

Department for Environment and Water

Draft Fire Management Plan

Draft Dudley Peninsula

**Incorporating Baudin, Cape Willoughby, Dudley, Lashmar,
Lesueur, Pelican Lagoon, & Simpson Conservation Parks.**

2019



**Government
of South Australia**

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Acronyms

AAR	Aboriginal Affairs and Reconciliation	GBC	Glossy Black-cockatoo
AFAC	Australasian Fire & Emergency Services Authorities Council	HA	Heritage Agreement
AMLR	Adelaide and Mount Lofty Ranges	ha	Hectares
A-zone	Asset Protection Zone	IMT	Incident Management Team
BMAP	Bushfire Management Area Plan	KI	Kangaroo Island
BMC	Bushfire Management Committee	KI NRM	Kangaroo Island Natural Resources Management
B-zone	Bushfire Buffer Zone	KI BMAP	Kangaroo Island Bushfire Management Area Plan
CFS	SA Country Fire Service	KI BMC	Kangaroo Island Bushfire Management Committee
CP	Conservation Park	MEW	SA Minister for Environment and Water
CSIRO	Commonwealth Scientific and Industrial Research Organisation	MVG	Major Vegetation Group
Cwith	Commonwealth	MVS	Major Vegetation Sub-group
C-zone	Conservation-Land Management Zone	NPW Act	National Parks & Wildlife Act
DEH	The (former) SA Dept. for Environment and	NVC	Native Vegetation Council
DENR	The (former) SA Dept. for Environment and Natural Resources	NVIS	National Vegetation Information System
DEW	The Dept. for Environment and Water	SA	South Australia
DEWNR	The (former) SA Dept. of Environment, Water and Natural Resources	sp.	Species (singular)
EA	Environmental Assessment	spp.	Species (plural)
EFMG	Ecological Fire Management Guidelines	ssp.	Subspecies
EFMS	Ecological Fire Management Strategy	SWER	Single Wire Earth Return
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999	TOMM	Tourism Optimisation Management Model
FES Act	Fire and Emergency Services Act 2005	TPC	Threshold of Potential Concern
GAFLC	The (former) Government Agencies Fire Liaison Committee	TSSC	Threatened Species Scientific Committee
GAFMWG	Government Agencies Fire Management Working Group		

Invitation to Contribute

It is Department for Environment and Water policy to consult with stakeholders and the public during the development of fire management plans. This is your opportunity to convey your comment on the draft Dudley Peninsula Fire Management Plan.

This fire management plan has been prepared by the Department for Environment and Water to provide direction for fire management actions and to identify objectives and strategies for fire management across the planning area.

You are welcome to make a written or e-mail submission to the address provided below.

How to Make an Effective Submission

State the plan to which you are referring, as several may be on public exhibition.

Make your text concise and clear.

Refer to the page, section number, paragraph and / or objective or strategy upon which you are commenting.

If you disagree with an objective or strategy, state your reasons and say what you would prefer in its place, and why.

If you are commenting on the accuracy of background information, provide references for your information sources.

It is also important to say with which sections of the plan you agree.

Submissions Close:	3 June 2019
Written submissions addressed to:	Chair Dudley Peninsula Fire Management Plan Planning Team Department for Environment & Water GPO Box 1047 ADELAIDE SA 5001

Method of Analysing Public Submissions

After the closing date for public submissions, the points made in each submission will be collated according to the section of the draft plan they address. Each point made will be assessed and the draft fire management plan amended using the following criteria.

1. The draft fire management plan will be amended if the point:

- a) provides additional information of direct relevance to management
- b) indicates or clarifies a change in Government legislation, management commitment or management policy
- c) proposes strategies that would better achieve or assist with management objectives
- d) prompts a re-consideration of the objective and / or strategy and results in an alternative objective and / or strategy for the park
- e) is an alternate viewpoint received on the topic and is considered a better option than that proposed in the draft plan
- f) indicates omissions, inaccuracies or a lack of clarity.

2. The draft fire management plan will not be amended if the point:

- a) addresses issues beyond the scope of the plan
- b) was already in the plan
- c) offers an open statement, or no change is sought
- d) clearly supports the draft proposals
- e) is an alternate viewpoint received on the topic and the recommendation of the draft plan is still considered the best option
- f) is based on incorrect information

- g) contributes options that are not possible (generally due to some aspect of existing legislation or Government policy)
- h) involves details that are not appropriate or necessary for inclusion in a document aimed at providing management direction over the long term.

What Will Happen to Your Submission

At the close of the public exhibition period, the draft plan and public submissions will be referred to the relevant planning project team for consideration and comment.

After considering all submissions, advice and recommendations the Director may adopt a fire management plan with or without alteration. The final plan will be made available to the public and on the Department's website: <http://www.environment.sa.gov.au/topics/fire-management/bushfire-risk-and-recovery/fire-management-plans>

Closing Date for Submissions

The closing date for public submissions is at least four weeks from the time the plan is released for comment. A notice of release is placed on the YourSAy.sa.gov.au website, the Islander Kangaroo Island paper, and on the Department's website.

Submissions Close: **3 June 2019**

Written submissions addressed to: Manager, Fire Planning
Fire and Flood Management Unit
Department for Environment and Water
GPO Box 1047
ADELAIDE SA 5001

Email submissions to: DEWFireManagement@sa.gov.au

EXECUTIVE SUMMARY

This Fire Management Plan for the Dudley Peninsula covers Cape Willoughby, Dudley, Lesueur, Pelican Lagoon, Baudin, Lashmar, and Simpson Conservation Park and selected Crown land and participating Heritage Agreements.

This plan has been prepared to provide direction for fire management in the planning area, through the inclusion of strategies for bushfire risk modification and suppression on the identified land. The plan emphasises the protection of life and property and provides direction for land managers in the protection and enhancement of the natural and cultural heritage of the area. It is important to note that there will be a transitional stage where the management strategies and actions proposed in the plan are undertaken and implementation depends upon fire management priorities and the allocation of regional resources.

The planning area was identified as a priority for fire management planning within the Department for Environment and Water Kangaroo Island Region to:

- enhance the protection of life, property and environmental values
- reduce the potential for a bushfire to impact upon the township of Penneshaw adjacent to Baudin Conservation Park, and the communities of Island Beach, Brown Beach and Baudin Beach adjacent to Dudley Conservation Park
- provide for the landscape protection of Baudin, Dudley, Simpson, Lashmar and Lesueur Conservation Parks, and to reduce the likelihood of the whole reserve, multiple reserves and adjacent private lands burning in a single fire event
- minimise the risk of fire threatening the community and significant infrastructure, such as power facilities
- identify issues for visitor management
- provide for the protection of significant built and natural assets within and adjacent to the reserves
- provide for the protection of fauna and flora species of conservation significance, for example the nationally rated Glossy Black-cockatoo, Southern Brown Bandicoot, Kangaroo Island Southern Emu-wren, Kangaroo Island Western Whipbird, White-bellied Sea-eagle and Kangaroo Island Echidna, and to provide for the protection of important habitat for these species
- provide for the protection of communities of conservation significance, such as the Kangaroo Island Narrow-leaved Mallee (*Eucalyptus cneorifolia*) woodland ecological community
- maintain or improve the viability of native species, populations, communities and habitats in reserves (some of which are unique to the plan area)
- provide for the protection of and to increase our knowledge of fire regimes required by species populations, fauna and flora communities and ecosystems of conservation significance (some of which are unique to the plan area)
- identify 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
- advocate for the pro-active management of habitats at a landscape level as well as individual species, by using fire as a management tool

- decrease the potential for intentional and accidental fire ignitions to build into landscape scale bushfires
- consider the implications of regeneration and revegetation processes changing fuel hazards.

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

- undertaking a risk assessment to identify life, property and environmental values that may be threatened by bushfires
- applying DEW Fire Management Zoning principles to guide the management of fuel in Asset Protection and Bushfire Buffer Zones and designating Conservation-Land Management Zones
- applying DEW Ecological Fire Management Guidelines to determine appropriate fire regimes in Conservation-Land Management Zones
- assessing track standards using the Government Agencies Fire Management Working Group (GAFMWG) guidelines for firebreaks and fire access tracks in South Australia (GAFMWG 2014).

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

- Fuel reduction:
 - in Asset Protection and Bushfire Buffer Zones using a variety of methods, including prescribed burning and mechanical removal
 - in strategic areas within the Conservation-Land Management Zone to provide some landscape protection within the reserves and increase patchiness within the vegetation across larger areas
 - to complement strategies to manage species or habitats.
- Fire management actions to increase fire readiness, including changes to fire access and mitigation and suppression infrastructure.
- Coordinated fire management between the Department and adjacent landowners through Bushfire Management Area Plans.

The Department thanks those who contributed to the development of this plan and encourages their continued engagement in managing fire in the planning area. This fire management plan forms a significant component of the Kangaroo Island Bushfire Management Area Plan. As fire is a landscape issue, the community will need to implement fire management strategies to complement work undertaken by the Department.

This draft plan will be released for public comment for a period of four weeks from the 26th of April 2019. Comments will then be evaluated and incorporated where considered appropriate. A major review of this plan will occur after ten years of implementation, or earlier if required.

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Fire Management Maps

Maps supporting this fire management plan are interactive and are provided via the web under five themes. To access this site please enter www.environment.sa.gov.au/topics/fire-management/bushfire-risk-and-recovery/fire-management-maps into your internet browser and follow the links to 'Fire Management Maps'.

- Map 1 – Terrain, Tenure and Infrastructure
- Map 2 – Vegetation Communities and Significant Species
- Map 3 – Fire History
- Map 4 – Fire Management and Access
- Map 5 – Implementation Strategy - Proposed Burns

1 SCOPE AND PURPOSE

This Fire Management Plan (the plan) provides a strategic framework for fire management on Department for Environment and Water (DEW)-managed reserves and other included land across the Dudley Peninsula, Kangaroo Island. The plan incorporates Cape Willoughby, Dudley, Lesueur, Pelican Lagoon, Baudin, Lashmar, and Simpson Conservation Park, and, selected Crown land and participating Heritage Agreements.

The plan drives the delivery of fire management on DEW-managed land by defining objectives for the protection of life and property (particularly in relation to visitors and adjacent landholders), protection of the environment and for ecological fire management. Strategies are recommended to meet objectives, which will increase the level of bushfire readiness and guide management and suppression strategies during bushfire incidents.

The area was identified for fire management planning to address the following issues:

- The general protection of life, property and the environment within and adjacent to the reserves
- The protection of built assets, natural and cultural values and assets, minor public infrastructure, and revegetation within and adjacent to the reserves
- The proximity of the reserves, Baudin and Dudley CP, to significant infrastructure, including the main power transmission line from Adelaide
- The occurrence of species, populations, and ecological communities of conservation significance within the plan area
- High visitor numbers, particularly during the fire season
- The likelihood of intentional and accidental fire ignitions
- The use of fire as a management tool for community protection and / or conservation management
- The high bushfire potential of the Dudley, Simpson, and Lesueur CP area
- The impact of a significant bushfire within the planning area on the economy of the local community
- The potential for bushfire to build in to a landscape-scale event due to the large areas of contiguous vegetation
- The potential for a bushfire within Dudley CP to impact on the township of Island Beach and Browns Beach and a bushfire within Baudin CP to impact on the township of Penneshaw
- The potential impacts to biodiversity as a result of a reserve burning in its entirety in a single fire event
- The need for fire management planning to inform revegetation projects within reserves and consider existing revegetation assets.

This 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 planning area

- 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 Site Bushfire Management Plan used by worksites wishing to remain open on days of heightened fire danger
- inform the preparation of Bushfire Response Plans for the included lands, which provide specific operational information useful in the early stages of an incident.

Fire management actions outlined in this plan will be implemented in a staged manner depending on available resources. Unforeseen events such as large-scale bushfires or significantly altered fuel hazards may also influence the implementation of the recommended works. These actions will be facilitated through the DEW Kangaroo Island Region with Regional Fire Management. Adjoining lands are considered in the plan, but only in the context of actions required to minimise the risk to assets from fires originating in the included reserves. However, through the Burning on Private Land Program, a joint initiative between Country Fire Service (CFS), DEW and private land holders, DEW will support and complement landscape-scale fire planning for adjoining lands (DEWNR 2016a). Fire management planning for other lands is the responsibility of the Kangaroo Island Bushfire Management Area Committee (KI BMC), in accordance with the requirements of the *Fire and Emergency Services Act 2005* (FES Act). DEW is represented on this Committee, along with Local Government, the Kangaroo Island Natural Resources Management (KI NRM), and the Country Fire Service CFS.

1.1 Objectives

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

General Objectives for Fire Management

- To reduce the risk to life, property and the environment during bushfire events
- To ensure that sound conservation and land management principles are applied to fire management actions
- To apply an adaptive management approach to fire management on DEW-managed land supported by contemporary research
- To support the strategic containment of bushfires (i.e. to minimise the likelihood of a fire entering / exiting a block or reserve) and to inhibit the spread of bushfire through DEW-managed land
- To complement Bushfire Management Area Plans prepared by BMCs under the FES Act
- To undertake bushfire suppression in a safe and professional manner
- To manage fire regimes to ensure consistency with the Ecological Fire Management Guidelines (EFMG) in Conservation-Land Management Zones (refer to Table 4).

The fire management objectives that apply specifically to the Dudley Peninsula are as follows.

General Objectives for Fire Management in the Dudley Peninsula

- To work with universities and / or other research institutions to develop research programs that inform DEW prescribed burning where appropriate. To improve knowledge of how species populations, flora and fauna communities and ecosystems respond to fire, by filling gaps in knowledge and contributing new information and concepts to the adaptive management process
- To reduce the impact of bushfire on the community, critical infrastructure and services on and adjacent to public land
- To reduce the likelihood of a bushfire impacting significant recreational values and assets
- To reduce the impact of bushfire in the reserves by:
 - minimising the likelihood of a block / reserve / significant portion of a reserve burning in a single fire event
 - minimising the likelihood of a landscape scale fire occurring within the planning area or spreading into the adjacent planning area
- To establish and maintain an appropriate level of readiness (including employee and equipment resources) that will enable rapid and effective response for fire management
- To establish and maintain an appropriate level of preparedness for bushfire response and prescribed burning activities by:
 - maintaining existing track standards
 - upgrading strategic access tracks where necessary
 - managing fuel loads at the landscape-scale
- To maintain or improve the viability of native species, populations and ecological communities in reserves by:
 - reducing the likelihood of fire suppression operations impacting upon the viability of flora and fauna populations and ecosystems
 - reducing the likelihood of contiguous remnants of significant bushland burning in their entirety during a single fire event
 - reducing the likelihood of fire threatening flora and fauna species of conservation significance by ensuring key populations (or their habitats) are not burnt in their entirety during a single fire event
 - creating variability in the fire regime across the landscape to benefit a range of flora and fauna populations and ecosystems.

2 THE PLANNING FRAMEWORK

2.1 Legislation

Fire management planning for public land is influenced by several pieces of state and federal legislation (Table 1 – Legislation influencing fire management planning). Of most relevance, the FES Act identifies the responsibilities for the CFS and land management agencies in minimising the risks and impacts of bushfires. Fire management plans themselves are not statutory documents but provide the mechanism to meet the statutory requirements under the relevant legislation.

TABLE 1 – LEGISLATION INFLUENCING FIRE MANAGEMENT PLANNING

Legislation	Sec.	Relevance to fire management
<i>Fire and Emergency Services Act 2005</i> (SA)	71	Defines the establishment of the State Bushfire Coordination Committee and its responsibility to divide the State into bushfire management areas, to prepare, and to keep under review the State Bushfire Management Plan and oversee its implementation.
	72	Defines the establishment of the Bushfire Management Committees and their responsibility to prepare, and to keep under review, a Bushfire Management Area Plan and oversee its implementation, for its relevant area.
	73	Defines the preparation, objectives, content, approval and review process of both the State Bushfire Management Plan and Bushfire Management Area Plans.
	97-6	States that CFS should consider the provisions of a management plan and make reasonable attempts to consult with the relevant land manager when responding to an incident within a government reserve.
	105H-1	Conveys the fire management responsibilities of DEW through requirements to minimise the risk of fire threatening life and property and to reduce the likelihood of fire ignitions and fire spreading through the land that they manage.
<i>National Parks & Wildlife Act 1972</i> (SA)	37	Defines overarching management objectives for proclaimed reserves managed by DEW, which includes 'the prevention and suppression of bushfires and other hazards', and provides protection for listed terrestrial flora and fauna
<i>Wilderness Protection Act 1991</i> (SA)	12	Directs DEW to prepare a <i>Wilderness Code of Management</i> (DEH 2004), which establishes principles for fire management and provides provisions for fire management in Wilderness Protection Areas and Zones if deemed an 'essential management operation'.
<i>Crown Land Management Act 2009</i> (SA)	9c	Assigns DEW, through the Minister for Environment and Water (MEW), with responsibilities for the on-ground management of unalienated Crown land and any Crown land dedicated to, owned by or under the care and control of the MEW.
<i>Native Vegetation Act 1991</i> (SA)	27(4)	Describes the allowable methods of native vegetation clearance, including 'cold burn' or prescribed burning, and the relevant conditions. DEW must meet the provisions of the Act if intending to modify native vegetation on their land (this includes burning). Clearance applications are assessed by NVC in accordance with Schedule 1 of the Act.
	25	Outlines the guidelines that the Native Vegetation Council must prepare to assist in the application of native vegetation clearance, including 'cold burns' or prescribed burning.
	23	Outlines the provisions for the establishment of native vegetation HAs for conservation purposes on private land.
<i>Native Vegetation Regulations 2003</i> (SA)	9	Clarifies which actions can be undertaken to modify native vegetation without approval from the Native Vegetation Council, specifically with the written approval of the Chief Officer of CFS and as per Schedule 1 of the Act.

Legislation	Sec.	Relevance to fire management
<i>Environment Protection & Biodiversity Conservation Act 1999</i> (Cwlth)	18	Regulation of actions likely to impact nationally-listed species and ecological communities.
	146, 146A, & 146B	Outlines the requirement for a strategic assessment to be undertaken. Strategic assessments are landscape-scale assessments and consider a broad set of actions. Where Matters of National Environmental Significance are involved, DEW must adhere to the <i>Fire Management Environmental Assessment and Management Procedure</i> (DEWNR 2014b) to meet EPBC Act requirements.
	269AA	Describes when Recovery Plans should be prepared for nationally-listed species and ecological communities (see Section 3.7.3).

2.2 DEW Fire Management Policy and Procedures

The *DEW Fire Policy and Procedure Manual* (DEWNR 2017) outlines the agency's fire management responsibilities to protect life, property and the environment. The policy states that DEW fire management plans will:

- identify fire related risks to life, natural and cultural heritage values, and built assets
- define objectives for fire management in the planning area
- identify strategies to achieve these objectives.

The plan has been developed in accordance with DEW's *Project Management, Risk Assessment, Zoning, and Protection of Cultural Heritage Procedures* (DEWNR 2017) for Fire Management Planning.

2.3 Other influences and considerations

There are a number of statutory plans and non-statutory documents that were considered during the fire management planning process.

2.3.1 Land management

Reserve management plans are statutory requirements under the *National Parks and Wildlife Act 1972* (NPW Act) and the *Wilderness Protection Act 1992* (WP Act) (where relevant). They may identify the requirement for a fire management plan based on the nature of the fire-related issues within a reserve.

There are reserve management plans, fire management statements, and biodiversity or natural resource management plan/s that cover the majority of reserves within the planning area of this Plan. These documents are discussed below, however it is acknowledge that at the time of writing these documents, fire may not have been seen as a valuable land management tool, and even be at odds with accepted and contemporary land management and fire management practices of today.

The Conservation Parks of Kangaroo Island Reserve Management Plan includes Cape Willoughby, Dudley, Lesueur (previously known as Cape Hart CP), and Pelican Lagoon CP (DEP 1987). The reserve management plan identifies that fire management within Dudley CP should be limited to mechanical fuel hazard reduction, predominantly along the park boundaries and that prescribed burning should not be part of the fuel reduction strategy (DEH 2002e; DEP 1987). Fire management within Lesueur Conservation Park (formerly Cape Hart CP) should be limited to low intensity burns for habitat management (DEP 1987).

The reserve management plan identifies that within Pelican Lagoon CP, mosaic burning for ecological management of habitats is possible (DEP 1987). The *Pelican Lagoon Peninsula Bushfire Prevention Plan* complements this through the identification of mechanical

treatments as the most suitable method of managing fuel loads within the reserves (KI DBPC 2002), leaving the use of prescribed fire as an ecological management tool.

The above reserves are covered by a consistent management objective throughout the *Conservation Parks of Kangaroo Island Reserve Management Plan*, which is to 'control wildfires in the park and protect the park from fire' (DEP 1987).

The *Baudin Conservation Park Management Statement* (DEH 2002a) was developed for Baudin CP and identifies the need to conserve remnant coastal shrubland and native grassland with the aim to rehabilitating Drooping sheoak (*Allocasuarina verticillata*) woodlands, significant habitat for the Glossy Black-cockatoos (*Calyptorhynchus lathami halmaturinus*), the protection of the endemic Kangaroo Island (KI) Narrow-leaf mallee (*Eucalyptus cneorifolia*), and to provide bushfire protection to the Penneshaw Township (DEH 2002c). Revegetation works will be undertaken consistent with the above objectives, as well as the fire management actions identified in [Appendix 1](#) – Assets and Strategies for Risk Mitigation, ensuring the fuel hazard does not exceed the prescribed hazard level for each zone, and improving bushfire management for the township of Penneshaw.

The *draft Cape Willoughby Conservation Park Fire Management Statement* (DEH 2002d) identifies that fuel hazard reduction will be managed through existing grazing arrangements, which will continue into the foreseeable future. The *Cape Willoughby Lightstation Conservation Management Plan* does not address the bushfire risk to the Cape Willoughby Conservation Park.

