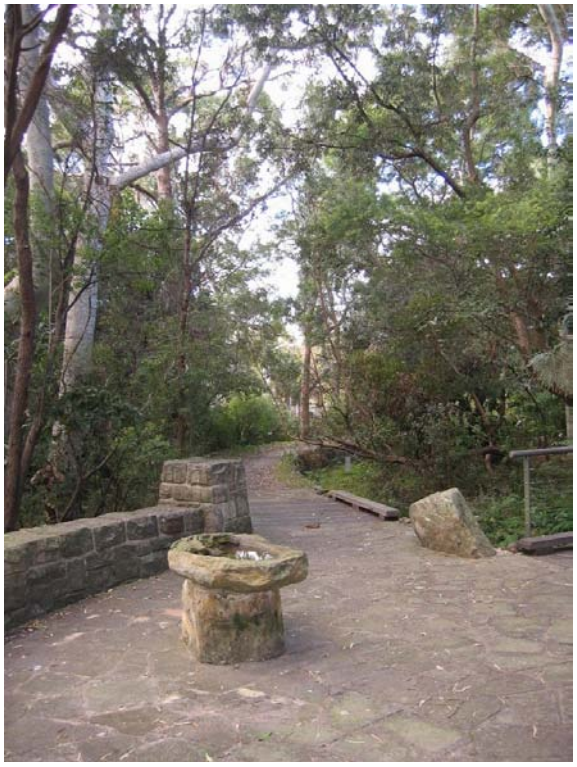
ASSESSMENT | PLANNING | MANAGEMENT

STONY RANGE FLORA RESERVE FIRE REGIME MANAGEMENT PLAN



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This report is based upon best practise management and ecological principles. Concerns have been raised that sufficient resources may not be available to implement this plan in its entirety.

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Glossary of Terms

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

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

Executive Summary

Stony Range Flora Reserve covers 3.16 hectares and is located in Sydney's Northern Beaches district, within the suburb of Dee Why. The reserve consists of typical Hawkesbury Sandstone formation vegetation and includes a wide variety of native plants from different areas of Australia.

No Endangered Ecological Communities (EECs) or threatened species were identified within the reserve.

The reserve has high educational value and supports recreational activities including bushwalking, picnicking and horticultural / regeneration activities. A residential dwelling occupied by the caretaker, the Corkery Building and propagation facilities also exist within the reserve.

Surrounding land uses include residential dwellings, light commercial development and a school (Saint Lukes Grammar).

A number of recommendations have been made in order to increase access and egress to the reserve and the assets it contains. These include (but are not limited to); creation of an access/egress point behind the residential house allowing access into the car park of the adjacent commercial complex and consideration given to the installation of an additional gate to the north eastern section of this reserve.

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

The Plan contains a Prescribed Operations Schedule that specifies treatments, timing and other characteristics. It prescribes burning between 2007 and 2016. Additional management actions include weed control and hand removal of fuels within areas of build up.

1 Introduction

Eco Logical Australia was contracted by Warringah Council in March 2005 to prepare a 10 year Fire Management Plan from 2006 to 2016 for Stony Range Flora Reserve.

1.1 Reserve Outline

Stony Range Flora Reserve is located in Sydney's Northern Beaches district, within the suburb of Dee Why. The reserve covers 3.16 hectares of typical Hawkesbury sandstone formation vegetation and includes a wide variety of native plants from different areas of Australia. See Figure 1 for site location.

The reserve has high educational value providing an information centre, brochures and plant identification plaques. Additional activities within the reserve include bushwalking, picnicking and horticultural / regeneration activities undertaken within the on site nursery and within the site as a whole. A residential dwelling occupied by the caretaker also exists within the reserve.

Ecologically the reserve provides habitat for a range of native flora and fauna species, particularly bird species.

Adjacent to Pittwater Road the reserve is surrounded by a number of land uses including residential dwellings and light commercial development.

Saint Lukes Grammar School is located at the south eastern edge of the reserve.

The public reserve is owned by the Department of Lands; Council has care control and management of the reserve and is assisted by a voluntary committee.

