

Fire Management Plan

Reserves of the Hills Face Zone, Mount Lofty Ranges

2009-2019



Incorporating Angove, Black Hill, Cleland, Eurilla, Ferguson, Giles, Horsnell Gully, Morialta and The Knoll Conservation Parks; Anstey Hill, Blackwood Forest, Brownhill Creek, Cobbler Creek and Greenhill Recreation Parks; Belair National Park; Mount Osmond Reserve and Mount Lofty Botanic Gardens

Department
for Environment
and Heritage



Government
of South Australia

PREPARE. ACT. SURVIVE.



For further information please contact:

Department for Environment and Heritage
Phone Information Line (08) 8204 1910, or
see SA White Pages for your local
Department for Environment and Heritage office.

This Fire Management Plan is also available from: www.dehfire.sa.gov.au

Front Cover: Morialta Conservation Park by Henry Rutherford

Permissive Licence

© State of South Australia through the Department for Environment and Heritage. Apart from fair dealings and other uses permitted by the *Copyright Act 1968* (Cth), no part of this publication may be reproduced, published, communicated, transmitted, modified or commercialised without the prior written approval of the Department for Environment and Heritage.

Written requests for permission should be addressed to:
Design and Production Manager
Department for Environment and Heritage
GPO Box 1047
Adelaide SA 5001

Disclaimer

While reasonable efforts have been made to ensure the contents of this publication are factually correct, the Department of Environment and Heritage makes no representations and accepts no responsibility for the accuracy, completeness or fitness for any particular purpose of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of or reliance on the contents of this publication.

Reference to any company, product or service in this publication should not be taken as a Departmental endorsement of the company, product or service.



EXECUTIVE SUMMARY

This Fire Management Plan for the Reserves of the Hills Face Zone, Mount Lofty Ranges includes 15 Department for Environment and Heritage (DEH) reserves: Angove, Black Hill, Cleland, Eurilla, Ferguson, Giles, Horsnell Gully, Morialta and The Knoll Conservation Parks, Anstey Hill, Blackwood Forest, Brownhill Creek, Cobbler Creek and Greenhill Recreation Parks, and Belair National Park. The Mount Lofty Botanic Gardens and the DEH managed Mount Osmond Reserve have also been included in the plan. The plan has been developed to guide fire management activities, including bushfire suppression considerations in these on all land managed by DEH in the Hills Face Zone. The plan emphasises the protection of life and property and provides direction for land managers on the protection and enhancement of the natural and cultural heritage of the planning area. It is important to note there will be a transitional phase where the management strategies and works proposed in the plan are undertaken and implementation will be dependant upon fire management priorities and the allocation of regional resources.

The Reserves of the Hills Face Zone, Mount Lofty Ranges were identified as a priority for fire management planning within the DEH Adelaide Region to address the following issues:

- The positioning of the reserves within the urban interface and the protection of significant built and natural assets adjacent to the reserves.
- The general protection of life, property and environmental values.
- *Extreme* overall fuel hazard levels in some areas of the reserves due to the long-term absence of fire and modification of the natural vegetation.
- Protection of fauna and flora species of conservation significance, some of which are unique to the Hills Face Zone.
- High visitor numbers.
- Regeneration and revegetation processes changing fuel hazards.
- The likelihood of arson and accidental fire ignitions.

The issues identified above were addressed during the planning process by:

- applying a risk assessment process to identify life, property and environmental values that may be threatened by bushfires
- applying DEH Fire Management zoning principles to guide the management of fuel in Asset and Buffer zones and designating Conservation zones
- applying DEH Ecological Fire Management Guidelines to determine appropriate fire regimes in Conservation zones
- auditing tracks within the reserves of this plan using the Government Agencies Fire Liaison Committee's (GAFLC) guidelines for firebreaks and fire access tracks in South Australia.

The following recommendations as a result of applying the above processes have been identified.

- Fuel reduction:

- in Asset and Buffer zones using a variety of methods including prescribed burning and mechanical removal
 - in strategic areas within the Conservation zone to provide some landscape protection within the reserves and increase patchiness within the vegetation (to reduce the possibility of a block or reserve burning in a single fire event)
 - to complement strategies to manage species' habitats.
- Alteration and/or upgrade of fire access points and track classifications to increase the:
 - safety of firefighting personnel involved in fire suppression activities
 - response time of fire suppression agencies
 - type of resources that can safely be deployed to assist in a fire suppression effort.
 - Identification of suppression considerations that may assist bushfire suppression operations and to contribute to improved fire management.

This draft plan was released for public comment for a period of four weeks over November and December 2007. Comments were then evaluated and incorporated where considered appropriate. A major review of this plan will occur after ten years of implementation, or earlier if required.

CONTENTS

EXECUTIVE SUMMARY	I
CONTENTS.....	III
List of Tables	iv
List of Figures	iv
List of Attached Maps	iv
1 SCOPE AND PURPOSE	1
1.1 Objectives.....	2
2 THE PLANNING FRAMEWORK.....	4
2.1 Legislation	4
2.2 Policies and Procedures	5
2.3 State Planning	6
2.4 Local and Regional Environmental Planning.....	6
2.5 Reserve Management Planning	8
2.6 Vegetation Management Planning.....	8
2.7 Partnership Agencies	9
2.8 Consultation	9
2.9 Plan Review and Currency	10
3 BUSHFIRE ENVIRONMENT	11
3.1 Description of the Planning Area	11
3.2 Values and Assets.....	15
3.3 Pest Species.....	23
4 RISK	26
4.1 Risk Assessment	26
4.2 Potential for Fire Ignitions.....	26
4.3 Fuel Hazard.....	26
5 READINESS	29
5.1 Equipment	29
5.2 Training	29
5.3 Risk Mitigation Strategies	29
6 RESPONSE	38
6.1 Response Plans.....	38
6.2 Suppression Considerations	38
6.3 Visitor Management.....	41
7 RECOVERY, RESEARCH AND MONITORING	42
7.1 Post-Fire Rehabilitation and Recovery	42
7.2 Research	42
7.3 Monitoring.....	43
8 SUMMARY OF MANAGEMENT STRATEGIES	45
9 REFERENCES.....	48
10 APPENDICES	53
Appendix 1: Assets and Strategies for Risk Mitigation	53

Appendix 2: Fire Response of Rated, Significant and Introduced Flora Species	65
Appendix 3: Fire Response of Rated and Significant Fauna Species.....	76
Appendix 4: Ecological Communities of Conservation Significance.....	82
11 SUMMARY OF CODES USED IN APPENDICES	85
12 GLOSSARY OF ACRONYMS AND FIRE MANAGEMENT TERMINOLOGY	86

List of Tables

Table 1 – Likely Maximum Overall Fuel Hazard for MVS in the Planning Area.....	28
Table 2 – Fire Management Block Information	34
Table 3 – Ecological Fire Management Guidelines for MVS in the Planning Area.....	37

List of Figures

Figure 1 – The Planning Framework.....	4
Figure 2 – Annual Rainfall Averages for Some Reserves in the Planning Area.....	12
Figure 3 – Visitor Numbers for Some Reserves in the Planning Area	15
Figure 4 – Components of Fuel Layers in Vegetation.....	27
Figure 5 – Flow Chart Detailing the Burn Planning Process.....	33
Figure 6 – Approach for Determining Ecological Fire Management Guidelines	35

List of Attached Maps

Map 1 – Terrain, Tenure and Infrastructure
Map 2 – Vegetation Communities and Significant Species
Map 3 – Fire History
Map 4 – Fire Management and Access

1 SCOPE AND PURPOSE

The intention of this plan is to provide a strategic framework for fire management activities in DEH Adelaide Region reserves that fall within the Hills Face Zone of the Mount Lofty Ranges. This plan incorporates Angove, Black Hill, Cleland (and Mount Osmond Reserve), Eurilla, Ferguson, Giles, Horsnell Gully, Morialta and The Knoll Conservation Parks; Anstey Hill, Blackwood Forest, Brownhill Creek, Cobbler Creek and Greenhill Recreation Parks; Belair National Park and Mount Lofty Botanic Gardens. The plan defines objectives for ecological fire management and the protection of life and property, particularly in relation to visitors and adjacent landholders. Strategies and works are suggested in order to allow the objectives to be met. Risk mitigation works and activities will increase the level of bushfire preparedness and guide management and suppression strategies during bushfire incidents.

These reserves were identified for fire management planning due to a number of factors:

- The positioning of the reserves within the urban interface and the protection of significant built and natural assets adjacent to the reserves.
- The general protection of life, property and environmental values.
- *Extreme* overall fuel hazard levels in some areas of the reserves, due to the long-term absence of fire and modification of the natural vegetation
- The protection of fauna and flora species of conservation significance, including the Mount Lofty Ranges Chestnut-rumped Heathwren (*Hylacola pyrrhopygia parkeri*), Southern Brown Bandicoot (*Isoodon obesulus obesulus*) and threatened orchids.
- High visitor numbers.
- Regeneration and revegetation processes changing fuel hazards.
- The likelihood of arson and accidental fire ignitions.

This Fire Management Plan aims to:

- assess the level of risk (particularly in relation to the above issues) and the existing fire management and reserve management objectives
- identify objectives for fire management within the reserves
- outline strategies for risk mitigation and propose operational works to increase the level of bushfire preparedness and guide suppression management during bushfire incidents
- inform the preparation of Response Plans for the included reserves, which provide specific operational information useful in the early stages of an incident.

Operational works outlined in this plan will be implemented in a staged manner depending on available resources. These works will be facilitated through the DEH Adelaide Region and prioritised by the respective Districts (in this case, Southern and Northern Lofty Districts) in liaison with the Adelaide Regional Fire Management Unit. Adjoining lands are considered in the plan, but only in the context of works required to minimise the risk to assets from fires originating in the included reserves. However, DEH will support and complement landscape scale fire planning for adjoining lands. Fire management planning for land outside of the

reserves is the responsibility of the Adelaide Hills, Burnside, Mitcham, Salisbury and Tea Tree Gully Bushfire Prevention Committees (DBPC), in accordance with the requirements of the *Fire and Emergency Services Act 2005*. DEH is represented on these committees, along with Local Government and the Country Fire Service (CFS).

In recent years DEH has reviewed and updated fire management planning to appropriately address issues such as safety, protection of life and property, ecological management and mitigation of fire risk. This approach has been carefully considered to ensure that the gap is bridged between planning, on-ground actions and outcomes. Mechanisms are in place to allow the plans to evolve and improve. Consultation with the community and stakeholders is seen as critical to successful planning and has been built into the planning process.

1.1 Objectives

The fire management objectives that apply to all DEH reserves and DEH managed land are as follows.

General Objectives for Fire Management

- To provide for the protection of human life and property during bushfire events.
- To ensure that sound conservation and land management principles are applied to fire management activities (where information is available on species, habitat, cultural and built heritage, then it will be taken into account during fire suppression activities and when completing works for risk mitigation).
- To provide for the strategic containment of bushfires (e.g. to minimise the likelihood of a fire entering/exiting a reserve).
- To complement Bushfire Prevention Plans.
- To undertake bushfire suppression activities in a safe and professional manner.
- To establish and maintain perimeter access.
- To manage fire regimes to ensure consistency with the fire management guidelines in conservation zones (refer to Table 3).

The fire management objectives that apply specifically to the reserves of the Hills Face Zone are as follows.

Objectives for Fire Management in the Hills Face Zone

- To reduce the impact of bushfire in the reserves by:
 - minimising the likelihood of a significant portion of a reserve burning in a single fire event
 - minimising the likelihood of a landscape scale fire in the Hills Face Zone planning area.
- To maintain or improve the viability of native species, populations, communities and

Objectives for Fire Management in the Hills Face Zone

habitats in reserves by

- reducing the likelihood of fire suppression operations impacting upon the viability of native species, populations, communities and habitats
 - reducing the likelihood of contiguous remnants of significant ecological communities burning in their entirety during a single fire event
 - creating a mosaic of areas with a range of different time since last fire, to benefit a range of native species, populations, communities and habitats.
- To establish and maintain an appropriate level of preparedness (including employee and equipment resources) that will enable rapid and effective response for fire management by:
- preparing response actions that consider bushfire risk, including prevailing weather, topography, overall fuel hazard, available resources, fire location and the current situation
 - assessing each fire and determining strategies promptly
 - maintaining a safe working environment during fire operations, in compliance with the *Occupational Health Safety and Welfare Act 1986* and consistent with DEH Policy
 - using the functions, roles and responsibilities of the Australasian Interagency Incident Management System (AIIMS).
- To improve knowledge of native species, populations, communities and habitats response to fire by:
- undertaking ecological / experimental burns in order to examine the response of a particular, or range of native species, populations, communities and habitats to various fire regimes
 - implementing ecological / experimental burns as part of integrated weed management, in order to reduce the abundance of environmental weeds posing a threat to the integrity of significant habitats / ecological communities.

2 THE PLANNING FRAMEWORK

The policy and planning framework for fire management on DEH reserves is shown in Figure 1 (below). Reserve Management Plans provide the overarching strategy for all management activities in reserves and are prepared as a requirement under the *National Parks and Wildlife Act 1972*. Fire Management Plans are produced for reserves in accordance with Fire Management Policy and Procedures. An outcome of the fire management planning process is the identification of strategies and operational works for risk mitigation over a 10 year period (as set out in Appendix 1). These works are prioritised and programmed into a works schedule, which is prepared on an annual basis. Response Plans provide a greater level of detail in regards to fire suppression. Response Plans are used in the early stages of an incident and are reviewed annually to ensure currency.

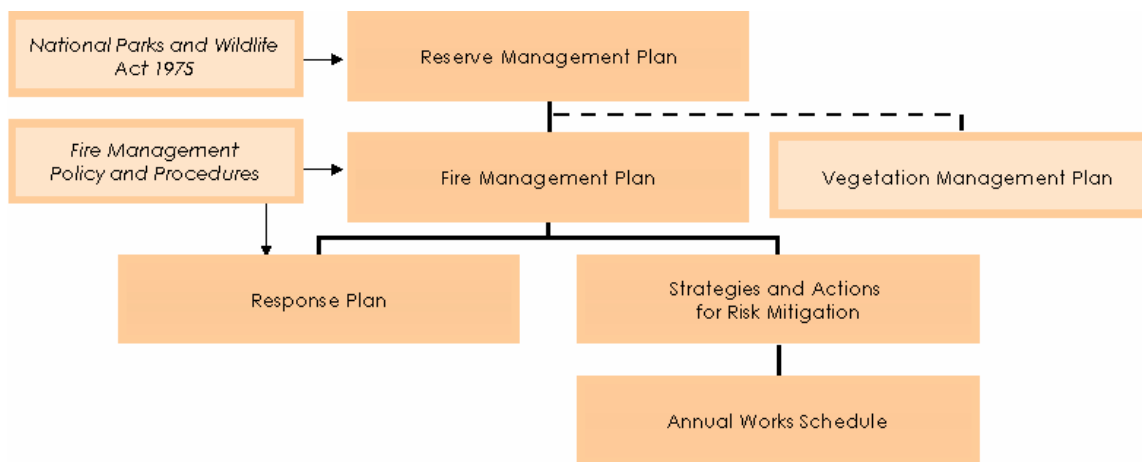


FIGURE 1 – THE PLANNING FRAMEWORK

2.1 Legislation

2.1.1 Federal Legislation

The Federal *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* describes the assessment and approval process required for actions likely to impact matters of national environmental significance (e.g. Nationally listed species and ecological communities). This fire management plan will be presented to the EPBC Act Referrals Unit prior to adoption.

2.1.2 State Legislation

Under the provisions of the South Australian *National Parks and Wildlife (NPW) Act 1972*, DEH has responsibilities for fire management activities within reserves constituted under this Act. The preparation of Fire Management Plans is not a statutory requirement under this Act, but a Departmental Policy.

DEH is required to meet the provisions under the *Native Vegetation Act 1991* when prescribing any works that involve the clearance of native vegetation, or the use of fire (note that fire is also defined as 'clearance' under the Act). All prescribed burns must be approved through the process delegated to DEH by the Native Vegetation Council (NVC).

The South Australian *Fire and Emergency Services Act 2005* outlines the responsibilities of DEH and other fire authorities in relation to fire management within proclaimed reserves. Under

this Act, the Chief Officer (CFS) must take steps to have any relevant provisions of a management plan for a government reserve brought to the attention of members of CFS who might exercise powers under this section with respect to the reserve.

All landholders are obliged to comply with the *Fire and Emergency Services Act 2005*, which outlines responsibilities for fire preparedness. DEH will implement works for fire management on DEH managed lands within the planning area; however adjoining landholders are also required to implement works on their own property to minimise the threat of fire. Note that the *Fire and Emergency Services Act 2005* is currently undergoing review.

As a result of the recent *Ministerial Review of Bushfire Management in South Australia* (Monterola, 2007) amendments to the *Fire and Emergency Services Act 2005* have been recommended, as well as changes in regards to landscape fire management planning and the management framework. As a result of the review the requirement for District Bushfire Prevention Committees will cease and regional Bushfire Management Committees will be established to address fire management at a landscape scale. CFS prepared Bushfire Management Plans will replace District Bushfire Prevention Plans, which are generally prepared by local Government. Bushfire Management Plans will be developed, implemented and reviewed, incorporating a broader perspective on bushfire management values and local knowledge through an expanded number of stakeholders and increased community engagement.

2.2 Policies and Procedures

2.2.1 DEH Fire Management Policy

DEH has a Fire Management Policy which states that “DEH will manage fire in the State's reserve system to protect life, property and environmental assets and enhance the conservation of natural and cultural heritage” (DEH, 2005e). This policy outlines a number of key principles relating to bushfire suppression, prescribed burning and fuel reduction:

- Fire is recognised as a natural component of the South Australian environment and ecosystems conserved in the reserve system.
- The maintenance of biodiversity and ecosystem processes in reserves depends on appropriate fire regimes.
- Fire should be managed in a way that protects and maintains biodiversity values, as well as providing for the protection of life and property.

The policy also states that “DEH is committed to the planned use of fire (prescribed burning) as a management tool for reducing fuel hazard to protect life, property and biodiversity values, and for ecological management” (DEH, 2005e). Property protection activities, where recognised as a priority, will be carried out in such a way as to minimise the negative impacts on biodiversity.

The policy specifies that Fire Management Plans will provide the framework for:

- the management of bushfire suppression, including identification of strategic access and control lines; and
- prescribed burning for ecological management and fuel reduction purposes.

2.2.2 Policy and Procedure for Fire Management Zoning in DEH Fire Planning

DEH has a Zoning Policy that outlines the zoning standard that is used for fire management planning on DEH managed lands (DEH, 2006a). Zoning is derived from:

- the level of perceived risk, using the *Policy and Procedure for Risk Assessment in DEH Fire Planning* (DEH, 2006b)
- the overall fuel hazard, which is assessed using the *Overall Fuel Hazard Guide for South Australia* (DEH, 2006c)
- the activities considered appropriate to mitigate the threat that fire poses to life, property and environmental assets.

Three distinct zones exist: Asset zone (A-zone), Buffer zone (B-zone) or Conservation zone (C-zone) and these are applied according to landscape objectives. A- and B-zones are determined by fuel management objectives whereas C-zones are designated to assist in the conservation of biodiversity through the application of appropriate fire regimes. For more information on zoning, refer to Section 5.3.3 of this plan and the *Policy and Procedure for Fire Management Zoning in DEH Fire Planning* (DEH, 2006a).

2.2.3 Policies and Procedures for Response

The following Policies and Procedures are to be used in conjunction with this Fire Management Plan during an incident:

- DEH Fire Management Policy.
- DEH Fire Management Policy and Procedures (covering various aspects of fire management).
- CFS Chief Officer Standing Orders (COSOs).
- CFS Standard Operating Procedures (SOPs).
- CFS Operations Management Guidelines (OMGs).

Strategies implemented during an incident will be determined by the Incident Management Team (IMT), taking this plan into consideration in accordance with Section 97 of the *Fire and Emergency Services Act 2005*.

2.3 State Planning

The State Government has prepared the *No Species Loss – A Nature Conservation Strategy for South Australia 2007 – 2017* (DEH, 2007a) document in order to set targets for statewide biodiversity conservation. The Strategy is a direct, whole of government partnership response to the 'lose no species' target identified in the South Australian Strategic Plan (DPC, 2004). The Strategy identifies inappropriate fire regime as a threat to biodiversity in SA (DEH, 2007a).

2.4 Local and Regional Environmental Planning

The objectives, strategies and works outlined in this Fire Management Plan were developed with consideration given to providing for the maintenance of ecological integrity. The

following local and regional environmental plans were reviewed during the development of this Fire Management Plan to ensure consistency with these documents.

2.4.1 Biological Survey of South Australia

The Reserves of the Hills Face Zone are part of the *Flinders Lofty Block IBRA Region* (Interim Biogeographical Regionalisation for Australia) (DEH (Cwlth), 2005), which has survey data included within the *Biological Survey of the Southern Mount Lofty Ranges* (Armstrong, *et al.*, 2003). This survey was conducted as part of the greater *Biological Survey of SA*. The following objectives were identified within the survey (Armstrong, *et al.*, 2003).

- Improving knowledge of South Australian biodiversity
- Determining biological variation across the state
- Managing nature conservation in the long-term.

2.4.2 Regional Biodiversity Report

A regional biodiversity report, entitled *Informing Biodiversity Conservation for the Adelaide and Mount Lofty Ranges Region – Priorities, Strategies and Targets* has recently been finalised (DEH, 2009). Recommendations from the report will be implemented in order to guide the conservation, management and rehabilitation of habitats at a regional level (DEH, 2009).

2.4.3 Natural Resources Management Plan

A Natural Resource Management Plan has been developed for the Adelaide and Mount Lofty Ranges region that identifies 'inappropriate fire regime' as a threat to terrestrial diversity (AMLR NRM Board, 2007). The report recognises that changing climate may lead to increased frequency and severity of bushfires (AMLR NRM Board, 2007). Fire is also identified as a threat to surface water quality (AMLR NRM Board, 2007).

2.4.4 Recovery Plans

Recovery Plans are prepared for nationally threatened species that are listed under the EPBC Act. In the Hills Face Zone, a number of species and communities of national conservation significance have been recorded and the following species either have Recovery Plans that are under development or in place.

- Southern Brown Bandicoot (Haby and Long, 2005)
- Several species of orchid including the White Spider-orchid (*Caladenia rigida*), Leafy Greenhood (*Pterostylis cucullata*) and Pink-lipped Spider-orchid (*Caladenia behrii*) (Bickerton, 1999; Quarmby, 2006)

DEH is currently undertaking investigations into habitat requirements and fire response of the Nationally threatened MLR Chestnut-rumped Heathwren. Recommendations from these Recovery Plans are discussed in more detail in Section 3.2.4. Data relating to significant species that occur within the planning area are shown on Map 2.

A regional Recovery Plan has been prepared to explore a more strategic and integrated approach to threatened species recovery and threat abatement in the Adelaide and Mount

Lofty Ranges Region (Willson and Bignall, 2009). A total of 203 species and subspecies and 18 threatened terrestrial ecological communities have been included in the plan. Inappropriate fire regimes and fire management activities (such as prescribed burning and other risk mitigation works) have been identified as a threat to a number of these species. The plan details the following actions for DEH:

- Improve knowledge of fire responses of priority species which are fire sensitive or fire dependent.
- Improve information quality and dissemination for prescribed burning and fire suppression activities to protect and manage threatened species and ecological community locations.

2.5 Reserve Management Planning

Reserve Management Plans are a statutory requirement under the NPW Act or the *Wilderness Protection Act 1992*. Reserve Management Plans provide the overarching strategy for all management activities in reserves.

In relation to fire, a Reserve Management Plan will:

- provide an overview of any fire-related issues in the reserve in question
- state DEH responsibilities for managing fire in the reserve system in accordance with DEH Fire Management Policy
- identify the requirement for a Fire Management Plan based on the nature of any fire-related issues.

Reserve Management Plans have been developed for the following reserves in the Hills Face Zone.

- Angove Conservation Park (DEH, 2005g).
- Anstey Hill Recreation Park (DEH, 2006l).
- Belair National Park (DEH, 2003d).
- Black Hill and Morialta Conservation Parks (DEH, 2001).
- Blackwood Forest Recreation Park (DEH, 2005f).
- Brownhill Creek Recreation Park (DEH, 2003c).
- Cleland Conservation Park (DEP, 1983).
- Cobbler Creek Recreation Park (DEH, 2003a).
- Ferguson Conservation Park (DEP, 1984).
- Greenhill Recreation Park (Draft) (DEP, 1985).

