to avoid introduction of fire into wetlands within the zone.</li> <li>• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as access tracks, slashed areas, gates, information signs, identified water points, etc.</li> <li>• Restrict unauthorised vehicle access onto identified tracks in the area in order to help limit arson, rubbish dumping, and to avoid unnecessary damage that may prevent ready access by emergency vehicles.</li> <li>• Undertake a pre-season review of key fire access tracks and other fire suppression advantages with advice on conditions to local and regional fire emergency agencies.</li> <li>• Liaise with Department of Lands regarding inclusion of adjacent Crown Land in SFAZ fire management activities.</li> </ul>



### **3.2.3 Land Management Zones (Heritage) - (LMZ)**

Seven Land Management Zones – (Heritage) have been defined within and around the reserves. (Map 4) The primary management objectives in Land Management Zones – (Heritage) are to prevent the extinction of all species which are known to occur naturally within the reserves – i.e. conserve biodiversity – and to protect Aboriginal and historic heritage sites.

Except where noted otherwise, these objectives will be achieved by:

- Suppressing bushfires and where necessary, conducting prescribed burns to maintain fire regimes within biodiversity thresholds specified in Table 6.
- Implementing the threatened species and cultural heritage management guidelines specified in Table 7 and 8 in locations where threatened species and cultural heritage sites are known or likely to occur

When manipulating fire regimes (by suppressing fires and conducting prescribed burns) to conserve biodiversity within these Land Management Zones, managers will take account of the status of fire regimes across all fire management zones in the reserves. This should ensure regard for the maintenance of biodiversity within the reserves and particularly applies to Asset Protection and Strategic Fire Advantage Zones where fire is more likely to be deliberately introduced. Due to the emphasis on fire protection aspects in these zones, fire frequency and other strategies prescribed for these areas may see the possibility of an adverse impact on biodiversity within these zones.

As can be seen from Table 6 the vegetation types and communities within these reserves are both diverse and complex. The information on vegetation types comes from a number of sources over a number of surveys as land has been added to the reserves. One of the important objectives for reserve management will be the continued review and reassessment of these vegetation classification systems to provide a uniform appreciation of vegetation complexity across the reserves and their regional context.

Within Bush Fire Risk Management Plans (BFRMP) for Fire Districts, Land Management Zones – (Heritage) fall within the Land Management Zone category. The common title as used in the BFRMPs is appended in this strategy as there is a need to identify the primary fire management purpose of the zone i.e. natural and cultural Heritage management as different from Asset Protection or the provision of Strategic Fire Advantages for fire fighters. This also identifies the purpose of the Land Management Zone as different in both use and fire management from other Land Management Zone purposes such as forestry, recreation, agriculture, mining etc.



**Table 6. Fire regimes to be applied to vegetation in Land Management Zones – (Heritage) in order to sustain biodiversity.**

These regimes are time and frequency thresholds in which fire events may not compromise biodiversity within the listed vegetation types. (Adapted from Bradstock et al, 1995, and Keith, 1996.) Fire regimes outside these thresholds - eg too frequent fire - are predicted to cause significant declines in species populations especially if they prevail over more than 50% of the vegetation type in the area.