The *draft Simpson Conservation Park Fire Management Statement* notes that fire prevention will be limited to fuel break establishment along the boundaries or adjoining road reserves of Simpson CP (DEH 2002f). DEW fire management objectives and strategies have changed significantly since the production of the above statement and will therefore differ in its application of fire in the landscape as a bushfire and ecological management tool.

The *Biodiversity Plan for Kangaroo Island, South Australia* has been developed for the region to guide the conservation, management and rehabilitation of habitats at a regional level. The plan seeks to improve fire management for biodiversity through increasing understanding of the effects of fire on biodiversity (Willoughby, Oppermann & Inns 2001).

The KI NRM Board has developed the *Kangaroo Island Natural Resources Management Plan 2017-2027* (KI NRM Plan) (KI NRM Board 2017). The KI NRM Plan addresses the management of natural resources over the next 10 years with a particular focus on climate change, which will influence fire behaviour.

Currently Simpson CP is not covered by a reserve management or other plan, and there is no current plan to develop one for this reserves.

2.3.2 Bushfire planning

Fire management planning at a landscape scale, regardless of tenure, is addressed in Bushfire Management Area Plans (BMAPs) prepared by Bushfire Management Area Committees (BMCs) as a statutory requirement under the FES Act. DEW fire management plans and BMC Bushfire Management Area Plans are complementary and both are developed in accordance with each other.

The Kangaroo Island Bushfire Management Area Plan (KI BMAP) (KI BMC 2017) has been adopted for the Kangaroo Island Bushfire Management Area and covers the Dudley Peninsula. Following the finalisation of this DEW fire management plan, the risk treatments

identified will be integrated within the KI BMAP. DEW will ensure that the BMC is aware of all fire management planning and actions undertaken on DEW-managed land, and that proposed actions are incorporated within the BMC annual works plan supporting the implementation of the BMAP.

2.4 Partnership Agencies

An agreement exists between the State Government public land management agencies (DEW, the South Australian Forestry Corporation (ForestrySA) and the South Australian Water Corporation (SA Water)) and the CFS to cooperatively manage fire in high fire risk areas. The Heads of Agencies Agreement the *Code of Practice for Fire Management on Public Land in South Australia* (DEW et al. 2018) aims to improve public safety, reduce the risk to private and community assets, and to reduce the impacts of inappropriate fire regimes on the environment.

Bushfire suppression in rural South Australia is led by the CFS, and DEW is a CFS group of brigades under the FES Act. Responding to a fire in DEW reserves is undertaken jointly by DEW and other CFS brigades. Local CFS brigades are heavily relied upon for fire suppression, particularly in the early stages of an incident. The cooperation, support and understanding between CFS brigades, DEW and the local community has been critical to successful fire suppression in the past, and will be critical to the success of this plan.

2.5 Consultation

DEW is committed to close cooperation and involvement with State and Commonwealth (Cwlth) organisations, special interest groups and the broader community to achieve the goals of protection of life and property and biodiversity conservation.

Consultation is not a statutory requirement for fire management plans, but is DEW policy (DEWNR 2017). Before planning commences, the community is invited to submit their views on fire management in the planning area, to ensure that a wide-range of issues are considered over the course of the planning process. Once a plan is drafted it is subject to DEW internal consultation for a period of at least four weeks prior to being released externally for public consultation, also for a period of four weeks. The finalised plan will be reviewed and treatments approved by the Native Vegetation Council before it is adopted by DEW.

2.6 Plan Review and Currency

The plan will undergo a major review after ten years of implementation, or earlier if required. Causes for earlier review could include legislation changes, altered fuel hazards, large-scale bushfires, and new information relevant to the risk assessment (DEWNR 2017). In addition to this, the CFS have developed the KI BMAP, which may influence the works and / or treatments the plan seeks to achieve by planning for fire at a landscape-scale, regardless of tenure. BMAPs require a review every 4 years, which may influence this plan and its currency.

An annual works program will be derived from the recommendations listed in the plan by the KI Region and reviewed on an annual basis.

3 BUSHFIRE ENVIRONMENT

This section provides an overview of the planning area, including its location, land use, terrain, vegetation, fire history, weather, and climate. The potential impacts of climate change and conditions conducive to significant fire intensity and behaviour are also discussed. Dudley Peninsula is an area with a high potential for bushfires.

3.1 Description of the Planning Area

3.1.1 Location

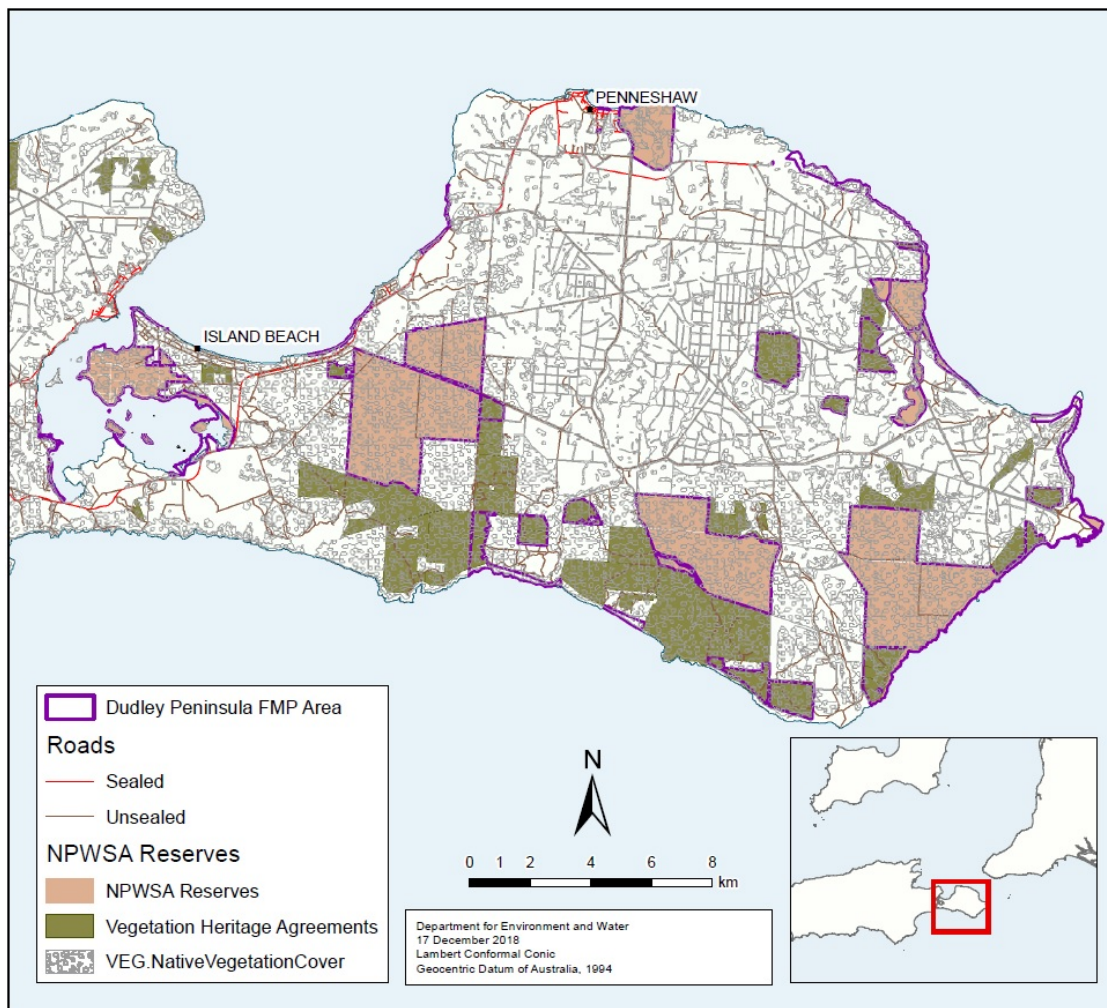


FIGURE 1 – DUDLEY PENINSULA FIRE MANAGEMENT PLAN AREA

Kangaroo Island is located 15 km south west of the western tip of the Fleurieu Peninsula, South Australia across Backstairs Passage. Kangaroo Island encompasses the single Local Government Area of the Kangaroo Island Council. Situated at the eastern end of Kangaroo Island, the Dudley Peninsula planning area covers the Hundred of Dudley, incorporating over 5,290 ha of DEW reserves: Baudin CP (310 ha), Cape Willoughby CP (18 ha), Dudley CP (1,768 ha), Lashmar CP (359 ha), Lesueur CP (1,409 ha), Pelican Lagoon CP (449 ha), and Simpson CP (977 ha) over an area of approximately 394 km². Approximately 481 ha of land owned by or under the care and control of the Minister for Environment and Water has been included in this plan, as DEW has responsibilities for fire management on land owned by or under the care and control of the Minister.

Dudley Peninsula is home to a resident population of 4,611 (ABS 2015), while more than 170,000 state, interstate and international tourists visit each year (KI Council 2015). Seasonal visitation sees the number of residents and visitors increase dramatically over the peak fire season, summer.

3.1.2 Included Lands

A total of 65 parcels of other lands, totalling approximately 1,828 ha, have been incorporated into this plan (Table 2). This includes Crown land, and participating Heritage Agreements (HA) adjoining DEW-managed land.

Proposed reserve additions have been included into this plan to ensure issues are identified and strategies for bushfire risk minimisation are established prior to dedication. HAs abutting DEW reserves or connected through contiguous native vegetation have been considered during the planning process; however, it is the responsibility of the individual owners to approve the adoption of this fire management plan for their land and undertake the proposed recommended works. Where prescribed burning has been identified as an appropriate treatment method, DEW will work with landowners to support the delivery, with the specialised resources, skills, and methodology.

It is important to note that the State Government's Burning on Private Land project (DEWNR 2016a, 2016b) has the scope and ability, through the CFS and DEW, to support the implementation of recommended works on these HAs where the risk of bushfire has been identified as High. It is also the intention of the CFS and DEW to work with Local Government and land owners to more efficiently implement this plan through cooperative implementation.

Twenty five parcels covered by a HA were considered in the planning process; the final number of HA owners agreeing to be included in the plan is still being resolved at the time of writing.

Crown land dedicated to, owned by, or under the control of the Minister for Environment and Water was identified for inclusion into this plan through a risk assessment process considering existing and potential issues for fire management. The proximity to built assets, presence of native vegetation, location and size of the parcel was considered during this process.

TABLE 2 – OTHER LANDS INCLUDED IN THIS FIRE MANAGEMENT PLAN

Tenure	Custodian	Title Reference	Plan	Parcel	Area (ha)
Unalienated Crown land	MEW	CR 5748/829 CR 5744/265 CR 5760/422 CR 5766/857 CR 5766/864 CR 5766/860 CR 5748/831 CR 5748/833 CR 5766/872 CR 5766/856 CR 5766/870 CR 5918/576 CR 5766/874 CR 5744/556 CR 5766/875 CR 5766/858 CR 5748/835 CR 5766/877 CR 5766/865 CR 5766/866 CR 5744/555 CR 5766/882 CR 5766/878 CR 5658/461 CR 5658/463	Hundred of Dudley	Section 418, 425, 435, 437, 438, 458, 499, 501, 511, 514, 515, 521, 523, 528, 529, 531, 536, 540, 543. 544, 545, 546, 547, 549 and 556	232
		CR 5947/938	Deposited Plan 65167	Allotment 52	10
		CR 5794/225	Deposited Plan 54226	Allotment 53	38
		CR 6025/53	Deposited Plan 76857	Allotment 102	30
		CR 6064/875	Deposited Plan 74635	Allotment 201	19
		CR 6123/832	Deposited Plan 91868	Allotment 42	12
		CR 6139/661	Deposited Plan 91760	Portion of Allotment 101	23
		CR 5766/884	Town Plan 110201	Allotment 90	1.1
Proposed Addition to Pelican Lagoon CP	MEW	CR 6139/661	Deposited Plan 91760	Portion of Allotment 101	32
		CR 6144/779	Deposited Plan 94227	Allotment 100	23
		CR 6136/862	Deposited Plan 91271	Allotment 100	4
		CR 6139/664	Deposited Plan 91270	Allotment 100	1.6
		CR 6139/663	Deposited Plan 91269	Allotment 100	7
		CR 6144/780	Deposited Plan 94227	Allotment 101	0.2
		CR 6139/660	Deposited Plan 91760	Allotment 100	33

		CR 6123/831	Deposited Plan 91868	Allotment 41	15
Heritage Agreement	Freehold	CT 5946/885	Hundred of Dudley	Section 353	147
		CT 6013/378	Hundred of Dudley	Section 72	30
		CT 6039/516	Hundred of Dudley	Section 73	189
		CT 5251/522	Deposited Plan 40035	Allotment 2	60
		CT 5354/240	Deposited Plan 45769	Allotment 1	39
		CT 5354/246	Deposited Plan 45770	Allotment 7	35
		CT 6014/434	Deposited Plan 53721	Allotment 1	75
		CT 6014/435	Deposited Plan 53945	Allotment 3	41
		CT 5535/380	Deposited Plan 46966	Allotment 18	36
		CT 5812/433	Deposited Plan 55245	Allotment 20	64
		CT 6058/482	Deposited Plan 83049	Piece 1 & 2	7
					59
		CT 5351/652	Deposited Plan 45164	Allotment 15	44.2
		CT 5351/653	Deposited Plan 45164	Allotment 16	44.5
		CT 5351/657	Deposited Plan 32111	Allotment 1	45
		CT 6014/433	Deposited Plan 53945	Allotment 4	39
		CT 6014/435	Deposited Plan 53945	Allotment 3	41
		CT 5868/473	Deposited Plan 58804	Allotment 2	37
		CT 5911/315	Deposited Plan 63056	Allotment 4	52
		CT 5354/240	Deposited Plan 45769	Allotment 1	35
		CT 5354/246	Deposited Plan 45770	Allotment 7	38
		CT 5825/990	Filed Plan 180958	Allotment 116	14
		CT 5514/659	Filed Plan 2106	Allotment 1	101
		CT 5513/735	Filed Plan 2809	Allotment 2	31
		CT 5351/658	Filed Plan 36900	Allotment 10	44.2

3.1.3 Fire Management Blocks

The planning area has been divided into four fire management blocks to ensure that information and issues unique to a particular area have been addressed (Table 3). Block boundaries are based on access and the practicalities of implementing fire management objectives.

TABLE 3 – FIRE MANAGEMENT BLOCK INFORMATION

Block	Included Lands	Size (ha)
Pelican Lagoon Block	Pelican Lagoon CP, pending additions to Pelican lagoon CP, and Crown land	637
Southern Block	Dudley CP, Simpson CP, Lesueur CP, Heritage Agreements, and Crown land	5038
Penneshaw Block	Baudin CP and Crown land	326
Lashmar Block	Cape Willoughby CP, Lashmar CP, Heritage Agreements, and Crown land	1009

3.1.4 Surrounding Land Use

Lands adjoining the planning area have a variety of uses including agriculture, horticulture and viticulture, apiculture, educational facilities, public institutions, recreational reserves, built-up areas (Penneshaw, Sapphire town, Brown Beach, and Island Beach), tourism, and conservation.

Tourism and primary production are the two largest economical contributors for the planning area, and this is reflected in the community's values (refer to 3.7.1). The quality of the natural environment on KI is significant in supporting these two industries, which rely on a healthy environment to produce and provide high quality tourism and primary production products. [Map 1](#) provides an overview of surrounding land tenure.

3.1.5 Terrain

The Dudley Peninsula is characterised by rolling plains, plateaus and hills in the north, with the south characterised by coastal and inland sand dune systems. Throughout the northern portion of the peninsula, vehicle access is relatively easy due to primary production being the major land use, and the associated road infrastructure that supports this. Due to extensive historic land clearing, access and egress is readily available throughout the Peninsula. This provides options for direct attack, but also increases the effect of wind on fire behaviour. The prevailing wind conditions of Kangaroo Island and the Dudley Peninsula planning area are characterised by strong north westerly winds, which can have a greater influence on fire behaviour across the cleared areas of the north. To the east of Penneshaw the land rises, and particularly along the coast, it is characterised by gullies and ridges (Baudin CP), which results in variable local weather conditions.

From central Dudley to the south coast, the terrain is characterised by mallee, coastal mallee and sand dune systems. The elevation is generally below 140 m and the slope is varied but not significant. Access and egress is difficult and tracks need to be maintained regularly as the dune systems do not provide stable surfaces. The nature of the terrain has made it mostly unsuitable to primary production so much of the land remains covered in intact contiguous native vegetation. This has resulted in higher fuel loads with the potential for increased fire intensity, but less wind driven fire behaviour.

3.1.6 Climate and Fire Weather

The typical climate of Kangaroo Island area is a mild Mediterranean one with a strong maritime influence. Rainfall is concentrated in the winter months, with 42-49% falling during this time, and only 10% during the summer period (Mooney & Grinter 2000). Average rainfall varies considerably in different areas of the Island, from less than 500 mm in the Hundreds of

Menzies, Haines and MacGillivray, to an average of 900-1000 mm in the elevated western areas of the island at Gosse. The agricultural growing season usually commences with rains in April / May, and ends in October / November (Mooney & Grinter 2000). Local maritime influences can cause significant variations in wind speed and direction within the Island.

The bushfire season generally runs from November to April. Prevailing weather conditions associated with the bushfire season on Kangaroo Island are characterised by strong north to north westerly winds, low humidity and high temperatures. These characteristically swing west south west with strong gusty wind changes, and then around to the south east. South easterlies generally prevail from January until mid-late autumn April-May, at which point north westerlies prevail (BOM 2011). Dry lightning storms occur frequently in the October-December period in particular.

3.2 Climate Change and Bushfire

The Australian climate has shown to be changing (Hughes & Fenwick 2015), and the latest data shows an increase to the mean surface air temperature and surrounding seas surface temperature by around 1°C since 1910 (CSIRO & Bureau of Meteorology 2018). That trend is mirrored in South Australia (DENR 2010; Suppiah et al. 2006). Hennessy et al. (2005) established that since 1950, rainfall has decreased in south-east Australia, droughts have become more severe and the number of extremely hot days has risen. Significant variation and winter drying has been observed across much of the southern agricultural areas from April to October with rainfall decreasing by 10-40 mm per decade (DEW 2018d). With south-eastern Australia already one of the most bushfire-prone areas in the world, it is projected that the south-east of Australia is likely to become hotter and drier in the future, with an increase in the length of fire danger seasons and extreme fire weather being observed since the 1970s (CSIRO & Bureau of Meteorology 2018). Warmer and longer fire danger seasons are likely (CSIRO & Bureau of Meteorology 2018; Hughes & Fenwick 2015), with reduced opportunities to undertake fuel management prescribed burning (Hennessy et al. 2005). However, the specific ways that climate change will impact all aspects of fire management are unknown: fuel accumulation rates, plant decomposition rates, fuel moisture, humidity and particularly rainfall patterns are either unknown or likely to be impacted in a complex manner, making accurate predictions difficult on a local scale (Enright & Fontaine 2014). The impacts of these changes on fire management are discussed below.

- Warming temperatures and a tendency for reductions in average annual rainfall (Suppiah et al. 2006) may lead to an increase in the frequency and intensity of fires in the future
- Increases in the frequency of fire danger days has also been predicted (Williams, Karoly & Tapper 2001), which will potentially lead to longer fire danger seasons and may reduce the time available for prescribed burning (Hennessy et al. 2005)
- Vegetation growth is also likely to be influenced by a changing climate, contributing to variations in fuel availability (Bardsley 2006; Hughes 2003)
- Increased fuel dryness in some vegetation types and reductions in relative humidity due to rising temperatures is likely to be prevalent in areas where rainfall has decreased (Hughes 2003).

The South Australian Government acknowledges the significance of climate change and the potential impacts it will have on managing bushfire risk. With bushfire seasons increasingly

longer and overlapping with the Northern Hemisphere, Australia's bushfire preparedness will come under elevated strain (Hughes & Fenwick 2015).

In response to the challenge of climate change, the South Australian Government is developing an across agency climate change strategy. The strategy will identify a defined number of practical, new initiatives which reduce emissions or help South Australia to adapt to a changing climate.

While land managers may grapple with the uncertainty of the climate predictions, adaptive management principles remain the most logical strategy for fire management programs. Expanding our options for addressing climate change will be critical to delivering effective responses in the future. This preparedness is especially important given that the precise timing and magnitude of climate change impacts are uncertain (DEWNR 2012).

3.3 Extreme Fire Conditions

Strong winds, combined with high temperatures and low humidity increases the likelihood of extreme fire intensity and behaviour. Under such conditions, the effectiveness of fire suppression activities are unlikely to be effective. Fires will be unpredictable and fast moving, they will produce embers, and spot fires will occur some distance ahead of the fire front. People in the path of the fire will be at significant risk.

Buildings constructed to the requirements of *Australian Standard for Construction of Buildings in Bushfire-prone Areas AS3959-2009* will not necessarily survive a bushfire event on every occasion, but are intended to reduce the risk to occupants (Eadie & Herbert 2009).

The following factors will contribute to a dramatic increase in fire behaviour:

- *High* and above Fire Danger Indices
- *Very High* to *Extreme* overall fuel hazard levels
- Broad areas of continuous *Very High* to *Extreme* fuel hazard levels, making fire suppression less effective
- The presence of *Very High* to *Extreme* bark fuel hazard levels, increasing the chance of spot fires and crown fires
- Low humidity, decreased soil and fuel moisture, particularly during drought years
- Strong winds shifting direction during the course of a fire, typically north-west to south-west
- Lightning strikes between October and April
- Steep terrain.