2.6 Vegetation Management Planning

Vegetation Management Plans are compiled as a means to identify a prioritised, strategic and sustainable approach to mitigating the impact of pest plants on natural ecosystems (Paul and Incoll, 2001). Unlike Reserve Management Plans, they are not a legislative

requirement under the NPW Act or *Wilderness Protection Act 1992* and are completed on an ad hoc basis for selected DEH reserves depending on resource availability. Vegetation Management Plans have been prepared for eight of the 15 reserves included in this Fire Management Plan.

- Belair National Park (Paul, 1998).
- Black Hill Conservation Park (Paul, 2001; Te, 2000).
- Blackwood Forest Recreation Park (Smytherman, 2003).
- Brownhill Creek Recreation Park (DEH, 2000; Kinnear, *et al.*, 2001).
- Cleland and Eurilla Conservation Parks (DEH, 2002e).
- Cobbler Creek Recreation Park (Robertson, 2002).
- Morialta Conservation Park (DEH, 2005d).

Vegetation Management Plans prepared for any of the reserves in the planning area in the future should take the zoning and strategies within this Fire Management Plan into consideration when planning sites for revegetation. Any revegetation should be planned in conjunction with the relevant District Ranger and in consultation with the Adelaide Region Senior Fire Management Officer.

2.7 Partnership Agencies

The South Australian CFS is the lead combatant agency for bushfire suppression in rural South Australia. Responding to a fire in DEH reserves is undertaken jointly by DEH and other CFS Brigades (note DEH is a CFS Brigade under the *Fire and Emergency Services Act 2005*). Within the planning area the Metropolitan Fire Service (MFS) will respond to bushfires within reserves in their response zone (Map 1). Within reserves in the MFS response zone, MFS is the lead authority for bushfires. Coordination between the agencies is essential in maintaining fire management operations and implementing fire preparation, mitigation and suppression activities.

SA Water and DEH have developed a *Memorandum of Understanding* (MOU) for fire suppression operations on SA Water managed land. This arrangement is critical in complementing fire management works undertaken on DEH reserves, particularly where they are adjacent to SA Water lands.

All fire management planning and works undertaken on DEH land are subject to consultation with local government to ensure that they are consistent with the objectives of the respective Regional and District Bushfire Management Plans (formerly Bushfire Prevention Plans).

2.8 Consultation

DEH is committed to close cooperation and involvement with State and Commonwealth organisations, special interest groups and the broader community to achieve the goals of biodiversity conservation and protection of life and property. To achieve this, the CFS, Local Government, Friends of Parks, Adelaide and Mount Lofty Ranges Natural Resources Management Board have been consulted during the development of the plan.

DEH Fire Management Plans are prepared and adopted in accordance with the *Policy and Procedure for Fire Management Planning: Project Management and Consultation* (DEH, 2007b). Consultation is not a statutory requirement for Fire Management Plans, but is a Departmental Policy. The plan was subject to DEH internal consultation for a period of four weeks prior to being released externally for public consultation (for four weeks over November and December 2007). The finalised plan was then adopted by the Executive Director, Regional Conservation Delivery and the Executive Director, Conservation Policy and Programs.

2.9 Plan Review and Currency

This Fire Management Plan will undergo a major review after ten years of implementation, or earlier if required. A works program will be derived from the recommendations listed in this Fire Management Plan and reviewed on an annual basis.

3 BUSHFIRE ENVIRONMENT

The components of any landscape contributing to its bushfire potential include terrain, slope and aspect, climate and weather, vegetation and land use.

3.1 Description of the Planning Area

3.1.1 Location

The Hills Face Zone extends approximately 100 km of the higher elevations of the western face of the Mount Lofty Ranges, from Gawler in the north to Sellicks Hill in the south, covering just over 30 000 ha (Planning SA, 2004). The Hills Face Zone has been protected from excessive development under planning legislation since the 1960's and as a result, currently 22% of the Hills Face Zone supports native vegetation, with about half of this protected within DEH reserves (Planning SA, 2004).

This plan addresses fire management issues associated with the 15 DEH reserves and DEH managed lands that fall within a 30 km length of the central Hills Face Zone. For the purpose of this Fire Management Plan, the 30 km length, extending from Cobbler Creek Recreation Park (RP) in the north to Blackwood Forest RP in the south, will be known as the 'planning area'.

Six councils are included in the planning area (Map 1), these are:

- City of Mitcham
- City of Burnside
- Adelaide Hills Council
- Campbelltown City Council
- City of Tea Tree Gully
- City of Salisbury.

The planning area forms part of the *Mount Lofty Ranges Bushfire Prone Area*. The MLR Bushfire Prone Area spans from the Barossa Valley in the north to the Fleurieu Peninsula in the south (Planning SA, 2006).

3.1.2 Surrounding Land Tenure

Areas adjoining the reserves have a variety of land uses including agriculture and horticulture, educational facilities, public institutions, recreational reserves, built-up areas, quarrying, forestry and conservation (Map 1). Adjoining land tenure includes land managed by SA Water, ForestrySA and privately owned land (Map 1).

The urban area of the Adelaide Plains begins at the western edge on the lower slopes of the Mount Lofty Ranges and extends through to the coast. Urban development abuts many of the reserves covered in this Fire Management Plan. To the east development is generally classified as rural and many of these towns are positioned upslope from the reserves. Water is generally difficult to source for firefighting, as there are few dams. Map 1 provides an overview of built up areas.

3.1.3 Terrain

The Hills Face Zone planning area incorporates the western aspect of the Mount Lofty Ranges and includes Mount Lofty, South Australia's highest point, a heavily vegetated peak rising above Cleland Conservation Park (CP). The zone is characterised by rugged topography and is generally dominated by Stringybarks and an *Extreme* overall fuel hazard. There is contiguous vegetation from Anstey Hill RP in the north to Belair National Park (NP) in the south. This combination of slope and fuel contributes to the fire danger.

3.1.4 Climate and Fire Weather

The Hills Face Zone experiences cool, wet winters and warm to hot, dry summers. Rainfall occurs primarily within the winter period, from May to September. Rainfall averages vary across the planning area with reserves on the lower slopes receiving from as little as 500 mm annually to reserves at the higher elevations receiving over 1000 mm annually (Figure 2).

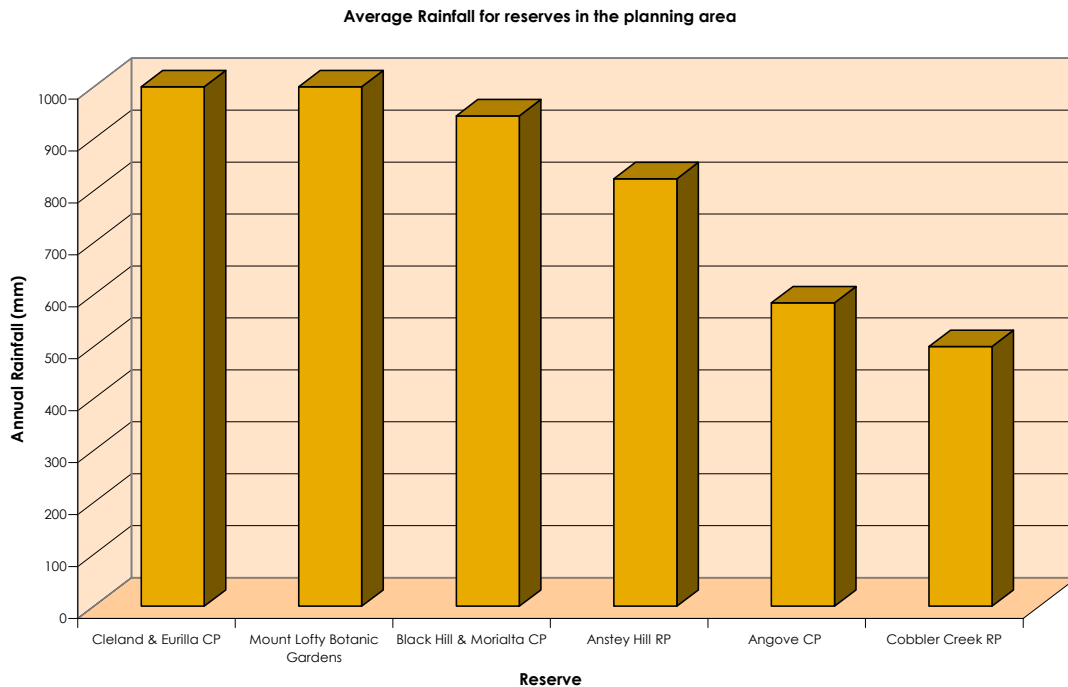


FIGURE 2 – ANNUAL RAINFALL AVERAGES FOR SOME RESERVES IN THE PLANNING AREA

During winter, westerly winds travel across South Australia bringing moisture to the metropolitan area. However, during the summer months the wind system moves south causing hot dry winds originating from central Australia to blow from the north. The planning area is also subject to local wind effects with the regular occurrence of 'gully winds'. Gully winds occur when cool air descends from the top of the Mount Lofty Ranges replacing the warmer air of the Adelaide plains. These winds most frequently occur during the summer months, generally in the late afternoon and evening and are usually strong and variable in direction.

Extreme Fire Conditions

Strong winds, combined with high temperatures and low humidity increases the likelihood of extreme fire intensity and behaviour. Under such conditions suppression activities are unlikely to be effective in areas supporting *Very High* and above overall fuel hazard levels (DEH, 2006c) and suppression activities will be confined to the protection of life and property. There is a dramatic increase in the likelihood of major bushfire events when the following conditions are experienced:

- *Very High* to *Extreme* overall fuel hazard levels in native vegetation
- low humidity, decreased soil and fuel moisture, particularly during drought years
- strong winds shifting direction during the course of a fire (especially westerly wind changes)
- lightning strikes as a result of increased thunderstorm activity between late November and December, then again around mid March to early April
- steep terrain.

3.1.5 Fire History

Mapping Fire Occurrences

The fire history map (Map 3) has been compiled from the latest DEH fire incident reports. The quality of the firescar mapping varies, depending on the method of capture. It is important to note that only visible fire scars over 0.5 ha in size have been mapped and that mapping is limited to fires that have occurred on DEH managed land or fires where DEH was in attendance. Consequently, the mapped fires should be regarded as a minimum estimate of fire occurrences.

The fire history map (Map 3) shows two representations of the same data, fire frequency (left frame) and last fire (right frame). Fire frequency shows the number of times an area has been burnt, assuming only one fire per calendar year. Recent fires (last 10 years) are shown with hatching and labelled with year. The last fire map shows the same data classified into five year class intervals. In combination, Map 3 shows that the planning area is dominated by a single fire event that occurred over 20 years ago (Ash Wednesday fires).

Natural and Anthropogenic Fires

Detailed records of recent fire incidents that have occurred within DEH reserves are stored within the Department's fire reporting database. This database along with spatial records and any other historical records was reviewed during the development of this Fire Management Plan.

Historically a number of large fires have been recorded throughout the planning area, the most recent include:

- a 777 ha fire that burnt most of Morialta CP in 1972. This fire also burnt land to the south of the reserve
- the Ash Wednesday fires of 1983. These fires burnt six DEH reserves within the planning area, including all of Eurilla CP and Greenhill RP. Significant sections of Cleland CP,

Anstey Hill RP, Horsnell Gully CP and Giles CP were burnt, as well as DEH managed land including the Mt Lofly Botanic Gardens and Mount Osmond Reserve

- a fire that burnt Black Hill CP in its entirety in 1985. This fire was part of a larger 1 616 ha fire that burnt land to the east of the reserve.

Since 2001, approximately 80 records pertaining to bushfire incidents have occurred within or in close proximity to the reserves in the planning area. Some of the larger incidents include:

- a 60 ha fire that burnt 55 ha of Morialta CP, adjacent Montacute Road in 2004. This same area was also subject to fires in 1982 and 1998
- a 100 ha fire that started within Anstey Hill RP and burnt 40 ha of DEH reserve before burning into adjacent land in 2004
- a 140 ha fire at Mount Osmond adjacent the Princes Highway in January 2005.

A significant number of fires within the Hills Face Zone have been attributed to anthropogenic ignitions, including campfires, car fires, suspected arson, burn offs on adjacent land and sparks from machinery use. Suspected arson is the most frequent cause of ignition, with approximately 40 incidents within the planning area since 2001.

Fires attributed to natural causes, such as ignition by lightning are not as common within the planning area. A small fire within Horsnell Gully CP was caused by lightning in 2002.

Prescribed Burning

Prescribed burning has been undertaken within nine of the 15 reserves included in this Fire Management Plan; these are Anstey Hill RP, Belair NP, Black Hill RP, Cleland CP, Cobbler Creek RP, Giles CP, Horsnell Gully CP, Morialta CP and Mt Lofly Botanic Gardens.

As part of the planning process, areas have been identified for prescribed burning across the planning area (Map 4). The implementation of these burns is subject to resource availability and regional priorities. Potential burn areas may be altered, or may be withdrawn at the discretion of DEH as a result of unplanned fires or other factors that may have occurred since time of writing. Each burn area identified on Map 4 may not be burnt in its entirety at one point in time, as the area may be divided and burnt over a number of seasons or the burn itself may be patchy. Proposed burns are subject to the planning process described in Section 5.3.4.

3.1.6 Vegetation Communities

Major Vegetation Sub-groups (MVS)

Floristic mapping for this plan uses a compilation of regional vegetation mapping data that has been reclassified to comply with the National Vegetation Information System (NVIS) classification for Australia. The MVS level of the NVIS classification emphasises the structural and floristic composition of the dominant stratum but with additional types identified according to typical shrub or ground layers occurring with a dominant tree or shrub stratum. There are eight MVS within the planning area that have been mapped by DEH. Map 2 shows the distribution of MVS in the planning area. Table 1 lists the species composition for each MVS and the Ecological Fire Management Guidelines are outlined in Table 3.

The Major Vegetation Sub-groups represented in the planning area are:

- MVS No. 4 *Eucalyptus* forests with a shrubby understorey
- MVS No. 8 *Eucalyptus* woodlands with a shrubby understorey
- MVS No. 9 *Eucalyptus* woodlands with a grassy understorey
- MVS No. 21 Other *Acacia* tall open shrublands and shrublands
- MVS No. 26 *Casuarina* and *Allocasuarina* forests and woodlands
- MVS No. 32 Other shrublands
- MVS No. 37 Other tussock grasslands
- MVS No. 38 Wet tussock grassland, herbland, sedgeland or rushland

These MVS differ from the broad vegetation groups defined within the draft *Biodiversity Strategy for the Adelaide and Mount Lofty Ranges* (DEH, in prep), although there are significant similarities. Within this Fire Management Plan MVS have been used as these groupings are accepted by fire managers for predicting maximum overall fuel hazard levels (Section 4.3.2).

3.2 Values and Assets

3.2.1 Visitor Use

The reserves of the Hills Face Zone receive a large number of visitors per year. Visitor numbers for reserves are shown as approximate numbers collected for the 2006 to 2007 financial year by DEH (Figure 3).

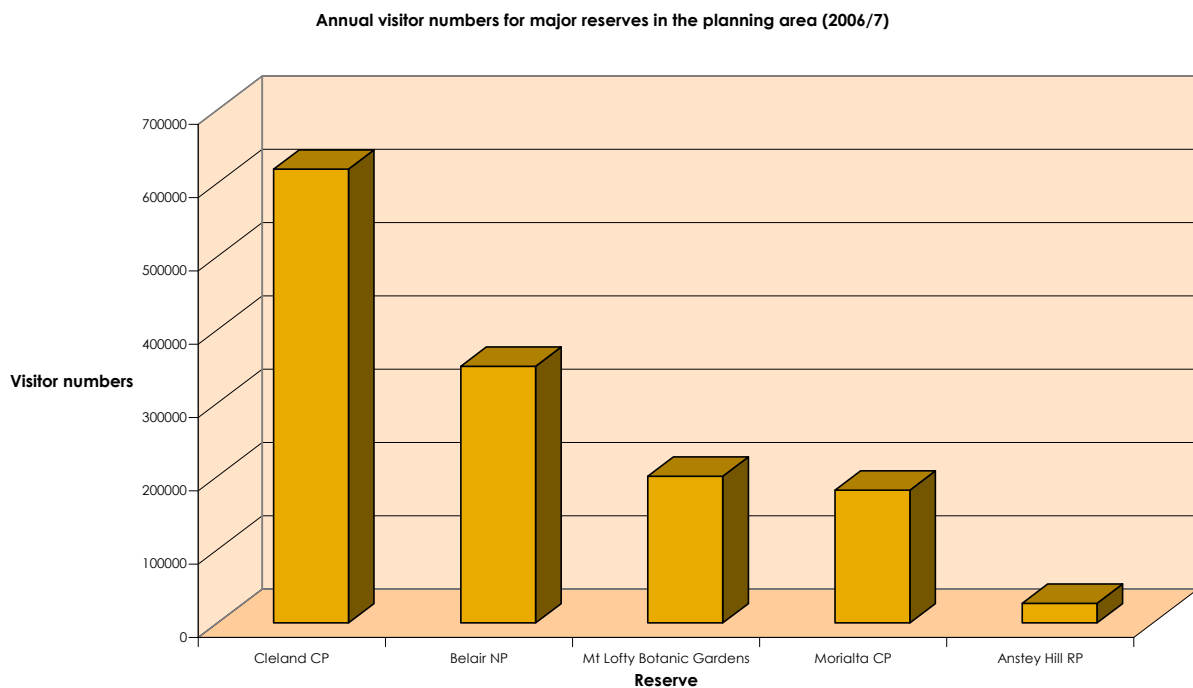


FIGURE 3 – VISITOR NUMBERS FOR SOME RESERVES IN THE PLANNING AREA

As these figures only reflect the number of people that cross the data collection points, it can be assumed that actual visitor numbers are higher. A range of day-use recreational activities are undertaken in these reserves. Camping is not permitted in metropolitan DEH reserves and as a result, visits are generally short-term, undertaken during the daylight hours.

Management Strategies

Visitor Use	1. Implement appropriate fuel management strategies as shown on Map 4 to increase visitor safety.
	2. Consider reserve closures on extreme fire weather days to ensure visitor safety at the discretion of the Director National Parks (Executive Director Conservation Policy and Programs) or delegate.

3.2.2 Built Assets

There are a number of built assets at risk from bushfires within the reserves including:

- Cleland Wildlife Park
- Mount Lofty Botanic Gardens
- Mt Lofty Summit Visitor Centre
- Mt Lofty Fire Tower and associated assets
- Waterfall Gully kiosk
- DEH worksites at Black Hill CP, Cleland CP and Belair NP
- Brownhill Creek Caravan Park
- Communication towers
- Several heritage listed buildings, including Old Government House at Belair NP
- Visitor facilities and infrastructure in Belair NP, Cleland CP and Morialta CP.

DEH will undertake fire management works and activities to minimise the likelihood of fire impacting built assets, (both public and private buildings).

Appendix 1 details significant assets within and adjacent the reserves and the corresponding fire management strategies. Map 1 shows the location of assets within the planning area.

Management Strategies

Built Assets	3. Implement fuel management strategies appropriate to asset protection as shown on Map 4.
	4. Encourage adjacent property owners to work with CFS to implement appropriate and coordinated fire management works on their own land to minimise the threat of fire.
	5. Undertake fire management works and activities on DEH reserves to minimise the impact that fire may pose to adjacent public assets.
	6. Encourage volunteer participation in undertaking approved fuel reduction activities.

3.2.3 Cultural Assets

Aboriginal Heritage

The land comprising the Reserves of the Hills Face Zone forms part of the 'Country' of the Kaurna people and the Peramangk people as described by Tindale (1974). The Peramangk people occupied the Mount Lofty Ranges east through to Strathalbyn. The Kaurna people occupied the Adelaide Plains, west of the Mount Lofty Ranges, only visiting the Ranges during spring and autumn. It is thought that the Stringybark forests of the Mount Lofty Ranges marked the eastern boundary of Kaurna Country. Mount Bonython and Mount Lofty are featured in Kaurna Dreaming.

Aboriginal heritage sites have been recorded throughout the Hills Face Zone. Belair NP, Cobbler Creek RP and Brownhill Creek RP contain sites that have been listed on the Central Archive, which includes the Register of Aboriginal Sites and Objects (the Register). There is also a listed site east of Horsnell Gully CP. It should be noted that the Register is not a comprehensive record of all Aboriginal sites and objects in South Australia, therefore sites or objects may exist in the planning area, even though the Register does not identify them. When implementing this plan, DEH will comply with the *Aboriginal Heritage Handbook and Strategy* (DEH, 2006e), to facilitate the protection of sites during bushfire suppression and prescribed burns. Information on Aboriginal heritage is collected during prescribed burn planning as part of the Environmental Assessment Table (EAT) (refer to Section 5.3.4).

European Heritage

The European heritage of the Hills Face Zone was recently catalogued through the Adelaide Hills Face Zone Cultural Heritage Project. An outcome of the project was the publication of a book detailing the nineteenth century colonisation on the western face of the Mount Lofty Ranges (Smith, *et al.*, 2006).

Details on European heritage assets can be found within *Valleys of Stone - The Archaeology and History of Adelaide's Hills Face* (Smith, *et al.*, 2006).

Management Strategies

Cultural Assets	7. Implement fuel management strategies appropriate for the protection of cultural assets as shown on Map 4.
	8. Ensure liaison at bushfires occurs to identify cultural assets, where time allows. Once the fire has passed evaluate sites to establish if any damage has occurred.
	9. Ensure suppression strategies take into account significant cultural assets in order to minimise impacts from these activities and undertake post-fire rehabilitation.

3.2.4 Natural Values

Flora, Fauna and Ecological Communities

The Environmental Database of South Australia contains records from several data sources, including the Threatened Plant Population Database, the Biological Survey of South Australia and opportunistic sightings of significant flora and fauna.

Fire response information, where known, is included for species and communities of conservation significance in Appendix 2, 3 and 4.

In this plan 'of conservation significance' is used to describe rated populations or species of flora and fauna as well as vegetation communities. These may be:

- Nationally rated, that is, listed as Threatened (with a rating of Extinct, Critically Endangered, Endangered or Vulnerable) under the federal EPBC Act
- South Australian rated, listed as Threatened (with a rating of Endangered, Vulnerable or Rare) under the NPW Act, *Revised Schedules 7, 8 and 9*
- Provisionally listed as Threatened (with a rating of Endangered or Vulnerable) in South Australia, that is, included on the unpublished DEH *Provisional List of Threatened Ecosystems of South Australia* (DEH, 2005c).

There are a number of flora and fauna species as well as ecological communities considered to be of conservation significance within the planning area. This includes five Nationally Endangered species.

- Mount Lofty Ranges (MLR) Chestnut-rumped Heathwren.
- Southern Brown Bandicoot.
- Pink-lipped Spider-orchid.
- White Spider-orchid.
- Osborn's Eyebright (*Euphrasia collina* ssp. *osbornii*).

Appendix 2 and 3 contains a list of flora and fauna of conservation significance as well as species that are considered important in terms of fire management. Note that this is not intended to be an exhaustive list of rated species as it does not consider species that are regionally significant, but attempts to summarise the current level of fire response knowledge for particular species. Appendix 4 summarises information on threatened ecological communities.

DEH is committed to increasing its capacity to incorporate species' requirements into improved ecological fire management. The actions in this plan relate specifically to fire management actions within reserves; nevertheless DEH will work with the community on landscape scale biodiversity conservation.

MLR Chestnut-rumped Heathwren

The MLR Chestnut-rumped Heathwren is endemic to the Mount Lofty Ranges in South Australia (TSSC, 2005), and is listed as Endangered at the National level and Vulnerable at the State level. Within the planning area, there are species records within Morialta, Black Hill, Cleland, Giles and Horsnell Gully Conservation Parks as well as Anstey Hill RP. The MLR Chestnut-rumped Heathwren has also been recorded in Montacute CP, Kenneth Stirling CP (Wotton Scrub and Filsell Hill) and Mark Oliphant CP (Pickett, 2007). The main populations occurring within the planning area appear to be in Cleland, Black Hill and Morialta Conservation Parks (Pickett, 2007). Refer to Map 2 for records of Chestnut-rumped Heathwren occurrence in the planning area. Specific information on how the MLR Chestnut-rumped Heathwren responds to fire is listed in Appendix 2.