Veg'n. Class ID	Vegetation communities	Approx. area in reserves	Biodiversity Thresholds – Fire Frequency		
			Minimum Fire interval	Maximum Fire interval	Notes
A	Coastal complex woodland	3.9	5	30	
E	Coastal headland heathlands	8.5	7	30	
	Coastal lowlands - Cycad dry shrub dry forest - <i>Corymbia maculata</i>	308.3			
	Coastal sands - shrub/fern forest - <i>Eucalyptus botryoides</i> / <i>Banksia serrata</i>	188.8			
	Lowland dry shrub forest - <i>Corymbia gummifera</i> / <i>Syncarpia glomulifera</i>	695.7			
	Southern coastal hind dune / headland scrub & Southern coastal dune scrub	22.3			
	Northern hinterland / dry shrub forest - <i>Syncarpia glomulifera</i> .	4.2			
	Northern coastal hinterland heath / shrub / dry forest - <i>Corymbia gummifera</i>	8.4			
	Northern coastal sands shrub/fern forest - <i>Eucalyptus pilularis</i> / <i>Banksia serrata</i>	252.0			
F	Coastal wet heath / swamp forest - <i>Casuarina glauca</i> / <i>Melaleuca ericifolia</i>	321.0	7	35	Crown fires should be avoided in the lower end of the interval range
	South coast swamp forest complex - <i>Allocasuarina glauca</i>	85.6			
	Dry forest dominant. / some moist forest	92.5			
G	Southern coastal dune scrub complex & coastal dune herb/grassland	7.82	8	30	
H	Northern foothills moist shrub forest - <i>Corymbia. maculata</i> / <i>Eucalyptus pilularis</i>	1142.0	25	60	Crown fires should be avoided in the lower end of the interval range
I	Coastal hinterland - ecotonal gully rainforest	25.4	-	-	Fire should be avoided
	Mangrove / Estuarine low forest	11.4			
	Mudflats/saltmarshes	0.88			

**Table 7. Threatened Species and Endangered Ecological Communities & Fire management strategies to be applied in the reserves.**

These strategies are derived from NPWS (1999), (2000a), 2000b), and Hunter and Alexander (2002). Strategies are also updated on the Endangered Species Hazard Reduction List on the Rural Fire Service website (Codes of Practice)

Not all observation sites may be depicted on maps within this fire management strategy for reasons of species security. Information for managers and firefighters is provided on Operational Maps and Incident Action Plans

	Map ID	Strategies	Species	Species status (1)
<b>Flora</b>				
On Fire Ops. maps for reserves & 4a,b,c.	FL 1	<ul style="list-style-type: none"> <li>Avoid earthmoving disturbance. No slashing in autumn and no more frequently than every ten years</li> <li>No fire more than once every ten years</li> </ul>	<i>Cryptostylis hunteriana</i> (Leafless Tongue Orchid)	Vulnerable 1
	FL 2	<ul style="list-style-type: none"> <li>Avoid earthmoving disturbance</li> </ul>	<i>Galium australe</i> (Tangled Bedstraw)	Endangered1

### Threatened Species - continued

	Map ID	Strategies	Species	Species status (1)
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#### Fauna

Note – not all species observed within the reserve may have specific fire management responses indicated.

On Fire Ops. maps for reserves	FA 1	<ul style="list-style-type: none"> <li>No burning of <i>Allocasuarina</i> thickets.</li> <li>Avoid slashing or disturbance of <i>Allocasuarina</i> thickets</li> </ul>	<i>Calyptrorhynchus lathamii</i> (Glossy Black-Cockatoo)	Vulnerable 1
			<i>Xanthomyza phrygia</i> (Regent Honeyeater)	Endangered1
	FA 2	<ul style="list-style-type: none"> <li>No fire.</li> <li>No slashing, trittering or tree removal.</li> </ul>	<i>Pezoporus wallicus wallicus</i> (Ground Parrot (eastern subsp.))	Vulnerable 1
			<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Vulnerable 1
	FA.3	<ul style="list-style-type: none"> <li>Avoid the use of firefighting foams near watercourses and wetlands.</li> </ul>	<i>Litoria aurea</i> (Green and Golden Bell Frog)	Endangered1
	FA.4	<ul style="list-style-type: none"> <li>No fire around known roost sites.</li> <li>No removal of trees around known roost sites.</li> </ul>	<i>Myotis adversus</i> (Large-footed Myotis)	Vulnerable 1
			<i>Pachycephala olivacea</i> (Olive Whistler)	Vulnerable 1
			<i>Petaurus australis</i> (Yellow-bellied Glider)	Vulnerable 1
	FA 5	<ul style="list-style-type: none"> <li>Avoid introduction of fire or disturbance to roost sites – these may be seasonal in various locations as feeding patterns change. There is a preference to moister sheltered gullies and rainforest sites. Sites evident by noise, smell, and flight patterns at dusk. Report sightings so that operational strategies may limit disturbance.</li> </ul>	<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	Vulnerable 1
			<i>Tyto novaehollandiae</i> (Masked Owl)	Vulnerable 1
	FA 6	<ul style="list-style-type: none"> <li>No burning around known nesting sites at any time.</li> <li>No slashing trittering or tree removal around known nesting sites.</li> </ul>	<i>Tyto tenebricosa</i> (Sooty Owl)	Vulnerable 1
	FA 6	<ul style="list-style-type: none"> <li>No burning around known nesting sites at any time</li> <li>No slashing trittering or tree removal around known nesting sites.</li> </ul>	<i>Ninox strenua</i> (Powerful Owl)	Vulnerable 1
	FA 7	<ul style="list-style-type: none"> <li>No slashing, trittering or tree removal at (or around) known nesting sites</li> </ul>	<i>Pandion haliaetus</i> (Osprey)	Vulnerable 1