1.2 Management Plan Objectives

- To provide recommendations for:
  - New fire management zones
  - Suitable alternatives for fuel management
  - Strategies to protect the existing infrastructure located within the reserve
  - Strategies to protect persons and property within, or immediately adjacent to the escarpment
- Creation of:
  - Comprehensive fire history for the reserve
  - A plan that is acceptable to and can be implemented by Council and the NSW Rural Fire Service (RFS)
  - An ecologically based strategy for fuel management, incorporating the requirements for:
    - Mosaic burn patterns

        - Fire regimes inline with vegetation community thresholds, endangered ecological communities and identified threatened species, as well as locally or regionally significant species
    - A strategy to enable the effective planning of Hazard Reduction (HR) burns with regard to:
        - Endangered ecological communities
        - Endangered populations
        - Threatened, locally or regionally significant species
        - Aboriginal sites and culturally significant features known to exist within the reserve
        - Assets and infrastructure

1.3 Report Structure

The Fire Management Plan for Stony Range Flora Reserve comprises two separate documents:

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

This report identifies the fire management framework, fire related issues and risks within the reserve, and provides an operational schedule and performance measures. It is intended that this written report be used in conjunction with the "Stony Range Flora Reserve Fire Regime Management Poster" (Appendix 6, ELA 2006).

Figure 1 Site Location

2 Legislative and Planning Instruments

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

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

2.1 Local Government Act 1993 & Crown Lands Act 1989

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

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

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

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

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

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

Fire management objectives include:

- Ensuring that fire management access zones are of dimensions that can be maintained in the long term
- Ensuring that methods of construction and maintenance of fire management access zones are environmentally sensitive

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

- Carrying out of community education in conjunction with Fire Control, and of fire hazard reduction techniques
- Co-ordinating with Fire Control on the fire hazard reduction issues

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

2.3 Rural Fires Act 1997

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

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

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

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

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

2.4 Warringah Pittwater Bush Fire Risk Management Plan

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

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

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

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

2.5 Bush Fire Environment Assessment Code

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

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

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

The land covered by Stony Range Reserve is a Land Management Zone (LMZ) under the Bush Fire Risk Management Plan (WPBFMC 2000) and is not considered to be restricted or excluded land; as such the existing Bush Fire Environment Assessment Code (RFS 2006) does apply to this reserve.

2.6 Planning for Bush Fire Protection 2001

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

2.7 National Parks and Wildlife Act 1974

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

2.8 Environment Protection & Biodiversity Conservation Act 1999

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

The Atlas of NSW Wildlife (DEC 2004) was utilised to identify known threatened flora within 5km and threatened fauna within 10km of the reserve.

2.9 Environmental Planning and Assessment Act 1979

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

2.10 Threatened Species Conservation Act 1995

The NSW *Threatened Species Conservation Act 1995* (TSC Act) aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. The TSC Act is integrated with the EP&A Act and requires consideration of whether a development or an activity (such as mechanical hazard reduction) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

Threatened flora within 5km and threatened fauna within 10km of the reserve have been identified (see Appendix 2) and the fire ecology requirements of those species considered.

2.11 Noxious Weed Act 1993

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

Weeds identified within this plan are considered noxious and accordingly require removal under this Act.

2.12 Rivers and Foreshores Improvement Act 1948

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

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

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

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

This reserve is zoned as public open space. Future Hazard Reduction work must address this legislation.

3 Bush Fire Risk

3.1 Bush Fire History

Fire history mapping including both Wildfire and Hazard Reduction burning was supplied by Warringah Council, the Department of Environment and Conservation and the NSW Rural Fire Service. Fire history data for these agencies ranged in date from 1952 to 2005.

Additional written fire history data was obtained from the NSW Fire Brigade consisting of records for Hazard Reduction burning over the last 5 years and unplanned vegetation fires for the past 10 years.

Fire history mapping prior to 2000 was often not undertaken or consisted of approximate desktop estimates. Past fire history data may therefore be incomplete.

Field validation of fire history data has been carried out in order to increase the reliability of data. Spatial accuracy of data was found to be low, particularly for older fires.

Fires recorded within Stony Range Flora Reserve boundaries occurred between 1999 and 2003. This is thought to include a number of pile burns which may have been joined together and mapped as one fire, the likely scenario for the two smaller burns within the north east of the reserve.

An analysis of available mapped fire history data showed 37% of Stony Range Flora Reserve has been burnt since 1952, with fire predominantly occurring at the eastern and southern edges of the reserve. Small spot fires mapped outside the reserve were not included in the analysis.

See "Stony Range Flora Reserve Fire Regime Management Poster" (Appendix 6, ELA 2006) for a map of recorded fire history.

3.2 Fuel Load Assessment

An assessment of fuel loads was not undertaken due to vegetation within the reserve being mapped as highly disturbed vegetation (P & J Smith 2003).