The species inhabits dense heathlands and sclerophyllous *Eucalyptus* woodlands with a dense heathy understorey (MVS No. 4 and 9 in the planning area) (Pickett, 2007). Key habitat requirements are considered to be low dense vegetation, with areas of rocky ground or rocky outcrops (Pickett, 2007).

The MLR Chestnut-rumped Heathwren is considered to be threatened by inappropriate fire regime (TSSC, 2005). It is a fire sensitive species and fire is likely to influence the abundance of preferred food sources, availability of shelter sites and nesting materials, limit the dispersal capabilities of the species and contribute to population isolation (Pickett, 2007).

In fragmented habitats, like the Mount Lofty Ranges, there is an increased risk of localised extinction if a fire burns a habitat patch in its entirety (although the species is known to have successfully recolonised Cox Scrub CP (outside the plan area) after a fire burnt the reserve in its entirety in 1983 (Garnett and Crowley, 2000)). Strategic reduction of fuel loads to minimise the extent of bushfires is recommended to reduce this threat.

There is evidence that this species may be an early successional coloniser of burnt woodland and heathy vegetation, therefore may rely on patchiness within remaining habitats (Pickett, 2007). The effects of fire on the MLR Chestnut-rumped Heathwren will be monitored for prescribed burns undertaken at known habitat locations.

Management Strategies

Chestnut-rumped Heathwren	10. Conduct prescribed burning to minimise the risk of large contiguous areas of habitat burning in one fire event.
	11. If necessary, conduct prescribed burning to increase preferred habitat.
	12. Fire suppression activities should attempt to retain some unburnt patches as refuge areas.
	13. Monitor the effect of fire on MLR Chestnut-rumped Heathwren populations and preferred habitat and use this information to update the DEH vital attributes database for use in future Ecological Fire Management Guidelines (Appendix 2).
	14. Consult the Adelaide Region Biodiversity Conservation Unit when planning burns in known habitat of the MLR Chestnut-rumped Heathwren.

Southern Brown Bandicoot

The Southern Brown Bandicoot is the last remaining species of bandicoot occurring naturally in South Australia and is rated Endangered at the National level and Vulnerable in South Australia. A Recovery Plan has been prepared for the species, which is aimed at maintaining or increasing the distribution and abundance of the Southern Brown Bandicoot in the Mount Lofty Ranges (Haby and Long, 2005). Specific information on how the Southern Brown Bandicoot responds to fire is included in Appendix 2. An Ecological Fire Management Strategy for the Southern Brown Bandicoot in the Mount Lofty Ranges is in preparation.

Southern Brown Bandicoots occupy a variety of structural vegetation communities including; sclerophyllous forest and woodland, shrubland and heathland. Pivotal to their habitat choice is the presence of a dense heathy or shrubby understorey up to one metre tall (MVS No. 8) (DEH, 2006f).

The Southern Brown Bandicoot is known to occur in Belair NP, Cleland CP, Morialta CP and Mount Lofty Botanic Gardens and probably also occurs in suitable habitat in Horsnell Gully CP, Giles CP and Eurilla CP. Bandicoots have either been recorded in these reserves by DEH or suitable habitat has been identified. Map 2 shows Southern Brown Bandicoot records for the planning area. It should be noted that the paucity of records is more a reflection of the cryptic behaviour of the species and the limited survey effort expended in the area rather than of the species' true distribution.

The *Recovery Plan for the Southern Brown Bandicoot in the Mount Lofty Ranges* advocates the development and implementation of Fire Management Plans that minimise the likelihood of bushfires burning entire habitat patches, as well as the implementation of monitoring programs to determine the effect of fire management regimes on Southern Brown Bandicoot populations (Haby and Long, 2005). Providing a mosaic of successional stages is considered desirable. Furthermore, current knowledge suggests that fire regimes that simplify habitat structure (in the medium and long term) or allow habitats to become excessively dense are undesirable.

In fragmented habitats, like the Mount Lofty Ranges, there is an increased risk of localised extinction if a fire burns a habitat patch in its entirety (Haby and Long, 2005). Strategic reduction of fuel loads to minimise the extent of bushfires is therefore recommended to reduce this threat.

The MLR Southern Brown Bandicoot Recovery Team supports the use of prescribed burns where they assist in achieving recovery actions. The effects of fire on the Southern Brown Bandicoot will be monitored for prescribed burns undertaken in known habitat.

Management Strategies

Southern Brown Bandicoot	15. Conduct prescribed burning to minimise the risk of large contiguous areas of habitat burning in one fire event.
	16. Conduct prescribed burning to increase habitat patchiness where necessary.
	17. Attempt to provide unburnt patches as refuge areas during prescribed burning and bushfire suppression activities.
	18. Finalise and publish the Ecological Fire Management Strategy for the species.
	19. Monitor the effects of fire on the Southern Brown Bandicoot populations and preferred habitat and use this information to update the DEH vital attributes database for use in future Ecological Fire Management Guidelines (Appendix 2).
	20. Consult the Southern Brown Bandicoot Recovery Team during the planning of any burn to be conducted within the known habitat of the species.

Threatened Orchids

The Pink-lipped Spider-orchid and White Spider-orchid are both listed as Endangered at the national level under the EPBC Act 1999 and Endangered in South Australia under the NPW Act 1972. The Leafy Greenhood is listed as nationally Vulnerable under the EPBC Act 1999 and Endangered in South Australia under the NPW Act 1972. A draft recovery plan covering these species has been developed (Quarmby, 2006). A national recovery plan was also prepared in 1999 for the Pink-lipped Spider-orchid (Bickerton, 1999). Specific information on how threatened Spider-orchids respond to fire is included in Appendix 2.

The Pink-lipped Spider-orchid, White Spider-orchid and Leafy Greenhood all occur within Belair NP, and inhabit *Eucalyptus* forests and woodlands (MVS 8 and MVS 9). These orchids also occur in DEH reserves outside the planning area, including Scott Creek CP, Para Wirra CP, Warren CP and Hale CP, as well as on private, other government land or Heritage Agreement. Map 2 shows threatened orchid habitat in the planning area.

All of these orchids lie dormant during summer months and resprout from underground tuberoids during April and May. Flowering and seed set occurs between August and December (refer to Appendix 2). These orchids are pollinated by insects (thynnid wasps and fungus gnats) and produce thousands of minute seeds. Seedling recruitment and growth is dependent on the establishment of mycorrhizal fungi associations.

The impact of fire on each of these threatened orchids is poorly understood (Quarmby, 2006). The White Spider-orchid and Pink-lipped Spider-orchid have been observed to flower more prolifically in the years immediately following disturbance and then to prefer open habitats (Bickerton, 1999), but this needs further investigation. All of the orchids are considered to be at risk of fire between May and November, particularly the Leafy Greenhood due to its relatively shallow tubers (Quarmby, 2006). Furthermore, orchid populations that occur near fire access tracks are considered to be at risk of damage from track management and fire suppression activities (i.e. track grading, widening, slashing, herbicide use and heavy vehicle use) (Quarmby, 2006).

The recovery plan recommends that protocols for track management are developed to protect threatened Orchid populations and strategies to minimise potential impacts of prescribed burning and fire suppression activities on threatened Orchids are also developed.

Management Strategies

Threatened Orchids	21. Minimise the likelihood of vehicles or earthmoving equipment impacting on threatened Orchid populations during track management and fire suppression operations.
	22. Avoid prescribed burning or slashing within threatened Orchid populations between May and November.
	23. Avoid prescribed burning or slashing within threatened Orchid populations more frequently than every 5 years.
	24. Minimise the likelihood of large areas of threatened Orchid habitat burning in a single fire event.
	25. Liaise with the South Lofty Block Orchid Recovery Team when planning prescribed burns within known habitat of threatened Orchids.
	26. Undertake ecological/experimental burns on threatened Orchid populations to examine the response of these species to different disturbance regimes.

Osborn's Eyebright

Osborn's Eyebright is listed as Endangered nationally under the EPBC Act 1999 and Endangered in South Australia under the NPW Act 1972. A national recovery plan does not exist for the species, however a recovery plan has been prepared for Tasmanian *Euphrasia* species (Potts, 1999). Specific information on how Osborn's Eyebright responds to fire is included in Appendix 2.

In the planning area, the species was recorded within Morialta CP in 2003. Historical records indicate that the species was observed within Cleland CP up until the 1960's. Outside the planning area the species occurs on eastern Kangaroo Island, on Eyre Peninsula (Venus Bay), in the states south east, across the Mount Lofty Ranges and on Yorke Peninsula within government land, private land and Heritage Agreements.

Osborn's Eyebright is known to flower from June through to August/September.

Euphrasia species are known to prefer open habitats, characterised by patches of open ground, spaced low vegetation and moist soils (Potts, 1999). Lack of disturbance, such as fire, is thought to pose a risk to the recovery of *Euphrasia* species from the seed bank (Potts, 1999). As *Euphrasia* species are seed regenerators, it is recommended that prescribed fire should only be applied after seed release in Autumn (Potts, 1999).

Management Strategies

Osborn's Eyebright	27. Minimise the likelihood of large areas of known habitat burning in a single fire event.
	28. Consult the Adelaide Region Biodiversity Conservation Unit when planning burns in areas supporting Osborn's Eyebright.
	29. Undertake ecological/experimental burns within known habitat to examine the response of Osborn's Eyebright to different disturbance regimes.
	30. Prescribed burning should occur after seed release in Autumn.
	31. Monitor the effects of fire on Osborn's Eyebright use this information to update the DEH vital attributes database for use in future Ecological Fire Management Guidelines (Appendix 2).

3.3 Pest Species

3.3.1 Fauna

The conditions that result following a fire can be favourable to some fauna, but for other species these conditions may result in population decline. There is evidence that pest fauna can flourish in the conditions existing after a fire. The degree of impact by pest fauna post-fire depends on a number of factors, including the pre-fire abundance of the species and characteristics of the fire (e.g. fire size, shape, season, intensity and location).

Within the planning area, a number of pest fauna have been observed. These include Eurasian Blackbird (*Turdus merula*), European Goldfinch (*Carduelis carduelis*), Fox (*Vulpes vulpes*), Cat (*Felis catus*), Brown Hare (*Lepus capensis*), House Mouse (*Mus musculus*), Black Rat (*Rattus rattus*) and European Rabbit (*Oryctolagus cuniculus*).

It is important that the information collected on pest fauna pre-fire is used to determine appropriate management post-fire. There is the opportunity to increase the rate of eradication programs for pest fauna after fire, to take advantage of the reduced vegetation cover and/or possible concentration of fauna in a smaller area. Prescribed burning provides opportunities for research and monitoring into how pest fauna respond to fire. Management of pest fauna post-fire is more likely to be implemented if it is expected that pest fauna will impact species of conservation significance.

Information on pest fauna may be collected during prescribed burn planning as part of the Environmental Assessment Table (EAT), to determine appropriate management post-fire (DEH, 2004; 2006d). Section 5.3.4 provides more information on burn preparation.

3.3.2 Flora

Weeds can have significant impacts on native vegetation and ecological communities within reserves (Saunders, *et al.*, 1991). Disturbance (e.g. grazing, nutrient inputs, erosion, fragmentation) is likely to promote weed invasion, and fire in areas already affected by one or more of these disturbance mechanisms is likely to lead to weed proliferation (Hobbs, 1991; Hobbs, 2002; Hobbs and Huenneke, 1992). It is well known that fire is an important source of disturbance in natural systems (Hobbs and Huenneke, 1992). Some of the most significant weed species within the planning area include Boneseed (*Chrysanthemoides monilifera*), Bridal Creeper (*Asparagus asparagoides*), Blackberry (*Rubus* spp.), European Olive (*Olea europaea* ssp. *europaea*), Gorse (*Ulex europaeus*), Coolatai Grass (*Hypharrhenia hirta*), Aleppo Pine (*Pinus halepensis*) and Texas Needle Grass (*Nassella leucotricha*). Fire management guidelines for these species and other weeds of concern are included in Appendix 2.

All prescribed burns conducted by DEH will assess weed control measures in the EAT, completed as a requirement of the prescribed burn planning process (DEH, 2004; 2006d). The EAT will describe the weed control to be implemented post-burn, however investment will be based on the reserves overall habitat quality and also management priorities within the region.

Monitoring programs should ensure that vulnerable areas are evaluated pre and post-fire to determine what post-fire weed control is required.

3.3.3 Plant Pathogens

The EPBC Act identifies Phytophthora (*Phytophthora cinnamomi*) as a key threatening process, which means that it is a major threat to native vegetation and associated fauna, particularly threatened species. Phytophthora is a soil and waterborne fungus that causes disease and death to a variety of native plant species (as well as introduced species). It occurs in areas of high rainfall and the fungus can spread through mud carried on vehicle tyres, walking boots and equipment, therefore there is significant risk of Phytophthora infestation and spread in the Mount Lofty Ranges. The presence of Phytophthora has been confirmed by soil testing within Anstey Hill RP, Belair NP, Cleland CP, Horsnell Gully CP and Morialta CP.

DEH has a Standard Operating Procedure, which addresses Phytophthora threat management (DEH, 2002d). This outlines hygiene procedures and guidelines to protect the integrity of natural areas by minimising the risk of Phytophthora infestation and spread in DEH reserves.

Management Strategies

Pest Species	32. Refer to Ecological Fire Management Guidelines (Table 3) and fire management guidelines for introduced flora species (Appendix 2) during prescribed burn planning.
	33. Consider the use of fire as part of an integrated biodiversity management strategy.
	34. Conduct post-fire weed control subject to Regional priorities.
	35. Identify the potential impact of weed species prior to any prescribed burn in prescribed burn planning, as part of the EAT. This will identify any priority weed species and recommend post-fire actions to mitigate the impact of weeds.
	36. Collect relevant information in prescribed burn planning as part of the EAT on introduced fauna, to determine appropriate management post-fire.
	37. Ensure the Standard Operating Procedure – Phytophthora Threat Management (SOP-002) (DEH, 2002d) is adhered to in Phytophthora risk areas, which includes all the reserves in the planning area.
	38. Ensure hygiene practices are implemented to reduce the spread of Phytophthora across the planning area. Refer to the DEH Operating Procedure - Phytophthora Vehicle Disinfection Unit (DEH, 2003b).

4 RISK

4.1 Risk Assessment

A risk assessment was conducted in line with the *Policy and Procedure for Risk Assessment in DEH Fire Planning* (DEH, 2006b), as a requirement for the compilation of this Fire Management Plan. The risk assessment is a tool used to gauge the risks arising from bushfire to life, property and environmental values, within and adjacent to the reserves in the planning area. The risk assessment considered visitor use, assets (built, cultural and natural values) and neighbouring properties for all reserves in the planning area. Risk assessment is a function of likelihood and consequence.

- Likelihood considers the possibility that a fire related risk will occur and is assessed on a basis of *Rare to Almost Certain (Rare, Unlikely, Possible, Likely, Almost Certain)*.
- Consequence considers bushfire risk based on impacts to life, property and environmental values and is ranked from *Insignificant to Critical (Insignificant, Minor, Moderate, Major, Critical)*.
- Based on the derived likelihood and consequence ratings, the overall risk for each scenario is determined using a Risk Matrix and ranked from *Low to Extreme (Low, Moderate, High, Extreme)*.

The *Policy and Procedure for Risk Assessment in DEH Fire Planning* (DEH, 2006b) provides more information on this process. Risk assessment is ongoing and continually reviewed to reflect the changing landscape. The application of fire management zones as well as recommended actions and works in this plan are derived from the risk assessment process.

4.2 Potential for Fire Ignitions

It was assessed that there is a *Low* risk of lightning strike ignition, as there is generally rain associated with lightning throughout the year within the Hills Face Zone.

The risk of anthropogenic ignitions is assessed as *High* due to the reserves positioning at the urban interface, with high fuel levels, high accessibility and large visitor numbers. These may include ignitions from unattended campfires, private burn-offs, agricultural equipment or the result of arson.

4.3 Fuel Hazard

4.3.1 Overall Fuel Hazard

The overall fuel hazard is used in fire management planning to determine the level of risk posed by bushfire to life, property and environmental assets in the risk assessment. The overall fuel hazard is derived from the assessment of four fuel layers in vegetation: *Surface, Near-surface, Elevated and Bark Fuel* (Figure 4). *Canopy Fuel* is not measured as part of overall fuel hazard.

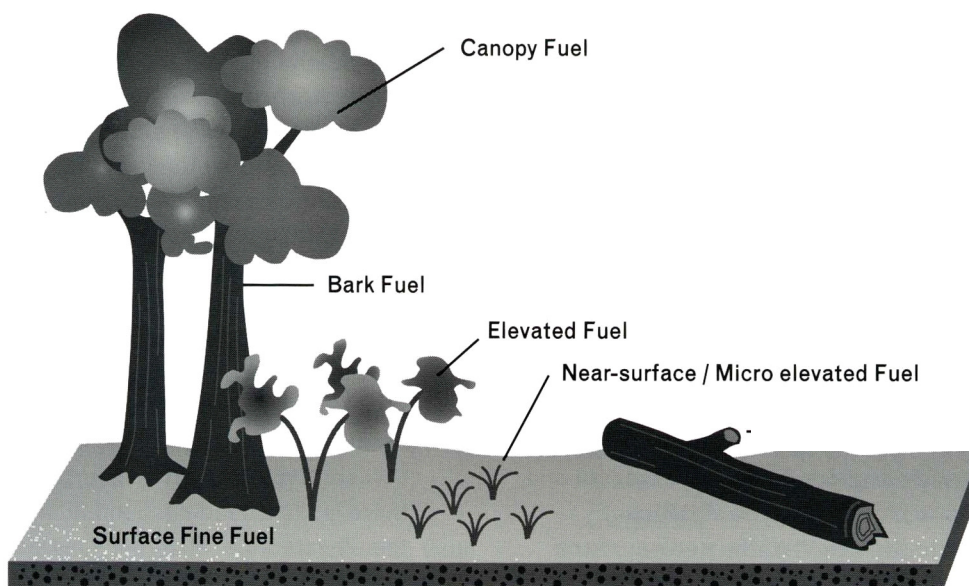


FIGURE 4 – COMPONENTS OF FUEL LAYERS IN VEGETATION

Source (Tolhurst and Cheney, 1999)

Each fuel layer contributes to different aspects of fire behaviour: flame depth and height, surface fire combustion and rate of spread, spotting and crown fire (DEH, 2006c). Each layer, as well as the overall fuel hazard can be assessed as: *Low, Moderate, High, Very High* or *Extreme* (DEH, 2006c).

Extreme bark hazard is likely in areas supporting Brown Stringybark (*Eucalyptus baxteri*) and/or Messmate Stringybark (*E. obliqua*) where fire has not occurred for some time, or if fire has occurred it was of low intensity and did not reduce the bark fuel hazard. In these areas, spot fires are likely to start ahead of the fire front, due to embers and firebrands blown in the wind. The occurrence of Stringybark throughout the planning area is shown on Map 2.

Introduced species such as Olive and Aleppo Pine are known to influence fuel hazards across the planning area and these are assessed as part of overall fuel hazard where they occur. Aleppo Pine is characterised by ladder fuels that facilitate the transition of fire to the crown.

Research completed by McCarthy and Tolhurst (2004) investigated the effectiveness of fuel reduction burning in Victoria. It was concluded that maintaining overall fuel hazard levels at *High* or less aids in slowing the rate of spread of a subsequent bushfire. It was determined that to achieve long-term fuel reduction effects the focus should be on the reduction of bark and elevated fuels as these fuel layers are likely to contribute to the overall fuel hazard.

For more information on fuel hazard assessment methodology and evaluation refer to the *Overall Fuel Hazard Guide for South Australia* (DEH, 2006c).

4.3.2 Likely Maximum Overall Fuel Hazard

Maximum overall fuel hazard levels have been estimated for Major Vegetation Sub-groups (MVS) within the planning area in order to provide a guide for fire management (Table 1). The process used to derive MVS is described in Section 3.1.6 and the extent of each MVS within the planning area is shown on Map 2.

The likely maximum overall fuel hazard is based on on-ground sampling and vegetation mapping within the planning area, adjusted to account for the time since last fire. It can be used for planning and incident management, however this estimate should be supported by on-ground inspection as areas of vegetation remain unmapped and it is likely that other factors (such as high weed density) will influence the overall fuel hazard.

TABLE 1 – LIKELY MAXIMUM OVERALL FUEL HAZARD FOR MVS IN THE PLANNING AREA

MVS No	MVS Name	Dominant Species Layers	Likely Maximum Overall Fuel Hazard	Significant Fuel Layers
4	<i>Eucalyptus</i> forests with a shrubby understorey	<i>Eucalyptus baxteri</i> , <i>E. cosmophylla</i> , <i>Leptospermum myrsinoides</i> , <i>Platylobium obtusangulum</i> , <i>Hakea rostrata</i> , <i>Hibbertia riparia</i>	Extreme	Surface; Elevated ¹
8	<i>Eucalyptus</i> woodlands with a shrubby understorey	<i>Eucalyptus obliqua</i> , <i>E. baxteri</i> , <i>E. viminalis</i> ssp. <i>cygnetensis</i> , <i>E. baxteri</i> , <i>E. cosmophylla</i> , <i>E. fasciculosa</i> , <i>E. goniocalyx</i> , <i>E. leucoxylon</i> , <i>Pultenaea daphnoides</i> , <i>Lepidosperma semiteres</i> , <i>Hakea rostrata</i> , <i>Platylobium obtusangulum</i> , <i>Allocasuarina muelleriana</i> ssp. <i>muelleriana</i> , <i>Hibbertia exutiacies</i> , <i>Acacia pycnantha</i> , <i>Leptospermum myrsinoides</i> , <i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i> , <i>Xanthorrhoea semiplana</i> ssp. <i>semiplana</i> , <i>Astroloma conostephioides</i>	Extreme	Surface; Elevated ¹
9	<i>Eucalyptus</i> woodlands with a grassy understorey	<i>Eucalyptus leucoxylon</i> , <i>E. viminalis</i> ssp. <i>cygnetensis</i> , <i>E. microcarpa</i> , <i>E. camaldulensis</i> var. <i>camaldulensis</i> , <i>E. fasciculosa</i> , <i>E. porosa</i> , <i>Acacia pycnantha</i> , <i>A. paradoxa</i> , <i>Briza maxima</i> , <i>Olearia ramulosa</i> , <i>Astroloma humifusum</i> , <i>Olea europaea</i> ssp. <i>europaea</i> , <i>Vulpia</i> spp.	Very High	Surface; Elevated ¹
21	Other <i>Acacia</i> tall open shrublands and shrublands	<i>Acacia retinodes</i> var. <i>retinodes</i> , <i>Pteridium esculentum</i>	High	
26	<i>Casuarina</i> and <i>Allocasuarina</i> forests and woodlands	<i>Allocasuarina verticillata</i> , <i>Acacia pycnantha</i> , <i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i> , <i>Themeda triandra</i> , <i>Lomandra densiflora</i> , <i>Xanthorrhoea quadrangulata</i>	High	
32	Other shrublands	<i>Allocasuarina muelleriana</i> , <i>Xanthorrhoea quadrangulata</i> , <i>Hakea</i> spp., <i>Calytrix tetragona</i>	High	
37	Other tussock grasslands	<i>Themeda triandra</i>	High	
38	Wet tussock grassland, herbland, sedgeland or rushland	<i>Pteridium esculentum</i>	High	

* denotes introduced species

¹ if Stringybark present

5 READINESS

5.1 Equipment

DEH is committed to purchasing and maintaining specialised fire equipment and communications systems to optimise fire management and response capabilities.

DEH issues personal protective equipment (PPE) to all firefighting staff that is designed to protect the safety and welfare of personnel and improve fire suppression effectiveness. DEH ensures that PPE issued to firefighters shall meet recognised Australian Standards and CFS requirements and schedules as set out in the *Policy and Procedure for Personal Firefighting Equipment* (DEH, 2005a). PPE is also consistent with the *DEH Occupational Health, Safety and Welfare Policy* (2006h).