3.4 Fire History

There is a history of large bushfires burning throughout Dudley Peninsula, with whole of reserves bushfire events occurring on numerous occasions (refer to 3.4.2.). Much of the fire history across Kangaroo Island can be traced back to human ignition or lightning strikes. Many of the fire records point to either an escaped burn-off or the rekindling of a burn-off (Overton 1997), relating to the land management practices prevalent, particularly as a method for land clearance, during early settlement. It is the earliest recorded method of land clearance on the island and a useful tool in encouraging new growth across grasslands for grazing. Fire as a clearance method was particularly prevalent during the Solider Settler Scheme (Overton 1997). Lightning strikes have also been responsible for a large percentage of fires across

Dudley Peninsula (Overton 1997), typically occurring in late spring to late autumn (October to April).

Most recently in 2006 the majority of Dudley CP was burnt out during the Mouth Flat bushfire (3,157 ha) triggered by a lightning strike.

Prescribed burning as a fuel reduction method has also been used across Dudley Peninsula, both by private landholders (Overton 1997), and public land managers. The last known fire in Pelican Lagoon was in the 1950s for the purpose of vegetation clearance (DEP 1987).

3.4.1 Mapping Fire Occurrences

[Map 3](#) (Fire History) has been compiled from the latest DEW fire incident reports. The quality of this mapping varies, depending on the method of capture. Only visible burn areas over 0.5 ha in size have been mapped and mapping is limited to fires that have occurred on DEW-managed land or fires where DEW was in attendance. Consequently, the mapped fires should be regarded as a minimum estimate of fire occurrences.

[Map 3](#) shows fires occurring in the last 10 years, the last fire for a particular location (regardless of year), and fire frequency (assuming no more than one fire per year).

3.4.2 Bushfires

Detailed records of recent fire incidents that have occurred within DEW-managed land 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.

Since 1940 a total of 106 records pertaining to bushfire incidents have occurred within or in close proximity to DEW-managed land in the planning area. Some of the larger incidents include:

- 1954 South of Dudley CP (1,345 ha)
- 1954 eastern boundary of Dudley CP (626 ha)
- 1954 bushfire burnt all of Lashmar CP (505 ha)
- 1958 Southern boundary of Dudley CP (1,278 ha)
- 1958 north of Lesueur CP (1,019 ha)
- 1969 bushfire south of Rocky Point and Brown Beach (183 ha)
- 1980 bushfire burnt all of Lesueur CP (3,789 ha)
- 1982 Dudley CP bushfire (574 ha)
- 1986 bushfire burnt all of Simpson CP (1,318 ha)
- 2006 Mouth Flat bushfire (3157 ha)

(Overton 1997)

3.4.3 Prescribed Burning

Prescribed burning is the planned application of fire under prescribed environmental conditions and within defined boundaries for fuel hazard management, to mitigate bushfire risk and to achieve ecological and research objectives. The CFS is the lead agency in bushfire management and suppression.

In 2005 the KI BMC was formed with representation from the CFS, DEW, Agriculture KI, SA Water, KI NRM Board, SA Police, Conservation Council SA, and the KI Council. The Committee

seeks to deliver joint agency integrated bushfire preparedness and mitigation, and coordinated bushfire response arrangements across the planning region.

The CFS, DEW, ForestrySA, and SA Water have agreed to collaborative arrangements to reduce the impact of bushfires on public land (DEW et al. 2018).

Prescribed burning will be carried out in the plan area in the future to achieve fire management objectives. Fuel reduction in A-, B- and C-zones is discussed in Section [5.1](#).

3.4.4 Prescribed Burning History

DEW commenced a statewide prescribed burning program in 2004, and SA Water in 2008 (DEWNR 2017; SA Water 2012). Since 2004 a small number of burns have been undertaken across Dudley Peninsula (Dowie 2006b). Prescribed burning has been undertaken within Dudley CP and Lashmar CP, the most significant prescribed burn was undertaken in 2009 in Lashmar CP to reduce fuels around the camping and recreation areas.

3.5 Fuel Hazard

3.5.1 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 2). Canopy Fuel is not measured as part of overall fuel hazard.

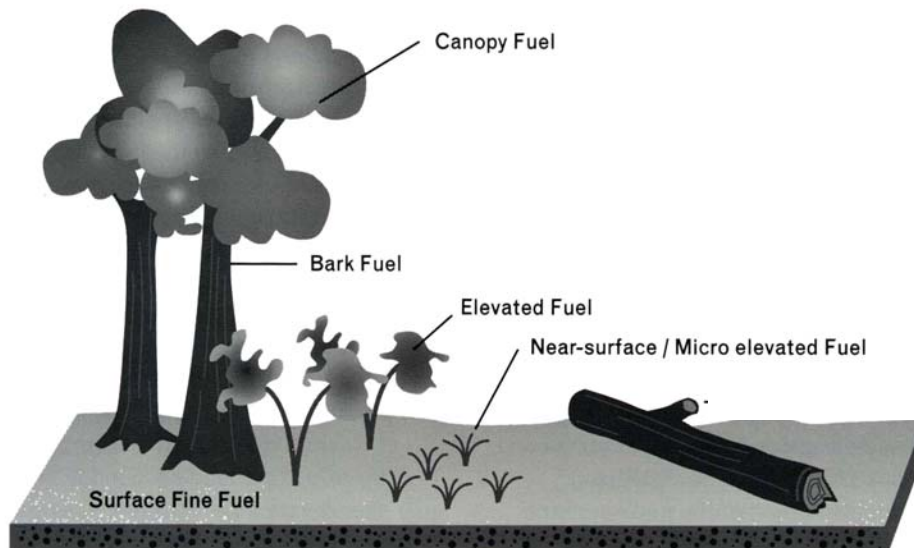


FIGURE 2 – COMPONENTS OF FUEL IN VEGETATION

(Tolhurst & 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 (DENR 2011f). Each layer, as well as the overall fuel hazard can be assessed as: Low, Moderate, High, Very High or Extreme (DENR 2011f). 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 (see section 4.2).

The fuel hazard assessment, as assessed during the Fahrenheit 451 Project (Dowie 2006b) identified areas of fuel hazard ranging from *Low*, being mostly primary production land, to *Very High* and *Extreme* across the southern part of Dudley Peninsula, which is characterised by continuous native vegetation. *Extreme* bark hazard is likely in areas supporting Coastal Mallee (*Eucalyptus diversifolia*) and *I* or Kingscote Mallee (*E. rugosa*) 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 (*Olea europaea*) and Aleppo Pine (*Pinus halepensis*) are known to influence fuel hazards. These fuels 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 conducted by McCarthy and Tolhurst (2004), who investigated the effectiveness of fuel reduction burning in Victoria, concluded that maintaining overall fuel hazard levels at *High* or less aids in slowing the rate of spread of a subsequent bushfire. To achieve long-term fuel reduction effects, the researchers recommended that the focus of fuel reduction should be on the reduction of bark and elevated fuels, as these fuel layers are likely to contribute to the overall fuel hazard.

In response to the 2009 Black Saturday bushfires in Victoria, a Royal Commission recommended prescribed burning as a key tool to reduce fuel loads across the landscape to decrease the likelihood and intensity of bushfires (Parliament of Victoria 2010).

This plan is consistent with the Australasian Fire and Emergency Service Authorities Council (AFAC) National Position on Prescribed Burning (AFAC 2016).

For more information on fuel hazard assessment methodology and evaluation refer to the *Overall Fuel Hazard Guide for South Australia* (DENR 2011f). DEW maintains a database containing fuel hazard assessment records. The process for recording and submitting fuel hazard data is explained in the *DEW Fuel Hazard Assessment Procedure* (DEWNR 2017).

3.6 Vegetation Communities

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 Major Vegetation Sub-group (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. Within this fire management plan MVS have been used as these groupings are accepted by fire managers for predicting maximum overall fuel hazard levels (see Section 3.6.1).

There are six MVS within the planning area that have been mapped by DEW. [Map 2](#) shows the distribution of MVS in the planning area. Table 4 (below) lists the species composition for each MVS and the EFMG are outlined in Table 4.

3.6.1 Likely Maximum Overall Fuel Hazard

Maximum overall fuel hazard levels have been estimated for MVS within the planning area in order to provide a guide for fire management (Table 4). The process used to derive MVS is

described in Section 3.5 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. 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. It is likely that other factors (such as high weed density) will influence the overall fuel hazard.

TABLE 4 – DOMINANT SPECIES LAYERS AND 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
8	Eucalyptus woodlands with a shrubby understorey	<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> , <i>E. cneorifolia</i> , <i>E. albopurpurea</i> , <i>E. viminalis</i> ssp. <i>cygnetensis</i> , <i>E. diversifolia</i> ssp. <i>diversifolia</i> , <i>E. albopurpurea</i> , <i>Melaleuca uncinata</i> , <i>Acacia paradoxa</i> , <i>Banksia marginata</i> , <i>Allocasuarina striata</i> , <i>Leptospermum myrsinoides</i> , <i>Thryptomene ericaea</i> , <i>M. gibbosa</i> , <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , <i>Pomaderris halmaturina</i> ssp. <i>halmaturina</i> , <i>Bursaria spinosa</i> ssp. <i>spinosa</i> , <i>A. myrtifolia</i> var. <i>myrtifolia</i> and <i>Hibbertia australis</i> .	Extreme	Near surface, elevated, bark
21	Other Acacia tall open shrublands and shrublands	<i>Eucalyptus rugosa</i> , <i>Acacia paradoxa</i> , <i>A. uncifolia</i> , <i>Melaleuca uncinata</i> , <i>M. lanceolata</i> , <i>M. gibbosa</i> , <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , <i>Thryptomene ericaea</i> , <i>Pteridium esculentum</i> , and <i>Adriana quadripartite</i>	Very high	Near surface, elevated
26	Casuarina and Allocasuarina forests and woodlands	<i>Allocasuarina verticillata</i> , <i>A. striata</i> , <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>E. cneorifolia</i> , <i>Acacia paradoxa</i> , <i>Melaleuca uncinata</i> , <i>Dodonaea viscosa</i> ssp. <i>angustissima</i> , and <i>Melaleuca gibbosa</i> .	High	Surface
29	Mallee heath and shrublands	<i>Eucalyptus fasciculosa</i> , <i>E. cneorifolia</i> , <i>E. diversifolia</i> ssp. <i>diversifolia</i> , <i>E. albopurpurea</i> , <i>E. leucoxylon</i> ssp. <i>leucoxylon</i> , <i>E. rugosa</i> , <i>E. oleosa</i> ssp. <i>ampliata</i> , <i>E. albopurpurea</i> , <i>Melaleuca uncinata</i> , <i>M. lanceolata</i> , <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , <i>Banksia marginata</i> , <i>Acacia paradoxa</i> , <i>Hakea vittata</i> , <i>Choretrum glomeratum</i> , <i>Acrotriche patula</i> , <i>Logania ovate</i> , and <i>Lasiopetalum schulzenii</i>	Extreme	Near surface, elevated

47	Eucalyptus open woodlands with shrubby understorey	<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> , <i>E. fasciculosa</i> , <i>E. diversifolia</i> ssp. <i>diversifolia</i> , <i>E. albopurpurea</i> , <i>E. viminalis</i> ssp. <i>cygnetensis</i> , <i>Acacia paradoxa</i> , <i>Banksia marginata</i> , <i>Callistemon rugulosus</i> , <i>Allocasuarina striata</i> , <i>Melaleuca lanceolata</i> , <i>M. gibbosa</i> , and <i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Extreme	Near surface, elevated, bark
49	Melaleuca shrublands and open shrublands	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i> , <i>M. lanceolata</i> , <i>M. gibbosa</i> , <i>M. brevifolia</i> , <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Hakea mitchellii</i> , <i>H. rugosa</i> , <i>Acacia paradoxa</i> , <i>Leucopogon parviflorus</i> , <i>Lasiopetalum schulzenii</i> , <i>Goodenia varia</i> , <i>Correa eburnea</i> , <i>Pultenaea acerosa</i> , <i>Beyeria lechenaultii</i> , <i>Eutaxia microphylla</i> , <i>Spyridium spathulatum</i> , <i>Callistemon rugulosus</i> , and <i>Leptospermum myrsinoides</i>	High	Near surface

* denotes introduced species

¹ if Stringybark present

3.7 Values and Assets

3.7.1 Community

The Dudley Peninsula community were asked in August 2013 to identify significant values and assets within the planning area via a survey mailed to all Dudley Peninsula landowners, and placed on the DEW website. Forty six submissions were received and the community of Dudley Peninsula have been consistent in their messaging regarding bushfire management.

The following values and assets have been identified as significant concerns due to bushfires:

- Native flora and fauna
- Recreation
- Tourism
- Threatened species
- Agriculture
- Farming heritage
- The natural environment.

A number of issues were also identified by the community, which has helped focus the management efforts of DEW:

- Poorly managed camp facilities (Lashmar CP adjacent Chapman River)
- High fuels (Hog Bay Road)
- Impacts on built assets
- Lack of awareness by locals and visitors on total fire ban days
- Lightning strikes
- Burn offs.

A number of expectations have been clearly communicated by the community, which includes:

- an increase in planned burns
- an increase in community education
- an increase in adequate fire access tracks
- a reduction in fuels loads.

This information has helped guide DEW's bushfire management focus across the planning area and has informed and prioritised a number of bushfire management mitigation works, outlined in [Appendix 1](#).

3.7.2 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, State Herbarium, research data sets, 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](#) – Fire Response of Rated, Significant and Introduced Flora Species, [Appendix 3](#) – Fire Response of Rated, Significant and Introduced Fauna Species, and [Appendix 4](#) – Ecological Communities of Conservation Significance.

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

- nationally rated, that is, listed as *Threatened* (with a rating of *Extinct*, *Critically Endangered*, *Endangered*, *Vulnerable* or *Marine and Migratory*) 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 *DEW Provisional List of Threatened Ecosystems of South Australia* (DEH 2005).

While fire is a natural component of the ecosystem within the South Australian environment, the ecological effect of fire on the plants, animals, and ecosystems is strongly influenced by the fire regime (DEWNR 2013a). Fire regimes consist of multiple components that interact across different temporal, spatial, and physical scales. Elements of fire regimes include the time since the last fire, the time between successive fires, the intensity of the fire, the season in which a fire occurs, and the spatial extent and pattern of the fire (DEWNR 2013a). These elements stimulate the required conditions for the germination and flowering of different plant species. This then influences the displacement or promotion of certain fauna due to localised habitat changes, among other processes (DEWNR 2013a).

This plan is based on the best available information and guided by ecological fire regimes that contain spatial and temporal elements to provide ecologically sustainable outcomes for biodiversity conservation.

The Nature of SA project (DEWNR & CCSA 2016) is being developed in partnership with the conservation sector, including the Conservation Council SA, the Nature Conservation Society, Trees for Life, the Department of Primary Industries and Regions (PIRSA), and DEW regions. The plan will seek to contribute to the goals of the project by ensuring that fire management activities in C-zones are consistent with the *Ecological Fire Management Guidelines for Native Vegetation in South Australia* (DEWNR 2013a)(see section 4.2).

In addition to the information provided within the appendices, species response and ecological information for selected significant flora, fauna, and ecological communities have been detailed in the following section. These are species and ecological communities listed as *Threatened* at a national or state level for which appropriate fire management is regarded as being significant in their long-term conservation.

The information here will be provided to the Natural Values Team of the Incident Management Team (IMT) during bushfire response to further minimise the impact to environmental values and assets, which can be impacted as a result of suppression operations.

Further, DEW is committed to increasing its capacity to incorporate species' requirements into improved Ecological Fire Management Guidelines. The actions in this plan relate specifically to fire management actions within reserves; nevertheless DEW will work with the community on landscape-scale biodiversity conservation.

3.7.3 Nationally & State rated species

Species covered under this section are those that have been identified as at risk of bushfire, prescribed fire, or other fire management activities.

Bassian Thrush

The Bassian Thrush is a bird found across Australia. The subspecies *Zoothra lunulata halmaturina* (South Australian) is restricted to South Australia, occurring on Kangaroo Island, and on the mainland across the Mount Lofty Ranges and the southern Flinders Ranges (DEH 2008a; Department of the Environment 2015b). Within the planning area, there are records of occurrence within the Lashmar and Simpson Block. The Bassian Thrush is listed as *Vulnerable* under the EPBC Act (Department of the Environment 2015b).

The Bassian Thrush prefers densely forested, moist gully environments and so may have relatively limited distributions across many of the parks and reserves in the region (van Weenen 2013, pers. comm.). For this mostly sedentary species (Department of the Environment 2015b), a key habitat requirement is considered to be the presence of a damp litter layer, which provides foraging habitat (DEH 2008a). Probing through damp leaf litter, the Bassian Thrush feeds mostly on invertebrates, mainly earthworms and beetles (Department of the Environment 2015b).

The Bassian Thrush is considered to be threatened by inappropriate fire regimes, which can make remaining habitat unsuitable for the subspecies (Department of the Environment 2015b). Frequent fire and high intensity fires that remove leaf litter and cover are likely to degrade habitat (DEH 2008a; Department of the Environment 2015b).

The effect of prescribed burning on suitable habitat needs to be considered to ensure relative availability of habitat within the immediate area. Specific information on how the Bassian Thrush responds to fire is listed in [Appendix 3](#).

A significant area of the species' distribution on Dudley Peninsula was burnt in the 2006 Mouth Flat bushfire, meaning that its extent in this region may have contracted as a result. [Map 2](#) (Vegetation Communities & Significant Species; [online](#)) displays records within the planning area. To protect the species, data are buffered to prevent fine-scale identification of their exact location.

In fragmented habitats, there is an increased risk of localised extinction if a fire burns a habitat patch in its entirety. Fire management strategies within this plan have been designed to minimise the likelihood of this occurring. The effects of fire on the Bassian Thrush will be monitored to improve knowledge of the species response to fire.

Management Strategies	
Bassian Thrush	1. Map significant habitat patches of Bassian Thrush and record in Environmental Database of South Australia. If unknown, undertake Bassian Thrush bird and habitat surveys to estimate.
	2. During bushfires, attempt to retain unburnt patches of land as refuge areas to minimise the risk of local extinctions.
	3. Undertake post-burn weed management to avoid altering habitat structure.
	4. Ensure known habitat is not deliberately burnt without appropriate Bassian Thrush specific management considerations in consultation with regional ecological expertise, including: a. > 50% of known habitat should not burn in single fire event b. Undertake patchy burns in riparian areas c. minimise canopy scores to < 20%
	5. Utilise landscape protection burns to reduce bushfire risk to known habitat.
	6. Monitor the effect of fire on Bassian Thrush populations and preferred habitat and use this information in future fire management consideration (Appendix 3).
	7. Implement appropriate fire management strategies that will minimise the risk of local extinctions in the event of a bushfire.
	8. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
	9. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

Glossy Black-cockatoo

The South Australian subspecies of the Glossy Black-cockatoo (GBC) is listed as *Endangered* under both the federal EPBC Act and the South Australian NPW Act. The subspecies once occurred on the South Australian mainland, however, is now restricted to Kangaroo Island. It

occurs mainly along the north coast and hinterland, and along inland river systems where food and nesting resources are available.

Current critical feeding sites, which contribute to the GBC home-range occur in Baudin CP, where significant work has helped to revegetate areas of the reserve with Drooping Sheoak (*Allocasuarina verticillata*), which Glossy Black-cockatoos are restricted to for foraging (DEWNR 2015a).

Current breeding sites occur across the island, including at American River, a significant nesting site where large hollow-bearing eucalypts are utilised, and on Blue Gums Road on the Dudley Peninsula (GBC Recovery Program 2018; Mooney & Pedler 2005). Greater than 85% of known nesting hollows occur in Sugar Gum (*Eucalyptus cladocalyx*) (DEWNR 2015a), with recent observations of nesting in Blue Gums (*Eucalyptus leucoxylon ssp leucoxylon*) (GBC Recovery Program 2018). Nesting boxes are currently planned to be installed within Baudin CP, and may begin being utilised by GBC within a 12 month period. Any fire management activities within Baudin CP will need to consider these assets.

A bushfire at American River impacted a number of hollow-bearing eucalypts in November 2018, demonstrating how vulnerable critical breeding habitat is for this species.

The Baudin CP portion of Dudley Peninsula is a key home-range area for the GBC, and therefore requires great care when implementing prescribed burns or responding to bushfire events.

Fire will impact both the availability of suitable nesting hollows (in old Sugar Gum (*E. cladocalyx*), Manna Gum (*E. viminalis* ssp.) and Blue Gum (*E. leucoxylon ssp. leucoxylon*) trees) and the primary food source; Drooping Sheoak (*A. verticillata*) (Mooney & Pedler 2005). Frequent fires may therefore have a negative effect on populations of GBC. Conversely, complete lack of fire will also reduce the long term viability of feeding and nesting habitats. Specific information on how the GBC responds to fire is included in [Appendix 3](#).

The Recovery Plan for the subspecies identifies that some fire is required to regenerate habitat, however, this process is poorly understood (Mooney & Pedler 2005). Further research is necessary to determine appropriate fire regimes. Managers should aim to minimise the loss of GBC feeding and nesting habitat by ensuring that these key habitat components are not severely impacted during bushfire or prescribed burning.

Management Strategies

Glossy Black-cockatoo	10. Monitor the effect of fire on Glossy Black-cockatoo habitat use, and use this information to manage the fire regime for this species in the future, and improve the fire management consideration (Appendix 3).
	11. Refer to the EMFS and consult with the Parks & Sustainable Landscapes Manager when planning burns in known Glossy Black-cockatoo habitat.
	12. Minimise the negative impact of fire management activities on feeding and nesting habitat of the Glossy Black-cockatoo (refer to Mooney and Pedler, 2005 and Appendix 3).