3.3 Assets at Risk from Fire

3.3.1 Built and Cultural Assets

Built assets within the reserve include one residential dwelling (accessed from within the reserve), as well as an information centre, nursery, green house, garage, pergola, BBQ facilities, wooden seats, a bridge, signs, plant identification plaques, a water tank, irrigation systems and fences.

St Lukes Grammar School is located adjacent to the reserve and is considered a special protection development.

The existing irrigation system within the reserve includes regular hose outlets as well as a limited number of sprinklers (within the rainforest area). A fire hydrant is also located directly adjacent to the reserve on the playing fields within St Lukes Grammar School, and within the commercial property adjacent to the residential dwelling. The existence of these assets should aid in the control of fire within the reserve.

Identification of cultural assets including known European and Aboriginal heritage sites have been undertaken using information from the Aboriginal Heritage Information Management System (AHIMS – May 2005) and the Bush Fire Risk Management Plan (WPBFMC 2000).

AHIMS data has been provided in digital GIS format and is intended to flag known cultural heritage issues for consideration during HR planning.

Stony Range Flora Reserve is listed as being a heritage item within the Warringah LGA.

No known items of Aboriginal heritage were identified.

3.3.2 Natural Heritage Assets

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

- Atlas of NSW Wildlife (DEC 2004)
- Warringah Vegetation Mapping (P & J Smith 2003, supplied in digital format by Council)
- Warringah Natural Area Survey, Vegetation communities and Plant Species (P & J Smith 2003)