DEH firefighting resources includes a variety of specialised vehicles and equipment, which may be deployed to fires anywhere in South Australia or interstate. DEH ensures that all firefighting equipment meets Australian Standards (where they exist) and complies with CFS standards, unless specified otherwise in DEH environmental policies and standards including the *Policy and Procedure for Vehicle Equipment Standards* (DEH, 2005b) and the *Policy and Procedure for Earthmoving Equipment* (DEH, 2006i)

All firefighting equipment is inspected prior to the commencement of the fire season and after use at fires to ensure that minimum standards are met as prescribed in DEH policies and standards.

5.2 Training

Firefighting is a specialised activity with a range of associated hazards. All firefighters shall be trained to carry out their duties safely and recognise hazardous situations. DEH staff involved, directly or indirectly, in the management of fire incidents are required to complete the *Basic Fire Fighting Level 1* CFS course at a minimum.

All DEH personnel engaged in fire management operations are trained in accordance with DEH fire management policy and procedures and CFS standards. All staff involved in fire suppression are required to undertake annual pre-season training, health checks and fitness testing to ensure that they are able to carry out assigned duties safely and competently.

DEH is committed to maintaining a safe working environment during fire operations in compliance with the *Occupational Safety, Health and Welfare Act 1986* and consistent with the *DEH Occupational Health, Safety and Welfare Policy* (2006h).

5.3 Risk Mitigation Strategies

5.3.1 Fire Access

DEH is committed to managing a strategic network of fire access tracks in the reserve system, in accordance with the GAFLC standard (GAFLC, 2005). Tracks occurring within the reserves, as well as external tracks/public roads considered important for fire suppression have been classified as a 'Major', 'Standard' or a 'Minor' Track according to the standard. Tracks that

are considered unsuitable for fire suppression have been classified as 'Service Tracks' and should not be used during fire suppression operations unless verified by on-ground inspection. Map 4 shows fire access tracks according to their GAFLC classification.

Slashed areas (unmapped) may be used for access during an incident subject to consultation with relevant DEH District staff.

Tracks that are identified as important for fire suppression are usually located in low fuel areas, supported by zoning or may be positioned between significant assets (e.g. Moores Road in Morialta CP, Queens Jubilee Drive in Belair NP and Long Ridge Track in Cleland CP).

In the Hills Face Zone the majority of the major public roads run east-west (e.g. Old Norton Summit Road, Lower North East Road, Princes Highway, Greenhill Road, Montacute Road, Gorge Road, etc.). DEH fire access tracks will provide strategic links between these roads to increase suppression opportunity and access within the reserve system.

Design and location of new fire access tracks will take into consideration gentle slopes and low fuel hazard areas to provide for the safety of firefighters during suppression.

Fire access points and tracks have been reviewed as part of this plan and proposed changes are summarised within Appendix 1. If track closures or upgrades are not recommended in the plan, tracks will be maintained to the GAFLC standards shown on Map 4 (Fire Management and Access) through verge works and slashing. In order to maintain tracks to GAFLC standards works will be implemented on an annual basis, subject to resources, fuel hazard and other factors.

Management Strategies

Fire Access	39. Implement changes to fire access as described in Appendix 1.
	40. If no changes are proposed in Appendix 1, maintain fire access tracks to the GAFLC standards as shown on Map 4.
	41. Implement signs on fire access tracks according to GAFLC standards.

5.3.2 Fire Infrastructure

The following fire infrastructure is maintained for fire suppression activities within the Hills Face Zone.

- Mount Lofty Fire Tower (operated and maintained by CFS).
- Woodside and Cherry Gardens Airstrips (located outside the planning area).
- Helipad within Morialta CP, near Fox Dam.
- Fire hydrants within the Mount Lofty Botanic Gardens.
- Fire protection systems on high value assets including buildings at the Mount Lofty Botanic Gardens, Black Hill worksite, Morialta Resource Centre, Cleland Wildlife Park and Mount Lofty Summit Visitor Centre.

- Sprinkler systems at the Mount Lofty Botanic Gardens and at Cleland Wildlife Park.
- Numerous standpipes, hydrants and static water supplies (tanks, dams, etc.).

Map 4, the *Response Plan for the Adelaide Region* (DEH, 2006j) as well as the Adelaide Region annual works schedule will provide more information on fire infrastructure .

5.3.3 Fire Management Zones

Fire management zones as detailed in the *Policy and Procedure for Fire Management Zoning in DEH Fire Planning* (DEH, 2006a) have been introduced into fire management planning to:

- ensure that appropriate management actions are implemented to meet the requirements for asset protection and ecological management on DEH managed land
- clarify the areas where different fire management activities will be undertaken on all DEH managed land.
- ensure a standard approach to the application of fire management zones on DEH managed land across the state.

Fire management zones are categorised according to the primary objective for fire management – Asset Zone (A-zone), Buffer Zone (B-zone) or Conservation Zone (C-zone). These zones were determined, giving consideration to overall fuel hazard levels in different habitat types and the level of risk to assets including life, property and cultural heritage and biodiversity assets (DEH, 2006a). The zones allocated to the reserves within the planning area are described in Appendix 1 and shown on Map 4.

The following general objectives apply for fire management zoning across the reserves in the planning area.

A-zone Objectives

- To provide a low fuel area of at least 40 m to help protect life and property/built assets from radiant heat damage, flame contact and short distance ember attack.
- To modify the rate of spread and fire intensity providing the highest degree of safety for fire crews during suppression.

B-zone Objectives

- To minimise the likelihood of bushfire impacting on property and ecological assets.
- To assist in reducing bushfire intensity, ember attack, and spotting potential, which is likely to impact on the assets within the surrounding urban areas or within the reserves.
- To provide a suppression advantage to assist in containing bushfires within defined areas, that is to minimise the likelihood of fires entering the reserve from the wider landscape or exiting the reserve.
- To enhance safe access for firefighters.

C-zone Objectives

- To manage fire to meet the reserve management objectives as specified within the Reserve Management Plans listed in Section 2.4 of this document.
- To assist in the conservation of species and populations such as the rated species listed in Appendix 2 and 3, as well as threatened ecological communities listed in Appendix 4, through the application of appropriate fire regimes.
- To reduce the likelihood of contiguous vegetation burning in a single fire event.

Prescriptions for Fuels in A- and B-zones

The overall fuel hazard:

- should not exceed *Moderate* for the areas designated as A-zones; and
- should not exceed *High* for the areas designated as B-zones.

In A- and B-zones, fuel management will be undertaken to achieve the desired level of overall fuel hazard, once it exceeds the prescribed limit. Note that within C-zones management is not dictated by overall fuel hazard levels, rather zoning allows for fire management to meet ecological and conservation management objectives.

Fuel Reduction in A- and B-zones

Details on fuel reduction methods within A- and B-zones are provided within the EAT (as part of prescribed burn planning), which is prepared before the implementation of each prescribed burn (see below) and also before fire management works are undertaken within DEH managed land (where native vegetation is being cleared and is not exempt under the *Native Vegetation Act 1991*). Refer to the *Interim Environmental Assessment Table Guidelines* (DEH, 2004) and the *Policy and Procedure for Prescribed Burning* (DEH, 2006d) for more information.

5.3.4 Burn Preparation

All prescribed burning in A-, B- and C-zones (regardless of the objective or tenure) will adhere to the planning process utilising the EAT, as detailed in Figure 5 and in the *Policy and Procedure for Prescribed Burning* (DEH, 2006d). Ecological burns are also subject to the planning process as detailed in the *Policy and Procedure for Ecological Burning* (DEH, 2008d).

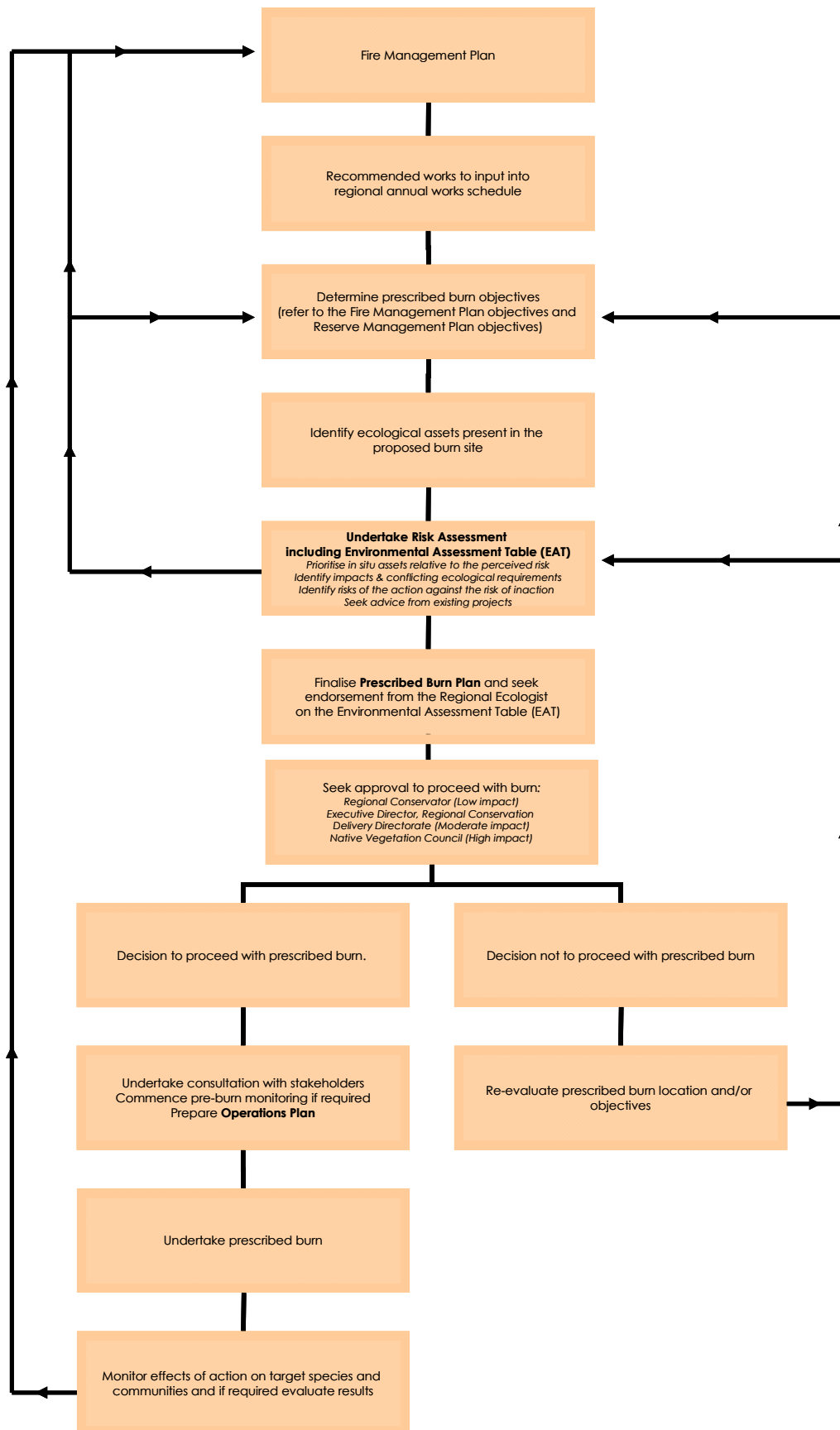


FIGURE 5 – FLOW CHART DETAILING THE BURN PLANNING PROCESS

5.3.5 Fire Management Blocks

The planning area has been divided into 30 fire management blocks to ensure that information and issues unique to a particular area have been addressed (Table 2). Block boundaries are based on access and the practicalities of implementing fire management objectives.

TABLE 2 – FIRE MANAGEMENT BLOCK INFORMATION

Reserve	Block	Size (ha)
Angove Conservation Park	Angove Block	5
Anstey Hill Recreation Park	Main Anstey Hill Block	157
	North East Road Block	59
	Eastern Anstey Block	64
	Lower North East Road Block	83
Belair National Park	Karka Block	284
	Jubilee Block	238
	Lodge Block	238
	Belair Leaselands Block	77
Black Hill Conservation Park	Gorge Road Block	108
	Black Hill Summit Block	500
	Eagles Court Block	145
Blackwood Forest Recreation Park	Blackwood Forest Block	21
Brownhill Creek Recreation Park	Brownhill Creek Block	57
Cleland and Eurilla Conservation Parks	Cleland Wildlife Park Block	51
	Chambers Gully Block	297
	Southern Cleland Block	659
	Freeway Block	29
	Eurilla Block	130
Cobbler Creek Recreation Park	Cobbler Creek Block	270
Ferguson Conservation Park	Ferguson Block	8
Giles Conservation Park	Giles Block	110
Greenhill Recreation Park	Greenhill Block	24
Horsnell Gully Conservation Park	John Horsnell Block	137
Morialta Conservation Park	Third Falls Block	162
	Montacute Road Block	131
	Rocky Hill Block	123
	Fourth Creek Block	147
Mount Lofty Botanic Gardens	Eurilla Block	130
Mount Osmond Reserve	Mount Osmond Block	98
The Knoll Conservation Park	The Knoll Block	2

5.3.6 Ecological Fire Management

The management of fire to maintain biodiversity is discussed in more detail in the Draft DEH *Guidelines for Ecological Fire Management* (DEH, 2006k). This approach is being used as a sound basis for the management of fire for biodiversity across Australia (Andersen, *et al.*, 2003; FEWG, 2004; Hopkins and Saunders, 1987; Whelan, *et al.*, 2002). It is based on accumulating knowledge of species, populations and communities and their response to fire regimes, and then applying this knowledge to fire management practices to maximise biodiversity outcomes. Ecological Fire Management Guidelines are used to assist in achieving management objectives in C-zones within all DEH Fire Management Plans.

Methodology

Ecological Fire Management Guidelines have been developed from the research and analysis of available data relating to the Key Fire Response Species (the species most likely to decline due to inappropriate fire regime) within the planning area. The approach used by DEH to define the Ecological Fire Management Guidelines involves the identification of fire regime thresholds using flora and the assessment of the potential impacts of these thresholds against known faunal requirements, particularly the requirements of species of conservation significance. The steps taken in the development of the Ecological Fire Management Guidelines are as follows.

- Vital attributes data of flora and fauna, and ecological communities are gathered and assessed.
- This knowledge is used to identify the Thresholds of Potential Concern (TPC) of fire regime (fire interval, intensity, season and type) where species significantly decrease.
- Ecological Fire Management Guidelines are formed from these thresholds and are then used to guide the fire management practices to ensure that adequate habitat is available to maintain biodiversity (i.e. species, populations and communities).

Figure 6 (below) illustrates this process.

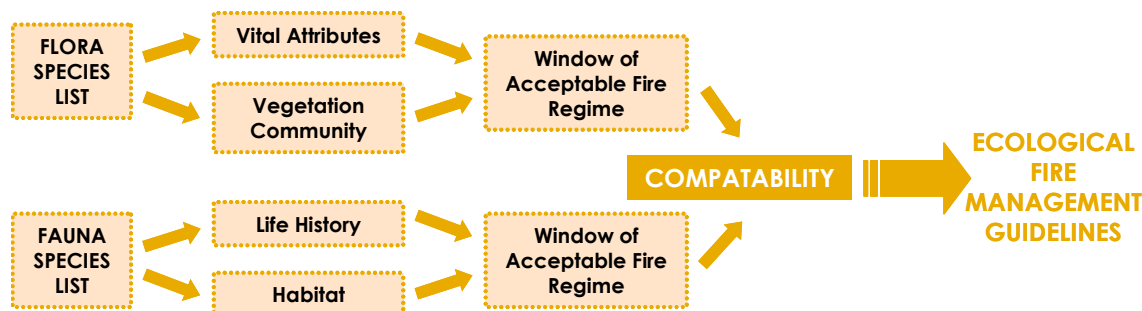


FIGURE 6 – APPROACH FOR DETERMINING ECOLOGICAL FIRE MANAGEMENT GUIDELINES

Adapted from (DEH, 2006k)

Interpreting Ecological Fire Management Guidelines

Ecological Fire Management Guidelines have been defined for MVS, enabling fire management to strategically plan and manage fire within the reserves in the planning area in a way that will ensure the maintenance and enhancement of biodiversity (Table 3). Guidelines for five aspects of fire regime (interval, frequency, spatial, intensity and season)

have been determined for all MVS within the planning area (where data are available). The upper and lower thresholds of potential concern for a particular MVS have been proposed, as well as recommendations on the management of fire frequency. Fire intensity requirements for species regeneration and undesired seasonal burning patterns have also been identified. Ecological Fire Management Guidelines should not be used as prescriptions; instead they define a window of “acceptable” fire regime that ensures the conservation of existing species.

Thresholds of Potential Concern

Thresholds of Potential Concern (TPC) are defined as ‘the limits of tolerance to a particular fire regime’ (Kenny, *et al.*, 2003).

- TPC1 demonstrates the lower threshold for fire interval (in years) for a particular MVS. That is, vegetation within this MVS will be represented predominantly by early successional species if the inter-fire interval is less than the time specified, and those species that require longer to flower and set seed can disappear from a community.
- TPC2 demonstrates the upper threshold for fire interval (in years) for a particular MVS. That is, populations of some species (e.g. obligate seeders) are likely to reduce within this MVS if fire is absent for more than the time specified.

If either of the thresholds are breached, species of sensitive functional types are likely to significantly decline. Fire intervals between the upper and the lower threshold (Table 3) are predicted to maintain the species complement, whereas intervals shorter than the lower threshold or longer than the upper threshold are predicted to lead to the decline of the Key Fire Response Species (Kenny, *et al.*, 2003).

TABLE 3 – ECOLOGICAL FIRE MANAGEMENT GUIDELINES FOR MVS IN THE PLANNING AREA

		FIRE REGIME						
		Thresholds of Potential Concern (TPC)		Spatial Criteria	Frequency		Intensity	Season
MVS No	MVS NAME	TPC1 Lower threshold in years	TPC2 Upper threshold in years	Inter-fire intervals within TPC1 and TPC2 across more than X% of the extent of this MVS within the planning area	Avoid more than 2 fires within a period of X years	Avoid more than 2 successive fires of low intensity	Some medium to high intensity fire needed to regenerate some species	Avoid 2 or more successive fires in season ¹
4	<i>Eucalyptus</i> forests with a shrubby understorey	20	35	50%	40	Y	Y	Spring
8	<i>Eucalyptus</i> woodlands with a shrubby understorey	20	35	50%	40	Y	Y	Spring
9	<i>Eucalyptus</i> woodlands with a grassy understorey	20	25	50%	40	Y	Y	Spring
21	Other <i>Acacia</i> tall open shrublands and shrublands	20	40	50%	40	Y	Y	Dry
26	<i>Casuarina</i> and <i>Allocasuarina</i> forests and woodlands	20	50	50%	40	#	#	#
32	Other shrublands	20	35	50%	40	#	#	#
37	Other tussock grasslands	10	25	50%	20	#	#	Autumn
38	Wet tussock grassland, herbland, sedgeland or rushland	20	35	50%	40	#	#	Spring

Denotes that fire response is unknown or ambiguous for this MVS thus the required data is not available to propose Ecological Fire Management Guidelines. When data becomes available this table will be updated.

¹ Note that this is not restricted to the same year, but may relate to fires occurring in the same season over a number of years.

6 RESPONSE

6.1 Response Plans

A Response Plan exists for the Adelaide Region (DEH, 2006j), which is reviewed on an annual basis. The response plan provides reserve-specific information in relation to fire suppression including water points, equipment and access, as well as levels of preparedness.

A Fire Action Plan has been prepared for the Mount Lofty Botanic Gardens (Leading Emergency Services, 2005), which outlines recommended actions for days of high fire danger and in the case of fire impacting the gardens.

Note that these plans are for initial response only and if the incident escalates this Fire Management Plan should be referred to for more detailed fire management information, in conjunction with DEH staff.

6.2 Suppression Considerations

Initial efforts to contain bushfires should be made using existing access tracks, previously burnt areas and natural low fuel areas. If unsuccessful, alternative strategies may be considered providing the impact can be justified, and ecological consequences considered. The best available fire prediction should be used before decisions on strategies are taken to ensure all agencies are working to a common goal. For DEH reserves it is likely that DEH staff will be the best source of information, as such they should be consulted during the development of any incident prediction. A DEH Liaison Officer will be assigned to most incidents attended by DEH crews in accordance with the *DEH Fire Policy and Procedure for Fire Response* (DEH, 2008b) and the *DEH Fire Policy and Procedure for Coordinated Fire Management* (DEH, 2008a). The role of the DEH Liaison Officer is to coordinate and work with Incident Control, to provide Policy advice as well as resources and other logistical and planning support. Consideration for firefighter safety and the protection of life are paramount during all suppression operations.

Ground Crews

Considerations:

- Hazards such as the presence of mineshafts, quarries, steep slopes and cliffs.
- Likelihood of extreme fire conditions as a result of:
 - wind funnelling up east/west drainage lines
 - westerly wind changes.
- Extreme fuels in vegetation dominated by Stringybarks.
- Likelihood of spotting and ember attack on assets toward the eastern edge of the planning area.
- Consider safety overhead, aerial suppression is likely and falling trees/limbs are common.
- Use anchor points to maintain safe access for firefighters.

- Reliance on ground crews and aerial suppression due to difficulty of machinery deployment.
- DEH role in fire suppression and the role of other fire suppression agencies during an incident (i.e. CFS and MFS may focus on asset protection and Forestry SA, DEH and CFS are likely to implement hose lays and carry out remote area firefighting).
- Water for fire suppression can be sourced from DEH standpipes and static water supplies as shown on Map 4. Alternatively Bulk Water Carriers may be deployed to the incident and there may be mains water points in the surrounding metropolitan area.
- In regards to fire access within the planning area:
 - public roads and access tracks within reserves have been classified to GAFLC standards and are shown on Map 4
 - gates providing access to DEH managed lands are illustrated on Map 4
 - public roads and access tracks classified as Service Tracks should not be used during fire suppression operations unless verified by on ground inspection and approved by the IMT
 - there is a high likelihood that public roads may be blocked due to traffic during an incident, as a result there is a risk of entrapment
 - through access may not be possible in many reserves (e.g. Brownhill Creek Road), maps should be checked carefully to reduce the risk of entrapment.
- Backburning operations should only be implemented in accordance with the *DEH Fire Policy and Procedure for Backburning* (DEH, 2008c) at the discretion of the Incident Controller.
- Implement precautionary hygiene measures to reduce the risk of *Phytophthora* infestation and spread of weeds. This is to be in accordance with the *Standard Operating Procedure - Phytophthora Threat Management* (DEH, 2002d) and the *DEH Operating Procedure - Phytophthora Vehicle Disinfection Units* (DEH, 2003b), which states that:
 - all vehicles and equipment are to arrive at the fireground in a clean state
 - when stood down, all vehicles are to leave the staging area in a clean state.

Machinery Use

Considerations:

- Steep terrain/cliffs within these reserves will often considerably reduce the effectiveness of, and pose risks to machinery operators.
- The construction of new tracks should not be necessary during an incident as the existing track network is extensive.
- Machinery is to be excluded from significant swamp areas, such as Wilson's Bog in Cleland CP.

- Machinery use during fire suppression is to be in accordance with the *Policy and Procedure for Earthmoving Equipment* (DEH, 2006i), which states that CFS must liaise with a delegated DEH officer before engaging earthmoving equipment on DEH managed lands.
- Machinery deployment is to be managed in accordance with the *CFS Supervision of Machinery Guidelines* (CFS, 2007).
- All practical options, effectiveness, the likelihood of success and likely positive and negative impacts on environmental and cultural values must be considered when planning the use of earthmoving equipment.
- *Minimum Impact Suppression Techniques* (MIST) and specialised equipment that reduces impacts to the landscape shall be used wherever possible and control methods will not be greater than the potential or actual impact of the fire.
- Standards for control lines are to be in accordance with the *Standard Operating Procedure for Fire Control Lines* (DEH, 2002c).
- The use of control lines should be determined by the IMT, based on fire severity and weather conditions, giving due consideration to safety and strategic advantage.
- Implement precautionary hygiene measures to reduce the risk of *Phytophthora* infestation and spread of weeds. This is to be in accordance with the *Standard Operating Procedure for Phytophthora Threat Management* (DEH, 2002d) and the *DEH Operating Procedure - Phytophthora Vehicle Disinfection Units* (DEH, 2003b):
 - All machinery and equipment are to arrive at the fire ground in a clean state
 - When stood down, machinery is to leave the staging area in a clean state.