13. Information and interpretation on Glossy Black-cockatoo critical nesting and feeding habitat to be made available to the Natural Values Team within the Incident Management Team during a bushfire.
14. Do not plan fire in areas containing Drooping Sheoak stands, if more than 15% of feeding habitat within that flock region has been burnt in the previous 15 years (in either bushfires or prescribed burns).
15. Do not conduct prescribed burns in or adjacent to nesting habitat with active Glossy Black-cockatoo nests.
16. Protect critical nesting habitat, especially known nest trees from prescribed burning and where possible, from bushfire.
17. The frequency of burns in Drooping Sheoak feeding habitat should ensure periods of >25 years between fires.
18. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
19. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with Brigades to inform them of known critical habitat sites.

Kangaroo Island Echidna

The KI Echidna (*Tachyglossus aculeatus multiaculeatus*) is restricted to Kangaroo Island (Department of the Environment 2015a) and is listed as *Endangered* under the EPBC Act. It is found across the Dudley Peninsula planning area, with records occurring in Lashmar, Pelican Lagoon, Dudley, Simpson, and Lesueur CP.

Adults are solitary, with large territories that overlap with other individuals. Typical habitat consists of coarse woody debris and low vegetation, which they favour for foraging (Department of the Environment 2015a; National Parks and Wildlife Service NSW 1999). Diet consists of an array of invertebrates, such as earthworms and larvae, with a preference for termites and ants as the main food source. Termite mounds are found across the planning area and provide a valuable source of termites for the KI Echidna, which it accesses through the outer wall of the termite mound with its claws and beak. As a result KI Echidnas are highly reliant on active termite mounds (Rismiller 2017, pers. comm.).

Termite mounds are vulnerable to fire, directly impacting and burning out the entire mounds if suppression is not undertaken. Termite mounds can also be impacted from other fire management activities such as the creation of new firebreaks and tracks, track upgrades, and / or mechanical clearance. Impacts to termite mounds, where ever appropriate should be mitigated, avoiding direct contact with termite mounds or through appropriate and sensitive ignition methods and exclusion from burnt areas.

Other threats to the KI Echidna include predation by feral cats and pigs, car strikes and second hand poisoning due to pesticides (Department of the Environment 2015a). Feral Cat

predation was shown to be a significant cause of young echidna death (Rismiller & McKelvey 2000), which when coupled with the potential impact of fire on individual echidnas and the effects of fire on the hunting response of Feral Cats (refer to Section 3.8.1) demonstrates that the mitigation of these potential impacts needs to be strongly considered.

While individuals are capable of surviving bushfire and prescribed burn events by burrowing into the soil or other suitable substrate and use torpor to manage their survival during and post-fire (Nowack, Cooper & Geiser 2016), the loss of individuals should still be considered. Further, both bushfire and prescribed burning can impact on KI Echidna populations through the removal of foraging habitat, including coarse woody debris, and its main food source, termite mounds. Habitat loss poses the greatest threat, and efforts to maintain and / or restore KI Echidna habitat, including favourable conditions, such as coarse woody debris, tree stumps, leaf litter and debris, is considered ideal (National Parks and Wildlife Service NSW 1999). The maintenance of this habitat structure, within and / or adjacent a burn area will also assist KI Echidnas in predator evasion post-fire.

Management Strategies	
Kangaroo Island Echidna	20. Avoid termite mounds when undertaking mechanical suppression, treatments or track upgrades.
	21. During burn preparation, remove fuel from the base of known termite mounds and coarse woody debris, and where high densities of mounds and coarse woody debris exist, exclude from the burn area. Monitor termite mounds and coarse woody debris throughout prescribed burning activities to ensure preservation.
	22. Work with the <i>Kangaroo Island feral cat eradication initiative</i> to mitigate Feral Cat predation impacts post-fire.
	23. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
	24. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

Kangaroo Island Narrow-leaved Mallee Woodland

The KI Narrow-leaved Mallee (*Eucalyptus cneorifolia*) Woodland is a significantly depleted community of conservation significance and is only known to occur on the eastern half of Kangaroo Island, South Australia (Commonwealth of Australia 2014; TSSC 2014). It is listed as a *Critically Endangered* ecological community under the federal EPBC Act.

The KI Narrow-leaved Mallee Woodland ecological community is endemic to the Kanmantoo IBRA bioregion that comprises Kangaroo Island and the Fleurieu Peninsula, South Australia (TSSC 2014). Only about 15% of the area's native vegetation currently remains (TSSC 2014),

largely a result of land clearance (Commonwealth of Australia 2014). Remaining areas are fragmented and vulnerable to the impacts of threats such as weeds and changes in the fire regime. In many areas, especially along roadsides, the ecological community now mostly exists as small and fragmented patches (Commonwealth of Australia 2014).

The overstory of this community is dominated by KI Narrow-leaved Mallee (*E. cneorifolia*). Other overstory species include the Purple-flowered Mallee Box (*E. albopurpurea*), Coastal White Mallee (*E. diversifolia diversifolia*), and the White Mallee (*E. phenax compressa*). The following species may also occur to a lesser extent: Kingscote Mallee (*E. rugosa*), Peppermint Box (*E. odorata*), Pink Gum (*E. fasciculosa*), Cup Gum (*E. cosmophylla*), and Drooping Sheoak (*Allocasuarina verticillata*) (TSSC 2014).

Understory species typically represented within the community include Broombrush (*Melaleuca uncinata*), Dryland Tea-tree (*Melaleuca lanceolata*), Scarlet Bottlebrush (*Callistemon rugulosus*), Fringe-myrtles (*Calytrix glaberrima*), Common Fringe-myrtle (*C. tetragona*), KI Correa (*Correa reflexa insularis*) or Heath Thryptomene (*Thryptomene ericaea*). The Grass-tree (*Xanthorrhoea semiplana* subsp. *Tateana*) (yakka) is also sometimes present (Commonwealth of Australia 2014; TSSC 2014).

The ground layer can typically be absent to sparse, usually a deep layer of litter and twigs, depending on time since the last disturbance event. Patches of grasses and shrubs may occur, for instance Wallaby Grasses (*Rytidosperma* spp.) and lilies such as Black-anther Flax Lily (*Dianella revoluta*) (Commonwealth of Australia 2014; TSSC 2014).

Most patches of KI Narrow-leaved Mallee Woodland are long-unburnt and therefore considered to be in a mature to senescent state (Dowie 2006a). The tree canopy is well developed, while the understorey is generally sparse with considerable bare ground and plant litter. Small trees or shrubs may continue to persist (Commonwealth of Australia 2014). Disturbance events, such as fire, can dramatically change the structure and appearance of KI Narrow-leaved Mallee Woodland. Tree canopy is reduced or removed, being replaced by mallee regeneration. Mass germination from the soil seed bank occurs and results in a highly-diverse and dense understorey, which thins over time as shorter-lived shrubs and herbs progressively die out (Commonwealth of Australia 2014).

Currently only a small proportion of this group is within the ideal fire age class. Bushfire suppression and a lack of prescribed burning has resulted in a high proportion of this ecological community being above the maximum fire age class, resulting in species senescing and a homogenous vegetation community (Dowie 2006a). Prescribed burning within this ecological community should be implemented in order to address the distribution of age classes (Dowie 2006a). This approach should aim to create an appropriate spread of fire age classes across the ecological community to avoid situations where a majority of the community is long-unburnt (>30 years) or recently burnt (<5 years) (TSSC 2014). Issues such as small patch size, fragmented distribution, weed incursion and overgrazing need to be addressed when planning prescribed burns. It is likely that it will be 20-30 years before any significant improvement in the amount of area within the thresholds can be achieved.

The decline of this woodland has serious ramifications for its long term resilience. The greatest risks to this ecological community are altered fire regimes, fragmented and small patch size, inappropriate grazing (native and feral), and weed encroachment (Commonwealth of Australia 2014; TSSC 2014).

The use of fire has been observed to stimulate a regeneration event, greatly increasing above ground diversity of this plant community, including the regeneration of threatened plant species such as the nationally *Vulnerable* Macgillivray Spyridium (*Spyridium eriocephalum* var. *glabrisepalum*) (Taylor 2011). The most successful method for increasing plant diversity was the pollarding / burning treatment, which should be considered as part of any burn program within senescing KI Narrow-leaved Mallee communities. Reducing grazing pressure by fencing was also found to improve diversity across sites (Taylor 2008).

When planning prescribed burns the impact of these threats must be considered. Most importantly, the majority of the ecological community is within the senescent stage, having not been burnt for 30 years or more. This is a result of current fire suppression practices, however introducing disturbance events through the use of prescribed fire should be encouraged in partnership with mitigation works to ensure that post-burn over grazing and weed encroachment are minimised.

It is estimated that about 1005 ha, or approximately 15 to 18% of the current extent of the ecological community, is protected in public reserves (Willoughby, Oppermann & Inns 2001). The DEW Burning on Private Land project could be used to assist the management of this species on private lands, particularly where dual benefits of fuel hazard reduction can be achieved.

Management Strategies	
KI Narrow-leaved Mallee Woodland	25. Undertake prescribed burning to improve the distribution of post-fire age-classes across the KI Narrow-leave Mallee Woodland community.
	26. Consider and implement integrated weed management strategies pre- and post-fire in KI Narrow-leaved Mallee Woodlands.
	27. Consider and implement grazing management (fencing) post-fire in KI Narrow-leaved Mallee Woodlands.
	28. Develop an Ecological Fire Management Strategy (EFMS) for the threatened ecological community.
	29. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities. Region to engage with brigades to inform them of known critical habitat sites.

Kangaroo Island Southern Emu-wren

The KI Southern Emu-wren (*Stipiturus malachurus halmaturinus*) is a small passerine and is one of eight subspecies of the Southern Emu-wren. There is little subspecies specific information on the KI Southern Emu-wren so where appropriate, knowledge on the Mount Lofty Ranges Southern Emu-wren (*Stipiturus malachurus intermedius*) has been used as a baseline. DEW has prepared an Ecological Fire Management Strategy (EFMS) for the AMLR Southern Emu-wren (DENR 2011b), which can provide some of this basic guidance.

Its breeding season spans from August to the end of March (including nesting and the rearing of young), with most young hatching during September to December (MLRSEW & FPS

Recovery Team 2007). The species forages for small invertebrates in the shrub layer or occasionally on the ground. Specific information on the species life history and fire response is included in [Appendix 3](#).

The Mount Lofty Ranges Southern Emu-wren is listed as *Endangered* under the EPBC Act and also the NPW Act. A Recovery Program for the Southern Emu-wren has been in place since 1995, with coordinated site surveys, population census, monitoring and threat abatement across its range.

Within the Southern Block, key habitat for the species is considered to be dense dry heath of up to one metre in height. The species also occurs within swamp or tidal areas, such as Pelican Lagoon, where preferred habitat is characterised by tea-tree bushes, grasses, sedges and ferns (DEH (Cwlth) 2003).

There are numerous records of KI Southern Emu-wrens within Pelican Lagoon CP, Simpson CP and adjacent Lesueur CP ([Map 2](#)). It should be noted that the KI Southern Emu-wren data shown on [Map 2](#) is indicative of occurrences over recent surveys and may not represent the full extent of the species.

The Southern Emu-wren and Swamps of Fleurieu Peninsula Recovery Team (2007) consider bushfire, vegetation clearance, and a lack of an appropriate fire regime as some of the major threats to the Southern Emu-wren population. The likely impacts to the species due to bushfire are:

- habitat degradation, loss and / or fragmentation
- the loss of productivity
- reduced adult survival
- forced dispersal.

The likely impacts to the species due to vegetation clearance (e.g. for fuel reduction) are:

- habitat degradation, loss or fragmentation
- forced dispersal.

As part of the fire management planning process, DEW has assessed the risk of bushfire impacting on the persistence of the species and its habitat within the planning area as *Extreme*.

There is a history of bushfires occurring in KI Southern Emu-wren habitats, particularly across the Southern Block through Dudley, Simpson and Lesueur CPs ([Map 3](#)). Recolonisation of the sites occurred post-fire even though the sites are not connected.

This plan supports the use of small scale prescribed burning across the planning area to provide further information and understanding of how fire influences the KI Southern Emu-wren population and its habitat. In order to avoid the species' breeding season (spring to early summer), any prescribed burns in areas of core habitat should be conducted outside of the breeding season. The maintenance of structural and floristic integrity in connective areas (corridors) of native vegetation is vital so linkages to populations are maintained. When implementing prescribed burns or carrying out suppression operations within known and potential habitat (typically dense shrub / sedge ground / mid layers), or between areas of occupancy, managers need to consider the possible impacts on the species.

Management Strategies

KI Southern Emu Wren	30. Implement strategically located prescribed burns in order to create low fuel buffers that aim to mitigate against major population losses by providing potential refuge areas and minimising the likelihood of bushfire impacting on core population areas and potential habitat patches that are soon to become preferable.
	31. Identify critical habitat areas to determine if a C-zone burning program is required for this sub-species.
	32. Conduct prescribed burns as required to maintain or increase habitat quality.
	33. Develop an EFMS for the species. In its absence refer to the principles identified in the AMLR subspecies EFMS.
	34. Use prescribed burning as an opportunity to gather new information on the fire response of the species as well as to assess and improve the fire management consideration (Appendix 3).
	35. Monitor response of populations post-fire.
	36. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
	37. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

Kangaroo Island Spider-orchid

The Kangaroo Island Spider-orchid (*Caladenia ovata*) is nationally listed as *Vulnerable* and is endemic to South Australia (DEE 2019). It occurs across the eastern half of KI, including a restricted population within Lashmar CP, and on the Fleurieu Peninsula. Populations are highly fragmented (DEH 2008b; Taylor 2003).

Growing to a height of 25 cm with typically one, rarely two flowers, the KI Spider-orchid flowers from September to October and prefers scrubby heath and woodland. The KI Spider-orchid it is known to regenerate after fire or site disturbance (DEH 2008b), and Davies (1986) reports that fire promotes flowering.

Altered fire regimes, including the lack of fire, is considered a threat, particularly as fire is needed to induce regeneration. Post-fire grazing and weed incursion is considered a threat that will require management considerations (DEH 2008b; Taylor 2012).

Management Strategies

Kangaroo Island Spider-orchid

38. Ensure known habitat is not deliberately burnt without appropriate KI Spider-orchid specific management considerations, in consultation with regional ecological expertise, including:
 - a. Do not burn during growth or flowering period (late autumn to early spring)
 - b. Consider post-fire pest plant and animal management
39. Utilise landscape protection burns to reduce bushfire risk to known habitat.
40. Monitor the effect of fire on KI Spider-orchid populations and preferred habitat and use this information in future fire management consideration ([Appendix 2](#)).
41. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.

Kangaroo Island Western Whipbird

The KI Western Whipbird (*Psophodes nigrogularis lashmari*) is endemic to Kangaroo Island and inhabits remnant mallee and heath in coastal and subcoastal areas with an open upperstorey above a dense shrubby understorey (Department of the Environment 2016; Garnett, Szabo & Dutson 2011). Preferred habitat is usually 2–3 metres tall and dominated by shrubs, occasionally mixed with eucalyptus. (BirdLife International 2016; Department of the Environment 2016; Garnett, Szabo & Dutson 2011). It is known to forage on the ground for invertebrates, usually below dense low vegetation, probing through leaf litter and dead stumps (Department of the Environment 2016; Garnett, Szabo & Dutson 2011). Within the planning areas the KI Western Whipbird is known to occur within Dudley CP and Lesueur CP. Vegetation structure plays a more important role in preferred habitat than species composition for the KI Western Whipbird. Fire regimes have an integral role in maintaining the availability of suitable habitat, with the majority of records indicating that the KI Western Whipbird prefers vegetation in the age class of 10-25 years post-burn (Garnett, Szabo & Dutson 2011). The KI Western Whipbird is known to survive fire events and persist in unburnt patches of vegetation. Following the large fires across Kangaroo Island in 2007, sporadic observations of Western Whipbirds were recorded within months to a year after the fire events. This suggests an ability to disperse considerable distances and persist post-fire. The Western Whipbird (Western Heath) (*Psophodes nigrogularis nigrogularis*) has been shown to establish territories in some areas 4–6 years post-fire, and 7–10 years in other areas (Smith 1985, 1991).

Major threats include land clearance, with the past clearance of mallee and heath vegetation for agriculture being responsible for the removal of about half the suitable habitat on Kangaroo Island (BirdLife International 2016). Altered fires regimes, due to human intervention and climate change, are likely to further fragment populations and pose

significant risk to isolated populations across Kangaroo Island (BirdLife International 2016; Garnett et al. 2013).

A population increase of *P. nigrogularis nigrogularis* in WA has been attributed to the exclusion of fire from the area since 1970, while an initial decline in population has been observed in 2004-2005 after a fire at Mt Manypeaks, WA (Danke & Comer 2006). It is not known at what stage post-fire habitat is suitable for the species, but the patchy nature and array of fire intensities during the Manypeaks fire may benefit the species in the future. The species' ability to recover from this fire is assisted by nearby established populations, and the recovery of the vegetation community (Danke & Comer 2006).

Management Strategies

KI Western Whipbird	42. Conduct prescribed burning to improve and maintain suitable habitat for the KI Western Whipbird. Optimal habitat for KI Western Whipbird is between 10 and 25 years post-fire.
	43. Identify critical habitat areas to determine if a C-zone burning program is required for this sub-species.
	44. When undertaking prescribed burning in potential or suitable habitat, retain unburnt patches as refuge areas.
	45. Avoid burning more than 50% of individual habitat patches in a single fire event.
	46. Avoid two or more successive fires in late winter / spring
	47. A draft EFMS is being developed for the Eastern sub-species. When completed refer to and apply the principles identified in the EFMS for the Eastern Western Whipbird subspecies.
	48. Study the effects of fire including the subspecies' ability to survive it, and the re-establishment of sub-populations in relation to post-fire age. Gather new information on the fire response of the subspecies and use this information in future fire management consideration (Appendix 3).
	49. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
	50. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with Brigades to inform them of known critical habitat sites.

Southern Brown Bandicoot

The Southern Brown Bandicoot is the last remaining species of bandicoot occurring naturally in South Australia. The subspecies *Isoodon obesulus obesulus* is rated *Endangered* at the national level and *Vulnerable* in South Australia. Regionally, 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 (Long 2010). A draft national recovery plan has been written for the species. Specific information on how the Southern Brown Bandicoot responds to fire is included in [Appendix 3](#). The *Ecological Fire Management Strategy for the Southern Brown Bandicoot (Isoodon obesulus obesulus)* has been published and is available [online](#) (DENR 2011c). This document should be referred to as the primary source of information for this species when implementing the management strategies outlined in the plan.

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 2006b).

The Southern Brown Bandicoot is known to occur in the Southern Block of the planning area. Bandicoots have either been recorded in these areas or suitable habitat has been identified. [Map 2](#) (Vegetation Communities & Significant Species; [online](#)) shows records of threatened species within the planning area, including the Southern Brown Bandicoot. To protect the species, data are buffered to prevent fine-scale identification of their exact location.

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 & Long 2005). Providing a mosaic of successional stages is considered desirable to cater for this and other species. Furthermore, current knowledge suggests that fire regimes that breach the EFMG requirements, being either too frequent or infrequent, simplify habitat structure (in the medium and long-term), which is undesirable.

Management Strategies

Southern Brown Bandicoot	51. Implement appropriate fire management strategies identified in the EFMS that will minimise the risk of local extinctions in the event of a bushfire.
	52. Work with the <i>Kangaroo Island feral cat eradication initiative</i> to mitigate Feral Cat predation impacts pre- and post-fire.
	53. Conduct prescribed burning to maintain or improve habitat suitability as identified in the regional Recovery Plan.
	54. During bushfires, attempt to retain unburnt patches as refuge areas to minimise the risk of local extinctions.
	55. Monitor the effects of fire on the Southern Brown Bandicoot populations and preferred habitat and structure. Use this information to inform the DEW vital attributes database.
	56. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
	57. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

White-bellied Sea-eagle

The White-bellied Sea-Eagle (*Haliaeetus leucogaster*) is listed as *Endangered* under the NPW Act and *Marine and Migratory* under the EPBC Act, and is present within the planning area. It is likely that numerous nesting sites are located along the southern coastline of the island. White-bellied Sea-Eagles are sensitive to nest disturbance, and it has been shown that in areas of high human disturbance, White-bellied Sea-Eagle nests are linked to lower breeding success compared to areas with less disturbance (Dennis, McIntosh & Shaughnessy 2011). Consideration should be given to minimising disturbance to known nesting sites from fire management activities, particularly during the breeding season.

Specific information on how these coastal raptors respond to fire is included in [Appendix 3](#).

Management Strategies

White-bellied Sea-eagle	58. Incorporate known nesting site data into the SA Environmental database to ensure consideration of impacts from fire management activities.
	59. When planning burns in known nesting habitat, consult with the relevant specialists.
	60. Avoid undertaking fire management works within 100 metres of known nesting sites during breeding season, May – December.

61. Aerial operations will be undertaken consistently with the KI Fly Neighbourly Advice (NRM 2013).
62. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
63. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

3.7.4 Locally significant species

Enigma Moth & Callitris Pine

The Enigma Moth (*Aegmatinea glatzella*) is a Kangaroo Island endemic, and is found on the southern portion of the Dudley Peninsula. Its larvae are dependent on the Southern Cypress Pine (*Callitris gracilis*) as its host (Kristensen et al. 2015). The Limestone Cypress Pine (*C. canescens*) and the Oyster Bay Pine (*C. rhomboidea*) also occur across the Dudley Peninsula planning area, however, the Enigma Moth (*A. glatzella*) is not known to utilise these species as a food resource or host.

The Southern Cypress Pine (*C. gracilis*) occurs across the Dudley Peninsula and is associated with sandy, limestone soils, which are rocky and well drained. They can appear in dense stands where they form the dominant vegetation, or as scattered individuals (State Flora 2015). Immature and adult pines are fire sensitive and are destroyed by severe fires, however, mass germination post-fire is a frequent event. Anecdotally, within Dudley CP, an increase in numbers since the 2006 Mouth Flat bushfire has been recorded. Further monitoring is required to confirm the pre- & post-fire distribution and inform future management of *Callitris* across the planning area.