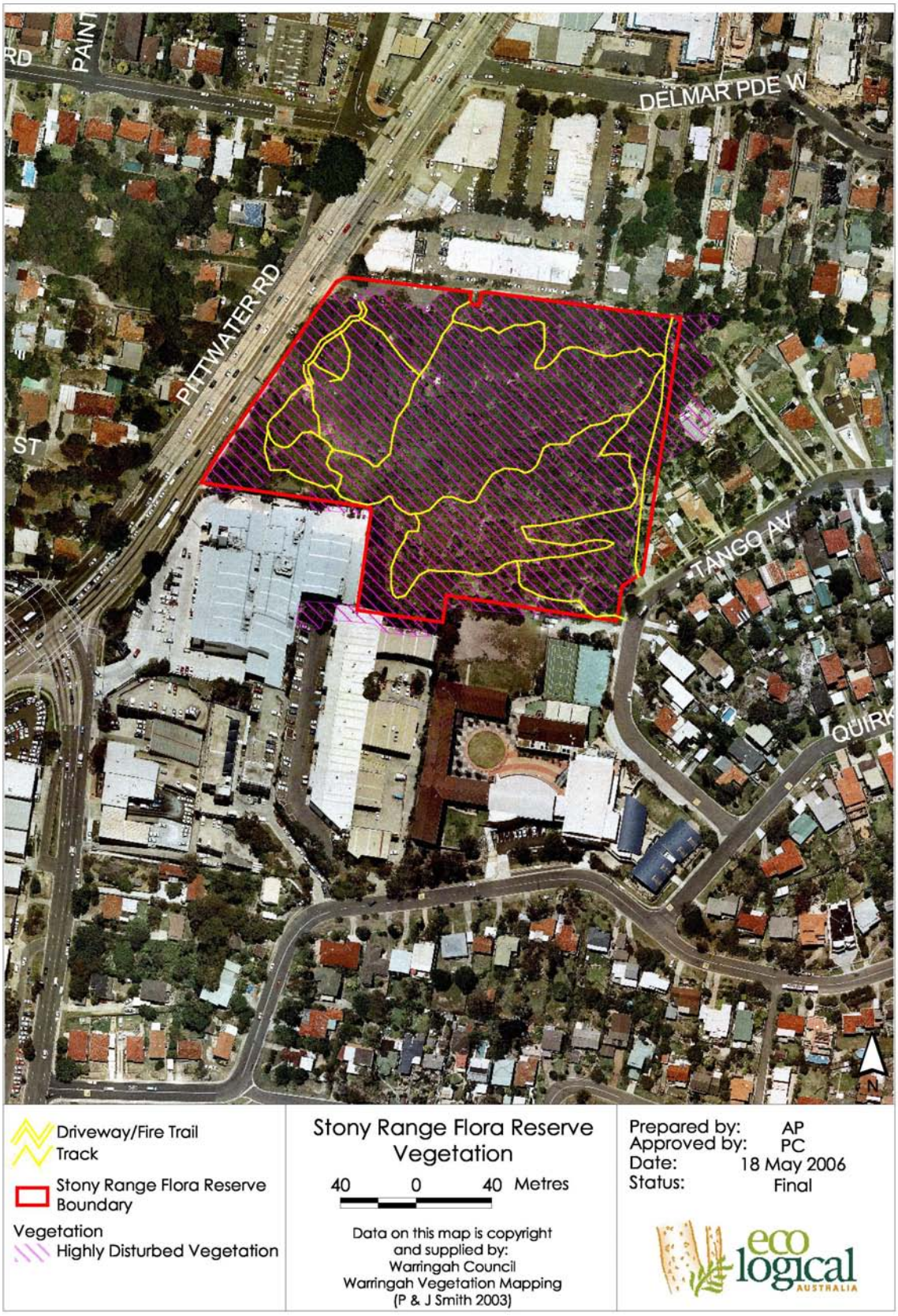
3.3.2.1 Vegetation Communities

No EPBC Act listed communities or any considered as Endangered Ecological Communities (EECs) under the TSC Act occur within the reserve. In fact, due to the reserves role as a flora reserve the area has been mapped, in the councils vegetation mapping, as highly disturbed (see figure 2).

The reserve brochure describes a number of vegetation assemblages including Wattles, Spider Flowers, Orchids, Flannel Flowers, Tea Trees, Bottle Brushes, Kangaroo Paws, Coachwood, Flame Tree, Hoop Pine, Lilly Pillys, and Ferns.

During field assessment, vegetation in the small gully within the reserve was identified as rainforest, created through plantings. This area was mapped and zoned a FEZ in order to protect this community.

Figure 2 Vegetation Communities



3.3.2.2 Managed Regeneration Areas

In light of past and future regeneration and planting works within the reserve it is recommended that:

- The proposed burning schedule be considered when planning future works
- Past planting and regeneration activities be considered during HR planning

3.3.2.3 Threatened Flora and Fauna

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

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

Species identified within the radius' above may be seen in Appendix 2 and include:

- 39 threatened fauna species
- 43 national, regional or locally significant fauna species
- 5 threatened flora species
- 11 national, regional or locally significant flora species

No threatened species were identified within the reserve.

Fire requirements for threatened fauna identified within 10km of the reserve were considered during creation of the operational schedule. These included requirements identified within relevant recovery plans for each species.

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

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

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

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

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

- Potential refuge areas for amphibians, reptiles and mammals (considering the existence of barriers such as fences)

- Distribution and abundance of habitat features for which protective measures can be implemented, including:
    - Ephemeral areas
    - Hollow bearing trees/ significant stands

4 Fire Management Issues

4.1 Fire Management Boundaries

The reserve boundary used within this plan has been compiled from cadastral data.

In order to provide logical management and increased protection to assets, an area outside of the reserve boundary within the eastern edge of the reserve has been included within prescribed fire management zones.

4.2 Management Responsibilities

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

Overall management of the reserve is the sole responsibility of Warringah Council with the assistance of the voluntary management committee. The NSW Fire Brigade is responsible for fire suppression efforts in the reserve and for mapping any fires that occur.

This plan has divided the reserve into a number of different management zones. Those adjoining or including private/commercial properties may require landowner's cooperation. Council have no responsibility for land not under their management.

In additiaon to this plan, it is recommended that an evacuation plan be created for the reserve.

4.3 Fire Trails and Tracks

Concern exists regarding access and egress to built assets within the west of the reserve. Whilst the current driveway/fire trail allows access to the information centre and the nursery, it does not extend all the way to the house.

In order to address these concerns, the following actions are recommended:

- Maintenance of a minimum vertical clearance of 6m for the current driveway/fire trail
- An access/egress point behind the residential house allowing access into the car park of the adjacent commercial complex. Due to a difference in elevation between the rear of the house and the car park, it is recommended that an access trail and gate be created approximately 5m to the west of the house, between the existing fire hydrant and light pole. This would result in a drop of about half a metre. The gate should be lockable with the resident, Council and emergency services having access

- An existing access/egress point, consisting of a locked gate, is located adjacent to St Lukes Grammar School at Tango Avenue. Appropriate locks should be used, allowing Emergency access and egress through this point
- Installation of an additional gate to the north eastern section of this reserve should also be considered

In conjunction with the existing irrigation system, tracks within the reserve are considered sufficient to provide for adequate response to fire events.