Aerial Suppression

Considerations:

- The MLR Primary Response Zone for the automatic dispatch of aerial bombers.
- Only chemicals qualified and approved by the United States Department of Agriculture (USDA) Forest Service and endorsed by Australasian Fire and Emergency Authorities Council (AFAC) will be used on DEH managed land and on DEH fire appliances (see USDA Forest Service (2008) document).
- The use of retardant and foams should be in accordance with the *Standard Operating Procedure for Fire Suppression Chemicals* (DEH, 2002b).
- Implementation of aerial suppression is to be in accordance with the *Standard Operating Procedure for Air Operations* (DEH, 2002a).
- The use of retardant in catchment areas should be in accordance with the *Memorandum of Understanding on Aerial Application of Chemical Fire Retardants between SA Water and CFS* (CFS, 2006b).

6.3 Visitor Management

For areas with high visitor numbers, visitor management plans are prepared and implemented by regional DEH staff on a needs basis. Buildings and sites have emergency procedures, which includes evacuation from a limited space.

Visitor safety within reserves is managed in accordance with the 'Plan Now to Stay and Defend – or Go Early' principle, which advocates for the preparation of Bushfire Action Plans and explains why trying to escape a fire at the last moment could be fatal (CFS, 2006a). Cleland Wildlife Park provides visitors with a handout (in English and other languages) on Extreme fire danger days outlining procedures to be carried out in the event of an emergency. A Bushfire Preparedness and Response Audit was carried out for the Mount Lofty Botanic Gardens (Ellis, 2005). This audit proposes strategies that should be undertaken to minimise risk to visitors during a bushfire.

Management Strategies

Visitor Management	42. Review the need for bushfire visitor management plans within the reserves in the planning area and prepare plans as required.
	43. Ensure bushfire visitor management plans are reviewed annually.
	44. Regularly rehearse the visitor management procedure to be implemented during a bushfire.

7 RECOVERY, RESEARCH AND MONITORING

7.1 Post-Fire Rehabilitation and Recovery

DEH has a *Policy and Procedure for Post-fire Rehabilitation* (DEH, 2007c) to ensure that the post-fire rehabilitation and recovery of a reserve is identified during an incident. A post-fire rehabilitation plan will be prepared and describe the areas affected by fire and impacts on the natural and built environment. Specific objectives of post-fire rehabilitation plans are outlined in the Policy and Procedure (DEH, 2007c).

7.2 Research

At present there are two research projects that are being undertaken within the Hills Face Zone.

- DEH and Flinders University are investigating three myrmecochorous species in Messmate Stringybark (*Eucalyptus obliqua*) woodlands. The research aims to determine whether:
 - plants benefit from myrmecochory by having their seed protected from lethal temperatures during fire
 - seed selection and seed handling behaviour of ants affects seedbank dynamics of myrmecochorous plants
 - the post-fire ant community environment affects ant-seed dispersal.
- DEH and the University of Adelaide are investigating how prescribed burning influences sediment movement in the Mount Lofty Ranges. The research aims to determine whether optimising prescribed burning practices can reduce potential erosion and hence protect other regional ecosystem services such as water quality, land productivity and biodiversity. The research involves:
 - GIS modelling to determine potential erosion
 - quantitative measurement of sediment movement in the field
 - investigations into the influence of slope, vegetation cover and bioturbation.

Any fire-related research that is proposed within the reserves in the planning area should be discussed with the Senior Fire Research Officer, Fire Management Branch.

It is recommended that research should be undertaken to:

Research

45. Investigate the suitability of the Ecological Fire Management Guidelines (Table 3) for MVS by:
 - quantifying the existing status of MVS within the planning area to assist fire managers with burn planning and suppression activities
 - the on-ground assessment of historical fire regimes in similar communities across the state
46. Explore the effects of season of burn, fire intensity and fire frequency on the Nationally rated Southern Brown Bandicoot populations and preferred habitat structure and use this information to update the Ecological Fire Management Guidelines (Appendix 3).
47. Research the effects of fire regime, particularly fire frequency, season of burn and fire intensity on the Nationally rated MLR Chestnut-rumped Heathwren populations and preferred habitat and use this information to update the Ecological Fire Management Guidelines (Appendix 3).
48. Explore the effects of fire regime, particularly season of burn, fire frequency, fire interval and fire intensity on Nationally rated flora species, including Osborn's Eyebright, Clover Glycine (*Glycine latrobeana*) Silver Daisy-bush (*Olearia pannosa* ssp. *pannosa*) and Pale Leek-orchid (*Prasophyllum pallidum*). Use this information to propose Ecological Fire Management Guidelines (Appendix 2).
49. Investigate the effects of fire regime, particularly fire frequency and fire intensity on Nationally rated orchid species: Pink-lipped Spider-orchid, White Spider-orchid and Leafy Greenhood and use this information to update the Ecological Fire Management Guidelines (Appendix 2).

7.3 Monitoring

Monitoring will be established in conjunction with any prescribed burns conducted within the reserves in the planning area, in accordance with DEH Policy and Procedures. This includes the *Policy and Procedure for Prescribed Burning* (DEH, 2006d), incorporating the Environmental Assessment Table and monitoring procedures. Refer to Section 5.3.3 and 5.3.4 of this plan for general information on zoning, burning and the planning requirements.

It is recommended that monitoring be undertaken to:

Monitoring	50. Investigate the fuel accumulation rates of the various MVS that occur within the planning area (Table 1). These data will help DEH staff determine if and when fuel reduction works are required, ultimately assisting in the scheduling of operational works and activities in B-zones.
	51. Assess the suitability of the proposed weed management guidelines for the control of introduced species following fire (Appendix 2)
	52. Assess the suitability of the proposed inter-fire interval and season of burn guidelines for Nationally rated orchids: Pink-lipped Spider-orchid, White Spider-orchid and Leafy Greenhood (Appendix 2).
	53. Investigate the appropriateness of the proposed extent of burn and fire interval guidelines on the Nationally rated MLR Chestnut-rumped Heathwren (Appendix 3).
	54. Examine the appropriateness of the proposed fire interval guidelines for the Nationally rated Southern Brown Bandicoot, in conjunction with the Southern Brown Bandicoot Recovery Team (Appendix 3).

8 SUMMARY OF MANAGEMENT STRATEGIES

Visitor Use

1. Implement appropriate fuel management strategies as shown on Map 4 to increase visitor safety.
2. Consider reserve closures on extreme fire weather days to ensure visitor safety at the discretion of the Director National Parks (Executive Director Conservation Policy and Programs) or delegate.

Built Assets

3. Implement fuel management strategies appropriate to asset protection as shown on Map 4.
4. Encourage adjacent property owners to work with CFS to implement appropriate and coordinated fire management works on their own land to minimise the threat of fire.
5. Undertake fire management works and activities on DEH reserves to minimise the impact that fire may pose to adjacent public assets.
6. Encourage volunteer participation in undertaking approved fuel reduction activities.

Cultural Assets

7. Implement fuel management strategies appropriate for the protection of cultural assets as shown on Map 4.
8. Ensure liaison at bushfires occurs to identify cultural assets, where time allows. Once the fire has passed evaluate sites to establish if any damage has occurred.
9. Ensure suppression strategies take into account significant cultural assets in order to minimise impacts from these activities and undertake post-fire rehabilitation.

Chestnut-rumped Heathwren

10. Conduct prescribed burning to minimise the risk of large contiguous areas of habitat burning in one fire event.
11. If necessary, conduct prescribed burning to increase preferred habitat.
12. Fire suppression activities should attempt to retain some unburnt patches as refuge areas.
13. Monitor the effect of fire on MLR Chestnut-rumped Heathwren populations and preferred habitat and use this information to update the DEH vital attributes database for use in future Ecological Fire Management Guidelines (Appendix 2).
14. Consult the Adelaide Region Biodiversity Conservation Unit when planning burns in known habitat of the MLR Chestnut-rumped Heathwren.

Southern Brown Bandicoot

15. Conduct prescribed burning to minimise the risk of large contiguous areas of habitat burning in one fire event.
16. Conduct prescribed burning to increase habitat patchiness where necessary.
17. Attempt to provide unburnt patches as refuge areas during prescribed burning and bushfire suppression activities.
18. Finalise and publish the Ecological Fire Management Strategy for the species.
19. Monitor the effects of fire on the Southern Brown Bandicoot populations and preferred habitat and use this information to update the DEH vital attributes database for use in future Ecological Fire Management Guidelines (Appendix 2).

20. Consult the Southern Brown Bandicoot Recovery Team during the planning of any burn to be conducted within the known habitat of the species.

Threatened Orchids

21. Minimise the likelihood of vehicles or earthmoving equipment impacting on threatened Orchid populations during track management and fire suppression operations.
22. Avoid prescribed burning or slashing within threatened Orchid populations between May and November.
23. Avoid prescribed burning or slashing within threatened Orchid populations more frequently than every 5 years.
24. Minimise the likelihood of large areas of threatened Orchid habitat burning in a single fire event.
25. Liaise with the South Lofty Block Orchid Recovery Team when planning prescribed burns within known habitat of threatened Orchids.
26. Undertake ecological/experimental burns on threatened Orchid populations to examine the response of these species to different disturbance regimes.

Osborn's Eyebright

27. Minimise the likelihood of large areas of known habitat burning in a single fire event.
28. Consult the Adelaide Region Biodiversity Conservation Unit when planning burns in areas supporting Osborn's Eyebright.
29. Undertake ecological/experimental burns within known habitat to examine the response of Osborn's Eyebright to different disturbance regimes.
30. Prescribed burning should occur after seed release in Autumn.
31. Monitor the effects of fire on Osborn's Eyebright use this information to update the DEH vital attributes database for use in future Ecological Fire Management Guidelines (Appendix 2).

Pest Species

32. Refer to Ecological Fire Management Guidelines (Table 3) and fire management guidelines for introduced flora species (Appendix 2) during prescribed burn planning.
33. Consider the use of fire as part of an integrated biodiversity management strategy.
34. Conduct post-fire weed control subject to Regional priorities.
35. Identify the potential impact of weed species prior to any prescribed burn in prescribed burn planning, as part of the EAT. This will identify any priority weed species and recommend post-fire actions to mitigate the impact of weeds.
36. Collect relevant information in prescribed burn planning as part of the EAT on introduced fauna, to determine appropriate management post-fire.
37. Ensure the Standard Operating Procedure – Phytophthora Threat Management (SOP-002) (DEH, 2002d) is adhered to in Phytophthora risk areas, which includes all the reserves in the planning area.
38. Ensure hygiene practices are implemented to reduce the spread of Phytophthora across the planning area. Refer to the DEH Operating Procedure - Phytophthora Vehicle Disinfection Unit (DEH, 2003b).

Fire Access

39. Implement changes to fire access as described in Appendix 1.
40. If no changes are proposed in Appendix 1, maintain fire access tracks to the GAFLC standards as shown on Map 4.

41. Implement signs on fire access tracks according to GAFLC standards.

Visitor Management

42. Review the need for bushfire visitor management plans within the reserves in the planning area and prepare plans as required.
43. Ensure bushfire visitor management plans are reviewed annually.
44. Regularly rehearse the visitor management procedure to be implemented during a bushfire.

Research

45. Investigate the suitability of the Ecological Fire Management Guidelines (Table 3) for MVS by:
 - quantifying the existing status of MVS within the planning area to assist fire managers with burn planning and suppression activities
 - the on-ground assessment of historical fire regimes in similar communities across the state
46. Explore the effects of season of burn, fire intensity and fire frequency on the Nationally rated Southern Brown Bandicoot populations and preferred habitat structure and use this information to update the Ecological Fire Management Guidelines (Appendix 3).
47. Research the effects of fire regime, particularly fire frequency, season of burn and fire intensity on the Nationally rated MLR Chestnut-rumped Heathwren populations and preferred habitat and use this information to update the Ecological Fire Management Guidelines (Appendix 3).
48. Explore the effects of fire regime, particularly season of burn, fire frequency, fire interval and fire intensity on Nationally rated flora species, including Osborn's Eyebright, Clover Glycine (*Glycine latrobeana*) Silver Daisy-bush (*Olearia pannosa* ssp. *pannosa*) and Pale Leek-orchid (*Prasophyllum pallidum*). Use this information to propose Ecological Fire Management Guidelines (Appendix 2).
49. Investigate the effects of fire regime, particularly fire frequency and fire intensity on Nationally rated orchid species: Pink-lipped Spider-orchid, White Spider-orchid and Leafy Greenhood and use this information to update the Ecological Fire Management Guidelines (Appendix 2).

Monitoring

50. Investigate the fuel accumulation rates of the various MVS that occur within the planning area (Table 1). These data will help DEH staff determine if and when fuel reduction works are required, ultimately assisting in the scheduling of operational works and activities in B-zones.
51. Assess the suitability of the proposed weed management guidelines for the control of introduced species following fire (Appendix 2)
52. Assess the suitability of the proposed inter-fire interval and season of burn guidelines for Nationally rated orchids: Pink-lipped Spider-orchid, White Spider-orchid and Leafy Greenhood (Appendix 2).
53. Investigate the appropriateness of the proposed extent of burn and fire interval guidelines on the Nationally rated MLR Chestnut-rumped Heathwren (Appendix 3).
54. Examine the appropriateness of the proposed fire interval guidelines for the Nationally rated Southern Brown Bandicoot, in conjunction with the Southern Brown Bandicoot Recovery Team (Appendix 3).

9 REFERENCES

- AMLR NRM Board (2007) *Creating a Sustainable Future - a Natural Resource Management Plan for the Adelaide and Mount Lofty Ranges Region - Draft*. Adelaide and Mount Lofty Ranges Natural Resource Management Board, Government of South Australia, Adelaide.
- Andersen, A, Cook, G and Williams, R (2003) Synthesis: fire ecology and adaptive conservation management. In: *Fire in Tropical Savannas: the Kapalga Experiment* (eds A Andersen, G Cook and R Williams) pp. 153-164. Springer, New York.
- Anon. (2006) *EPBC Nomination to list in the Critically Endangered category Derwentia derwentiana subsp. homalodonta (Mount Lofty Speedwell)*. Department of Environment and Heritage, Australian Government. Online: <<http://eied.deh.gov.au/biodiversity/threatened/nominations/pubs/derwentia-d-homalodonta.pdf>> Accessed: 13 September 2007.
- Armstrong, D, Croft, S and Foulkes, J (2003) *A Biological Survey of the Southern Mount Lofty Ranges, South Australia 2000-2001*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Attiwill, P and Wilson, B (2003) *Ecology: An Australian Perspective*. Oxford University Press, South Melbourne.
- Australian Weeds Committee (1999) *Weeds of National Significance*. National Weeds Strategy Executive Committee, Commonwealth of Australia, Canberra. Online: <<http://www.weeds.org.au/natsig.htm>> Accessed: 26 June 2007.
- Bickerton, D (1999) *Pink-lipped Spider Orchid (Caladenia behrii) Recovery Plan*. Department of the Environment and Water Resources, Australian Government, Canberra.
- Brooks, M, D'Antonio, C, Richardson, D, Grace, J, Keeley, J, DiTomaso, J, Hobbs, R, Pellant, M and Pyke, D (2004) Effects of invasive alien plants on fire regimes. *BioScience* **54**, 677-688.
- Brougham, K, Cherry, H and Downey, P (2006) *Boneseed Management Manual: Current Management and Control Options for Boneseed (Chrysanthemoides monilifera ssp. monilifera) in Australia*. Department of Environment and Conservation, NSW Government, Sydney South.
- CFS (2006a) *Preparing for Bushfires - A Family Guide to Home and Property Protection (Book 1)*. SA Country Fire Service, Government of South Australia, Adelaide.
- CFS (2006b) *Memorandum of Understanding on Aerial Application of Chemical Fire Retardants*. Country Fire Service and the South Australian Water Corporation, Adelaide.
- CFS (2007) *Supervision of Machinery Guidelines*. South Australian Country Fire Service, Government of South Australia, Adelaide.
- Chapman, T (1995) *The Ecology and Management of the Black-chinned Honeyeater (Meliphreptus gularis) in the Mount Lofty Ranges*. Unpublished Thesis. University of Adelaide, Adelaide.
- Daskalakou, E and Thanos, C (1996) Aleppo pine (Pinus halepensis) postfire regeneration: the role of canopy and soil seed banks. *International Journal of Wildland Fire* **6**, 59-66.
- Davies, RJP (2006) *Stipoid Grass Weed Management Strategy for the Onkaparinga Catchment, South Australia*. Stipoid Grass Weeds Working Group, Adelaide.
- DEH (2000) *Brownhill Creek Recreation Park Weed Management Plan*. Department for Environment and Heritage, Government of South Australia.
- DEH (2001) *Morialta and Black Hill Conservation Parks Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2002a) *Standard Operating Procedure - Air Operations*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2002b) *Standard Operating Procedure - Fire Suppression Chemicals*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2002c) *Standard Operating Procedure - Fire Control Lines*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2002d) *DEH Standard Operating Procedure - Phytophthora Threat Management (SOP-002)*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2002e) *Cleland and Eurilla Conservation Park Vegetation Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2003a) *Cobbler Creek Recreation Park Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2003b) *DEH Operating Procedure - Phytophthora Vehicle Disinfection Unit, V1*.

- Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2003c) *Brownhill Creek Recreation Park Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2003d) *Belair National Park Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2004) *Interim Environmental Assessment Table Guidelines*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2005a) *Policy and Procedure for Personnel Firefighting Equipment*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2005b) *Policy and Procedure for Vehicle Equipment Standards*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2005c) *Provisional list of Threatened Ecosystems of South Australia*. Unpublished. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2005d) *Morialta Conservation Park Vegetation Management Plan 2005-2009*. Department for Environment and Heritage, South Australian Government, Adelaide.
- DEH (2005e) *Fire Management Policy*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2005f) *Blackwood Forest Recreation Park Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2005g) *Angove Conservation Park Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006a) *Policy and Procedure for Fire Management Zoning in DEH Fire Planning*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006b) *Policy and Procedure for Risk Assessment in DEH Fire Planning*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006c) *Overall Fuel Hazard Guide for South Australia, 1st Edition*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006d) *Policy and Procedure for Prescribed Burning*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006e) *Aboriginal Heritage Handbook and Strategy*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006f) *Biodiversity - Threatened species: The Southern Brown Bandicoot*. Department for Environment and Heritage, Government of South Australia, Adelaide. Online: <<http://www.environment.sa.gov.au/biodiversity/bandicoot.html>> Accessed: 20 June 2006.
- DEH (2006g) *Glossary of Fire Management Terms*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006h) *Occupational Health, Safety and Welfare Policy*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006i) *Policy and Procedure for Earthmoving Equipment*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006j) *Fire Response Plan – Adelaide Region Response Zone*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006k) *Ecological Fire Management Guidelines - DRAFT*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2006l) *Anstey Hill Recreation Park Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2007a) *No Species Loss: a Nature Conservation Strategy for South Australia (2007-2017)*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2007b) *Policy and Procedure for Fire Management Planning: Project Management and Consultation*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2007c) *Policy and Procedure for Post-Fire Rehabilitation*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2008a) *Fire Policy and Procedure - Coordinated Fire Management*. Fire Policy and Procedure Manual. Department for Environment

- and Heritage, Government of South Australia, Adelaide.
- DEH (2008b) *Fire Policy and Procedure - Fire Response*. Fire Policy and Procedure Manual (Draft). Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2008c) *Fire Policy and Procedure - Backburning*. Fire Policy and Procedure Manual (Draft 2008). Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2008d) *Fire Policy and Procedure - Ecological Burning*. Fire Policy and Procedure Manual (Draft 2008). Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (2009) *Informing Biodiversity Conservation for the Adelaide and Mount Lofty Ranges Region - Priorities, Strategies and Targets - DRAFT*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (in prep) *Biodiversity Strategy for Adelaide and Mount Lofty Ranges - DRAFT*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- DEH (Cwth) (2005) *Australia's Biogeographical Regions*. Department of Environment and Heritage, Commonwealth of Australia, Canberra. Online: <<http://www.deh.gov.au/parks/nrs/ibra/>> Accessed: 23 November 2006.
- DEP (1983) *Cleland Conservation Park Management Plan*. Department of Environment and Planning, Government of South Australia, Adelaide.
- DEP (1984) *Ferguson Conservation Park Management Plan*. Department of Environment and Planning, Government of South Australia, Adelaide.
- DEP (1985) *Recreation Parks of the Adelaide Foothills (Sturt Gorge, Shepherds Hill, Windy Point, Greenhill and The Elbow) Management Plan - DRAFT*. Department for Environment and Planning, Government of South Australia, Adelaide.
- DPC (2004) *South Australia's Strategic Plan - Creating Opportunity*. Department of the Premier and Cabinet, Government of South Australia, Adelaide.
- DWLBC (2006) *Native Vegetation Council of South Australia*. Department of Water, Land and Biodiversity Conservation, Government of South Australia, Adelaide. Online: <<http://www.dwlbc.sa.gov.au/native/nvc/index.html>> Accessed: 29 January 2007.
- Ellis, S (2005) *Independent Audit of Bushfire Preparedness and Response for the Mount Lofty and Wittunga Botanic Gardens*. Leading Emergency Services and the Department for Environment and Heritage, Government of South Australia, Adelaide.
- FEWG (2004) *Guidelines and Procedures for Ecological Burning on Public Land in Victoria*. Fire Ecology Working Group, Department for Natural Resources and Environment & Parks Victoria, Government of Victoria, Melbourne.
- GAFLC (2005) *South Australian Guidelines for State Government Agencies: Firebreaks and Fire Access Tracks*. Government Agencies Fire Liaison Committee, Government of South Australia, Adelaide (approved: September 2005).
- Garnett, S and Crowley, C (2000) *Recovery Outline - Chestnut-rumped Heathwren (Mt Lofty Ranges)*. In: *The Action Plan for Australian Birds 2000*. Environment Australia, Australian Government, Canberra.
- Haby, N and Long, K (2005) *Recovery Plan for the Southern Brown Bandicoot in the Mount Lofty Ranges, South Australia, 2004-2009*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Hobbs, R (1991) Disturbance a precursor to weed invasion in native vegetation. *Plant Protection Quarterly* **6**, 99-104.
- Hobbs, R (2002) Fire regimes and their effects in Australian temperate woodlands. In: *Flammable Australia: The Fire Regimes and Biodiversity of a Continent* (eds R Bradstock, J Williams and A Gill) pp. 305-326. Cambridge University Press, United Kingdom.
- Hobbs, R and Huenneke, L (1992) Disturbance, diversity and invasion: implications for conservation. *Conservation Biology* **6**, 324-337.
- Hopkins, A and Saunders, D (1987) Ecological studies as the basis for management. In: *Nature Conservation: the Role of Remnants in Native Vegetation* (eds D Saunders, G Arnold, A Burbidge and A Hopkins) pp. 15-28. Surrey Beatty, Sydney.
- Kenny, B, Sutherland, E, Tasker, E and Bradstock, R (2003) *Guidelines for Ecologically Sustainable Fire Management - NSW Biodiversity Strategy*. NSW National Parks and Wildlife Service, NSW Government, Hurstville.
- Kinnear, A, Overton, I and Hyde, M (2001) *Brownhill Creek Recreation Park Vegetation Management Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Leading Emergency Services (2005) *Mount Lofty Botanic Gardens - Fire Action Plan*. Department for Environment and Heritage, Government of South Australia, Adelaide.