**Fauna continued**

On Fire Ops. maps for reserves	FA 8	<ul style="list-style-type: none"> <li>Avoid introduction of fire or to possible roost sites incl. 'habitat' trees – eg by extinguishing, avoid felling, clear around or not backburning older or dead trees with hollowed trunks and openings along the sides of control lines - where possible and practicable. Report sightings.</li> </ul>	<i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat)	Vulnerable 1
		<ul style="list-style-type: none"> <li></li> </ul>		

(1) as per *Threatened Species Conservation Act 1995*

### Threatened Species - continued

### Endangered Ecological Communities (EEC)

At the time of publication, the process of identifying and mapping EEC within the reserve is being undertaken. Generally the principles of biodiversity conservation via management for appropriate fire regimes will be undertaken. (See Table 6). The application of fire and suppression strategies will aim to provide for a range of times-since-fire across these communities within the biodiversity fire regime thresholds. Where EEC's include adjacent lands the NPWS will seek a cooperative approach to fire management / biodiversity conservation including such areas.

Any specific strategies below are identified within guidelines provided by DEC and outlined on the RFS website. As mapping and other EEC community-specific fire management requirements may be developed they will be included in the following table.

Endangered Ecological Community		Strategies
E1	<ul style="list-style-type: none"><li>Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions</li></ul>	<ul style="list-style-type: none"><li>maintain biodiversity as with appropriate fire regimes</li></ul>
E2	<ul style="list-style-type: none"><li>Coastal Saltmarsh in the NSW North Coast, Sydney Basin and SE Corner Bioregions</li></ul>	<ul style="list-style-type: none"><li>Avoid disturbance and introduction of fire.</li></ul>
	<ul style="list-style-type: none"><li></li></ul>	<ul style="list-style-type: none"><li></li></ul>

**Table 8. Cultural Heritage strategies for fire management to be applied in the reserves**

As detailed in section 2.3 there were no cultural sites in the reserves at risk within areas of higher fire potential. Nevertheless most known sites are vulnerable to fire suppression and management operations. Below are the strategies relevant to sites identified within the reserves. In all cases a precautionary approach should be adopted where activities are undertaken away from formed tracks or roads. Skilled assistance should be sought in guiding these operations.

Site ID	Fire Management Strategies	Site Types
<b>Aboriginal Heritage Sites</b>		
AH-A	<ul style="list-style-type: none"> <li>As far as possible – protect site from fire</li> <li>Do not cut down trees</li> <li>Use of foams, wetting agents and retardants is acceptable</li> </ul>	Sites affected by fire itself eg possible artefacts of flammable materials such as scarred or carved trees.
AH-B	<ul style="list-style-type: none"> <li>As far as possible – protect site from fire</li> <li>Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites.</li> <li>Avoid water bombing, which may cause ground disturbance.</li> </ul>	Sites less affected by fire but prone to disturbance by suppression operations eg - stone arrangements, ceremonial rings, rock engravings, rock art, grinding grooves.
AH-C	<ul style="list-style-type: none"> <li>Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites.</li> <li>Avoid water bombing, which may cause ground disturbance.</li> <li>Site may be burned by bushfire, backburn or prescribed burn without damage</li> </ul>	Sites least affected by fire itself but still prone to disturbance by fire suppression operations. eg - burial sites, artefact scatters, middens.