It should be noted that the trail along the eastern edge of the reserve is a public access track located outside the reserve (separated by a boundary fence).

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

4.4 Introduced Species Management

Weed management

Weed management has been considered as a component of proposed fire management within Stony Range Flora Reserve.

Interactions between fire and weed species include:

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

Weed information was collected opportunistically as a component of field surveys (see Figure 3). Species lists are not considered comprehensive; weed recording focused on species which have potentially high impacts upon either ecological diversity, human health or fire impacts.

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

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

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

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

Feral fauna management

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

No evidence of feral species was observed during field surveys.

Figure 3 Recorded Weed Presence Within Stony Range Flora Reserve

Weed Management Explanation

- Weed mapping consisted of point and area records.
- Where area records align with APZ areas, weeds within APZ and within directly adjacent bushland have been recorded.
- Approximately 10m mapping accuracy.
- Comments on litter build up and site safety have been provided within some locations.
- *Melaleuca nodosa* is threatened in Warringah.
- Targeted weeds should include:
  - Pampas grass - due to its high flammability,
  - *Lantana* - creates high fuel loads (contributing to hotter bushfires); and
  - *Pittosporum undulatum* - an opportunistic species; high densities increase canopy density, contributing to crown fires.
  - Noxious species

Weed Point Reference	Weed Species	Comments
1	Asparagus fern	
2	Brazilian fire weed, Cobblers pegs	
3	*Ehrharta erecta*, *Sporobolus sp*, Mother of millions	
4	Small leaved privet	
5	Asparagus fern, Lantana	Lantana looks like it is being attacked by rust/ mite
6	Asparagus fern, Cotoneaster	
7	*Ehrharta erecta*	
8	Cobblers pegs, *Ehrharta erecta*, Coastal morning glory	
9	Large leaf privet, Small leaved privet, *Monstera deliciosa*	
10	Madera vine, Large leaf privet	
11	*Pittosporum undulatum*, Asparagus fern, *Passiflora sp*	Remove *Pittosporum undulatum*
12	Small leaved privet	
13	Wandering Jew, Impatiens, Small leafed privet, Morning glory (*Ipomoea sp*), *Pittosporum undulatum*	Remove *Pittosporum undulatum*
14	Pennywort, Lantana, *Pittosporum undulatum*, *Ehrharta erecta*	

4.5 Fire Management Zones

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

4.5.1 Asset Protection Zones (APZ)

Description

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

Aims

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

Prescriptions

- To maintain reduced ground fuel loads and maintain understorey to less than 50cm in height, with discontinuous shrub and canopy layers, by:
  - removal/ suppression of weeds
  - thinning of regrowth
  - hand removal
  - raking and slashing A combination of prescriptions may be appropriate depending upon the slope and naturalness of the vegetation
- APZ areas may be burnt as appropriate dependant on management issues

NOTE: No restriction has been placed on the management of the canopy within APZ areas for this reserve due to the low level of threat posed by the site.

4.5.2 Land Management Zone (LMZ)

Description

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

- burning
- weed control

Aims

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

Prescription

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

4.5.3 Strategic Fire Advantage Zones (SFAZ)

Note: No SFAZ have been proposed within Stony Range Flora Reserve

Description

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

Aims

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

Prescription

- A general prescription for maximum fine fuel loading within a range of 8 – 18 tonnes per hectare
- To be managed consistently with the following applications:

- to provide fuel reduced areas which enable the protection of assets by fire fighters when Asset Protection Zones are not in place
- to complement Asset Protection Zones where insufficient protection is provided
- to provide fuel reduced zones in areas of high ignition potential (eg along roads, rail lines, power lines etc) to slow the development of fires, reduce their spread, and provide for safe suppression
- to provide strategically located fuel reduced areas to reduce the vulnerability of assets susceptible to fire
- to attain a fire regime consistent with the requirements for the preservation of biodiversity within vegetation communities

4.5.4 Fire Exclusion Zones (FEZ)

Description

- Areas containing fire intolerant species and assets

Aims

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

Prescription

- Exclude fire and undertake rapid suppression of unplanned fires to maintain fire intolerant species and assets

4.6 Biodiversity Fire Regime Thresholds

Due to the mapping of the reserve as highly disturbed vegetation, biodiversity fire regime thresholds were unable to be assessed.