- McCarthy, G and Tolhurst, K (2004) *Effectiveness of broad scale fuel reduction burning in Victorian parks and forests*. Forest Science Centre Orbost & Creswick, Department for Sustainability & Environment, Government of Victoria.
- Molnar, C (1992) *Flora and Fauna Guarantee Action Statement #16: Dainty Maidenhair *Adiantum capillus-veneris**. Department of Sustainability and Environment, Government of Victoria, East Melbourne. Online: <<http://www.dse.vic.gov.au>> Accessed: 13 September 2007.
- Monterola, V (2007) *Ministerial Review of Bushfire Management in South Australia*. South Australian Fire and Emergency Service Commission Board, Government of South Australia, Adelaide.
- Paul, S (1998) *Belair National Park Vegetation Management Plan 1998-2003*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Paul, S (2001) *Black Hill Conservation Park Vegetation Management Plan 2001-2006*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Paul, S and Incoll, R (2001) *A Model for Vegetation Management Planning in the Mt Lofty Ranges. Vegetation Management Plan Methodology - DRAFT*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Pausas, J, Ouadah, N, Ferran, A, Gimeno, T and Vallejo, R (2003) Fire severity and seedling establishment in *Pinus halepensis* woodlands, eastern Iberian Peninsula. *Plant Ecology* **169**, 205-213.
- Pickett, M (2007) *Assessment of the distribution, habitat and conservation status of the Chestnut-rumped Heathwren (*Hylacola pyrrhopygia parkeri*) in the Mount Lofty Ranges - DRAFT. Unpublished*. Department for Environment and Heritage, Government of South Australia Adelaide.
- Planning SA (2004) *Hills Face Zone Review*. Department of Transport and Urban Planning, Government of South Australia, Adelaide.
- Planning SA (2006) *Bushfire Prone Areas. Primary Industries and Resources, Government of South Australia, Adelaide*. Online: <<http://www.planning.sa.gov.au/go/building/technical-information/maps/bushfire-prone-areas>> Accessed: 16 November 2006.
- Potts, W (1999) *Recovery Plan for Threatened Tasmanian Lowland *Euphrasia* Species 1997-2001*. Department for Primary Industries, Water and Environment. Online: <<http://www.deh.gov.au/biodiversity/threatened/publications/recovery/tas-euphrasia/index.html>> Accessed: 10 July 2007.
- Quarmby, J (2006) *Recovery Plan for Twelve Threatened Orchids in the Lofty Block Region of South Australia 2007-2012*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Robertson, M (2002) *Cobbler Creek Recreation Park Vegetation Management Plan 2002-2007*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Saunders, D, Hobbs, R and Margules, C (1991) Biological consequences of ecosystem fragmentation: a review. *Conservation Biology* **5**, 19-32.
- Smith, PA, Pate, FD and Martin, R (2006) *Valleys of Stone - The Archaeology and History of Adelaide's Hills Face*. Kopi Books, Belair, South Australia.
- Smytherman, M (2003) *Vegetation Management Plan for the Friends of Blackwood Forest Recreation Park*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Te, T (2000) *Black Hill Conservation Park Surveyed Populations of Native and Introduced Vegetation*. Department for Environment and Heritage, Government of South Australia, Adelaide.
- Tindale, N (1974) *Aboriginal Tribes of Australia*. ANU Press, Canberra.
- Tolhurst, K and Cheney, P (1999) *Synopsis of the Knowledge Used in Prescribed Burning in Victoria*. Department of Natural Resources and Environment, Victorian Government East Melbourne, Victoria.
- TSSC (2005) *Commonwealth Listing Advice on Chestnut-rumped Heathwren (Mt Lofty Ranges) (*Hylacola pyrrhopygia parkeri*)*. Threatened Species Scientific Committee, Australian Government, Canberra. Online: <<http://www.environment.gov.au/biodiversity/threatened/species/chestnut-rumped-heathwren.html>> Accessed: 7 August 2007.
- Turner, M (2001) *Conserving Adelaide's Biodiversity: Resources*. South Australian Urban Forest Biodiversity Program, Adelaide.
- USDA Forest Service (2008) *Class A Wildland Fire Foam - qualified and approved by the USDA Forest Service*. United States Department of Agriculture Forest Service - Fire & Aviation Management, Washington, Available Online. URL: http://www.fs.fed.us/rm/fire/documents/qpl_fm1.pdf
- WFLLC (2003) *Minimum Impact Suppression Techniques Guidelines*. Wildland Fire Lessons Learned Centre, Tucson, Arizona. Online:

<www.wildfirelessons.net/documents/GB_MIST_Guide_lines.pdf> Accessed: 9 January 2008.

Whelan, R, Rodgerson, R, Dickman, C and Sutherland, E (2002) Critical life cycles of plants and animals: developing a process-based understanding of population changes in fire-prone landscapes. In: *Flammable Australia: The Fire Regimes and Biodiversity of a Continent* (eds R Bradstock, J Williams and A Gill) pp. 94-124. Cambridge University Press, United Kingdom.

Willson, A and Bignall, J (2009) *Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia 2009-2014*. Department for Environment and Heritage, Government of South Australia, Adelaide.

10 APPENDICES

Appendix 1: Assets and Strategies for Risk Mitigation

	Values and Assets	Location	Recommended Works
ANGOVE CP	Suburb of Tea Tree Gully Tea Tree Gully Primary School White Avenue Reserve Angove Park Drive Reserve Leslie Crescent Reserve	Surrounding the reserve	<ul style="list-style-type: none"> • Upgrade minor perimeter tracks on the southern and western boundary to Standard Tracks • Improve access behind houses along the south-eastern boundary (on Heitmann Court) • Continue slashing program along boundaries where no tracks exist • Implement mechanical or manual fuel removal concentrating on the understorey layer, 5 m from houses where there are no tracks • Maintain fuel reduced buffer along the eastern boundary
	Angove CP - whole of reserve	-	<ul style="list-style-type: none"> • Maintain Service Track that dissects the reserve to a width of 3 m • C-zone burning in the northern section of the reserve if required
	Historic grape vines	On-reserve	<ul style="list-style-type: none"> • Maintain fuel reduced area immediately adjacent grape vines • Revegetation must be approved by the District Ranger
ANSTEY HILL RP	Public roads	Surrounding the reserve	<ul style="list-style-type: none"> • B-zones (40 m minimum) adjacent North East Road and Lower North East Road • B-zone (40 m minimum) adjacent Perseverance Road where the road abuts the reserve boundary • B-zone (80 m minimum) adjacent Range Road South where the road abuts the reserve boundary • B-zone (40 m minimum) adjacent Lower North East Road where the road abuts the reserve boundary
	Suburbs of Tea Tree Gully, Vista and Highbury	Adjacent western boundary (Perseverance Road)	<ul style="list-style-type: none"> • A-zone (40 m minimum) from North East Road to Casemate Road, where houses abut the reserve. • B-zone (40 m minimum) where houses do not abut the reserve.
	Houghton	Adjacent eastern boundary (Range Road South)	<ul style="list-style-type: none"> • A-zone (40 m minimum) behind assets that are less than 40 m from the reserve boundary • B-zone (~80 m) to buffer the A-zone along the entire eastern boundary • C-zone burning to be implemented in the eastern section of the reserve
	Tea Tree Gully Primary School	50 m from western boundary	<ul style="list-style-type: none"> • A-zone (40 m minimum) behind houses adjacent the reserve boundary

	Values and Assets	Location	Recommended Works
ANSTEY HILL RP	Ellis Cottage, Bakehouse and Newman's Nursery Ruins	On-reserve	<ul style="list-style-type: none"> A-zone (40 m minimum) around assets
	Rangers residence / Friends of Anstey Hill shed / Visitor carpark	On-reserve	<ul style="list-style-type: none"> A-zone (40 m minimum) around assets Maintain carpark precinct as an A-zone
	Tea Tree Gully commercial / dining precinct	Adjacent north-west boundary (North East Road)	<ul style="list-style-type: none"> A-zone (40 m minimum) in the north-west corner of the reserve B-zone (60 m minimum) to buffer
	United Water infrastructure	Adjacent southern boundary (Lower North East Road)	<ul style="list-style-type: none"> A-zone (40 m minimum) applied as a buffer to United Water buildings in the eastern land parcel B-zone to buffer the eastern land parcel (80 m) minimum Continue woody weed control within Anstey Hill RP United Water to continue to maintain tracks on their land providing access to tanks and buildings United Water to continue to maintain their land as an A-zone, through slashing and spaying on a cyclic basis, ensuring fuel reduction is carried out before the fire season.
	Neighbouring native vegetation	Adjacent north-east and south-east boundaries	<ul style="list-style-type: none"> B-zone to buffer south-east boundary and north-east boundary
	Anstey Hill RP - whole of reserve	-	<ul style="list-style-type: none"> C-zone burning to be implemented in the eastern section of the reserve B-zones in the vicinity of major roads to reduce likelihood of ignition Upgrade Water Gully, Quarry and Boundary Walk Tracks to Standard Tracks
BELAIR NP	Suburb of Glenalta / Belair	Adjacent western boundary (Upper Sturt Road)	<ul style="list-style-type: none"> Boundary access to be maintained through slashing (10 m minimum) from north-western corner through to the main entrance (note that this further level of fuel reduction will occur in the B-zone) B-zone (100 m minimum) along the western boundary
	Suburb of Belair / Crafers West	Adjacent northern boundary (Sheoak Road)	<ul style="list-style-type: none"> A-zone (40 m minimum) in the north-eastern corner B-zone to buffer the A-zone in the north-eastern corner B-zone to reduce spotting hazard in the north-western section Recommend to DBPC that Council maintain Sheoak Road to a B-zone standard. Where the road reserve is less than 40 m fuel reduction may be carried out on reserve

	Values and Assets	Location	Recommended Works
BELAIR NP	Suburbs of Upper Sturt / Hawthorndene	Adjacent southern boundary (Upper Sturt Road)	<ul style="list-style-type: none"> • A-zone (40 m minimum) on southern boundary • B-zone (200 m minimum) to buffer the A-zone (part)
	Suburbs of Upper Sturt / Crafers West	Adjacent eastern boundary	<ul style="list-style-type: none"> • B-zone (100 m minimum) along the entire length of the eastern boundary (ensure protection of historical trees including Sequoias within this zone) • C-zone burning throughout the reserve for landscape protection
	St Johns Primary School	Adjacent north-west boundary	<ul style="list-style-type: none"> • B-zone (100 m minimum) along western boundary (west of Sir Edwin Avenue)
	Residences on-reserve	On-reserve	<ul style="list-style-type: none"> • A-zones (40 m minimum) around all houses • Some residences fall within B-zones
	Western Lodge, Information centre & offices, Heritage Commissioners shack, Volunteer shed & buildings, Karka Pavilion and Old Government House	On-reserve	<ul style="list-style-type: none"> • A-zone (50 m minimum) around the information centre and office • A-zone (40 m minimum) around all other assets listed
	BBQ areas	On-reserve	<ul style="list-style-type: none"> • A-zone (40m minimum) unless they fall within a B-zone (see golf course) or the risk is not considered significant
	Golf course and associated assets (toilets and BBQ's)	On-reserve	<ul style="list-style-type: none"> • Lessee to maintain the leased area as a B-zone in its entirety
Belair NP - whole of reserve	-	<ul style="list-style-type: none"> • Implement C-zone burning to offer landscape protection • B-zone (40 m minimum) along Queen Jubilee Drive • Upgrade Queen Jubilee Drive to a Major Track 	
BLACK HILL CP	Suburb of Athelstone	Adjacent western boundary	<ul style="list-style-type: none"> • A-zone (40 m minimum) along most of the western boundary • B-zone (40 m minimum) adjacent residences of Bermuda Court/Gorge Road • Fuel reduction along Tetragona Trail • Recommend to DPBC that Lot 96/No 30 Joann Street be maintained to an A-zone standard and that Tucks Track is maintained to allow through access.
	Suburb of Montacute	Adjacent eastern boundary	<ul style="list-style-type: none"> • B-zone (350 m minimum) along south-east boundary

	Values and Assets	Location	Recommended Works
BLACK HILL CP	Friends of Black Hill Interpretive Centre and Wildflower Garden	On-reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) around asset
	Wadmore Park	Adjacent western boundary	<ul style="list-style-type: none"> • A-zone where Wadmore Park abuts the DEH office precinct • Slashed boundary break (10 m minimum) where A-zone does not abut
	Black Hill CP - whole of reserve	-	<ul style="list-style-type: none"> • B-zone (40 m minimum) along Main Ridge, Lodge, Banksia and Black Hill Tracks to reduce the likelihood of fires travelling through the reserve from Montacute or Gorge Roads • B-zone at the Black Hill Summit area • C-zone burning in the central area of the reserve • Upgrade Orchard Track to a Standard Track • Implement turnaround point at the end of Lodge Track • Upgrade Ambers Gully track to a Standard Track • Investigate the upgrade of Packers Track to a Minor Track (note this track falls on Crown land and private property – liaise with DBPC) • Investigate the upgrade of Ghost Tree Gully Track to a Standard Track • Upgrade Pixs Gully Track to a Minor Track • Implement turnaround point on Sugarloaves Track
	DEH offices and workshops	On-reserve	<ul style="list-style-type: none"> • A-zone for entire precinct
	Agriculture	Adjacent eastern boundary	<ul style="list-style-type: none"> • Recommend that grazing land is maintained as a B-zone • B-zone (40m minimum) along parts of the eastern boundary
	Adjacent native vegetation - Morialta CP	Adjacent southern boundary	<ul style="list-style-type: none"> • C-zone burning adjacent Black Hill Track • B-zone (40 m minimum) along Black Hill Track • Complementary B-zone (100 m minimum) within Morialta CP

	Values and Assets	Location	Recommended Works
BLACKWOOD FOREST RP	Suburbs of Coromandel Valley Blackwood, Hawthorndene	Surrounding the reserve	<ul style="list-style-type: none"> Entire reserve to be maintained as a B-zone Slashing along boundaries (10 m minimum) Staged pine removal (especially on the southern boundary) as detailed within the Blackwood Forest RP Management Plan (DEH, 2005f)
	House and the former office	On-reserve	<ul style="list-style-type: none"> A-zones (40 m minimum) around assets
	Blackwood Forest RP - whole of reserve	-	<ul style="list-style-type: none"> Entire reserve to be maintained as a B-zone
	Archibald Reserve	Adjacent eastern boundary	<ul style="list-style-type: none"> Maintain existing Standard Track on eastern boundary Recommend to DBPC that Council maintain Archibald Reserve as a B-zone
BROWNHILL CREEK RP	Suburbs of Brownhill Creek and Mitcham	Surrounding the reserve	<ul style="list-style-type: none"> A-zone (40 m minimum) along boundary of southern land parcel A-zone (40 m minimum) around housing abutting reserve Slashed boundary break (10 m minimum) where housing abuts the reserve and there is not a 40 m buffer between the asset and reserve vegetation carrying <i>Very High</i> to <i>Extreme</i> fuels
	Caravan Park	On-reserve	<ul style="list-style-type: none"> Lessee to maintain Caravan Park precinct as an A-zone
	Reserve assets	On-reserve	<ul style="list-style-type: none"> Slashed buffer to be maintained around significant assets where practicable
	Brownhill Creek RP - whole of reserve	-	<ul style="list-style-type: none"> B-zone (40 m minimum) south of Brownhill Creek Road Maintain Brownhill Creek Road as a Major Track, slashing along the track where practicable Recommend to DBPC opening of Tilley's Hill Road to Charlick Road to the east as an escape route
	Heritage Agreement	Adjacent eastern boundary	<ul style="list-style-type: none"> B-zone adjacent to the Heritage Agreement
	Neighbouring native vegetation	Adjacent south-east boundary, near James Road	<ul style="list-style-type: none"> Fuel reduction through the removal of woody weeds Recommend to DBPC for landowner to implement reciprocal works on their land

	Values and Assets	Location	Recommended Works
CLELAND CP AND EURILLA CP	Suburb of Greenhill	Adjacent northern boundary of Cleland CP (Yanagin, Yarrabee and Greenhill Roads)	<ul style="list-style-type: none"> • A-zone (40 m minimum) along northern boundary for the length of Yarrabee Road • B-zone (50 m minimum) to buffer the A-zone • B-zone (60 m minimum) along the northern boundary for the length of Yanagin Road • Last house on Yanagin Road is less than 40 m from reserve boundary so a limited fuel reduced area (A-zone standard) should be implemented to reduce the risk to this property • Recommend to DBPC that Council and Transport SA to maintain Greenhill Road verge vegetation as an A-zone and implement woody weed control • Recommend to DBPC that Council maintain reserve adjacent Yanagin Road as an A-zone
	Township of Summertown	Adjacent north-east boundary of Cleland CP (Mount Lofty Summit Rd)	<ul style="list-style-type: none"> • B-zone (60 m minimum) along the north-eastern boundary
	Suburb of Crafers	Between Cleland CP and Eurilla CP (Mount Lofty Summit Road, Vantage Way, etc.)	<ul style="list-style-type: none"> • A-zone (40 m minimum) along south-eastern boundary of Cleland CP, adjacent Vantage Way, Shurdington Road and Blackburn Drive • B-zone (160 m minimum) to buffer the A-zone • B-zone (200 m minimum) along the south-eastern boundary of Cleland CP, adjacent Summerhill Drive • B-zone (70 m minimum) along the eastern boundary of Cleland CP, adjacent Pam and Owens Street • A-zone (40 m) to minimise the risk to assets from the entrance to Mt Lofty Summit east to the start of Eurilla Track (between Cleland CP and Eurilla CP). Recommend to DBPC that owner implement complementary works on their land.
	Suburb of Crafers West	Adjacent southern boundary (Princes Highway)	<ul style="list-style-type: none"> • A-zone (40 m minimum) to buffer built assets
	Township of Piccadilly	Adjacent eastern boundary of Cleland CP (Sprigg Road)	<ul style="list-style-type: none"> • A-zone adjacent to last house on Sprigg Road. • Upgrade Eurilla Track to Standard Track for the first 250 m from Sprigg Road

	Values and Assets	Location	Recommended Works
CLELAND CP AND EURILLA CP	Suburb of Waterfall Gully	Adjacent western boundary of Cleland CP	<ul style="list-style-type: none"> • Mount Osmond Reserve to be maintained as a B-zone as well as part of Cleland CP behind assets on Waterfall Gully Road • Works on-reserve are restricted by steep slopes and many assets are more than 40 m from reserve boundary
	Cleland Wildlife Park	On-reserve	<ul style="list-style-type: none"> • A-zone for entire Wildlife Park precinct • B-zone (60 m minimum) to the south, west and north to buffer • A-zone (40 m minimum) along Entrance Road • Fire protection system throughout the Wildlife Park
	Waterfall Gully visitor area	On-reserve	<ul style="list-style-type: none"> • A-zone (20 m minimum) to buffer buildings (toilets, kiosk). The A-zone is reduced from the 40 m standard as there is a reduced potential fire intensity because of the downhill slope
	Workshop, offices, residences and accommodation	On-reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) to buffer assets • Fire protection system on offices and workshop need to be reviewed and upgraded
	Mount Lofty Summit visitor centre, restaurant and gas tank	On-reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) to buffer buildings • Fire protection system to be maintained by lessee • Install a colourbond fence around gas tank to minimise the effects of radiant heat
	Mount Lofty fire tower and communications towers	On-reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) to buffer significant assets
	Mount Bonython communication and research centre	Adjacent north-east boundary of Cleland CP (Mount Lofty Summit Rd)	<ul style="list-style-type: none"> • Liaise with DBPC and recommend fuel reduction burning within Mount Bonython. This burn should be planned in conjunction with DEH to ensure it is within Ecological Fire Management Guidelines
	Heritage Agreement	Adjacent eastern boundary of Cleland CP	<ul style="list-style-type: none"> • Recommend to DBPC that Reynolds Drive be upgraded to a Standard Track, including a turnaround point at the end
	Heritage Agreement	Adjacent Heysen Tunnels	<ul style="list-style-type: none"> • A-zone (40 m minimum) to the north of the Heritage Agreement to buffer buildings
	Wilson's Bog	On-reserve	<ul style="list-style-type: none"> • C-zone burning offering landscape protection to reduce the likelihood of fire threatening Bog

	Values and Assets	Location	Recommended Works
CLELAND CP AND EURILLA CP	Public roads	Mount Lofty Summit and Greenhill Roads	<ul style="list-style-type: none"> • Zoning to increase public and firefighter safety on these roads (as described above) and reduce the likelihood of ignition • B-zone (80 m minimum) along eastern boundary of Cleland CP • Public roads adjacent to Cleland CP are likely to be unsuitable for public use during a bushfire
	Chambers Gully Park	Adjacent north-west boundary of Cleland CP	<ul style="list-style-type: none"> • Access via Chambers Gully Track through Chambers Gully Park to Waterfall Gully Road - recommend to DBPC that track is maintained as a Standard Track
	Cleland/Eurilla CP - whole of reserve	-	<ul style="list-style-type: none"> • C-zone burning throughout Cleland CP to offer landscape protection • C-zone burning in rotation along Princes Highway and recommend to DBPC the potential for burning in between the highway and Mt Barker Road • B-zone (270 m minimum) south of Long Ridge Track
COBLER CREEK RP	Suburb of Salisbury East	Adjacent northern and western boundary	<ul style="list-style-type: none"> • Slashed boundary break (10 m minimum) along reserve boundary abutting Bridge Road, Toronga Court and along the northern boundary for fire access • A-zone within visitor carpark precinct off Bridge Road
	Suburbs of Golden Grove and Gulfview Heights	Adjacent eastern and southern boundary	<ul style="list-style-type: none"> • A-zone (40 m minimum) adjacent houses • B-zone (40 m minimum) where there are no assets • B-zone (90 m minimum) to buffer the A-zone in the south-east corner
	DEH housing and sheds	On-reserve	<ul style="list-style-type: none"> • A-zone (50 m minimum) around house and shed precinct
	Communications tower	On-reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) around tower. Lessee to maintain the A-zone within leased area
	Tea Tree Gully Council and Salisbury Council reserves	Adjacent southern and eastern boundaries	<ul style="list-style-type: none"> • B-zone (40 m minimum) where council reserves abut Cobler Creek CP to reduce the likelihood of fire entering/exiting these reserves • Recommend Councils maintain their reserves as B-zones • Liaise with Tea Tree Gully Council and DBPC to maintain a fuel reduced area on the eastern edge of the reserve.
	Trevalsa, Teakles and other ruins	On-reserve	<ul style="list-style-type: none"> • Slashed break to protect ruins from direct flame contact to a maximum of 10 m
	Cobler Creek RP - whole of reserve	On-reserve	<ul style="list-style-type: none"> • Perimeter fire access maintained by slashing on accessible slopes

	Values and Assets	Location	Recommended Works
GREENHILL RP AND FERGUSON CP	Suburbs of Stonyfell, Wattle Park and Erindale	Surrounding Ferguson CP	<ul style="list-style-type: none"> Slashed area (5 m) to be maintained on the northern boundary adjacent to St. Peters Girls School Woody weed control for fuel reduction
	Suburb of Burnside	Adjacent western boundary of Greenhill RP (Greenhill Road)	<ul style="list-style-type: none"> A-zone (40m minimum) along western boundary where houses are less than 40 m from the reserve boundary
	Neighbouring native vegetation within Stonyfell Quarry land	Adjacent eastern boundary of Greenhill RP	<ul style="list-style-type: none"> Liaise with Stonyfell Quarry and DBPC to discuss fuel reduction and track upgrades on quarry land
	Greenhill RP - whole of reserve	-	<ul style="list-style-type: none"> Unnamed track from Thorpe Road to Greenhill Road be upgraded to Standard Track C-zone burning (within and adjacent reserve) to offer landscape protection
HORSNELL GULLY/GILES CP	Suburb of Skye	To the west of the Horsnell Gully CP	<ul style="list-style-type: none"> C-zone burning in the west of Horsnell Gully CP adjacent Coach Road to provide landscape protection
	Townships of Ashton and Horsnell Gully	To the east of Giles CP	<ul style="list-style-type: none"> A-zone (40 m minimum) where Woods Hill Road abuts Giles CP Recommend to Adelaide Hills Council that they maintain road reserve to A-zone standard C-zone burning in Giles CP to provide landscape protection Neighbours to implement fuel reduction on their own lands
	Townships of Ashton and Horsnell Gully	To the south of the reserves	<ul style="list-style-type: none"> B-zone (80 m minimum) in the southern section of Horsnell Gully CP B-zone (60 m minimum) in the southern section of Giles CP
	Coach Road	To the south of Horsnell Gully CP	<ul style="list-style-type: none"> Recommend to the DBPC the upgrade of Coach Road to a Major Track
	Woods Hill Road	To the east of Giles CP	<ul style="list-style-type: none"> A-zone (40 m minimum) where Woods Hill Road abuts Giles CP
	Neighbouring native vegetation within Reeds Bed Valley	Between Giles CP and Horsnell Gully CP	<ul style="list-style-type: none"> Liaise with DBPC to recommend fuel reduction within Reeds Bed Valley
	Giles Cottage ruins	Giles CP	<ul style="list-style-type: none"> Cottage falls within a B-zone (60 m minimum)