#### Historic Heritage Sites

NB - @ July 2007 there were no sites of listed historic significance within the reserves. The table below table is retained for appropriate use if sites are identified within the life of the strategy.

Site type	<ul style="list-style-type: none"> <li>As far as possible – protect site from fire</li> <li>Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites.</li> <li>Avoid water bombing, which may cause ground disturbance.</li> <li>Use of foams, wetting agents and retardants is acceptable</li> </ul>	Flammable but structurally unsound sites including buildings with low structural integrity
HH-A		
HH-B	<ul style="list-style-type: none"> <li>As far as possible – protect site from fire</li> <li>Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites.</li> <li>Water bombing, use of foams, wetting agents and retardants is acceptable</li> </ul>	Flammable and structurally sound sites including buildings, wooden fences, signs, stock rails, etc
HH-C	<ul style="list-style-type: none"> <li>Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites.</li> <li>Avoid water bombing.</li> </ul>	Sites which are not flammable but are structurally unsound, eg dry stone walls

**Table 9. Land Management Zones – (Heritage) – area, fire regimes and fire management strategies.**

As outlined in section 3.7, survey work to uniformly assess the vegetation classes across these reserves was being undertaken as this strategy was in preparation. Once completed, the fire regimes appropriate to the revised classifications will be reassessed and applied to the zones below. Extensive tables and mapping tools are available to managers indicating the vegetation types to be found in each zone, This includes the status and area of each type with regard to fire history, biodiversity thresholds and current vulnerability. These are used to determine which areas should be protected from wildfire or subject to prescribed fire in order to maintain biodiversity.

Map	Id. No.	Zone Name	Zone Area	Area each Biodiversity Threshold class ( see Table 6)						Threatened Species Guide-lines (Table 7)	Cultural Asset Guide-lines (Table 8)	Overall Strategies
			inside reserve	A	E	F	G	H	I			
4	BAR L1	Lagoon Head LMZ	44.4	0.4	15.3	28.7					AH-C	<ul style="list-style-type: none"> <li>• Suppress bushfires and implement prescribed burning as appropriate to maintain fire regimes within the biodiversity thresholds as specified in Table 6.</li> <li>• Implement threatened species and EEC fire management strategies as specified in Table 7.</li> <li>• Implement cultural asset protection strategies as specified in Table 8</li> </ul>
4	BAR L2	South Barnunj LMZ	92.7	2.2	88.6		0.9		1.0			
4	MER L1	Burrill Lake LMZ	1015.4		505.2	54.5		427.5	28.2	FL 1, FA 2,	AH-B, AH-C	
4	MER L2	Crampton Island LMZ	5.0		4.5				0.5			
4	MER L3	South Meroo LMZ	990.3		468.8	225.6	7.9	288.0		FL 1, FL 2, FA 1, FA 3, FA 4, FA 5, FA 6. FA 2	AH-B, AH-C	
4	MER L4	Tabourie Lake North LMZ	1009.0	2.1	365.5	171.6		360.2	109.6	FA 1, FA 4, FA 5, FA 6, FA 7, FA 8. FA 2	AH-B, AH-C	
4	MER L5	Tabourie Lake South LMZ	204.7		117.5	17.8		68.2	1.2	FL 1, FA 1 FA 4		
		(As mapped)		Endangered Ecological Communities - EEC's						E 1, E2	AH-B	

NB Within some zones, biodiversity thresholds are not assigned eg estuarine or cleared areas within the zone.

### 3.3 Strategic fuel management areas – Slashed Areas (within APZ) and Slashed Breaks

Table 10 lists the specifications for slashed breaks to be maintained during the life of this plan