5 Operational schedule

The operational schedule is explained below and is made up of the:

- Prescribed Fire Management Zones
- Prescribed Works Schedule

5.1 Prescribed Fire Management Zones

The following fire management zones have been applied to areas within identified fire management boundaries (see Figure 4, Section 4.5):

- Asset Protection Zones (APZ)
- Fire Exclusion Zones (FEZ)
- Land Management Zones (LMZ)

Prescribed APZ widths may be seen in Table 1.

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

Cooperation between Council and the occupant of the residential dwelling within the reserve is required for the successful implementation of this plan.

5.2 Prescribed Works Schedule

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

Following consultation with Council, RFS and DEC and an evaluation of past fire history and fire risk:

- **APZ** have been proposed to protect known assets
- **LMZ** have been proposed, including prescribed burning for selected areas

Consideration to the protection of assets and potentially fire intolerant species should be given.

Further research into the potential use of fire for ecological and aesthetic management is recommended. This may include burning for wildflower displays.

Essential components of this reseach include an assessment of the vegetation composition within the whole reserve and fire requirments.

Water quality within the reserve should be protected by the restriction of fire or through limiting fire intensity from within 20 metre of watercourses where possible.

Figure 4 Prescribed Fire Management Zones

Figure 5 Prescribed Works Schedule

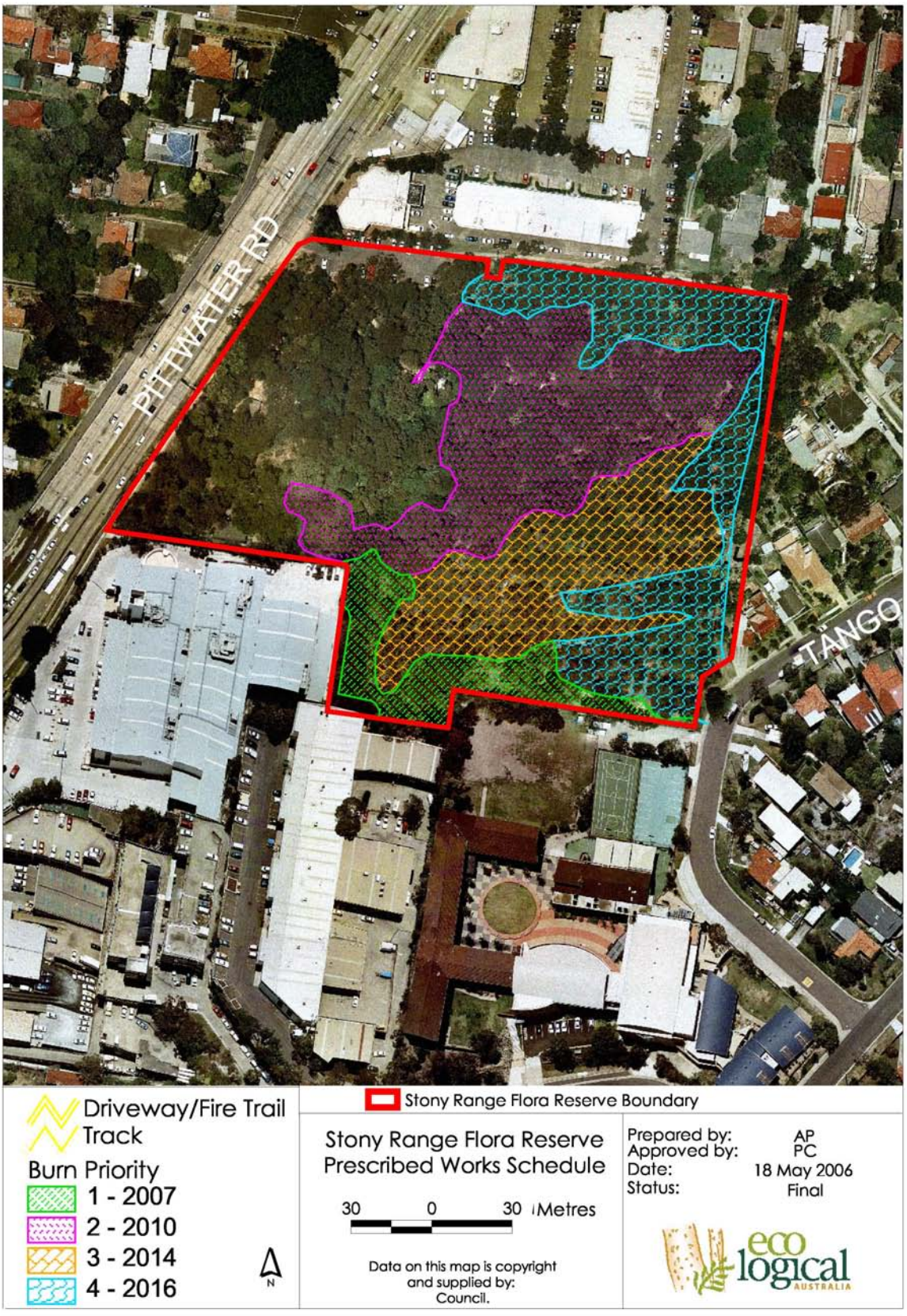


Table 1 Prescribed Operation Schedule for Stony Range Flora Reserve

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Aboriginal or Cultural Sites	Land Tenure	APZ Widths
APZ 1	APZ	Initial weed removal and long term weed suppression, slashing/hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Information centre, nursery, green house, garage, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	10m for house and 5m for garage and nursery
APZ 2	APZ	Slashing/hand removal of fuels within areas of build up, long term weed suppression	-	-	Subject to Council's FMAZ program priorities♦	BBQ facilities, wooden tables and chairs, electricity infrastructure, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Tenure is currently being resolved	Logical boundary applied
APZ 3	APZ	Slashing/hand removal of fuels within areas of build up, long term weed suppression	-	-	Subject to Council's FMAZ program priorities♦	Pergola, paving, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	5m
APZ 4	APZ	Slashing/hand removal of fuels within areas of build up, long term weed suppression	-	-	Subject to Council's FMAZ program priorities♦	Residential house, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	10m
APZ 5	APZ	Initial weed removal and long term weed suppression, slashing/hand removal of fuels within areas of build up	-	-	Subject to Council's FMAZ program priorities♦	Fence	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	Logical boundary applied to a minimum of 5m