The Enigma Moth (*A. glatzella*) lifecycle is dependent on the presence and distribution of the Southern Cypress Pine (*C. gracilis*). Adults are short lived, with observations only occurring between September and October. Once the females lay eggs below a bract (specialised leaf with an associated reproductive structure / flower), near the growing tip, the larvae remain under the bark feeding on tissue until emergence. Variability in larvae sizes observed at the same time indicates that the larval can take more than one season to mature. The timing and scale of prescribed burning needs to be considered to minimise the impacts during the breeding period (Kristensen et al. 2015).

Management Strategies

Enigma Moth & Callitris Pine

64. Map significant habitat patches of the Enigma Moth and record in Environmental Database of South Australia to inform fire management activities. If unknown, undertake Enigma Moth and habitat surveys to estimate.
65. Undertake monitoring of *C. gracilis* pine populations across the Dudley Peninsula pre- & post-fire, to inform an appropriate fire regime.

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| 66. Consider the Enigma Moths requirements for <i>C. gracilis</i> pre- & post-prescribed burn. If necessary, exclude 50% of <i>C. gracilis</i> habitat from burn operations. |
| 67. Consider mechanical treatment to protect stands of <i>C. gracilis</i> . |
| 68. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities. |
| 69. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites. |

Small Mammals

A number of small mammals including the Little-pygmy Possum (*Cercartetus lepidus*), Native Bushrat (*Rattus fuscipes. greyi*), Western Pygmy-possum (*Cercartetus concinnus*), and the KI Dunnart (*Sminthopsis aitkeni*), occur across KI and are considered vulnerable to altered fire regimes. The Western Pygmy-possum and Native Bushrat are indicator species that are able to be monitored to infer bushland condition. There is limited data on species distribution and abundance across the planning area for these small mammals, where possible include regional monitoring information to inform fire management activities. Where knowledge gaps exist monitoring pre- and post-fire should be undertaken to better understand population dynamics. Small mammals are vulnerable to predation from Feral Cats (Commonwealth of Australia 2015), particularly post-fire where Feral Cats are known to travel large distances and hunt for prolonged periods (McGregor et al. 2016). Pre- and post-fire management of Feral Cats should be strongly considered where known populations of small mammal occur, and where possible, work with the *Feral Cat eradication initiative*. The *Feral Cat eradication initiative* is undertaking research and monitoring of mammal species to assess the population dynamics in response to Feral Cat controls. Where appropriate, relevant data should be utilised to assist the fire management program to deliver improved ecological outcomes for small mammals and vice versa for the *Feral Cat eradication initiative* to benefit from the delivery of the fire management program.

Management Strategies

Small Mammals

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| 70. Consider pre- and post-fire monitoring opportunities for small mammals across the Dudley Peninsula planning area to inform an appropriate fire regime. |
| 71. Monitor the effect of fire on small mammal populations and preferred habitat and use this information in future fire management consideration (Appendix 3). |
| 72. Consider the pre- and post-fire pest management of species such as Feral Cats to reduce predation impacts on small mammal species. |

3.8 Abundant and Pest Species

3.8.1 Fauna

Some fauna species (exotic and native) flourish in post-fire conditions. The impact these species have on biodiversity will depend on a number of factors, including the pre-fire abundance of the species and the characteristics of the fire (e.g. fire size, shape, season, intensity, and location). Herbivores such as kangaroos (*Macropus* spp.) can benefit from post-fire plant regeneration, finding highly palatable food within the recently burnt area (Gill & Catling 2002; Murphy & Bowman 2007), while species such as the Koala (*Phascolarctos cinereus victor*), may add further pressure on recently burnt vegetation.

Within the planning area, a number of introduced fauna have been observed. These include: Black Rat (*Rattus rattus*), Domestic / Feral Cat (*Felis catus*), Eurasian Blackbird (*Turdus merula*), European Goldfinch (*Carduelis carduelis*), House Mouse (*Mus musculus*), and Indian Peafowl (*Pavo cristatus*).

Prior to any prescribed burn, potential impacts will be considered to determine whether pre- and / or post-fire management is required. Pest fauna and abundant species management is implemented based on a risk assessment.

Abundant species can impact dramatically on the post-fire recruitment of flora species, and while the overabundance of a species will not delay the risk management of bushfires, the management of the Tammar Wallaby (*Macropus eugenii decres*) and KI Kangaroo (*Macropus fuliginosus fuliginosus*) is of particular concern across the Dudley Peninsula landscape, particularly in areas such as Baudin and Pelican Lagoon CP (DEH 2002a). Management across the landscape by different land managers may differ. However, an appropriate management method to address abundant species needs to be considered prior to undertaking prescribed burning activities. For example, any kangaroo control program on DEW-managed land will be assessed against the DEW *Kangaroos on reserves (population control) Policy* (DENR 2011d).

Koalas are known to have caused tree death on Kangaroo Island. Currently Koalas do not present a management issue across the Dudley Peninsula planning area, but may need to be considered in the future (Maguire 2017, pers. comm.). Suitable habitat is present on the peninsula, particularly where *Eucalyptus leucoxylon* ssp. *leucoxylon*, and *E. viminalis* ssp. *cygnetensis*, is present (MVS No. 47) (KI NRM 2015b).

Further, prescribed burning can provide the opportunity to research and monitor how abundant fauna and flora respond to and impact on the environment post-fire. Section [5.1.2](#) provides more information on burn preparation.

Feral Cats

Domestic / Feral Cats (*Felis catus*) prey on native birds, mammals, reptiles and amphibians, and have a significant impact on native animal populations (KI NRM 2015a; PestSmart 2013). Predation by Feral Cats has been implicated in the extinction of numerous native species and as a result is listed as a *Key Threatening Process* under the *EPBC Act*.

Legge et al. (2016) estimates that between 2.1 – 6.3 million feral cats occur across Australia, depending on seasonal variation and drought factors. Across Kangaroo Island the Feral Cat population is estimated to be around 5,000 individuals, with a population density of 0.7 cats km² within the study area on Dudley Peninsula (Bengsen, Butler & Masters 2011). These estimates will vary due to seasonal variation and long term weather trends.

The median Feral Cat home range radius on KI across typical agricultural land is 1.29 km, however individuals will travel outside of this for prey opportunities. McGregor et al. (2016) showed that in Australia's tropical savannah, individual Feral Cats may travel up to 12.5 km from their home range to hunt in fire scars, and that this preference was stronger than for their own home range and increased relative to fire intensity. Feral Cats spent on average 15 days at the fire scar location, with the length of stay increasing with fire recency (McGregor et al. 2016).

In 2015, KI NRM launched the *Kangaroo Island feral cat eradication initiative*, with the aim of eradicating feral cats off the island by 2030. This was undertaken in response to the significant threat that Feral Cats pose through predation to over 50 native species on Kangaroo Island, as well as spreading disease (KI NRM 2015a; PestSmart 2013).

It is important that the DEW fire management program on Dudley Peninsula works alongside the Feral Cat eradication initiative to integrate management where appropriate. Control of Feral Cat populations should be considered pre- and post-prescribed burn to reduce the predation pressure on native species (refer to [Small Mammals](#)). The study into Feral Cat control undertaken by PestSmart (2013) and the KI Feral Cat eradication initiative (KI NRM 2015a) within the planning area should guide management decisions, with further studies undertaken to identify improvements in pre- and post-prescribed burning and pest management.

3.8.2 Flora

Weeds can have significant impacts on native vegetation and ecological communities within remnants (DPC 2003). 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 & Huenneke 1992). However, it is also well known that fire is an important source of disturbance in natural systems (Hobbs & Huenneke 1992) and that fire can be used as a tool for weed management, prescribed as part of an integrated approach (Hobbs 2003). An integrated approach to weed management involves the planned use of fire coupled with other weed control techniques (including herbicide, biological, mechanical and physical control) noting that the combination, timing, and application of methods is likely to differ depending on the target species and to minimise off target damage.

Some of the most significant weed species within the planning area include Aleppo Pine (*P. halapensis*), Arium Lilly (*Zantedeschia aethiopica*), Blackberry (*Rubus* spp.), Bluebell Creeper (*Sollya heterophylla*), Boneseed (*Chrysanthemoides monilifera*), Bridal Creeper (*Asparagus asparagoides*), Bridal Veil (*Asparagus declinatus*), Bulbil Watsonia (*Watsonia meriana* var. *Bulbillifera*), Cape Broom (*Genista monspessulana*), Coolatai Grass (*Hypharrhenia hirta*), English Broom (*Cytisus scoparius*), Erica spp., European Olive (*Olea europaea* ssp. *europaea*), False Caper (*Euphorbia terracina*), Gorse (*Ulex europaeus*), Horehound (*Marrubium vulgare*), Italian Buckthorn (*Rhamnus alaternus*), Lincoln Weed (*Diplotaxis tenuifolia*), Myrtle-leaf Milkwort (*Polygala myrtifolia*), One-leaf Cape Tulip (*Moraea flaccida*), Radiata Pine (*Pinus radiata*), Sallow Wattle (*Acacia longifolia* ssp. *longifolia*), and Salvation Jane (*Echium plantagineum*). Fire management guidelines for some of these species and other weeds of concern are included in [Appendix 2](#).

In relation to prescribed burning, priority will be given to managing fire responsive weed species post-fire to ensure existing weed management issues are not exacerbated. On

occasions, pre-burn weed management works will assist in achieving weed management objectives. In A- or B-zones, non-fire responsive woody weeds contributing to fuel loads may also be targeted. Fire may provide opportunities to control non-fire responsive species owing to improved access or early emergence when off target damage will be reduced and such opportunities should be identified in the planning phase.

Locally significant weeds within prescribed burn areas will be listed in the prescribed burn plan and mitigation actions identified consistent with the considerations outlined above (DEWNR 2013b, 2017). Post-fire weed control will be conducted where necessary and actions identified in relevant EFMS should be implemented pre- and post-fire.

Volunteers, community groups, and agency pest plant programs have completed significant weed management work on public land. Monitoring programs should ensure that vulnerable areas are evaluated pre- and post-fire to determine what post-fire weed control is required and to assess the effectiveness of control efforts.

3.8.3 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 mould that causes disease and death in a variety of native plant species (as well as introduced species). Areas that receive 400 mm or more of average annual rainfall are considered at risk from the mould, which can spread naturally through the soil and through mud carried on vehicle tyres, walking boots, and equipment. There is a risk of *Phytophthora* being introduced into new areas and of existing infestations spreading in the planning area. DEW has a Standard Operating Procedure, which addresses *Phytophthora* threat management (DEH 2002b). This outlines hygiene procedures and guidelines to protect the integrity of natural areas by minimising the risk of *Phytophthora* infestation and spread across the state. Primary locations are Baudin and Lashmar CP.

The rate of *Phytophthora* spread may be increased by fire but further monitoring is required to clarify the interaction between these two processes.

Management Strategies	
Pest Species	73. Refer to fire management guidelines for introduced flora species (Appendix 2) during prescribed burn planning.
	74. Implement pre- and post-fire management strategies identified in the EFMS that will minimise the risk of gorse and broom increasing post-fire (DENR 2011a).
	75. Use fire as a tool that forms part of integrated weed management strategies.
	76. Consider the likely post-fire responses and impacts of weed species and implement pre- and post-fire weed control and monitor accordingly (subject to agency priorities).
	77. Collect relevant information during prescribed burn planning on introduced fauna and undertake a risk assessment to determine the need for pre- and post-fire management.

78. Work with the *Kangaroo Island feral cat eradication initiative* to support integrated management and reduce Feral Cat predation impacts post-fire.
79. Ensure lessons learnt from the *Kangaroo Island feral cat eradication initiative* are incorporated through adaptive management into the DEW fire management program.
80. Adhere to the *Standard Operating Procedure – Phytophthora Threat Management* (SOP-002) (DEH 2002b) and conduct a risk assessment to determine whether fire management activities will exacerbate the spread of Phytophthora.
81. Ensure hygiene practices are implemented to reduce the spread of Phytophthora across the planning area. Refer to the *DEW Operating Procedure – Phytophthora Vehicle Disinfection Unit* (DEH 2003).
82. Monitor the interaction between Phytophthora and fire.

4 RISK ASSESSMENT

A risk assessment was conducted in line with the *DEW Risk Assessment in Fire Management Planning Procedure* (DEWNR 2017), 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 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 as *Rare, Unlikely, Possible, Likely* or *Almost Certain*.
- Consequence considers bushfire impacts to life, property and environmental values and is ranked as *Insignificant, Minor, Moderate, Major* or *Critical*.
- Based on the derived likelihood and consequence ratings, the overall risk for each scenario is determined using a risk matrix and ranked as *Low, Moderate, High* or *Extreme*.

The *DEW Risk Assessment in Fire Management Planning Procedure* (DEWNR 2017) 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 in this plan are derived from the risk assessment process.

4.1 Potential for Fire Impact on Life and Property

The population of Kangaroo Island is approximately 4,400 people. The major population centre located within the planning area is Penneshaw, with smaller settlements including, Island Beach, Baudin Beach and Browns Beach.

Each year approximately 190,000 people visit Kangaroo Island, of those approximately 79% spend time in the township of Penneshaw (TOMM 2013) and the planning area.

Colmar Burton has undertaken a survey on behalf of the Tourism Optimisation Management Model (TOMM) Committee Kangaroo Island. The figures below represent the percentage of visitors that participated in the survey and the areas of visitation within the Dudley Peninsula planning area:

- 77% at Penneshaw Township
- 37% at Cape Willoughby Light Station
- 20% at Antechamber Bay (Lashmar CP)
- 23% at Brown's Beach
- 16% at Island Beach
- 19% at Baudin CP (TOMM 2016).

The following demographic issues have been identified within the Kangaroo Island area as potentially impacting on the ability of certain sections of the community to prepare themselves for bushfire:

- Concentration of visitation during the peak fire danger season (an estimated 22-25,000 visitors / month in December and January) (TOMM 2009)

- A significant proportion (12%) of visitors from non-English speaking backgrounds including locations with no experience of wildfire (TOMM 2009)
- A high proportion of off Island landholders (48% of Island landowners), linked to capacity to undertake and timeliness of appropriate land management for fire prevention (65% of s.105 notices issued in 2008 / 2009 were sent to off Island landholders).
- Significant number of bushland settlements and isolated rural dwellings in bushland areas characterised by extreme fire risk and single access and egress.
- Groups of landholders in known fire paths outside of township, settlement and locality areas (multiple fires in past 40 years):
 - landholders on the southern Dudley Peninsula, south of Willson River Road

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

- Lashmar CP campground and visitor area
- Cape Willoughby Light Station
- Built heritage within Baudin CP

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

[Appendix 1](#) details significant assets within and adjacent to DEW-managed land and the corresponding fire management strategies. [Map 1](#) shows the location of assets within the planning area.

Management Strategies

Life and Property	83. Prepare visitor bushfire survival plans as required and review these annually. Plans for visitor facilities should be developed by the lessee, owner or manager.
	84. Encourage adjacent property owners to work with CFS and local government to implement appropriate and coordinated fire management actions on their own land to minimise the threat of fire.
	85. 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.
	86. Ensure suppression strategies take into account significant cultural assets in order to minimise impacts from these actions and undertake post-fire rehabilitation.

4.1.1 Smoke

Smoke produced from bushfires can have short- and long-term health impacts and also impact on the seasonal viticulture yield. Smoke is made up of a range of particles and gases including carbon monoxide, carbon dioxide, nitrogen oxides, volatile organic compounds, and water vapour. These particles can impact on human health and influence the taste of produce from smoke tainted grapes. The largest risk comes from the microscopic particles (SA Health 2009).

Health

Small particles from smoke can enter via the eyes, nose, and respiratory system (SA Health 2009), where they can cause irritation and inflammation, manifesting into a number of health

effects. Children and the elderly are particularly susceptible to the health effects of smoke and pre-existing illnesses such as chronic obstructive pulmonary disease, asthma, and heart disease may deteriorate due to smoke inhalation (DOH 2012; SA Health 2009).

Under the CFS Operational Doctrine Library Standard Operating Procedure 6.06, advice will be provided to the public during a fire event (CFS 2018). Generally, the CFS advises that people affected by smoke should close all doors and windows and stay indoors. If outside, the use of a smoke mask that meets the Australian Standard AS1716 or P2 or P3 is recommended (SA Health 2009).

Smoke Taint

Grape vines are grown across the Dudley Peninsula with extensive areas of vines abutting included lands within the planning area. Smoke as a result of bushfires or prescribed burning can have a notable impact on the taste and quality of grapes to be used in wine production. Smoke taint can lead to grapes displaying burnt, ashtray or charred flavours, leading to wine becoming unfit for sale or reduced in value. Smoke taint is a concern for wine growers especially during the veraison (ripening) period, with research suggesting that smoke uptake is the greatest from seven days post-veraison to harvest (DPI 2012; Kennison, Wilkinson & Gibberd 2009; Richter 2006). Consultation with landowners on the timing of prescribed burning activities should be undertaken and considered during prescribed burn planning.

Management Strategies

Smoke	87. Assess smoke modelling projections from the Bureau of Meteorology and information from the Environmental Protection Agency to consider smoke management prior to burning operations.
	88. Refer to <i>Smoke Taint Fire Management Strategy</i> (DEWNR 2013c).

4.2 Ecological Fire Management

4.2.1 Ecological Fire Management Guidelines

The management of fire to maintain biodiversity is discussed in more detail in the *DEW Guidelines for Ecological Fire Management* (DEWNR 2013a). This approach is being used as a sound basis for the management of fire for biodiversity across Australia (Andersen, Cook & Williams 2003; FEWG 2004; Hopkins & 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. EFMG are used to assist in achieving management objectives in C-zones within all DEW Fire Management Plans.

Methodology

EFMG 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 DEW to define the EFMG 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 EFMG 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
- EFMG 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 3 (below) illustrates this process.

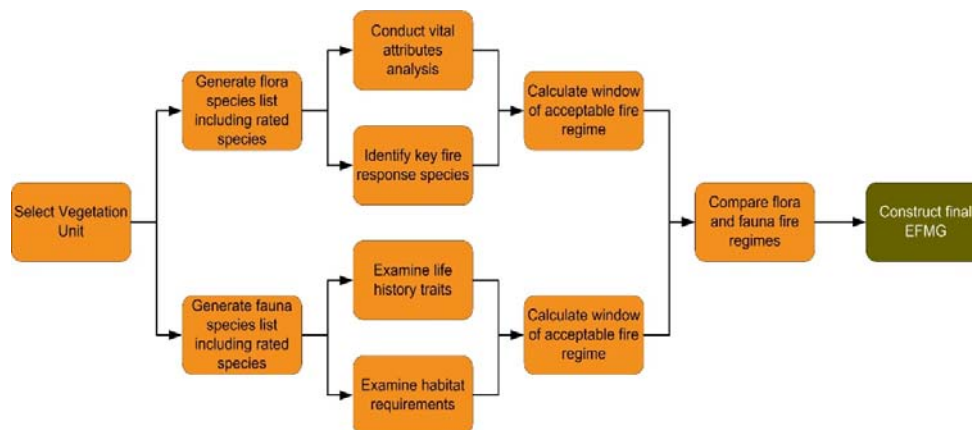


FIGURE 3 – APPROACH FOR DETERMINING ECOLOGICAL FIRE MANAGEMENT GUIDELINES

Interpreting Ecological Fire Management Guidelines

EFMG 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 4). 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. EFMG should not be used as prescriptions; instead they define a window of “*acceptable*” fire regime that ensures the conservation of existing species. The EFMG are based on the best available information and they will be refined as new research and monitoring data become available for Key Fire Response Species.

Thresholds of Potential Concern

TPC are defined as “the limits of tolerance to a particular fire regime” (Kenny et al. 2004).

- 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 4) 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. 2004).

TABLE 4 – ECOLOGICAL FIRE MANAGEMENT GUIDELINES FOR MVS IN THE PLANNING AREA

MVS No.	MVS Name	FIRE REGIME						
		Thresholds of Potential Concern		Spatial Criteria	Frequency	Intensity		Season
		TPC 1 – Inter-fire interval greater than X years	TPC 2 – Inter-fire interval less than X years			Avoid more than 2 successive fires of low intensity	Some medium to high intensity fire needed to regenerate some species	
8	Eucalyptus woodlands with a shrubby understorey	17	40	50	Avoid more than 2 fires within a period of X years	Y	Y	Same Season
21	Other Acacia tall open shrublands and shrublands	10	20	50	10	Y	Y	Same Season
26	Casuarina and Allocasuarina forests and woodlands	17	40	50	17	Y	Y	Same Season
29	Mallee heath and shrublands	17	40	50	17	Y	Y	Same Season
47	Eucalyptus open woodlands with shrubby understorey	17	40	50	17	Y	Y	Same Season
49	Melaleuca shrublands and open shrublands	17	40	50	17	Y	Y	Same Season

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.

4.3 Fire Management for Cultural Heritage

Information on Aboriginal and European heritage is collected during prescribed burn planning as part of the Prescribed Burn Environmental Assessment process (refer to Section 5.1.2) (DEWNR 2014a, 2017). Any fire operations must be in accordance with the *DEW Protection of Cultural Heritage Procedure* (DEWNR 2017).

Aboriginal Heritage

The land comprising the Dudley Peninsula planning area is an area of cultural significance for the Kaurna, Ngarrindjeri, Narungga and Ramindjeri people (KI NRM Board 2017). Kangaroo Island or Karta as it is known to Aboriginal people, forms an important part of Dreaming, where Ngurunderi mourns the passing of his wives and prepares for the spirit world (SA Museum 2015).

Archaeological, anthropological and historical evidence suggests that Aboriginal people inhabited Karta (Kangaroo Island) until approximately 4,000 years ago (DEH 2006c), while pollen spore evidence from bushfire events suggests that occupancy may have occurred until approximately 2,000 years ago (SA Museum 2015).