	Values and Assets	Location	Recommended Works
HORSNELL GULLY/GILES CP	House	Horsnell Gully CP	<ul style="list-style-type: none"> • A-zone (40 m minimum) around house
	Council reserve	To the south of Giles CP	<ul style="list-style-type: none"> • Recommend to Adelaide Hills Council to maintain fire access track
	Neighbouring native vegetation within Stonyfell Quarry land	To the south-west of the reserves	<ul style="list-style-type: none"> • Liaise with Stonyfell Quarry and DBPC to discuss C-zone burning within quarry land and the upgrade of quarry tracks for use in suppression • C-zone burning within reserve to reduce the likelihood of a landscape scale fire
	Horsnell Gully/Giles CP - whole of reserve	-	<ul style="list-style-type: none"> • C-zone burning throughout the reserve for landscape protection • C-zone burning within adjacent native vegetation to reduce the likelihood of a landscape scale fire • Rockdale Hill Track upgrade to Standard • Moulds Track upgrade to Standard • Ridge Track upgrade to Standard • Unnamed Minor Track in Giles CP upgrade to Standard Track and name
MORIALTA CP	Suburbs of Rostrevor and Woodforde	To the north and west of the reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) along western and southern boundary • B-zone (60 m minimum) on the western boundary to buffer the A-zone • Maintain picnic area as an A-zone • Woody weed control for fuel reduction
	Suburbs of Teringie and Norton Summit	To the south and east of the reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) along Norton Summit Road. • B-zone (100 m minimum) along Colonial Drive within Crown land
	Township of Montacute	To the north-east of the reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) along Third Falls Track adjacent private house
	Heritage Agreements	To the east of the reserve	<ul style="list-style-type: none"> • Refer to whole of reserve strategies
	Morialta Cottage	On-reserve	<ul style="list-style-type: none"> • Located within the Colonial Drive B-zone • A-zone (40 m minimum) around the Cottage
	Neighbouring native vegetation	To the north and south of the reserve	<ul style="list-style-type: none"> • C-zone burning within Morialta and Black Hill CP • Landholders are required to implement reciprocal works on their land

	Values and Assets	Location	Recommended Works
MORIALTA CP	Adjacent land – Lot 100 Morialta	Wandilla Drive	<ul style="list-style-type: none"> • B-zone (40 m minimum) to be implemented within Lot 100 Morialta, adjacent Wandilla Drive (note this is not mapped) • Investigate improved fire access into Lot 100
	Morialta Conservation Park - whole of reserve	-	<ul style="list-style-type: none"> • C-zone burning throughout the reserve for landscape protection • Fuel reduction along reserve boundary to reduce the likelihood of attempted arson threatening reserve • Upgrade Moores Road to a Major Track • B-zone (100 m minimum) along Montacute Road to reduce the likelihood of fire entering or exiting the reserve • B-zone (40 m minimum) along Moores Road (patchy mechanical treatment required to avoid impacts to Chestnut-rumped Heathwren population) • Recommend to DBPC burning within private land to the east of Montacute Road Block (north of the Heritage Agreements) • Upgrade Twin Creek Track to a Minor Track • Upgrade Fox Hill Track to Standard Track • Upgrade the section of Chapmans Track adjacent Montacute Road to a Minor Track • Upgrade Centre Track to a Standard Track • Upgrade the northern section of Third Falls Track to Major Track (along the eastern boundary) • Close the western end of Rocky Hill Track and develop a turn-around point
MT LOFTY BOTANIC GARDENS	Townships of Crafers and Piccadilly	To the south, east and west of the reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) where less than 40 m exists between reserve fuels and asset • Improve access and egress onto Mount Lofty Summit Road from Hardys Track - liaise with Council to remove section of crash barrier • Upgrade Hardys Track to a Standard Track and implement passing bays • Slashing along the reserve boundary where assets abut the reserve (adjacent Katherine Grove and Constance Avenue)
	Exotic plantings, specimens and garden beds	On-reserve	<ul style="list-style-type: none"> • Maintain irrigation systems
	Administration buildings, compound, nursery and workshop	On-reserve	<ul style="list-style-type: none"> • A-zone (40 m minimum) around significant assets • Maintain fire protection systems where they exist

	Values and Assets	Location	Recommended Works
MT LOFTY BOTANIC GARDENS	Mt Lofty House (Mecure Hotels)	To the west of the reserve	<ul style="list-style-type: none"> • Recommend to DPBC that off-reserve fuel reduction is undertaken by neighbours • Refer to <i>whole of gardens</i> strategies below
	Neighbouring native vegetation - Eurilla CP	To the north of the reserve	<ul style="list-style-type: none"> • C-zone burning to be implemented for landscape protection • Upgrade Northern Boundary Track to Standard Track and implement passing bays where practicable
	Crafers Primary School	To the south of the reserve	<ul style="list-style-type: none"> • Refer to <i>whole of gardens</i> strategies below
	Mount Lofty Botanic Gardens - whole of gardens	-	<ul style="list-style-type: none"> • C-zone burning to be implemented within the reserve for landscape protection • Implement track upgrades as detailed above • Upgrade South American Track to a Minor Track • Improve access and egress onto Mount Lofty Summit Road from Hardys Track - liaise with Council to remove section of crash barrier • Gates 8, 9 and 10 need to be repositioned to allow for appliance access if required • Plastic hydrants should be converted to steel to avoid damage during a fire
MT OSMOND RESERVE	Suburbs of Waterfall Gully, Mt Osmond, Beaumont, Leawood Gardens	Surrounding the reserve	<ul style="list-style-type: none"> • Mt Osmond Reserve to be maintained as a B-zone • Neighbours required to implement fuel reduction works on their land • Control woody weeds on reserve boundary • Slashing 20 m either side of tracks within Mt Osmond Reserve
THE KNOLL CP	Suburbs of Upper Sturt and Crafers West and communications tower	To the north and south of the reserve	<ul style="list-style-type: none"> • Neighbours required to undertake fuel reduction works on their own land • Maintain entire reserve as B-zone, aiming to reduce the elevated fuel by selectively burning the bark fuel under cool conditions and protecting any old growth trees with hollows. • B-zone fuel levels may be achieved through woody weed control for fuel reduction
	Adjacent native vegetation	To the south of the reserve	<ul style="list-style-type: none"> • Recommend to DBPC that the owner of the gorse infested land implements weed control measures as fuels are Extreme in adjacent vegetation

Appendix 2: Fire Response of Rated, Significant and Introduced Flora Species

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Adiantum capillus-veneris</i>	Dainty Maidenhair		V		AH BH	Erect or Spreading Fern	<ul style="list-style-type: none"> Found growing among rocks on ledges or cliffs close to water Root suckering Resprouting species Fire response is unknown 	• #	(Molnar, 1992)
<i>Asparagus asparagoides*</i>	Bridal Creeper			26	AN AH BE BH BC FE	Herb	<ul style="list-style-type: none"> Weed of National Significance Adults resprout following fire Flowers August-September 	• Weed control may be required post-fire	Aus [^]
<i>Brachyscome diversifolia</i>	Tall Daisy		E		BE	Erect or Ascending Perennial	<ul style="list-style-type: none"> Grows in dry well drained soil Flowers October-February 	• #	Aus [^]
<i>Caladenia behrii</i>	Pink-lipped Spider-orchid	EN	E	8 9	BE	Herb	<ul style="list-style-type: none"> Grows on the upper slopes and crests of moderate to steep hills Resprouts from underground tubers in April and May Flowering and seed set occurs between August and December Prefers open habitats Fire likely to encourage the dense proliferation of fire-stimulated understorey flora which may impact on this species Soil disturbance may enhance recruitment 	<ul style="list-style-type: none"> Avoid inter-fire intervals ≤ 5 years Avoid burning in late Autumn through to late Spring 	(Quarmby, 2006)

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Caladenia rigida</i>	White Spider-orchid	EN	E		BE	Herb	<ul style="list-style-type: none"> • Resprouts from underground tubers in April and May • Flowering and seed set occurs between August- and December • Prefers open habitats • Not likely to tolerate strong competition from other vegetation • Has been observed flowering prolifically in the years following fire • Population decline has been observed with increasing time since fire 	<ul style="list-style-type: none"> • Avoid inter-fire intervals ≤ 5 years • Avoid burning in late Autumn through to late Spring 	(Quarmby, 2006)
<i>Caleana major</i>	Large Duck-orchid		V		BE BF MO	Herb	<ul style="list-style-type: none"> • Flowers September-February • Known to regenerate post-fire • Suppressed by dense understorey 	<ul style="list-style-type: none"> • # 	R
<i>Chrysanthemoides monilifera*</i>	Boneseed				AH BE BH BC CL EU FE GI GR HG MO TK	Perennial Shrub	<ul style="list-style-type: none"> • <i>Weed of National Significance</i> • Lifespan 10-20 years • Flowers July-October • Fire kills adult plants • Seedlings readily recruit post-fire 	<ul style="list-style-type: none"> • Follow up weed control may be required post fire • Refer to (Brougham, <i>et al.</i>, 2006) • 	Aus^

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Crataegus monogyna</i> *	Hawthorn				AH BE BH BC CL GI GR HG MO TK MTO	Spreading Shrub or Small Tree	<ul style="list-style-type: none"> • Seed germination likely after fire • Forms dense thickets • Suckers form where roots are disturbed • Flowers in late spring • Fruits produced after flowering • Fruits eaten and seeds dispersed by birds 	<ul style="list-style-type: none"> • Weed control required post-fire 	Aus [^]
<i>Cullen parvum</i>	Small Scurf-pea		V	9	BH	Perennial Herb	<ul style="list-style-type: none"> • Flowers October-April 	<ul style="list-style-type: none"> • # 	Aus [^]
<i>Derwentia derwentiana</i> ssp. <i>homalodonta</i>	Mt Lofty Speedwell		E		BE	Shrub	<ul style="list-style-type: none"> • Seed regenerator • 1 year to set seed • Does not tolerate shade or strong competition from shrubs • Prefers moist areas with excellent drainage • Some indication that the species may increase after fire 	<ul style="list-style-type: none"> • Avoid inter-fire intervals ≤ 4 years • Avoid 3 or more successive fires of low intensity 	(Anon., 2006) SA [^]
<i>Deyeuxia minor</i>	Small Bent-grass		V		CL	Perennial Grass	<ul style="list-style-type: none"> • Flowers November-December 	<ul style="list-style-type: none"> • # 	Aus [^]
<i>Diuris behrii</i>	Behr's Cowslip Orchid		V	9	BE BF FE MO	Perennial Herb	<ul style="list-style-type: none"> • Juvenile period 1 year • Strongly dependent on fire • Prefers late spring-summer-early autumn burning • Intolerant of competition • Flowers September-November 	<ul style="list-style-type: none"> • Avoid burning late autumn through to early spring 	SA [^]

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Echium plantagineum*</i>	Salvation Jane			8 26	AN AH BE BH BC CL CC GI HG MO	Herb	<ul style="list-style-type: none"> Declared under the SA <i>Natural Resource Management Act 2004</i> Adults killed by fire Seedlings readily recruit post-fire Some seeds are killed by fire 	<ul style="list-style-type: none"> Weed control may be required post-fire. 	Aus [^]
<i>Eryngium rostratum</i>	Blue Devil		V		BE BH	Perennial Herb	<ul style="list-style-type: none"> Resprouting species Flowers November-January Primary juvenile period 1 year Killed by fire 	<ul style="list-style-type: none"> # 	SA [^]
<i>Euphrasia collina ssp. osbornii</i>	Osborn's Eyebright	EN	E		CL MO	Perennial	<ul style="list-style-type: none"> Seed regenerator Flowers June/August-September Patches of open ground are required for germination and adequate moisture levels are required for seedling survival Seed production is copious and the seedbank probably survives for decades Profuse germination occurs after a fire Fire is thought to be required for the recovery of populations from the seedbank There is risk of extinction if conditions do not favour germinants post fire 	<ul style="list-style-type: none"> Prescribed fire should only be applied after seed release in Autumn 	(Potts, 1999) Aus [^]
<i>Glycine latrobeana</i>	Clover Glycine	VU	V	9	BE BH	Perennial Herb	<ul style="list-style-type: none"> Flowers September-December Seed regenerator but also may spread from rhizomes Known to germinate post-fire 	<ul style="list-style-type: none"> # 	Aus [^]

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Helichrysum rutidolepis</i>	Pale Everlasting		E		BE	Perennial Herb	<ul style="list-style-type: none"> Resprouting species Known to germinate post-fire Intolerant of competition Flowers summer to early autumn Lifespan + seedbank > 10 years 	• #	Aus [^]
<i>Histiopteris incisa</i>	Bat's-wing Fern		E		CL	Rhizomatous Perennial Herb	<ul style="list-style-type: none"> Resprouting species Lifespan + seedbank = 100 years 	• #	Aus [^]
<i>Hypharrhenia hirta</i> *	Coolatai Grass				CC AH BH	Perennial	<ul style="list-style-type: none"> Declared under the SA <i>Natural Resource Management Act 2004</i> Fire promotes regeneration 	• #	R
<i>Juncus amabilis</i>			V		BE	Rhizomatous Perennial	<ul style="list-style-type: none"> Regenerates vegetatively from rhizomes Flowers November-December Known to persist after fire 	• #	Aus [^]
<i>Lagenifera gracilis</i>	Slender Bottle-daisy		V		CL	Herb	<ul style="list-style-type: none"> Known to germinate post-fire Lifespan + seedbank ≥ 20 years 	• #	Aus [^]
<i>Luzula flaccida</i>	Pale Wood-rush		V		MO	Perennial	<ul style="list-style-type: none"> Spores persistent in soil Flowers spring to summer 	• #	Aus [^]
<i>Lycium ferocissimum</i> *	African Boxthorn				AH BE BH CL CC MO	Shrub	<ul style="list-style-type: none"> Primary juvenile period 2 years Fruit: Berry Fruits dispersed by birds and foxes Adults resprout following fire 	• Weed control may be required post-fire.	SA [^]
<i>Lycopodiella serpentina</i>	Bog Clubmoss		E		CL	Herb	<ul style="list-style-type: none"> Grows in open wet areas 	• #	Aus [^]

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Lycopodium deuterodensum</i>	Bushy Clubmoss		E		BF CL MO	Rhizome	<ul style="list-style-type: none"> Lifespan + seedbank = 100 years Resprouting species 	• #	Aus [^]
<i>Marrubium vulgare</i> *	Horehound				AH BE BH CL CC MO	Erect or Spreading Perennial Herb	<ul style="list-style-type: none"> Declared under the SA <i>Natural Resource Management Act 2004</i> Flowers September-March Adults killed by fire and may reduce up to 80% of the seedbank Seedlings readily recruit post-fire 	• Weed control required post-fire either through spraying or burning at a short inter-fire interval	Aus [^]
<i>Montia fontana</i> ssp. <i>chondrosperma</i>	Waterblinks		V		BE		<ul style="list-style-type: none"> Little is known about the biology and ecology of this species 	• #	
<i>Muraltia heisteria</i> *	African Furze				FE MO HG	Stiff, Erect Spreading Shrub	<ul style="list-style-type: none"> Spreads significantly through the stimulation and germination of seed after a fire event Flowers August-October 	• #	R
<i>Nassella leucotricha</i> *	Texas Needle Grass				BE	Perennial Grass	<ul style="list-style-type: none"> Declared under the SA <i>Natural Resource Management Act 2004</i> Found along Minno Creek Flowers October-January Blackwood Forest RP is at risk of infestation 	• Follow up weed control required post-fire	(Davies, 2006)

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Olea europaea</i> <i>ssp. europaea</i> *	European Olive			9	AN AH BE BH CL CC FE GI GR HG MO MTO	Tree	<ul style="list-style-type: none"> • Declared under the SA <i>Natural Resource Management Act 2004</i> • Adults resprout following fire. • Juveniles < 1 m high are killed by low intensity fire • Flowers late spring • Seeds germinate in autumn. • Fruit: Berry - dispersed by birds 	<ul style="list-style-type: none"> • Weed control may be required post-fire. 	SA^
<i>Olearia pannosa</i> <i>ssp. pannosa</i>	Silver Daisy-bush	VU	V		BH	Shrub	<ul style="list-style-type: none"> • Flowers August-October • Resprouts from lignotuber 	<ul style="list-style-type: none"> • # 	SA^
<i>Phalaris aquatica</i> *	Phalaris				AN AH BE BC CL CC	Erect Perennial Grass	<ul style="list-style-type: none"> • Flowers September-November • Burning will stimulate germination 	<ul style="list-style-type: none"> • Weed control may be required following fire 	Aus^
<i>Pinus halepensis</i> *	Aleppo Pine				AN AH BE BC BH CL FE	Tree	<ul style="list-style-type: none"> • Reseeder • Burning will stimulate germination. • Forms a short-lived soil seed bank, which is particularly abundant after a fire. • Seedling recruitment takes place up to 1 year post fire. • Cones are produced 4 years from germination 	<ul style="list-style-type: none"> • Weed control may be required following fire 	(Daskalidou and Thanos, 1996)

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Prasophyllum pallidum</i>	Pale Leek-orchid	VU	R		BE BC BH FE AH	Herb	<ul style="list-style-type: none"> Has been observed occurring at higher densities in recently burnt areas Flowers September-October 	<ul style="list-style-type: none"> Avoid burning late Autumn through to late Spring 	(Turner, 2001) SA^
<i>Prasophyllum pruinosum</i>	Plum Leek-orchid		V		AN AH BE BH FE	Herb	<ul style="list-style-type: none"> Resprouting species 	<ul style="list-style-type: none"> Avoid burning late autumn through to early spring 	R
<i>Pterostylis cucullata</i>	Leafy Greenhood	VU	E	8 9	BE	Herb	<ul style="list-style-type: none"> Resprouts from underground tubers during April and May Grows on moist south to south-east facing slopes Flowering and seed set between August and December Frequent fire may be detrimental to this species 	<ul style="list-style-type: none"> Avoid burning late Autumn through to late Spring Avoid inter-fire intervals ≤ 5 years 	(Quarmby, 2006)
<i>Rosa canina</i> *	Dog Rose			26 8 9	AN AH BE BH CL CC FE GI HG MO	Shrub	<ul style="list-style-type: none"> Declared under the SA <i>Natural Resource Management Act 2004</i> Rose hips are eaten by birds Adults resprout following fire Response of seedlings and seeds unknown 	<ul style="list-style-type: none"> Weed control required post-fire. Drill and swab to kill adults. Hand pull or grub seedlings. 	SA^

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Rubus</i> spp.*	Blackberry			8 9	AH BE BH BC CL GI HG MO	Scrambling Semi-deciduous Shrub	<ul style="list-style-type: none"> • Weed of National Significance • 1 year to seed set • Readily resprouts following fire • Seeds distributed by birds 	<ul style="list-style-type: none"> • Weed control needed following fire 	Aus [^]
<i>Schizaea fistulosa</i>	Narrow Comb-fern		V		CL MTO	Erect	<ul style="list-style-type: none"> • Resprouting species • Known to regenerate post-fire • Fire will kill mature plants and juveniles • Intolerant of competition • Juvenile period 1 year • 2 years to set seed 	<ul style="list-style-type: none"> • Avoid interfere intervals ≤ 5 years 	SA [^]
<i>Senecio pterophorus</i> *	African Daisy				AN AH BE BH BC CL CC EU FE GI GR HG MO TK	Herb	<ul style="list-style-type: none"> • Flowers December-February • Burning will stimulate germination 	<ul style="list-style-type: none"> • Weed control may be required post-fire (prior to flowering) 	Aus [^]
<i>Thelymitra circumsepta</i>	Naked Sun-orchid		E		CL	Herb	<ul style="list-style-type: none"> • Resprouting species • Flowers December-January • Fire kills mature plants • Observed to establish in mature communities, not after disturbance 	<ul style="list-style-type: none"> • Avoid burning late Autumn through to late Spring 	Aus [^] R

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Todea barbara</i>	King Fern		E	8	CL	Arborescent Fern	<ul style="list-style-type: none"> • Propagule store short-lived • Intolerant of competition • Known to germinate post- fire 	• #	Aus^ R
<i>Ulex europaeus*</i>	Gorse			8	AH BE CL GI HG MO TK	Shrub	<ul style="list-style-type: none"> • Weed of National Significance • 1 year to set seed • Soil stored seed • Germination of soil stored seed stimulated following fire • Fire kills adult plants 	• Weed control required following fire	R
<i>Utricularia lateriflora</i>	Small Bladderwort		V		CL	Perennial Herb	<ul style="list-style-type: none"> • Flowers throughout the year • Resprouting species • Fire kills juvenile plants • Will resprout 1 year after fire • Flowers 2 years after fire and seeds soon after 	• #	SA^ R
<i>Veronica gracilis</i>	Slender Speedwell		V		CL	Perennial Herb	<ul style="list-style-type: none"> • Flowers spring through summer • Propagules always available (widely dispersed) • Establish in mature community or after disturbance 	• #	SA^
<i>Viola betonicifolia</i> <i>ssp. betonicifolia</i>	Showy Violet		E		CL	Perennial Herb	<ul style="list-style-type: none"> • Resprouting species • Seed persistent in soil • Flowers in summer • Primary juvenile period 1 year • Lifespan + seedbank ≥ 25 years • Resprout and rapidly reproductively mature (pyrogenic flowerer) • Propagule store exhausted at first disturbance • Will establish and grow after disturbance 	• #	Aus^

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Life Form	Species Ecology & Fire Response	Ecological Fire Mgt Guidelines / Post Fire Mgt	Source
<i>Watsonia</i> spp.*	Watsonia				MO BH CL HG GI FE	Erect Herb	<ul style="list-style-type: none"> • Fire stimulated flowering 	• #	Aus^

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Appendix 3: Fire Response of Rated and Significant Fauna Species

Type	Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Diet	Breeding	Species Ecology and Fire Response	Ecological Fire Mgt Guidelines	Source
Bird	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo		V	4 8 9 37	AH BE BH BC CL EU FE GI HG MO	G	<ul style="list-style-type: none"> Sites: hollows high in canopy Material: woodchips Season: Jul-Jan 	<ul style="list-style-type: none"> Nomadic or locally migratory Higher intensity fire can increase hollow loss Favours Eucalypt woodland and pine plantations (Aleppo Pine) Fire likely to impact the availability of food sources (seeds) 	<ul style="list-style-type: none"> Minimise loss of hollows (avoid high intensity fire) Minimise the loss of important feeding sites and critical habitat (including Aleppo Pine stands) Consideration should be given to replacement food sources if introduced pines are impacted by fire 	Aus [^]
Bird	<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo		R	8 9	AH BE BH CL GI HG MO	I	<ul style="list-style-type: none"> Sites: brood parasite Material: variable Season: Aug-Jan 	<ul style="list-style-type: none"> Continental movements Home range size unknown, but it is likely to be large Driven by host response Fire likely to increase parasitism by exposing nests May benefit from exposed sites, to feed on insects 	<ul style="list-style-type: none"> Reduce the likelihood of extensive bushfires 	SA [^]
Reptile	<i>Egernia cunninghami</i>	Cunningham's Skink		V	8 9	BE BH CL MO	I H	<ul style="list-style-type: none"> Season: late summer 	<ul style="list-style-type: none"> Prefers rocky crevices Occupy home ranges Normally found in crevices and rock formations Likely to find refuge in these areas during a fire Frequent fire likely to impact the availability of food sources within home ranges 	<ul style="list-style-type: none"> Reduce the likelihood of extensive bushfires Reduce the likelihood of frequent fires in known habitat 	R Aus [^]