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Aboriginal or Cultural Sites	Land Tenure	APZ Widths
APZ 6	APZ	Hand removal of fuels within areas of build up, long term weed suppression	-	-	Subject to Council's FMAZ program priorities♦	Fence	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	5m
FEZ 1	FEZ	Exclude fire/quick suppression	-	-	-	Plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 1	LMZ	-	-	-	-	Fence, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 2	LMZ	Burning	Control weeds	2	2010	Water tank, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 3	LMZ	-	-	-	-	Fence, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 4	LMZ	Burning	Control weeds	3	2014	Fence, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 5	LMZ	-	Control weeds	-	-	Plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-

Name	Zone Type	Treatment	Management	HR Treatment Priority*	HR Treatment Year	Assets	Aboriginal or Cultural Sites	Land Tenure	APZ Widths
LMZ 6	LMZ	-	-	-	-	Plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 7	LMZ	Burning	Control weeds	4	2016	Fence, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 8	LMZ	Burning	-	1	2007	Fence, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-
LMZ 9	LMZ	-	-	-	-	Fence, plaques	Stony Range Flora Reserve ,listed as a Heritage item within the Warringah LGA	Crown land, CCM Warringah Council	-

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

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

Note:

- No Threatened Species, Endangered Ecological Communities or Significant Species recorded in this reserve

6 Performance measures

6.1 Environmental Assessment of Scheduled Works

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

6.2 Monitoring Fire Regimes

Fire records should be updated as fire incidents occur.

Additional vegetation mapping is required to determine the fire requirements of vegetation assemblages within the reserve.

6.3 Fire Management Plan Review

The goal of this plan is to guide the management of fire in Stony Range Flora Reserve for the next 10 years and to provide a sustainable balance between asset protection and ecosystem management.

Fire management plan evaluation

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

Quantitative assessment:

- Maintenance of a mosaic of fire age (vegetation age)
- Maintenance of fuel free and fuel reduced APZ's
    - All activities proposed within the Prescribed Work Schedule accepted by the NSW Rural Fire Service (RFS)

Qualitative assessment:

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

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Appendix 1 – Vegetation Priority Explanation

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

Source: P & J Smith 2003

Appendix 2 – Known Threatened Flora Within 5km and Threatened Fauna Within 10km of Stony Range Flora Reserve

Table 1 Known threatened flora within 5km of Stony Range Flora Reserve*

Scientific Name	Common Name
Chamaesyce psammogeton	
Genoplesium baueri	
Pimelea curviflora var. curviflora	
Syzygium paniculatum	
Tetratheca glandulosa	