Aboriginal heritage sites have been reported throughout the Dudley Peninsula planning area. One reported site is located adjacent Lashmar CP and one registered site is located adjacent Lesueur CP. These sites are listed on the Central Archive, which includes the Register of Aboriginal Sites and Objects (the Register). 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. A number of unconfirmed sites have been reported throughout Pelican Lagoon CP.

Aboriginal Heritage Act 1988

The purpose of the *Aboriginal Heritage Act 1988* is the protection and preservation of Aboriginal sites, objects and remains. Aboriginal Affairs and Reconciliation (AAR) maintains a Central Archive, including the Register of Aboriginal Sites and Objects. An Aboriginal site is defined under the Act as “An area of land that is of significance according to Aboriginal tradition; or that is of significance to Aboriginal archaeology, anthropology or history.”

To ensure the protection of sites, DEW shall consult with AAR and the appropriate Heritage Committee, before planning any significant development works.

When implementing this plan, DEW will comply with the *Aboriginal Heritage Handbook and Strategy* (DEH 2006a), to facilitate the protection of sites during bushfire suppression and prescribed burns.

European Heritage

It was Captain Matthew Flinders aboard the Investigator who is credited as being the first European to officially site the island in March 1802. Since European occupation differing land uses have occurred throughout the planning area. There are many structures and remains of structures that are of special cultural and heritage value, providing examples of the European history of the island. Many of these sites are recorded on the South Australian Heritage Register. The majority of the heritage structures are built of stone, and therefore are not generally fire prone. Some are sited in cleared areas offering some protection from bushfire, while others will require bushfire protection works.

Places of cultural significance can be found in Baudin CP, Pelican Lagoon CP and Cape Willoughby CP. Due to Baudin CP's proximity to Penneshaw, the park is rich in European cultural heritage. Baudin CP retains the best remaining section of the original Cape Willoughby to Penneshaw Bullock Track, which linked the township of Penneshaw to Cape Willoughby. Numerous threshing floors, a well, a possible 'Binnies house', and the 'Bates' house ruin among others sites are some of the most significant cultural sites within the planning area. Work has been undertaken by the Penneshaw Progress Association to record all these sites with Baudin CP (DEH 2002a).

Cape Willoughby CP is home to South Australia's very first lighthouse, the Cape Willoughby Lightstation built in 1852 (Bruce Harry & Associates 2009). Cape Willoughby once played a vital role in the shipping trade of the young colony of South Australia. Cape Willoughby Lighthouse was built to assist the safe journey of ships passing through the treacherous stretch of water known as Backstairs Passage. The lighthouse was operated 24 hours a day by three

lightkeepers who lived there with their families. Cape Willoughby Lightstation was one of the last occupied lighthouses in Australia, until it was officially automated in 1992 (DEWNR 2014c).

Pelican Lagoon CP contains the remains of formal agricultural activity including wells, orchards, seawalls, dikes and canals, buildings, and mostly importantly a barley threshing floor (DEP 1987).

Dudley CP is home to a Charcoal Pit, the remains of a local industry to produce fuel for gas producers at the time when fuel restrictions were in force (DEP 1987). The exact location of this is not known.

Any fire management activities must be in accordance with the *DEW Protection of Cultural Heritage Procedure* (DEWNR 2017).

Management Strategies	
Cultural Heritage	89. Implement fuel management strategies appropriate for the protection of cultural assets as shown on Fire Management and Access Map 4 .
	90. During bushfire response, consult the cultural sites register to minimise impacts on significant cultural assets.
	91. Identify significant water sources / assets / sites for exclusion of fire suppression chemicals to inform Incident Action Planning / Response Planning.
	92. Integrate traditional knowledge about fire management with scientific principles and technology to develop best practice for the region.
	93. Engage with the Kaurna, Ngarrindjeri, Narungga and Ramindjeri people to assist and support the fire management activities.
	94. Prior to a prescribed burn or during a bushfire, and before any earthworks are undertaken, appropriate consultation is undertaken to identify cultural sites. After a fire, evaluate sites to establish if any damage has occurred and include works in the post-fire works plan.
	95. Aboriginal authorised officer to be consulted when planning prescribed burns.
	96. 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.
	97. Ensure suppression strategies take into account significant cultural assets to minimise impacts from these activities and undertake post-fire rehabilitation.

5 RISK MODIFICATION

5.1 Fire Management Zones

Fire management zones as detailed in the *DEW Zoning Procedure* (DEWNR 2017) 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 public land
- clarify the areas where different fire management activities will be undertaken on public land
- ensure a standard approach to the application of fire management zones on public land across South Australia.

Fire management zones are categorised according to the primary objective for fire management - Asset Protection Zone (A-zone), Bushfire Buffer Zone (B-zone) or Conservation-Land Management Zone (C-zone). Where A- or B-zones are not applied, C-zone is the default zone type. These zones are determined giving consideration to overall fuel hazard levels in different vegetation types and the level of risk to assets including life, property, and cultural heritage and biodiversity assets. The primary objective is fuel management within A- and B-zones; however, it is noted that carefully timed fuel management can benefit some species. In C-zones EFMG are used to define an appropriate fire regime (see Section 4.2.1). The zones applied to the planning area are described in [Appendix 1](#) and shown on [Map 4](#) (Fire Management & Access; [online](#)).

All fire management actions in A-, B- and C-zones (regardless of the objective or tenure) will meet fire management planning requirements by applying an environmental assessment process as detailed in Figure 4 and in the *DEW Prescribed Burning Procedure* (DEWNR 2017). The assessment considers aspects such as vegetation condition, threatened species, erosion potential, the potential to introduce or increase pest plants, animals or diseases, fire regime, bushfire risk, hydrology, and Aboriginal and non-Aboriginal heritage.

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

Asset Protection Zone Objectives

To ensure the overall fuel hazard does not exceed *Moderate*, in order to:

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

Bushfire Buffer Zone Objectives

To ensure the overall fuel hazard does not exceed *High*, in order to:

- minimise the likelihood of bushfire impacting on property, including essential infrastructure, and environmental and ecological assets
- assist in reducing bushfire intensity, ember attack and spotting potential, likely to impact on the assets within the surrounding areas or assets within the included lands
- provide a suppression advantage to assist in containing bushfires within defined areas, that is to minimise the likelihood of fires entering reserves from the wider landscape or exiting the reserves
- reduce the likelihood that significant areas of contiguous vegetation burns in a single fire event
- enhance safe access and egress for firefighters.

Conservation-Land Management Zone Objectives

C-zone management is not dictated by the overall fuel hazard, rather zoning allows for fire management to meet ecological and conservation management objectives. C-zone burns will be applied where necessary to:

- assist in the conservation of species and populations such as the species listed in [Appendix 2](#) and [Appendix 3](#), as well as threatened ecological communities listed in [Appendix 4](#), through the application of appropriate fire regimes
- provide landscape protection and reduce the likelihood of contiguous vegetation burning in a single fire event
- promote heterogeneity within the environment through the creation of variability in the fire regime
- maintain, or where possible, enhance habitat quality and viability through the maintenance of fire as a natural ecosystem process, as supported by best available knowledge
- reduce the likelihood of fragmentation of native vegetation through fire management strategies
- manage fire within the EFMG.

5.1.1 Major Strategies within the Planning Area

The following provides an overview of the major strategies that were developed based on the risk assessment:

- A-zones have been applied to areas of reserves where an adjacent asset is less than 40 m from the reserve boundary and not separated by a road
- A-zones have been applied to electricity infrastructure, the main power line to Kangaroo Island, which runs through Baudin CP and Dudley CP
- A-zones have been applied to park assets including heritage items

- B-zones have been placed around the perimeter of Dudley CP, in order to form an effective fuel break to reduce the likelihood of fire moving across the landscape or exiting DEW land, to support the protection of the township of Island Beach and Browns Beach
- C-zone burning has been proposed to provide protection from landscape-scale fires by interrupting large contiguous areas of fuels, strengthening B-zones or supporting off-reserve fuel reduction, such as within Baudin CP, Dudley CP, Simpson CP, Lesueur CP, and Lashmar CP
- C-zone burning managed in accordance with ecological guidelines as part of ecological restoration and research into fire as an ecological process.

All zones and proposed burns applied to the lands included in this plan are shown on [Map 4](#) and detailed in [Appendix 1](#). Note that the mapped extent of these zones and proposed burns is indicative and subject to alteration or addition given resource availability and regional priorities. The widths will be more clearly defined during the environmental assessment process prior to implementing any actions.

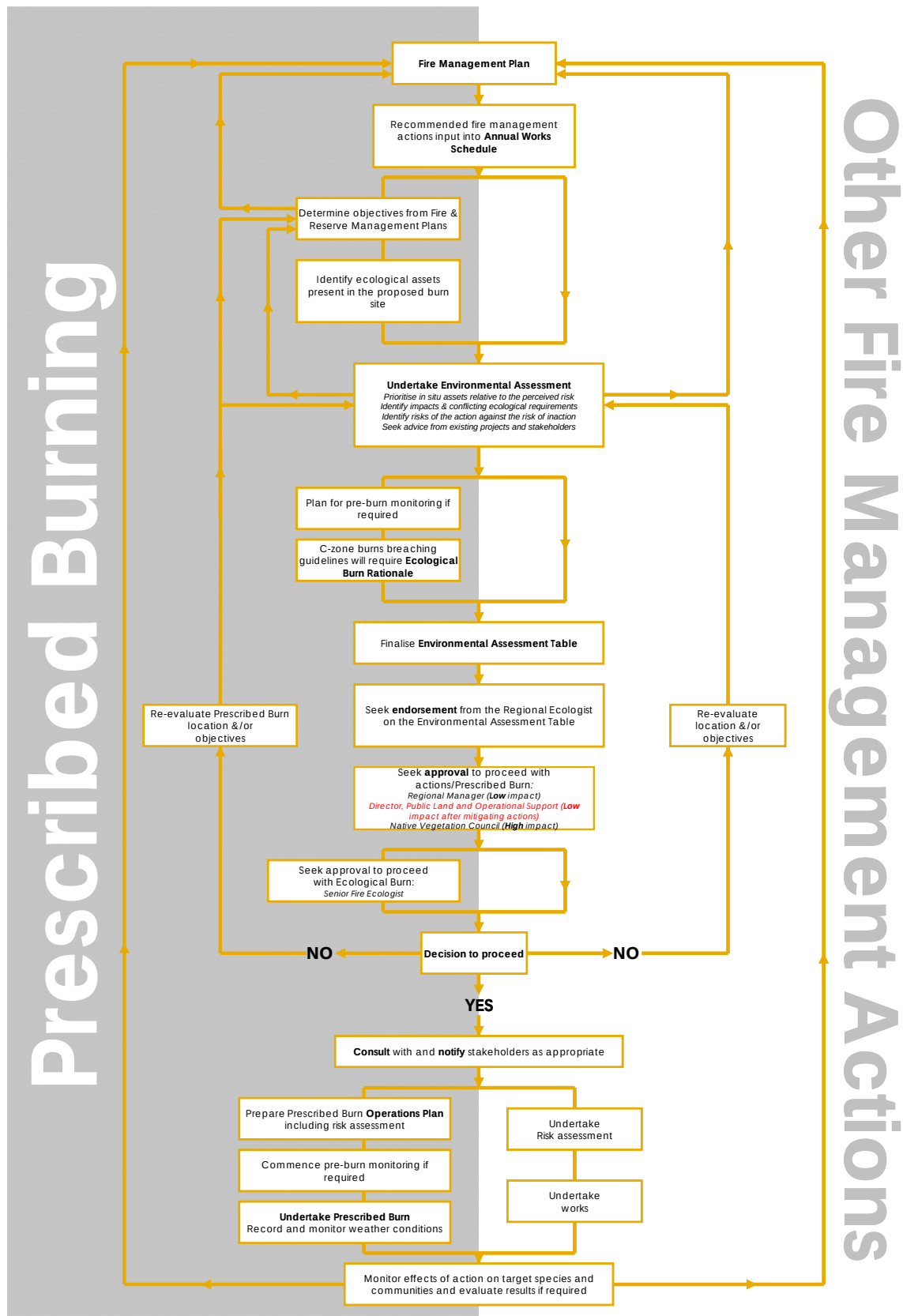


FIGURE 4 – PLANNING PROCESS FOR BURNING AND OTHER FIRE MANAGEMENT ACTIONS

Prescriptions for Fuels in A- and B-zones

The overall fuel hazard:

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

The overall fuel hazard is assessed via on-ground observations. The *Overall Fuel Hazard Guide for South Australia* (DENR 2011f) assists the agencies to identify the hazard posed by Surface, Near-surface, Elevated, and Bark fuels. The fuel hazard levels are then assessed against a table to determine the overall fuel hazard rating.

Fine fuels (less than 6 mm), particularly in the Near-surface and Surface layers, contribute the most to a fire's rate of spread and flame height (DSE 2010). The Elevated fuel layer significantly contributes to flame height and increases fire intensity (DSE 2010). Bark fuel (particularly stringy-bark) produces burning embers that can generate spotting (DENR 2011f), causing new fires or the ignition of other flammable objects (houses, sheds etc.). These fuel layers are therefore targeted during prescribed burning operations as a means of providing the greatest reduction to the overall fuel hazard. Other fuel reduction activities such as selective vegetation thinning, woody weed removal, and slashing can also significantly reduce fuel hazards.

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.

Details on fuel reduction methods within A- and B-zones are provided as part of an Environmental Assessment (EA) process which is completed before the implementation of each prescribed burn and also before new fire management works are undertaken within publicly managed land (where native vegetation is being cleared and is not exempt under the *Native Vegetation Act 1991*). For more information refer to the *Fire Information Management System - User Guide* (DEWNR 2014a) and the *South Australian Prescribed Burning Code of Practice* (GAFLC 2009).

5.1.2 Prescribed Burning

Prescribed burning is the planned application of fire within prescribed environmental conditions and predefined boundaries, either for bushfire risk mitigation or to achieve ecological or research objectives. This document guides the implementation of prescribed burning within the planning area. DEW has developed operational prescriptions outlining the preferred range of weather variables and fuel moisture content for different vegetation types suitable for prescribed burning (DENR 2011e).

Individual prescribed burn plans are prepared and assessed for approval for every prescribed burn regardless of the objective (DEWNR 2017; ForestrySA 2010; GAFLC 2009). Operations plans are approved by the nominated Incident Controller for each burn.

Prescribed burn plans include:

- the objective of the prescribed burn, e.g. fuel reduction, ecological or research purposes, and the area to be treated
- an EA of potential impacts on threatened species and ecological communities, cultural heritage, significant recreation and amenity values, significant weeds, and

vegetation age classes; for burns in C-zones, the application of the *Ecological Fire Management Guidelines for Native Vegetation in South Australia* (DEWNR 2013a). Mitigating actions are implemented where impacts are identified in an operations plan detailing:

- fuel hazard assessments
- prescriptions for the burn based on strategic objectives
- operational maps
- site preparatory work required before the burn is conducted
- forecasted weather
- the strategies and tactics to achieve the desired objectives
- the personnel required and their command
- plant and equipment
- site-specific safety considerations including control lines, fall-back lines, evacuation plans, and escape routes
- permits required
- notifications to other agencies and stakeholders
- a burn risk assessment assessing the risk of escapes, potential for off-target damage, effectiveness of mitigation strategies, and the potential for the burn to meet its objectives
- pre- and post-prescribed burn monitoring and follow-up works.

Approvals for prescribed burn plans vary depending on the level of complexity and risk. Where native vegetation is being treated an EA is undertaken. Depending on the level of impact a hierarchy of approvals must then be followed. This includes regional staff, including those with ecological expertise, Incident Controller, Regional Manager, and the Native Vegetation Council.

Where matters of national environmental significance are likely to be significantly impacted, approval is required from the Cwlth Department of the Environment under the EPBC Act.

All C-zone burns require consultation with senior ecological staff. Operations plans are approved by the nominated Incident Controller for each burn within the agencies.

Prescribed burning in zones identified on [Map 4](#) and [Map 5](#) (Fire Management & Access and Implementation Strategy – Proposed Burns; [online](#)) may not be treated in their entirety at one point in time, as the area may be divided and treated over a number of seasons, or the treated area may be patchy for environmental purposes or due to conditions at the time of the prescribed burn.

Prescribed Burning in C-zones

Under agency policies, prescribed burning within C-zones may be implemented for the purpose of ecological management, cultural management, research, or for landscape protection. A strategic program of landscape protection C-zone burning may be an appropriate way to mitigate the risk of a whole block / reserve / area burning in a single bushfire event (DEWNR 2017). All prescribed burning within C-zones will be in accordance with the EFMG described within the plan (see Section [4.2](#)).

Proposed prescribed burn areas in C-zones are shown on [Map 4](#) and [Map 5](#) (Fire Management & Access and Implementation Strategy – Proposed Burns; [online](#)). These burn areas may be added, altered, relocated, or may be withdrawn at the discretion of the agency at any time. This may be as a result of unplanned fires, an alternative approach to implementing a mosaic of age class across the reserve, or any other factors that may have occurred since the time of writing. The implementation of any proposed burn is subject to resource availability and agency priorities.

All prescribed burning in A-, B-, and C-zones (regardless of the objective or tenure) will meet fire management planning requirements by applying an EA process as part of a prescribed burn plan and consistent with the GAFLC *Code of Practice for Prescribed Burning* (GAFLC 2009). Within A- and B-zones burning is undertaken for the purpose of fuel reduction (as described above).

Landscape Protection Prescribed Burns

Prescribed burns within C-zones will be carried out for landscape protection purposes, where the reduction of fuel in a particular area reduces the likelihood of a whole reserve or large contiguous block of vegetation burning in a single fire event. This will be a particular focus of this plan. Unlike prescribed burns in A- or B-zones, return application of fire in landscape protection burns is not determined by set fuel hazard thresholds. Instead they are guided by fire regimes described in the *Ecological Fire Management Guidelines for Native Vegetation in South Australia* (DEWNR 2013a).

Ecological Prescribed Burns

Prescribed burns within C-zones may be carried out for specific ecological purposes, including the management of vegetation age classes, weed management, and management of threatened species or ecological communities, as well as non-threatened fauna and flora. Ecological prescribed burns are conducted in accordance with the *Ecological Fire Management Guidelines for Native Vegetation in South Australia* (DEWNR 2013a), which are described in Section 4.2 of this plan. Where a proposed prescribed burn is not included in an approved management plan or other approved document that outlines the requirements for the application of fire regimes, an Ecological Burn Rationale must be prepared and approved as per the *Ecological Burning Procedure*.

The *Native Vegetation Act 1991* and *Regulations 2017* apply to these prescribed burns. All ecological burns on DEW-managed land are either approved by the Native Vegetation Council (NVC) under *Native Vegetation Regulations 2017* or are in line with the *DEW Fire Management Standard Operating Procedure Under the Native Vegetation Act* (Native Vegetation Council 2017).

6 READINESS

DEW fire management actions are conducted in line with the *DEW Fire Policy and Procedure Manual* (DEWNR 2017), which sets out requirements for safety, plant and equipment, training, communications, infrastructure, response plans, resources, research and monitoring, coordinated inter-agency fire management, suppression.

6.1 Fire Access Tracks

DEW is committed to managing a strategic network of fire access tracks on DEW-managed land, in accordance with the GAFMWG standard (GAFMWG 2014) and the *DEW Fire Access Tracks Procedure* (DEWNR 2017). Tracks occurring within the planning area, 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 GAFMWG classification.

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. Binnies Track and East West Road).

A number of dead end tracks and tracks with difficult terrain due to the coastal dune systems and limestone substrate exist throughout the Southern Block. This influences track location and maintenance and hence plays a considerable role in access and egress. Simpson Track in Simpson CP and Dead Man Track and Howard Track in Lesueur CP in particular, provide challenges for strategic fire access tracks. These tracks are difficult to maintain due to the undulating sand dune country they traverse and in addition terminate when they reach the coast.

Fire access points and tracks have been reviewed as part of this plan and proposed changes are summarised within [Appendix 1](#). Other tracks will be maintained to their current GAFMWG standard shown on [Map 4](#) (Fire Management and Access). Actions will be implemented on a priority needs basis, subject to resources, fuel hazard and risk.

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

Management Strategies

Fire Access Tracks

98. Prioritise and implement actions regarding fire access as described in [Appendix 1](#).
99. Maintain tracks to the GAFMWG standards as shown on [Map 4](#) (Fire Management & Access; [online](#)).
100. Install signs on fire access tracks and gates according to GAFMWG standards and name tracks as appropriate.
101. Update and maintain track data on government mapping database.

6.2 Fire Infrastructure

The following fire infrastructure is maintained for fire suppression purposes within the Dudley Peninsula planning area:

- Kangaroo Island Airport Airstrip (located outside the planning area at Cygnet River)
- Cape Willoughby Helipad adjacent the Cape Willoughby Lighthouse
- Fire hydrants within the Penneshaw township adjacent Baudin CP
- Fire protection systems on high value assets including structures at the Lashmar CP camping grounds
- Fire protection systems at the Cape Willoughby Lighthouse
- Numerous standpipes, hydrants and static water supplies (tanks, dams, etc.) across the planning area.

Further information on fire infrastructure can be found in the Response Plans for the Dudley Peninsula parks, [Map 4](#), and in the Kangaroo Island Region annual works schedule.

6.3 Response Plans

Incident Response Plans are reviewed by the Kangaroo Island Region on an annual basis in accordance with the *DEW Response Plan Procedure* (DEWNR 2017). A Response Plan provides DEW KI specific information in relation to fire suppression. This includes procedures, contacts, resources, static water sources, equipment and access, as well as levels of readiness.

Note that the Response Plan is for initial response only and that the Incident Controller should refer to this Fire Management Plan for more detailed fire management information, in conjunction with DEW staff.