**Table 10. Strategic fuel management zones –Slashed Areas (SA) & Slashed Breaks (SB)– specifications and objectives**

ID	On Map/s	Slashed Area/Break Name - Location	Specifications	Fire Mgmt Zone	Mgmt responsibility	Fire mgmt objectives
<b>Existing slashed breaks / fuel managed areas to be maintained</b>						
MER SA1	4, 4a	Wyoming Avenue SA	Variable – up to 20m wide – includes road	APZ	NPWS	To enhance bush fire protection of existing adjacent dwellings.  To enable emergency access for fire fighters,  To enable prescribed burning in adjoining bushlands as indicated.
BAR SA1	4, 4b	Dolphin Point SA	Variable – up to 25m wide	APZ	NPWS	
BAR SA2	4, 4b	West Cabins SA	Variable, -up to 15m wide within reserve – includes access road	APZ	NPWS	
BAR SA3	4, 4b	Lot 144 & Lot 159 SA	Variable – allow continuation of existing mowing within reserve I.e. Up to 15m on SE, Up to 10m on N & NE	APZ	NPWS	
BAR SA4	4, 4b	Bush Camp – East SA	Up to 6m selective underscrubbing adjacent to dwellings	APZ	NPWS	
BAR SA5	4, 4b	Bush Camp – West SA	Up to 10m wide according to site conditions	APZ	NPWS	
MER SA2	4, 4c	Tabourie SA	Up to 10 m wide	APZ	NPWS	
MER SA3	4, 4c	Romney Park SA (Jennings)	Up to 5m wide – approx. 75m long	APZ	NPWS	
BAR SA6	4, 4b	Lot 159 SA	Up to 5m. wide	APZ	NPWS	
BAR SB1	4, 4b	Bush Camp Rd. SB	Up to 4m. North side of road.	LMZ	NPWS	

### **3.4 Fire management access – Tracks and Roads**

Within these reserves there are numerous ad hoc tracks and routes developed by four-wheel drive and motorbike use prior to the areas being gazetted as reserves. There is also a network of tracks resulting from former forest management. Tracks and roads provide access for firefighting vehicles and may be used to contain lower intensity fires or enable lower intensity backburning to contain larger wildfires or prescribed burns.

**Not all tracks or roads are maintained as fire trails**, though most vehicle access routes may provide some fire suppression advantage depending on the terrain, track status, crew competency, equipment, fire behaviour, weather conditions, and the task for which the route is to be used. These and other factors need to be considered by fire crews and planning teams prior to the use of a route for fire operations. Following this assessment, some routes will require works to prepare them to a sufficient standard for the proposed operation. The time and resources required to undertake this preparation also need to be considered within operational planning.

Not all routes or tracks can or will be maintained to all weather 2wd standard for fire suppression operations at all times due to the economic, resource, and environmental consequences that are presently unacceptable. As a member of the Shoalhaven Bush Fire Management Committee the NPWS has identified those routes of higher strategic significance for fire operations for which the NPWS is responsible. Along with the maintenance of slashed breaks in asset protection zones, the NPWS will give priority to those tracks and roads of higher strategic significance in the preparation of works programs and commitment of available resources.

**There are no tracks maintained primarily for fire management purposes within Meroo National Park or Barnunj State Conservation Area.**

Public access and management roads / tracks may be classified on operational maps according to possible carrying capacity eg suitable for Category 1 fire tankers (4WD Heavy Tanker up to a 3500 litre capacity).

However, as these tracks are not identified Fire Trails (with the NPWS commitment to maintain operational trafficability or advise on condition to emergency authorities) fire emergency users need at all times to consider a tracks suitability for the intended operation.

Whilst such tracks and roads shown on maps within the reserves are not primarily maintained for fire purposes they may have usefulness in fire management or suppression operations. Access to these tracks however may be limited at times due to seasonal conditions, management operations or safety considerations.

Tracks made or upgraded beyond routine standard as a result of fire suppression operations will be stabilised and rehabilitated as soon as practicable after the fire and may not be listed or marked on future maps. Where strategically useful these routes may be indicated on operational maps or recorded as possible control options for future operations.

Some of the roads and tracks are used for management purposes only and are not open for public use by vehicle. Where gated, The NPWS makes keys for access to such tracks available via the RFS headquarters. These keys are to be kept in Shoalhaven RFS fire tankers and other emergency service vehicles.

Otherwise, routes that may be used for vehicle access by visitors are described in the Plans of Management for the reserves.

**NB. Not all tracks within or around the reserve depicted on published topographic or guide maps may exist, not all are located where marked, or may be accessible in the indicated condition.** The NPWS will seek more accurate depiction of these features in subsequent map editions.