*** Source:** DEC 2004
***** No species identified within the reserve

Table 2 Known threatened fauna within 10km of Stony Range Flora Reserve*

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

*** Source:** DEC 2004

***** No species identified within the reserve

Appendix 3 – Known Significant Flora Within 5km and Significant Fauna Within 10km of Stony Range Flora Reserve

Table 1 Known significant flora within 5km of Stony Range Flora Reserve*

Scientific Name	Common Name	Significance
Angophora crassifolia		Nationally significant species
Angophora hispida	Dwarf Apple	Biogeographically significant
Boronia fraseri		Nationally significant species
Eucalyptus luehmanniana	Yellow-top Ash	Nationally significant species
Eucalyptus stricta	Mallee Ash	Threatened in northern Sydney
Gonocarpus salsoloides		Nationally significant species
Hibbertia nitida		Nationally significant species
Lomandra brevis		Nationally significant species
Plantago hispida		Threatened in northern Sydney
Rulingia hermanniifolia		Nationally significant species
Scaevola calendulacea		Threatened in northern Sydney

*** Source:** DEC 2004
***** No species identified within the reserve

Table 2 Known significant fauna within 10km of Stony Range Flora Reserve*

Scientific Name	Common Name	Significance
Anous stolidus	Common Noddy	Migratory
Antechinus swainsonii	Dusky Antechinus	Threatened in northern Sydney
Apus pacificus	Fork-tailed Swift	Migratory
Arenaria interpres	Ruddy Turnstone	Migratory
Calidris ruficollis	Red-necked Stint	Migratory
Charadrius bicinctus	Double-banded Plover	Migratory
Chlidonias leucopterus	White-winged Black Tern	Migratory
Diplodactylus vittatus	Eastern Stone Gecko	Threatened in northern Sydney
Egretta sacra	Eastern Reef Egret	Migratory
Furina diadema	Red-naped Snake	Threatened in northern Sydney
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory
Heteroscelus brevipes	Grey-tailed Tattler	Migratory
Heteroscelus incanus	Wandering Tattler	Migratory
Hirundapus caudacutus	White-throated Needletail	Migratory
Lialis burtonis	Burton's Snake-lizard	Threatened in Warringah
Limnodynastes dumerilii	Bullfrog	Threatened in northern Sydney
Limnodynastes tasmaniensis	Spotted Marsh Frog	Threatened in northern Sydney
Limosa lapponica	Bar-tailed Godwit	Migratory
Monarcha melanopsis	Black-faced Monarch	Migratory
Myiagra cyanoleuca	Satin Flycatcher	Migratory
Notechis scutatus	Mainland Tiger Snake	Threatened in northern Sydney
Numenius madagascariensis	Eastern Curlew	Migratory
Origma solitaria	Rockwarbler	Biogeographically Significant
Philomachus pugnax	Ruff	Migratory
Phyllurus platurus	Broad-tailed Gecko	Biogeographically Significant
Plegadis falcinellus	Glossy Ibis	Migratory
Pluvialis squatarola	Grey Plover	Migratory
Pogona barbata	Eastern Bearded Dragon	Threatened in Warringah
Pseudophryne bibronii	Bibron's Toadlet	Threatened in northern Sydney
Puffinus griseus	Sooty Shearwater	Migratory
Puffinus pacificus	Wedge-tailed Shearwater	Migratory
Puffinus tenuirostris	Short-tailed Shearwater	Migratory
Rattus lutreolus	Swamp Rat	Threatened in northern Sydney
Rhipidura rufifrons	Rufous Fantail	Migratory
Sericornis magnirostris	Large-billed Scrubwren	Threatened in northern Sydney
Stercorarius longicaudus	Long-tailed Jaeger	Migratory
Stercorarius parasiticus	Arctic Jaeger	Migratory
Stercorarius pomarinus	Pomarine Jaeger	Migratory
Sterna caspia	Caspian Tern	Migratory
Sterna hirundo	Common Tern	Migratory
Sterna paradisaea	Arctic Tern	Migratory
Tringa nebularia	Common Greenshank	Migratory
Tringa stagnatilis	Marsh Sandpiper	Migratory

*** Source:** DEC 2004

***** No species identified within the reserve

Appendix 4 – Warringah Local Government Area Hazard Reduction Guidelines

Appendix 5 – Fire Management Plan Methodology

Appendix 6 – Stony Range Flora Reserve Fire Regime Management Poster