6.4 Days of Heightened Fire Danger

The safety of people within DEW-managed land is of major consideration to DEW. Agency policies allow for the temporary closure of DEW-managed lands on days declared a Total Fire Ban (TFB), or for assessment and appointment of suitable shelter on reserve in the event of a bushfire (DEW 2018a, 2018b, 2018c). Reserves may also be closed in the event of a bushfire within or threatening a reserve or during other fire management operations, such as prescribed burning.

During Bushfire

DEW draft *Workplace and Event Requirements for Bushfire Safety Policy and Procedure* allows for DEW-managed reserves to remain open on the condition that all those on reserve have access to a bushfire refuge in the event of a bushfire. Adequate facilities/resources must be provided for the expected duration taken for a bushfire to pass. This must be documented in a Site Bushfire Management Plan and be reviewed annually.

CFS has an Evacuation Policy (CFS 2013b), which explains that as far as is possible, members of the community should decide for themselves whether to stay or go when threatened by an emergency. Directed evacuation will only be undertaken by the South Australia Police and Emergency Services when it is safe to do so and adequate resources are available. DEW will comply with all requests from these authorities in evacuating visitors, lessees and residents from reserves during an emergency.

To ensure safety, DEW staff and contractors working within the reserves during the fire season are required to maintain communications with their respective supervisors and / or contact officers through a DEW Bushfire Survival Plan, in accordance with the draft *Days of Heightened Fire Danger Procedure* (DEW 2018a). This is in place to ensure staff and contractors can be informed of any developing events.

7 RESPONSE

7.1 Response Plans (DEW Bushfire Suppression)

Response plans exist for public land in the planning area and these are reviewed on an annual basis by the KI Region. Response Plans provide reserve-specific information in relation to fire suppression including water points, equipment and access, as well as levels of preparedness.

The Response Plan is for initial response only and this plan should be referred to by an Incident Controller for more detailed fire management information, in conjunction with the land manager.

7.2 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 DEW-managed land it is likely that DEW staff will be the best source of this information, as such they should be consulted during the development of any incident prediction. Consideration for firefighter safety and the protection of life are paramount during all suppression operations. A DEW Liaison Officer will be assigned to most incidents attended by DEW crews. The role of the DEW Liaison Officer is to coordinate and work within the Incident Management Team, to provide policy advice as well as resources and other logistical and planning support.

General principles:

- All suppression efforts are to be in accordance with the FES Act and the CFS Operational Doctrine Library (CFS 2018).
- Bushfires should be kept to the smallest possible area when adjacent to townships and settlements and in primary production areas to minimise life, property and economic loss.
- The use of fire suppression chemicals in catchment areas will be in accordance with the *Memorandum of Understanding on Aerial Application of Chemical Fire Retardants* between the CFS and SA Water (CFS 2015).
- The use of fire suppression chemicals on DEW-managed public land will be in accordance with the *DEW Fire Suppression Chemicals Procedure* (DEWNR 2017).
- Only chemicals qualified and approved by the United States Department of Agriculture Forest Service (USDA Forest Service 2008) and endorsed by AFAC (AFAC 2013) will be used on public land.
- Implement precautionary hygiene measures to reduce the risk of *Phytophthora* infestation (see Section 3.8.3) and spread of weeds. Weed hygiene measures may incorporate cleaning by water (washdown), solvent based cleaning, and / or air jets.
- Consideration should be given for early resourcing requests due to the time delay in receiving resources due to transport to KI.

7.2.1 Ground Crews Access

Considerations for all ground crews are as follows:

- Remoteness and accessibility
- Hazards such as the presence of steep slopes and cliffs
- Likelihood of extreme fire conditions as a result of:
 - wind funnelling up drainage lines
 - wind changes
 - fire behaviour in coastal mallee, heath and woodland
- Extreme fuels in vegetation dominated by Mallee
- Likelihood of spotting and ember attack on assets
- 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
- DEW role in fire suppression and the role of other fire suppression agencies during an incident (i.e. CFS and SA Metropolitan Fire Service may focus on asset protection and ForestrySA, DEW and CFS are likely to implement hose lays and carry out remote area firefighting).

Water for fire suppression can be sourced from DEW 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.

7.2.2 Access

Considerations for access to a fire within the planning area are as follows:

- Public roads and access tracks considered important for fire management have been classified to GAFMWG standards and are shown on [Map 4](#)
- Gates providing access to DEW-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 (e.g. Simpson and Lesueur CP); maps should be checked carefully to reduce the risk of entrapment.

7.2.3 Machinery Use

Machinery may be used as a tactic for bushfire suppression in consultation with the relevant landholder. The decision to deploy machinery will be made by the IMT in consultation with the DEW KI Fire Duty Officer, DEW Liaison Officer, Regional Fire Management Officer, Fire Management Officer or the Natural Values Teams as early as possible, considering the following:

- Machinery use and deployment during fire suppression is to be in accordance with:
 - the *DEW Earthmoving Equipment Procedure* (DEWNR 2017)
 - the CFS Supervision of Machinery Guidelines (CFS 2007)

- the DEW Control Lines Procedure (DEWNR 2017).
- the fire weather and associated fire behaviour conditions under which the machinery will be operating
- the response time and anticipated time of work commencement is acceptable (e.g. to minimise the overall area cleared in the establishment of control lines and increase the likelihood of success)
- that the actions are authorised by the IMT, following liaison with the DEW Liaison Officer and / or the Natural Values Team,
- environmental and cultural impacts have been assessed
- Rocky, sandy, steep terrain / cliffs can considerably reduce the effectiveness of, and pose risks to machinery operators
- Minimum Impact Suppression Techniques and specialised equipment that reduces impacts to the landscape should be used wherever possible and control methods will not be greater than the potential or actual impact of the fire
- Where known environmental and cultural values and / or assets occur, machinery is to be excluded, particularly from significant areas such as threatened or reintroduced fauna and flora habitat, or sites of cultural heritage
- Machinery use should avoid significant swamp areas, such as Pelican Lagoon, Lashmar Lagoon, or riparian areas / drainage lines such as Chapman River ([Map 2](#))
- Machinery use should avoid significant habitat such as breeding or feeding areas
- Where possible, machinery use is strategically located to minimise the impact on native vegetation and the environment.

7.2.4 Aerial Suppression

There are opportunities for aerial fire operations within and adjacent to the Dudley Peninsula planning area. During bushfires, aerial ignition may be used to reduce the impact of head fires on control lines and increase the probability of success in limiting the propagation of bushfire within the landscape. The Kingscote Airstrip is the main airstrip on Kangaroo Island and is available for use.

All aerial suppression operations across the planning area will:

- be in accordance with the CFS Operational Doctrine Library (CFS 2018)
- only use chemicals qualified and approved by the United States Department of Agriculture (USDA) Forest Service and endorsed by AFAC will be used on DEW-managed land and on DEW fire appliances (see *USDA Forest Service* (2008) document)
- where catchments and swamps occur, use retardant and foams only in accordance with the *DEW Fire Suppression Chemicals Procedure* (DEWNR 2017)
- implement suppression only in accordance with the *DEW Aerial Operations Procedure* (DEWNR 2017)
- only undertake suppression where the operation is supported by ground crew.
- only undertake backburning operations in accordance with the *DEW Backburning Procedure* (DEWNR 2017) at the discretion of the Incident Controller.

8 RECOVERY, RESEARCH AND MONITORING

8.1 Post-fire Rehabilitation and Recovery

DEW Post-fire Rehabilitation Procedure (DEWNR 2017) ensures that requirements for the rehabilitation and recovery of areas affected by bushfire is identified during an incident. A post-fire rehabilitation plan shall consider:

- impacts to infrastructure, built assets and natural and cultural heritage
- potential threats to biodiversity conservation, natural heritage and catchment protection
- actions, responsibilities and costs associated with the rehabilitation effort.

Specific objectives of post-fire rehabilitation plans are outlined in the policy and procedure.

Under the *Emergency Management Act 2004*, the State Emergency Management Plan for South Australia outlines the process for recovery of incidents and disasters. The State Recovery Office is responsible for major post-bushfire recovery. South Australia is divided into Emergency Management Zones, and each zone is managed by a Zone Emergency Management Committee that is responsible for planning and implementing Zone-level actions in support of the State Emergency Management Plan (South Australian Fire and Emergency Services Commission 2015). This Plan forms part of the Adelaide Hills, Fleurieu and Kangaroo Island Zone.

8.2 Influence of a Changing Climate

There is potential for climate change to influence fire regimes and fire management practices into the future (see Section 3.2) and this has implications for biodiversity and the community across the planning area. Therefore, it is acknowledged that adaptation of fire management strategies to improve resilience may be required in the future in response to climate change.

Management Strategies

Changing Climate	102.	Monitor species and ecosystems and the processes that support them to understand their resilience to a changing climate.
	103.	Review and adapt fire management strategies in the plan area as the impacts of climate change become understood.
	104.	Monitor national and international fire management policy and best practice and partner with the research sector to increase our knowledge on altered fire regimes.

8.3 Research

Any fire-related research that is proposed within the reserves in the planning area should be discussed with the Senior Fire Ecologist and be in accordance with *DEW Fire Research Procedures* (DEWNR 2017) and in consultation with the KI Region. DEW has prepared a draft *Fire Research and Knowledge Strategy* (DEWNR 2015b) that will outline some key questions for research in fire science and fire management.

DEW will strongly consider opportunities to undertake new or further research across the landscape in partnership with landowners and community groups across the Dudley Peninsula planning area where there are clear benefits to the DEW fire program and regional conservation programs.

8.3.1 Eastern Plains Fire Trial

The Eastern Plains Fire Trial, which was undertaken from October 2008 to November 2010 delivered a series of 36 prescribed burns covering 98.07 ha across eastern KI. The purpose of this trial was to investigate ways to promote regeneration in KI Narrow-leaved Mallee (*Eucalyptus cneorifolia*) and to increase above ground flora diversity. Prescribed burning was found in a number of cases to promote regeneration and increase ground diversity, including the regeneration of threatened plant species such as the nationally *Vulnerable* MacGillivray Spyridium (*Spyridium eriocephalum* var. *glabrisepalum*). However, there were some sites where diversity remained unchanged or declined post-fire. Key factors observed influencing native plant regeneration at sites were edge effects, fire intensity, native herbivore grazing and site condition (Taylor 2011). Knowledge and data from the Eastern Plains Fire Trial will be utilised during the planning and application of prescribed burns across the Dudley Peninsula planning area, where appropriate.

8.3.2 Kangaroo Island Monitoring of Biodiversity Assets (KIMBA)

The Kangaroo Island Monitoring of Biodiversity Assets (KIMBA) project was established in 2002 as a baseline set of sites to be used in longer term monitoring of biodiversity change. Twenty five sites were established across the western side of the island, with each being surveyed for plant and bird composition and abundance. Surveys occurred in autumn and spring of 2002 and 2004. The large bushfire of late 2007 passed through the majority of the sites. Follow up post-fire surveys were conducted in spring 2010 / 11 and autumn and spring 2013 for a subset of 16 plant sites and all 25 bird sites to examine changes within these two taxa groups.

Analysis of the data has revealed 70 new species of plants recorded after the fires with 20 pre-fire species not being relocated. The largest increase in species richness occurred in the *Eucalyptus diversifolia* communities, which were the longest unburnt prior to the 2007 fire.

Bird surveys also highlighted an increase in species richness at the sites after the fire. In both taxa, species differences from site to site were less after the fire, perhaps facilitated by the loss of small scale heterogeneity throughout the landscape.

Further analysis of the data is required to understand fire related changes to functional components of the two taxa and how these will change into the future. Future monitoring of the same sites will help understand these changes and presents a rare opportunity to establish a long term monitoring dataset.

While the vegetation communities and landscape are not truly representative of the Dudley Peninsula planning area, fire management activities will consider the findings from the project when implementing this plan.

8.3.3 Kangaroo Island Feral Cat Eradication Initiative

In 2015, KI NRM launched the *Kangaroo Island feral cat eradication initiative* (the Initiative), with the aim of eradicating feral cats off the island by 2030. The negative impacts of feral cats on KI are significant with over 50 native fauna species impacted, along with associated livestock diseases that are spread by feral cats (KI NRM 2015a).

An objective of the Initiative is to protect KI's unique biodiversity and ecosystems, which is consistent with this Plan. The Initiative's current project area incorporates the entire Dudley Peninsula, with a number of research and monitoring activities occurring across the planning area, including within Pelican Lagoon and Dudley CP. The monitoring of key prey species such as small mammals through the use of camera traps, trapping and track plots / monitoring are being used to measure population dynamics as a major focus.

Where relevant, data and findings should help to inform the Fire Management Program, particularly in relation to population dynamics and the influence of fire regimes on both Feral Cats and prey species. The control of Feral Cat populations should be considered pre- and post-prescribed burn to reduce the predation pressure on native species (refer to [Small Mammals](#)). Where relevant the Initiative and its further studies will assist in identify improvements to pre- and post-prescribed burning and pest management.

As such, the DEW fire management program on Dudley Peninsula will work alongside the Initiative to guide management decision and integrate Feral Cat management where appropriate.

Management Strategies

Research	105. Determine the suitability of flora based thresholds for meeting fauna conservation objectives.
	106. Continue to collect and collate vital attributes for fauna and incorporate into future EFMG.
	107. Assess whether the chosen Key Fire Response Species are appropriately sensitive as community-wide indicators of inappropriate fire regimes in the plan area.
	108. Research the effect of fire on, and the appropriate use of fire, to manage regionally significant species and ecological communities.
	109. Investigate the social attitudes, values and drivers that will result from the implementation of this plan and incorporate the findings to underpin future iterations of fire management planning across KI.

8.4 Monitoring

Monitoring will be established in conjunction with prescribed burns to assess issues raised during prescribed burn planning, in accordance with *DEW Prescribed Burning*, and *Ecological Burning Procedure* (DEWNR 2017). Implementation will depend upon state and regional priorities and available resources.

Opportunities for monitoring will also be considered in areas impacted by bushfire to improve knowledge about the response of species, communities and habitats to fire within the planning area, as per DEW policy (DEWNR 2017). The results from post-fire monitoring will be used to further refine fire management, consistent with an adaptive management approach. Refer to Section 4.1 of this plan for general information on zoning, burning and the planning requirements.

A range of situations are likely to provide opportunities for measuring the response of biota to fire, including bushfire, planned fire and the activities associated with fire management that impact on natural systems.

Management Strategies

Monitoring	110. Research the fuel accumulation rates of the various MVS that occur within the planning area (Table). These data will help DEW staff determine if and when fuel reduction actions are required, ultimately assisting in the scheduling of fire management actions in B-zones.
	111. Undertake monitoring to assess the effectiveness of implemented weed control measures and refine the weed management information for the control of introduced species following fire accordingly (Appendix 2 , Appendix 3 , and Appendix 4).
	112. Establish monitoring of flora and fauna species pre- and post-fire to determine their fire response and to assess habitat preferences and requirements in relation to the TPC.
	113. Monitor the effect of fire on KI Narrow-leaved Mallee particularly in relation to regeneration and germination.

9 SUMMARY OF MANAGEMENT STRATEGIES

Bassian Thrush

1. Map significant habitat patches of Bassian Thrush and record in Environmental Database of South Australia. If unknown, undertake Bassian Thrush bird and habitat surveys to estimate.
2. During bushfires, attempt to retain unburnt patches of land as refuge areas to minimise the risk of local extinctions.
3. Undertake post-burn weed management to avoid altering habitat structure.
4. Ensure known habitat is not deliberately burnt without appropriate Bassian Thrush specific management considerations in consultation with regional ecological expertise, including:
 - a. > 50% of known habitat should not burn in single fire event
 - b. Undertake patchy burns in riparian areas
 - c. minimise canopy scores to < 20%
5. Utilise landscape protection burns to reduce bushfire risk to known habitat.
6. Monitor the effect of fire on Bassian Thrush populations and preferred habitat and use this information in future fire management consideration ([Appendix 3](#)).
7. Implement appropriate fire management strategies that will minimise the risk of local extinctions in the event of a bushfire.
8. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
9. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

Glossy Black-cockatoo

10. Monitor the effect of fire on Glossy Black-cockatoo habitat use, and use this information to manage the fire regime for this species in the future, and improve the fire management consideration ([Appendix 3](#)).
11. Refer to the EMFS and consult with the Parks & Sustainable Landscapes Manager when planning burns in known Glossy Black-cockatoo habitat.
12. Minimise the negative impact of fire management activities on feeding and nesting habitat of the Glossy Black-cockatoo (refer to Mooney and Pedler, 2005 and [Appendix 3](#)).
13. Information and interpretation on Glossy Black-cockatoo critical nesting and feeding habitat to be made available to the Natural Values Team within the Incident Management Team during a bushfire.
14. Do not plan fire in areas containing Drooping Sheoak stands, if more than 15% of feeding habitat within that flock region has been burnt in the previous 15 years (in either bushfires or prescribed burns).
15. Do not conduct prescribed burns in or adjacent to nesting habitat with active Glossy Black-cockatoo nests.
16. Protect critical nesting habitat, especially known nest trees from prescribed burning and where possible, from bushfire.
17. The frequency of burns in Drooping Sheoak feeding habitat should ensure periods of >25 years between fires.
18. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management

Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.

19. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with Brigades to inform them of known critical habitat sites.

Kangaroo Island Echidna

20. Avoid termite mounds when undertaking mechanical suppression, treatments or track upgrades.
21. During burn preparation, remove fuel from the base of known termite mounds and course woody debris, and where high densities of mounds and course woody debris exist, exclude from the burn area. Monitor termite mounds and course woody debris throughout prescribed burning activities to ensure preservation.
22. Work with the *Kangaroo Island feral cat eradication initiative* to mitigate Feral Cat predation impacts post-fire.
23. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
24. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

KI Narrow-leaved Mallee Woodland

25. Undertake prescribed burning to improve the distribution of post-fire age-classes across the KI Narrow-leave Mallee Woodland community.
26. Consider and implement integrated weed management strategies pre- and post-fire in KI Narrow-leaved Mallee Woodlands.
27. Consider and implement grazing management (fencing) post-fire in KI Narrow-leaved Mallee Woodlands.
28. Develop an Ecological Fire Management Strategy (EFMS) for the threatened ecological community.
29. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities. Region to engage with brigades to inform them of known critical habitat sites.

KI Southern Emu Wren

30. Implement strategically located prescribed burns in order to create low fuel buffers that aim to mitigate against major population losses by providing potential refuge areas and minimising the likelihood of bushfire impacting on core population areas and potential habitat patches that are soon to become preferable.
31. Identify critical habitat areas to determine if a C-zone burning program is required for this sub-species.
32. Conduct prescribed burns as required to maintain or increase habitat quality.
33. Develop an EFMS for the species. In its absence refer to the principles identified in the AMLR subspecies EFMS.
34. Use prescribed burning as an opportunity to gather new information on the fire response of the species as well as to assess and improve the fire management consideration ([Appendix 3](#)).
35. Monitor response of populations post-fire.

36. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
37. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

Kangaroo Island Spider-orchid

38. Ensure known habitat is not deliberately burnt without appropriate KI Spider-orchid specific management considerations, in consultation with regional ecological expertise, including:
 - a. Do not burn during growth or flowering period (late autumn to early spring)
 - b. Consider post-fire pest plant and animal management
39. Utilise landscape protection burns to reduce bushfire risk to known habitat.
40. Monitor the effect of fire on KI Spider-orchid populations and preferred habitat and use this information in future fire management consideration ([Appendix 2](#)).
41. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.

KI Western Whipbird

42. Conduct prescribed burning to improve and maintain suitable habitat for the KI Western Whipbird. Optimal habitat for KI Western Whipbird is between 10 and 25 years post-fire.
43. Identify critical habitat areas to determine if a C-zone burning program is required for this sub-species.
44. When undertaking prescribed burning in potential or suitable habitat, retain unburnt patches as refuge areas.
45. Avoid burning more than 50% of individual habitat patches in a single fire event.
46. Avoid two or more successive fires in late winter / spring
47. A draft EFMS is being developed for the Eastern sub-species. When completed refer to and apply the principles identified in the EFMS for the Eastern Western Whipbird subspecies.
48. Study the effects of fire including the subspecies' ability to survive it, and the re-establishment of sub-populations in relation to post-fire age. Gather new information on the fire response of the subspecies and use this information in future fire management consideration ([Appendix 3](#)).
49. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
50. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with Brigades to inform them of known critical habitat sites.

Southern Brown Bandicoot

51. Implement appropriate fire management strategies identified in the EFMS that will minimise the risk of local extinctions in the event of a bushfire.
52. Work with the *Kangaroo Island feral cat eradication initiative* to mitigate Feral Cat predation impacts pre- and post-fire.

53. Conduct prescribed burning to maintain or improve habitat suitability as identified in the regional Recovery Plan.
54. During bushfires, attempt to retain unburnt patches as refuge areas to minimise the risk of local extinctions.
55. Monitor the effects of fire on the Southern Brown Bandicoot populations and preferred habitat and structure. Use this information to inform the DEW vital attributes database.
56. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
57. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

White-bellied Sea-eagle

58. Incorporate known nesting site data into the SA Environmental database to ensure consideration of impacts from fire management activities.
59. When planning burns in known nesting habitat, consult with the relevant specialists.
60. Avoid undertaking fire management works within 100 metres of known nesting sites during breeding season, May – December.
61. Aerial operations will be undertaken consistently with the KI Fly Neighbourly Advice (NRM 2013).
62. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
63. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

Enigma Moth & Callitris Pine

64. Map significant habitat patches of the Enigma Moth and record in Environmental Database of South Australia to inform fire management activities. If unknown, undertake Enigma Moth and habitat surveys to estimate.
65. Undertake monitoring of *C. gracilis* pine populations across the Dudley Peninsula pre- & post-fire, to inform an appropriate fire regime.
66. Consider the Enigma Moths requirements for *C. gracilis* pre- & post-prescribed burn. If necessary, exclude 50% of *C. gracilis* habitat from burn operations.
67. Consider mechanical treatment to protect stands of *C. gracilis*.
68. During bushfire response, DEW Liaison Officer / Natural Values Team are encouraged to provide information and advice to the Incident Management Team regarding the protection of environmental assets that may be affected by a bushfire or by bushfire suppression activities.
69. Bushfire prevention is the preferred option. Rapid initial response is recommended for bushfires within a 2 km radius of the habitat, particularly when bushfire has the potential to reach the habitat site. Region to engage with brigades to inform them of known critical habitat sites.