### **3.5 Information, Cooperation, and Enforcement**

The NPWS will undertake the following during the life of this strategy:

- Participate within the Shoalhaven Bush Fire Management Committee (BFMC) and its sub-groups and functions to better provide an integrated and cooperative approach to fire management and suppression in the reserves and surrounding communities.
- Support the Shoalhaven BFMC, the RFS, Shoalhaven City Council and other agencies to increase the awareness of fire, to improve property and personal preparedness in the surrounding communities and encourage residents and visitors to report fire outbreaks or arson.
- Participate and maintain communications with RFS Brigades adjacent to the reserves in order to improve shared operations, training, community liaison and the monitoring and reporting of fire management access, bush fire fuel conditions and other fire management issues of concern to the community.

These RFS brigades and communities include:

Burrill Lake  
Lake Tabourie  
Bawley Point  
Termeil  
Milton  
Kioloa

- Assist landholders /occupiers and other agencies to undertake prescribed burns on private property and public lands adjacent to the reserves where this burning will help protect assets on neighbouring property from bush fires that may exit the reserves or may assist in limiting fires entering the reserves from adjacent lands. These cooperative works should be undertaken where resources allow and do not conflict with essential fire management activities being undertaken at the same time within the reserves
- Develop a cooperative approach to the maintenance and monitoring of slashed breaks and fire management tracks especially where they link with breaks and access managed by other agencies or land managers. Where appropriate, to describe this approach within Memorandums of Understanding (MOU) for all jointly managed and maintained breaks and access routes.
- Investigate all fires within the reserves that appear to have been deliberately lit and actively pursue this investigation and legal action in cooperation with other agencies against those responsible where evidence permits.
- Assess appropriate visitor or access sites to erect signs to advise reserve visitors of fire use conditions or where required, actions that may need to be taken in the event of fire.
- Advise visitor centres and appropriate media outlets of the status of current fires or visitor restrictions within the reserves.

### **3.6 Research and Monitoring**

From time to time, surveys are undertaken supporting reserve management or species conservation requirements.

It is planned to use this revised data to better define the appropriate fire regimes and indicate where fire may need to be applied or where fire should be avoided in order to conserve biodiversity.

These surveys will also define which communities in the reserves may be the site of vegetation monitoring plots that will contribute to the knowledge of vegetation response to fire and the accumulation of bush fire fuels. There are a number of these sites across the South Coast Region.

As Species Recovery Plans are prepared for threatened species identified within the reserve, implications for fire management will be incorporated in site and species management strategies in Table 7.

### **3.7 Fire Management Works Schedule**

From all the above strategies a priority list of fire management works has been assembled and is reviewed annually. These works programs are advised to the Shoalhaven District Bush Fire Management Committee annually as part of the NPWS contribution to cooperative bush fire risk management across the community.

The fire management works schedule for the current financial year may be viewed during business hours at the NPWS Area office at Collier Rd. – Ulladulla. To discuss works proposals for areas of concern it is best to contact this local NPWS Area office that will be managing the programs within these reserves.

The fire management works schedule indicates the works proposed in the present financial year and the indicated tasks over the following four years. The works for the present financial year indicate those activities that the NPWS has budgeted for and committed to its overall works programs along with other management tasks. Each year this program is reviewed with consideration of the following factors:

- seasonal conditions,
- available resources,
- the achievements of the past works year
- fire history of the previous season,
- biodiversity and risk management indications, and
- the indicated program over the next four years

Some of the tasks require appropriate conditions in order to be completed eg prescribed burning. Opportunities for suitable conditions are limited and highly variable according to seasonal weather patterns and drought cycles.

Similarly the limited opportunities for prescribed burning may be used by higher priority works of the same type eg burning in asset protection zones may displace biodiversity burning in remoter areas where timing is less critical. In all cases the NPWS provides explanation to the district Bush Fire Management Committee where works cannot be achieved or where works may need to be deleted, eg where a summer wildfire overtakes a prescribed burning proposal. In most cases, works not completed are automatically carried forward into next year's program.

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## 4. REFERENCES

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