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Type	Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Diet	Breeding	Species Ecology and Fire Response	Ecological Fire Mgt Guidelines	Source
Bird	<i>Falco peregrinus</i>	Peregrine Falcon		R	89	AH BE BH CL GI HG MO	C	<ul style="list-style-type: none"> Sites: rock crevices, cliffs Material: rock Season: Aug-Nov 	<ul style="list-style-type: none"> Fire will influence the availability of prey species within home ranges The same nesting sites may be used for many years Pairs will maintain a home range approximately 20 - 30 km² 	<ul style="list-style-type: none"> Reduce the likelihood of extensive bushfires 	Aus [^]
Bird	<i>Falcunculus frontatus</i>	Crested Shrike-tit		V	9	BE CL GI HG	I	<ul style="list-style-type: none"> Sites: vertical forks high in the canopy Material: bark and dry grass Season: Sept-Jan 	<ul style="list-style-type: none"> Dependant on the canopy, should avoid burning the canopy Sedentary with some local movements in autumn and winter Frequency of fires prevent insects from establishing beneath the bark of gum barked trees Peels bark from large branches or tree trunks to extract prey from underneath Has a large feeding territory >50 ha 	<ul style="list-style-type: none"> Avoid 2 or more successive fire intervals less than 10 years apart Avoid high intensity fire resulting in crown fire or canopy scorch 	R Aus [^]
Bird	<i>Hylacola pyrrhopygia parkeri</i>	MLR Chestnut-rumped Heathwren	EN	V	89	BH CL GI HG MO	I	<ul style="list-style-type: none"> Sites: on ground or in a low bush or tussock Material: dome shaped - grasses, fine bark and feathers Season: Jul-Nov 	<ul style="list-style-type: none"> Prefers heaths, low dense thickets in forests, woodlands In pairs or small groups Sedentary High risk to population loss due to bushfire May be an early successional coloniser of burnt woodland 	<ul style="list-style-type: none"> >50% of habitat patch should not burn in a single fire event Avoid 2 or more successive fire intervals less than 10 years apart 	Aus [^]

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Type	Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Diet	Breeding	Species Ecology and Fire Response	Ecological Fire Mgt Guidelines	Source
Mammal	<i>Isoodon obesulus</i>	Southern Brown Bandicoot	EN	V	89	BE CL EU MLBG		<ul style="list-style-type: none"> Sites: nests in understorey vegetation Material: soil and leaves Season: late winter to summer 	<ul style="list-style-type: none"> Home range 1 ha - 6 ha Inhabits heathland, shrubland, dry sclerophyll forest with heathy understorey, sedgeland or woodland At least some individuals capable of surviving low intensity fire Some indication that species prefers early seral stages but this is not supported by all research Higher intensity fire may threaten isolated populations Occurs in areas of dense understorey, which is probably required to provide protection from predators 	<ul style="list-style-type: none"> Mosaic of post-fire vegetation is desirable (diversity and structure) Avoid inter-fire intervals ≤ 7 years Some inter-fire intervals > 15 years desirable 	R Aus [^]
Bird	<i>Melithreptus gularis</i>	Black-chinned Honeyeater		V		BE AH	I N	<ul style="list-style-type: none"> Sites: high in canopy Material: fragile cup of bark, hair, fur and wool Season: Mainly Jul-Dec 	<ul style="list-style-type: none"> Prefers drier woodlands dominated by box Eucalypts, often with little understorey Local movements associated with the flowering of food plants Forages in the upper canopy High intensity fire likely to impact nesting sites and food availability Fire may assist this species through the provision of feeding and breeding habitat by altering the structure of vegetation 	<ul style="list-style-type: none"> Avoid high intensity fire resulting in crown fire or canopy scorch 	(Chapman, 1995) Aus [^]

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Type	Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Diet	Breeding	Species Ecology and Fire Response	Ecological Fire Mgt Guidelines	Source
Bird	<i>Oriolus sagittatus</i>	Olive-backed Oriole		R		BE	I H	<ul style="list-style-type: none"> Sites: In the outer drooping branch of a tree, 1-20 m above the ground Material: soft bark and leaves, lined with grass Season: Sept-Jan 	<ul style="list-style-type: none"> Summer breeding visitor to south-eastern Australia, but breeding or non-breeding birds may occur in the Adelaide region at any time Nomadic movements following fruiting food-plants over the autumn and winter 	<ul style="list-style-type: none"> Reduce the likelihood of extensive bushfires 	(Turner, 2001) Aus [^]
Bird	<i>Petroica rosea</i>	Rose Robin		R		AH	I	<ul style="list-style-type: none"> Sites: very small built high in the fork of a scrub tree Material: soft fibre or moss, fur, cobweb, lichen Season: Sept-Jan 	<ul style="list-style-type: none"> Seasonal migrant In Autumn disperses and migrates west, occasional visitor to SA Inhabits dense moist gullies Forages in the mid to upper canopy but also known to feed on the ground Sensitive to habitat fragmentation and the loss of understorey May benefit from exposed sites being able to forage for insects 	<ul style="list-style-type: none"> Reduce the likelihood of extensive bushfires 	

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Type	Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Diet	Breeding	Species Ecology and Fire Response	Ecological Fire Mgt Guidelines	Source
Bird	<i>Stagonopleura bella</i>	Beautiful Firetail		R		BE BH	G	<ul style="list-style-type: none"> Sites: within thick foliage of a bush or tree Material: bottle shaped nest of grass and leaves Season: Sept-Jan 	<ul style="list-style-type: none"> Considered <i>Locally Extinct</i> in the metropolitan area Prefers habitat dominated by Sheoak and Tea-tree species Sedentary to moderately mobile High risk of population loss due to bushfire Prefers swampy, marshy areas not far from water Impacted by habitat fragmentation Forages on the ground 	<ul style="list-style-type: none"> >50% of habitat patch should not burn in a single fire event 	(Turner, 2001) Aus^
Bird	<i>Stagonopleura guttata</i>	Diamond Firetail		V		BE	G	<ul style="list-style-type: none"> Sites: shrub and tree canopy Material: grass Season: Oct-Jan 	<ul style="list-style-type: none"> Inhabits grassy <i>Eucalypt</i> communities Feeds exclusively on the ground on native grasses and forbs Requires ground cover, including fallen timber Local movements Strong fliers likely to evade fire Habitat likely to be temporarily impacted by fire May benefit from exposed sites being able to forage for seeds and insects 	<ul style="list-style-type: none"> >50% of habitat patch should not burn in a single fire event 	Aus^

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Type	Species	Common Name	EPBC Act Status	NPW Act Status	MVS No	Reserve	Diet	Breeding	Species Ecology and Fire Response	Ecological Fire Mgt Guidelines	Source
Bird	<i>Turnix varia</i>	Painted Button-quail		V		AH BE	G I	<ul style="list-style-type: none"> Sites: terrestrial under some vegetation within a depression Material: grass acting as a hood and lined with finer grass Season: Sept-May 	<ul style="list-style-type: none"> Found within open forests and heaths with abundant leaf litter Numbers may be temporarily reduced due to fire and/or exposure to predators Low mobility Will enter farmlands for food May invade or become abundant in recently burnt areas Ground feeding species which generally increase in abundance post fire 	<ul style="list-style-type: none"> >50% of habitat patch should not burn in a single fire event Fox baiting programs should be considered post-fire 	Aus [^]
Bird	<i>Zoothera lunulata</i>	Bassian Thrush		R	8 26	BE CL MO	I	<ul style="list-style-type: none"> Sites: tree forks or tree stumps Material: cup shaped of bark strips, leaves, grasses, moss & rootlets Season: Jul-Dec 	<ul style="list-style-type: none"> Prefers dense vegetation and moist gullies Sedentary but dispersive Risk of population decline due to bushfire Forages for insects in the ground Frequent fire likely to disrupt foraging sites 	<ul style="list-style-type: none"> >50% of habitat patch should not burn in a single fire event 	R Aus [^]
Bird	<i>Aquila audax</i>	Wedge-tailed Eagle			9 8	AH BE BH CL GI HG MO	C	<ul style="list-style-type: none"> Sites: High in a tree Material: sticks, bark and leaves Season: usually Jun-Jul but can vary 	<ul style="list-style-type: none"> Protection of breeding locations important Inhabits timbered country and plains, singly or in pairs Requires old growth forests Low intensity fire not likely to impact the feeding or breeding habitat of this species 	<ul style="list-style-type: none"> Minimise the likelihood of extensive fires Minimise the likelihood of high intensity fire 	R Aus [^]

Refer to Table 1 (Section 4.3) for MVS names and descriptions and to Section 11 of this plan for a description of the codes used within Appendices
 NOTE: List includes species known or likely to occur within the plan area.

Appendix 4: Ecological Communities of Conservation Significance

Ecological Community	SA Proposed Status (DEH, 2005c)	Occurrence	Reserve	Components	Fire Response	Fire Management Guidelines	Source
<p>Grey Box <i>(Eucalyptus microcarpa)</i> Grassy Low Woodland</p>	<p>Endangered *Nominated for National listing under the EPBC Act</p>	<ul style="list-style-type: none"> • 1,250 ha remains within the MLR, SA • >163 ha in Belair National Park • 27 ha in Greenhill Recreation Park 	<p>BE GR BC</p>	<p>Tree Layer</p> <ul style="list-style-type: none"> • Grey Box (locally dominant) • SA Blue Gum (<i>E. leucoxylon</i>) • River Red Gum (<i>E. camaldulensis</i>) • Drooping Sheoak (<i>Allocasuarina verticillata</i>) • Golden Wattle (<i>Acacia pycnantha</i>) • *European Olive (<i>Olea europaea ssp. europaea</i>) <p>Shrub and Ground Layer</p> <ul style="list-style-type: none"> • Twiggy Daisy-bush (<i>Olearia ramulosa</i>) • Mount Lofty Grass-tree (<i>Xanthorrhoea quadrangulata</i>) • Yacca (<i>X. semiplana</i>) • Kangaroo Thorn (<i>Acacia paradoxa</i>) • Narrow-leaf Hop-bush (<i>Dodonaea viscosa ssp. angustissima</i>) • Rock Fern (<i>Cheilanthes austrotenuifolia</i>) • Soft Tussock Mat-rush (<i>Lomandra densiflora</i>). • Kangaroo Grass (<i>Themeda triandra</i>) • *African Daisy (<i>Senecio pterophorus</i>) • *Boneseed (<i>Chrysanthemoides monilifera</i>) • *Soursob (<i>Oxalis pes-caprae</i>) • *Broad-leaf Cotton-bush (<i>Asclepias rotundifolia</i>) • *Fennel (<i>Foeniculum vulgare</i>) 	<ul style="list-style-type: none"> • Most remnants are infested with woody weeds contributing to fire risk 	<ul style="list-style-type: none"> • Avoid burning entire remnants during a single fire event • Aim to increase patchiness within the remnants • Implement ecological/experimental burns as part of an integrated weed management strategy • Implement ecological/experimental burns to determine the response of the community to various fire regimes 	<p>SA^ (Turner, 2001)</p>

Ecological Community	SA Proposed Status (DEH, 2005c)	Occurrence	Reserve	Components	Fire Response	Fire Management Guidelines	Source
<p>Mountain (Candlebark) Gum (<i>Eucalyptus dalrympleana</i> ssp. <i>dalrympleana</i>) Open Forest</p>	Endangered	<ul style="list-style-type: none"> Occurs in the wetter, colder valleys on fertile soils between Mylor and Gumeracha, in areas receiving over 750 mm of annual rainfall < 30 ha in Cleland Conservation Park 	CL MO	<p>Tree Layer</p> <ul style="list-style-type: none"> Mountain Gum Swamp wattle (<i>Acacia retinodes</i>) (creek form) Blackwood (<i>Acacia melanoxylon</i>) Beaked Hakea (<i>Hakea rostrata</i>) <p>Shrub and Ground Layer</p> <ul style="list-style-type: none"> Mt Lofty Ground-berry (<i>Acrotriche fasciculiflora</i>) Hop Goodenia (<i>Goodenia ovata</i>) Cutting Sedge (<i>Gahnia sieberiana</i>) Bracken (<i>Pteridium esculentum</i>) Myrtle Wattle (<i>Acacia myrtifolia</i>) Prickly Tea Tree (<i>Leptospermum continentale</i>) Wallaby Grass (<i>Danthonia</i> spp.) Kangaroo Grass (<i>Themeda triandra</i>) Exotic species 	<ul style="list-style-type: none"> Remnants are infested with weeds contributing to fire risk Potential changes in fire regimes may be restricting natural regeneration 	<ul style="list-style-type: none"> Avoid burning entire remnants during a single fire event Avoid burning remnants at intervals of less than 10 years 	SA^ (Turner, 2001)
<p>Silver Banksia (<i>Banksia marginata</i>) Grassy Low Woodland</p>	Endangered	<ul style="list-style-type: none"> Occurs along the foothills of the Mount Lofty Ranges on the poor sandy soils, in areas receiving more than 550 mm of annual rainfall < 1 ha in Black Hill Conservation Park 2 ha in Morialta Conservation Park 	BH MO	<ul style="list-style-type: none"> In association with Hop Bush (<i>Dodonaea viscosa</i>) Black Hill CP In association with Drooping Sheoak (<i>Allocasuarina verticillata</i>) Morialta CP 	<ul style="list-style-type: none"> Remnants are small and highly fragmented contributing to fire risk Some of the dominant species will reseed following fire. Plants will need to reach reproductive maturity before fire. <i>B. marginata</i> appears to act as obligate seeder in some regions 	<ul style="list-style-type: none"> Avoid burning entire remnants during a single fire event Avoid burning remnants at intervals of less than 10 years Determine fire response at MLR sites 	(Turner, 2001)

Ecological Community	SA Proposed Status (DEH, 2005c)	Occurrence	Reserve	Components	Fire Response	Fire Management Guidelines	Source
<p>Silky Tea-tree (<i>Leptospermum lanigerum</i>) Closed Shrubland</p>	Endangered	<ul style="list-style-type: none"> • In swamps and creeklines with permanent water • < 20 ha in Cleland Conservation Park • < 1 ha in Eurilla Conservation Park 	CL EU	<p>In Eurilla CP</p> <ul style="list-style-type: none"> • Coral Fern (<i>Gleichenia microphylla</i>) • Water Fern (<i>Blechnum</i> spp.) • Wire-rapier Sedge (<i>Lepidosperma semiteres</i>) • King Fern (<i>Todea barbara</i>) <p>In Cleland CP Surrounded by</p> <ul style="list-style-type: none"> • Swamp Wattle (<i>Acacia retinodes</i>) • Hop Goodenia (<i>Goodenia ovata</i>) • Saw Sedge (<i>Gahnia sieberana</i>) • Fishbone Water Fern (<i>Blechnum nudum</i>) • Soft Water Fern (<i>B. minus</i>) • Maidenhair Fern (<i>Adiantum aethiopicum</i>) • Coral Fern (<i>Gleichenia microphylla</i>) • Bracken • Prickly Tea Tree • Exotic species 	<ul style="list-style-type: none"> • Some remnants are infested with weedy species such as Blackberry contributing to fire risk • <i>L. lanigerum</i> known to resprout after fire in Victoria; no records of response in SA. 	<ul style="list-style-type: none"> • Avoid burning remnants during a single fire event • Avoid burning remnants at intervals of less than 10 years 	(Turner, 2001)

11 SUMMARY OF CODES USED IN APPENDICES

Reserve Codes

CODE	RESERVE	CODE	RESERVE
AN	Angove CP	EU	Eurilla CP
AH	Anstey Hill RP	FE	Ferguson CP
BE	Belair NP	GI	Giles CP
BH	Black Hill CP	GR	Greenhill RP
BF	Blackwood Forest RP	HG	Horsnell Gully CP
BC	Brownhill Creek RP	MO	Morialta CP
CL	Cleland CP	MLBG	Mount Lofty Botanic Gardens
CC	Cobbler Creek RP	MTO	Mount Osmond Reserve
		KN	The Knoll CP

Other Codes Used

NPW ACT STATUS	EPBC ACT STATUS	DIET OF RATED FAUNA SPECIES
E Endangered	EX Extinct	C Carnivore or scavenger. Mainly vertebrates.
V Vulnerable	CE Critically Endangered	H Herbivore. Includes folivores, grazers and browsers.
R Rare	EN Endangered	N Nectar feeder
	VU Vulnerable	I Insectivore/"arthropodivore"/omnivore
		G Granivore. Typically peak in abundance after a fire event in fire-adapted vegetation, due to the stimulation of flowering and subsequent seed-set.

MISCELLANEOUS CODES

#	Fire response is unknown or ambiguous, thus the required data is not available to propose Ecological Fire Management Guidelines. When data becomes available the table will be updated.
*	Introduced species

FIRE RESPONSE SOURCE

R	Regional or local data
SA	South Australian data
Aus	Interstate data
^	Data/observations derived from published or unpublished literature.
E	Expert opinion (person knowledgeable in species genera)
I	Inferred from similar species (Senior Fire Ecologist - Fire Management Branch has inferred based on other species genera)

12 GLOSSARY OF ACRONYMS AND FIRE MANAGEMENT TERMINOLOGY

Term	Definition
Backburn(ing)	A fire started intentionally along the inner edge of a control line to consume the fuel in the path of a bushfire.
Bark Fuel	The flammable bark on tree trunks and upper branches (DEH, 2006c).
Bioturbation	The disruption of sediments by organisms, either by churning the surface layers or by burrows and trails (Attiwill and Wilson, 2003).
Bulk Water Carrier	A large tanker used for replenishing firefighting appliances with water.
Bushfire	An unplanned fire. A generic term that includes grass fires, forest fires and scrub fires.
Canopy Fuel	The crowns (leaves and fine twigs) of the tallest layer of trees in a forest or woodland. Not measured as part of the overall fuel hazard assessment (DEH, 2006c).
CFS	The South Australian Country Fire Service.
Control line	A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire.
DEH	The South Australian Department for Environment and Heritage.
DEH (Cwlth)	The Commonwealth Department of Environment and Heritage.
Direct attack	A method of bushfire attack where wet or dry firefighting techniques are used. It involves suppression action right on the fire edge, which becomes the control line.
Discontinuous fuels	Significant gaps between clumps or patches of fuel (DEH, 2006c).
DBPC	District Bushfire Prevention Committee.
EAT	DEH Environmental Assessment Table. Completed for all prescribed burns (as part of the Prescribed Burn Plan) and other fire management works where native vegetation is being cleared and is not exempt under the <i>Native Vegetation Act 1991</i> (DEH, 2004).
Elevated Fuel	Shrubs and juvenile understorey plants up to 3 m in height (DEH, 2006c)
EPBC Act	The Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Extreme fire behaviour	A level of bushfire behaviour characteristics that ordinarily precludes methods of direct suppression action. One or more of the following is usually involved: high rates of spread; prolific crowning and/or spotting; presence of fire whirls and/or a strong convective column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.
Fine fuels	Grass, leaves, bark and twigs less than 6mm in diameter.
Fire access	A track constructed and maintained expressly for fire management purposes.

Term	Definition
track	
Fire behaviour	The manner in which a fire reacts to the variables of fuel, weather and topography.
Firebreak	An area or strip of land where vegetation has been removed or modified to reduce the risk of fires starting and reduce the intensity and rate of spread of fires that may occur (GAFLC, 2005).
Fire danger	The combination of all factors, which determine whether fires start, spread and do damage, and whether and to what extent they can be controlled.
Fire danger rating	An evaluation of fire rate of spread, or suppression difficulty for specific combinations of fuel, fuel moisture, temperature, humidity and wind speed. The rating can be Low, Moderate, High, Very High or Extreme.
Fire frequency	The number of fires that have occurred on the same area over a time period.
Fire intensity	The rate of energy or heat release per unit time per unit length of fire front, usually expressed in kilowatts per metre (kw/m) (Pausas, <i>et al.</i> , 2003)
Fire interval	The interval between successive fires.
Fire management	All activities associated with the management of fire-prone land, including the use of fire to meet land management goals and objectives.
Fire regime	The history of fire in a particular vegetation type or area including the fire frequency, interval, intensity, extent and seasonality of burning (Brooks, <i>et al.</i> , 2004).
Fire scar	A destructive mark left on a landscape by fire.
Fire season	The period(s) of the year during which fires are likely to occur, spread and do sufficient damage to warrant organised fire control.
Fire severity	The effect of fire on an ecosystem, that is, on living plants, as well as on the amount and location of organic matter consumed during a fire (Pausas, <i>et al.</i> , 2003)
Fire suppression	The activities connected with restricting the spread of bushfire following its detection and making it safe.
ForestrySA	The South Australian Government's forest management agency.
Fuel	Any material such as grass, leaf litter and live vegetation, which can be ignited and sustains a fire. Fuel is usually measured in tonnes per hectare.
Fuel arrangement	A general term referring to the spacing and arrangement of fuel in a given area.
Fuel hazard	The overall fuel hazard is defined as the sum of the influences of bark fuel, elevated fuel and surface fine fuel (DEH, 2006c).
Fuel management	Modification of fuels by prescribed burning, or other means.
GAFLC	South Australian Government Agencies Fire Liaison Committee.
IBRA	Interim Biogeographical Regionalisation for Australia.

Term	Definition
Incident Controller (IC)	The individual responsible for the management of all incident operations and IMT.
IMT	Incident Management Team. The group of incident management personnel comprising the IC and the people he/she appoints to be responsible for the functions of Operations, Planning and Logistics.
Indirect attack	The use of backburning as a method of suppression to confine the fire within a defined area bounded by existing or prepared control lines. Control lines may be a considerable distance ahead of the fire.
Key Fire Response Species	These are the species most susceptible to decline due to inappropriate fire regimes: either too frequent or too infrequent fire, low or very high intensity fire, or fire in a particular season.
Ladder fuels	Fuels that provide vertical continuity between strata. Fire is able to carry surface fuels into the crowns of trees with relative ease.
MFS	South Australian Metropolitan Fire Service.
MIST	Minimum Impact Suppression Techniques. Achieving fire management objectives using methods that are consistent with land and resource management objectives. When determining an appropriate suppression response, consideration will be given to undertaking suppression with greater sensitivity and the long-term effects (WFLLC, 2003).
MLR	Mount Lofty Ranges.
MVS	Major Vegetation Sub-group.
Myrmecochory	Dispersal of spores or seeds by ants (Attiwill and Wilson, 2003).
Near-surface fuel	Grasses, low shrubs and heath, sometimes containing suspended components (leaves, bark and/or twigs).
NPW Act	The <i>South Australian National Parks and Wildlife Act 1972</i> .
NVC	Native Vegetation Council. Established under the provisions of the <i>Native Vegetation Act 1991</i> , responsible for making decisions on a wide range of matters concerning native vegetation in SA (DWLBC, 2006).
Of conservation significance	In this plan, used to describe important or rated populations or species of flora and fauna as well as vegetation communities. These may be: <ul style="list-style-type: none"> • Nationally rated, that is, listed as Threatened (with a rating of Extinct, Critically Endangered, Endangered, Vulnerable or Conservation Dependent) under the federal EPBC Act. • South Australian rated, listed as Threatened (with a rating of Endangered, Vulnerable or Rare) under the NPW Act, <i>Revised Schedules 7, 8 and 9</i>. • Provisionally listed as Threatened (with a rating of Endangered or Vulnerable) in South Australia, that is, included on the unpublished DEH <i>Provisional List of Threatened Ecosystems of South Australia</i> (DEH, 2005c).
Prescribed Burn Plan	The plan, which is approved for the conduct of prescribed burning. It contains a map identifying the area to be burnt and incorporates the specifications and conditions under which the operation is to be conducted.
Prescribed	The controlled application of fire under specified environmental conditions to a

Term	Definition
burning	predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives.
Response plan	A plan detailing the response for a risk or an area including the type and number of resources.
Retardant	A chemical generally mixed with water, designed to retard combustion by chemical or physical action. It is usually applied by aircraft but may be applied from tankers at the fire edge.
Risk assessment	Used in DEH fire planning to assist in evaluating the threat to life, property and environmental assets posed by bushfire and also to aid in developing strategies and works for risk mitigation. Considers <i>Likelihood</i> and <i>Consequence</i> to determine an overall risk rating through a matrix (DEH, 2006b).
SA Water	South Australian Water Corporation.
Spotting	The ignition of spot fires from sparks or embers.
Surface Fuel	Otherwise known as 'litter'. Comprised of leaves, twigs and bark on the ground (DEH, 2006c)
Total Fire Ban	A ban on lighting and maintaining of a fire in the open, which can be invoked at any time during the year. When invoked, the Total fire Ban is imposed for a period of 24 hours (from midnight to midnight) but may also be imposed for part of a day or days (<i>Country Fire Service Regulations, 2003</i>).
TPC	The <i>Threshold of Potential Concern</i> is defined as a point in time where <i>Key Fire Response Species</i> are likely to be affected by an aspect of fire regime.
Weed of national significance	20 priority weeds that pose future threats to primary industries, land management, human or animal welfare, biodiversity and conservation values at a national level. These weeds were identified and ranked through the assessment of invasiveness, impacts, potential for spread and socioeconomic and environmental aspects (Australian Weeds Committee, 1999).

Unless otherwise indicated, definitions for fire management terminology were adapted from (DEH, 2006g)