Small Mammals

70. Consider pre- and post-fire monitoring opportunities for small mammals across the Dudley Peninsula planning area to inform an appropriate fire regime.

71. Monitor the effect of fire on small mammal populations and preferred habitat and use this information in future fire management consideration ([Appendix 3](#)).
72. Consider the pre- and post-fire pest management of species such as Feral Cats to reduce predation impacts on small mammal species.

Pest Species

73. Refer to fire management guidelines for introduced flora species ([Appendix 2](#)) during prescribed burn planning.
74. Implement pre- and post-fire management strategies identified in the EFMS that will minimise the risk of gorse and broom increasing post-fire (DENR 2011a).
75. Use fire as a tool that forms part of integrated weed management strategies.
76. Consider the likely post-fire responses and impacts of weed species and implement pre- and post-fire weed control and monitor accordingly (subject to agency priorities).
77. Collect relevant information during prescribed burn planning on introduced fauna and undertake a risk assessment to determine the need for pre- and post-fire management.
78. Work with the *Kangaroo Island feral cat eradication initiative* to support integrated management and reduce Feral Cat predation impacts post-fire.
79. Ensure lessons learnt from the *Kangaroo Island feral cat eradication initiative* are incorporated through adaptive management into the DEW fire management program.
80. Adhere to the *Standard Operating Procedure – Phytophthora Threat Management* (SOP-002) (DEH 2002b) and conduct a risk assessment to determine whether fire management activities will exacerbate the spread of Phytophthora.
81. Ensure hygiene practices are implemented to reduce the spread of Phytophthora across the planning area. Refer to the *DEW Operating Procedure – Phytophthora Vehicle Disinfection Unit* (DEH 2003).
82. Monitor the interaction between Phytophthora and fire.
83. Prepare visitor bushfire survival plans as required and review these annually. Plans for visitor facilities should be developed by the lessee, owner or manager.
84. Encourage adjacent property owners to work with CFS and local government to implement appropriate and coordinated fire management actions on their own land to minimise the threat of fire.
85. 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.
86. Ensure suppression strategies take into account significant cultural assets in order to minimise impacts from these actions and undertake post-fire rehabilitation.

Smoke

87. Assess smoke modelling projections from the Bureau of Meteorology and information from the Environmental Protection Agency to consider smoke management prior to burning operations.
88. Refer to *Smoke Taint Fire Management Strategy* (DEWNR 2013c).

Cultural Heritage

89. Implement fuel management strategies appropriate for the protection of cultural assets as shown on Fire Management and Access [Map 4](#).
90. During bushfire response, consult the cultural sites register to minimise impacts on significant cultural assets.
91. Identify significant water sources / assets / sites for exclusion of fire suppression chemicals to inform Incident Action Planning / Response Planning.

92. Integrate traditional knowledge about fire management with scientific principles and technology to develop best practice for the region.
93. Engage with the Kurna, Ngarrindjeri, Narungga and Ramindjeri people to assist and support the fire management activities.
94. Prior to a prescribed burn or during a bushfire, and before any earthworks are undertaken, appropriate consultation is undertaken to identify cultural sites. After a fire, evaluate sites to establish if any damage has occurred and include works in the post-fire works plan.
95. Aboriginal authorised officer to be consulted when planning prescribed burns.
96. 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.
97. Ensure suppression strategies take into account significant cultural assets to minimise impacts from these activities and undertake post-fire rehabilitation.

Fire Access Tracks

98. Prioritise and implement actions regarding fire access as described in [Appendix 1](#).
99. Maintain tracks to the GAFMWG standards as shown on [Map 4](#) (Fire Management & Access; [online](#)).
100. Install signs on fire access tracks and gates according to GAFMWG standards and name tracks as appropriate.
101. Update and maintain track data on government mapping database.

Changing Climate

102. Monitor species and ecosystems and the processes that support them to understand their resilience to a changing climate.
103. Review and adapt fire management strategies in the plan area as the impacts of climate change become understood.
104. Monitor national and international fire management policy and best practice and partner with the research sector to increase our knowledge on altered fire regimes.

Research

105. Determine the suitability of flora based thresholds for meeting fauna conservation objectives.
106. Continue to collect and collate vital attributes for fauna and incorporate into future EFMG.
107. Assess whether the chosen Key Fire Response Species are appropriately sensitive as community-wide indicators of inappropriate fire regimes in the plan area.
108. Research the effect of fire on, and the appropriate use of fire, to manage regionally significant species and ecological communities.
109. Investigate the social attitudes, values and drivers that will result from the implementation of this plan and incorporate the findings to underpin future iterations of fire management planning across KI.

Monitoring

110. Research the fuel accumulation rates of the various MVS that occur within the planning area (Table). These data will help DEW staff determine if and when fuel reduction actions are required, ultimately assisting in the scheduling of fire management actions in B-zones.
111. Undertake monitoring to assess the effectiveness of implemented weed control measures and refine the weed management information for the control of introduced species following fire accordingly ([Appendix 2](#), [Appendix 3](#), and [Appendix 4](#)).

112. Establish monitoring of flora and fauna species pre- and post-fire to determine their fire response and to assess habitat preferences and requirements in relation to the TPC.
113. Monitor the effect of fire on KI Narrow-leaved Mallee particularly in relation to regeneration and germination.

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11 APPENDICES

Appendix 1 – Assets and Strategies for Risk Mitigation

	Values and Assets	Location	Recommended Actions
Lashmar Block	Cape Willoughby Lighthouse, lighthouse keepers quarters, car park and helipad.	Cape Willoughby CP	Implement an A-zone to a minimum 40 m radius around the lighthouse, lighthouse keepers quarters, car park, and helipad.
	Cape Willoughby Helipad	Cape Willoughby, Crown land Deposited Plan 65167 Allotment 52	- Implement an A-zone to a minimum 40 m radius around the helipad - Recommend to the KI BMC that land owners manage the part of the A-zone that falls on their land.
	Lashmar campgrounds with associated facilities and infrastructure	Creek Bay Road, Lashmar CP	Implement an A-zone to a minimum 40 m radius around the campgrounds and picnic areas, extending across Chapman River to the northern bank campgrounds.
	Powerline	Crown land, Deposited Plan 76857 Allotment 102	Liaise with SA Power Networks to ensure an A-zone to a minimum 40 m width either side of the powerline is maintained.
	House/structure	Crownland, Deposited Plan 54226 Allotment 53	- Implement an A-zone to a minimum 40 m radius around the house/structure - Recommend to the KI BMC that land owners manage the part of the A-zone that falls on their land.
	House/structure	HA 212	- Implement an A-zone to a minimum 40 m radius around the house/structure - Recommend to the KI BMC that land owners manage the part of the A-zone that falls on their land.
	Cape Willoughby Lighthouse, lighthouse keepers quarters, car park, and helipad.	Cape Willoughby CP	Implement and maintain a B-zone across the remaining areas of the Cape Willoughby CP. Treatment will be consistent with the current land use agreement (grazing).

	Values and Assets	Location	Recommended Actions
Lashmar Block	Access to Lashmar CP, strategic bushfire suppression opportunity, road users.	River Track, Lashmar CP	Implement a B-zone to a minimum 40 m width along the western side of Creek Bay Road, running north to meet the A-zone over the camp grounds and picnic areas.
	Access to Lashmar CP, strategic bushfire suppression opportunity, road users.	River Track, Lashmar CP	Implement a B-zone to a minimum 40 m width running along River Track between Cape Willoughby Road and Lashmar Road.
	Access to Lashmar CP, strategic bushfire suppression opportunity, road users.	Lashmar Road, Lashmar CP	Implement a B-zone to a maximum 125 m width running east-west along Lashmar Road from Cape Willoughby Road.
	Contiguous vegetation, wider landscape, Cape Willoughby Road, Road users, strategic bushfire suppression opportunity	North-western corner of Lashmar CP	Implement a B-zone to a maximum 420 m width to the west of Cape Willoughby Road. Treatment will be consistent with the current land use agreement (grazing).
	Contiguous vegetation, wider landscape, Cape Willoughby Road, Road users, strategic bushfire suppression opportunity	Western boundary of Lashmar CP	Implement a C-zone prescribed burn for landscape-protection.
	Contiguous vegetation, wider landscape, and ecological community. Associated tourism infrastructure located adjacent to HA 251.2.	Heritage Agreement 251.2	Recommend to the KI BMC that land owners implement and manage a 40 m A-zone around built assets adjacent HA 251.2.
	Contiguous vegetation, wider landscape, and ecological community, and strategic bushfire suppression opportunity	Heritage Agreement 455	Implement a C-zone burn for landscape protection, and to create a mosaic of vegetation ages class.

	Values and Assets	Location	Recommended Actions
Pelican Lagoon Block	House/structure	Muston Road	- Implement an A-zone to a minimum 40 m radius around the house/structure - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	House/structure	McKelvie Boundary Track	- Implement an A-zone to a minimum 40 m radius around the house/structure - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	House/structure	Sapphire town	- Implement an A-zone to a minimum 40 m radius around the house/structure located on unnamed road (extension of Main St) - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	Contiguous vegetation and wider landscape. Ecological community and lack of fire history. Strategic bushfire suppression opportunity.	Pelican Lagoon CP	Deliver an ecological prescribed burn within the Pelican Lagoon CP to create diversified vegetation age classes.
	Wider landscape and township of Sapphire town	Adjacent to the northern boundary of Pelican Lagoon CP	- Partner with the KI Council, as the land owner, to investigate opportunities to implement appropriate bushfire mitigation activities within the Crown land parcel surround Sapphire town. - Deliver in partnership with the KI Council appropriate bushfire mitigation activities to reduce the bushfire risk to Sapphire town.

	Values and Assets	Location	Recommended Actions
Penneshaw Block	Life and property (housing/structures) of Penneshaw township to the west of Baudin CP	Baudin CP	- Implement an A-zone along Binnies Track within Baudin CP - Recommend to the KI BMC that land owners implement A-zones around houses/structures on their land adjacent Baudin CP.
	SWER Line	Southern section of Baudin CP	Liaise with SA Power Networks to ensure the implementation of an A-zone to a minimum 40 m width along the SWER line, running east-west.
	Life, house/structure	Crown Land Parcel to the north of American Beach H110200 S514 CR 5766 865	- Implement an A-zone to a minimum 40 m around the houses/structures. - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	Bates Farmhouse, well and Threshing Floors and Roller (cultural item)	Baudin CP (two locations)	Implement an A-zone to a minimum 40 m width around the assets.
	Life and housing/structures of Penneshaw township to the west of Baudin CP Strategic bushfire suppression opportunity	Baudin CP	Implement a B-zone to a maximum 160 m width along Binnies Track in support of the A-zone along Binnies Track.
	Contiguous vegetation, wider landscape, ecological community, and the Glossy Black-cockatoo Strategic bushfire suppression opportunity	Southern section of Baudin CP	Implement and maintain the B-zones within the southern portion of Baudin CP through grazing where appropriate. Where grazing is not appropriate, supplement this with slashing and / or prescribed burning.
	Adjacent life and housing/structures	Crownland parcel within Penneshaw township H 110200 S525 CR 5760 420	Maintain whole parcel as a B-zone.
	Senescing ecological community		

	Values and Assets	Location	Recommended Actions
Southern Block	Contiguous vegetation, wider landscape, age class mosaic, ecological community integrity, and the Glossy Black-cockatoo.	Eastern boundary of Baudin CP	Implement a C-zone burn program in order to provide strategic bushfire suppression opportunities to protect the Glossy Black-cockatoo and maintain the ecological values and assets.
	Revegetation of Glossy Black-cockatoo habitat	Designated revegetation sites	Implement 8m wide slashed breaks around the revegetation fence lines.
	Life and property (houses/structures)	Crownland parcel located between Brown Beach and Baudin Beach H 110200 S 521 CR 5766 870 H110200 S 523 CR 5766 872	- Implement an A-zone to a minimum 40 m around the houses/structures. - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	Life – Limited access for fire response vehicles during a fire event and diminished firefighter safety	Dudley CP (north-west corner)	Implement an A-zone to a minimum 40 m width along the fire access track (unnamed) joining Sandhurst Road to East West Road.
	Life and property located on the north west side of Hog Bay Road Strategic bushfire suppression opportunity	Dudley CP	Implement a B-zones between Sandhurst Road, East West Road and the fire access track (unnamed).
	Contiguous vegetation, wider landscape, and ecological community. Strategic bushfire suppression opportunity	Dudley CP	Implement B-zones (primarily through mechanical methods) to a minimum 40 m width along Doug Road, East West Road, North South Road, Sandhurst Road, South Boundary Track, Sunquist Track, and the remaining sections of the western and southern boundary.

	Values and Assets	Location	Recommended Actions
Southern Block	Contiguous vegetation, wider landscape, and ecological community. Strategic bushfire suppression opportunity	Dudley CP	Recommend to the KI BMC to implement and continue the B-zone along North South Road to complement the work along the eastern boundary of Dudley Peninsula CP and HA 657.5
	Contiguous vegetation, wider landscape, and ecological community. Strategic bushfire suppression opportunity	Dudley CP	Implement C-zone burning across Dudley CP. Aim to re-establish a mosaic of post-fire age-classes in vegetation across the reserve in a strategic manner.
	Life and property (house/structure)	Crownland parcel located on the southern coast H 110200 S 501 CR 5748 833	- Implement an A-zone to a minimum 40 m around the structure. - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	Life and property (house/structure)	Crownland parcel located on the southern coast H 110200 S 425 CR 5766 856	- Implement an A-zone to a minimum 40 m around the structure. - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	Contiguous vegetation, wider landscape, life & property. Strategic bushfire suppression opportunity	Simpson CP	Implement an A-zone to a minimum 20 m depth, along the extension of Jeffs Road for 1 km to the unmaintained track junction.
	Contiguous vegetation, wider landscape, and ecological community. Strategic bushfire suppression opportunity	Simpson CP	Implement C-zone burning across the western portion of Simpson CP. Aim to re-establish a mosaic of post-fire age-classes in vegetation across the reserve in a strategic manner.

	Values and Assets	Location	Recommended Actions
Southern Block	Access and egress Strategic bushfire suppression opportunity	Simpson CP	- Upgrade section of Black Point Road running along the western boundary of Simpson CP and Simpson Track to Minor criteria at a minimum - Upgrade northern boundary track to Minor criteria at a minimum - Maintain Simpsons Track to Minor criteria and Liaise/work with the KI Council to upgrade the KI Council owned sections of Black Point Road to Minor Track criteria to support upgrades on Simpson Track.
	Life	Lesueur CP – Cape Hart Road	- Implement an A-zone to a minimum width of 40 m along the eastern side of Cape Hart Road - Recommend to the KI BMC that this A-zone is implemented along both sides of the entire length of Cape Hart Road.
	Contiguous vegetation, wider landscape, and ecological community. Strategic bushfire suppression opportunity	Lesueur CP	Implement C-zone burning across the northern and eastern portions of Lesueur CP. Aim to re-establish a mosaic of post-fire age-classes in vegetation across the reserve in a strategic manner.
	Access and egress	Lesueur CP	Realign Dead Man Track off private land (HA 425.2) on to Lesueur CP.
	HA 460.1	HA 460.1 Eastern boundary of Dudley CP	Recommend to the KI BMC that land owners implement and maintain an A-Zone around the properties that fall on their land outside of the Heritage Agreements.
	Contiguous vegetation, wider landscape, and ecological community.	HA 657.2 Between Dudley and Simpson CP	Work with landowner to implement a C-Zone burn within HA 657.2.
	Life and property (houses/structures) associated with HA 657.1 & HA 657.2	HA 657.1 & HA 657.2 Between Dudley and Simpson CP	Recommend to the KI BMC that land owners implement and maintain an A-Zone around the properties that fall on their land outside of the Heritage Agreements.

	Values and Assets	Location	Recommended Actions
Southern Block	Life and property (houses/structures)	HA 657.5 South of Dudley CP	Recommend to the KI BMC that land owners implements a 40 m A-zone on their land that fall outside HA 657.5.
	Life and property (houses/structures)	HA 657.6 South of Dudley CP	- Implement an A-zone to a minimum 40 m around the structure. - Recommend to the KI BMC that land owners manage the part of the zone that falls on their land.
	Life and property (houses/structures)	HA 1411.1 South of Lesueur CP on Cape Hart Rd	- Implement an A-zone to a minimum width of 40 m along the eastern side of Cape Hart Road, consistent with the 40 m A-zone implemented within Lesueur CP and HA 1411.2 & HA 1411.3 - Implement an A-zone to a minimum 40 m around the structure.
	Life and property (houses/structures)	HA 1411.2 South of Lesueur CP on Cape Hart Rd	- Implement an A-zone to a minimum width of 40 m along the eastern side of Cape Hart Road, consistent with the 40 m A-zone implemented within Lesueur CP and HA 1411.1 & HA 1411.3 - Implement an A-zone to a minimum 40 m around the structure.
	Life and property (houses/structures)	HA 1411.3 South of Lesueur CP on Cape Hart Rd	- Implement an A-zone to a minimum width of 40 m along the eastern side of Cape Hart Road, consistent with the 40 m A-zone implemented within Lesueur CP and HA 1411.1 & HA 1411.2 - Implement an A-zone to a minimum 40 m around the future planned development (site yet to be selected).

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

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Acacia longifolia</i> ssp. <i>Longifolia</i> *	Sallow Wattle					Shrub	- Native to eastern states of Australia - Flowers: spring - Has ability to hybridise with <i>A. longifolia</i> var. <i>sophorae</i> - Fire can stimulates mass germination	Pre- and post-fire weed control likely to be required since burning stimulates mass germination of the seed bank	Aus^
<i>Asparagus asparagoides</i> *	Bridal creeper						- Weed of National Significance - Adults resprout following fire - Flowers: August-September	- Burning for weed control preferably in autumn after the annual shoot cohort emerges - Plants likely to be more conspicuous post-fire facilitating control - Spot spray any post-fire regrowth	Aus^
<i>Asparagus declinatus</i> *	Bridal Veil						- Flowers: August-September - Adults resprout following fire - High intensity fire may impact tuber mass	Consider weed control post fire	Aus
<i>Banksia ornata</i>	Desert banksia						- Flowering occurs all year round - Seeds are non-dormant, viable seed should germinate readily - Obligate seeder - Adult plant is killed by fire - Requires disturbance with competition removed to initiate seedling recruitment - Key fire response species	Avoid inter fire interval <17 years or >40 years	SA

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Beyeria subsecta</i>	Kangaroo Island Turpentine Bush	VU	E	EN	PL	Shrub	- Habitat: Associated with open-scrub and tall shrubland with an overstorey dominated by <i>Eucalyptus cneorifolia</i> - Flowers: September to February - Response: Seed stored, maintains viability for long period, partial germination per disturbance - Establishment: Tolerant, will establish in presence of adult competition (multi-aged population)	Avoid inter fire interval <20 years or >40 years	SA
<i>Caladenia ovata</i>	Kangaroo Island Spider-orchid	VU	E	EN	L	Orchid	- Habitat: Observed growing in open areas (often subjected to disturbance) such as open mallee heath - Flowers: October - Response: Sprouters, all ages survive, all become juvenile. Observed flowering at burnt sites 1-2 years after fire - Establishment: Requires some precondition to be met before establishment, delayed establishment	- Timing of fire is important, with the best time for orchids during dormancy (late spring to early autumn) prior to new shoot growth - Avoid inter fire intervals <20 years or >40 years	SA
<i>Callitris gracilis</i>	Southern Cypress Pine			NT	PL S	Tree	- Habitat: Found in woodlands and mallee open scrub occupying shallow limestone soils to deep acid sands - Flowers: spring to summer - Response: Seed dispersed long distances - Establishment: Intolerant, needs disturbed site with competition removed (single-aged population)	Avoid fire interval <17 years	SA
<i>Callitris rhomboidea</i>	Oyster Bay Pine			NT	L	Tree	- Habitat: Unknown - Flowers: Unknown - Response: Seed dispersed long distances - Establishment: Tolerant, will establish in presence of adult competition (multi-aged population)	Avoid fire intervals <17 years	SA

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Chrysanthemoides monilifera</i> *	Boneseed					Shrub	• Weed of National Significance • Lifespan: 10-20 years • Flowers: July-October • Fire kills seedlings and adult plants • Seedlings readily recruit post-fire	• Pre and post-fire weed control likely not be required since fire stimulates mass germination of the seed bank	Aus^
<i>Cytisus scoparius</i> *	English Broom					Shrub	• Seed regenerator • Primary juvenile period: 2 years • Flowers: Oct to Dec • Plants may live for 10 years • Seeds may remain dormant in the soil for > 10 years (evidence for up to 80 years in Turner (1933)) • Fire stimulates germination by breaking the dormancy of soil-stored seed	• Pre- and post-fire weed control likely to be required since burning stimulates mass germination of the seed bank	SA^
<i>Echium plantagineum</i> *	Salvation Jane					Herb	• 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	• Consider weed control post-fire	SA^
<i>Erica arborea</i> *	Tree Heath					Shrub	• Flowers in spring • Resprouts after fire	• Adult plants resprout rapidly and may outcompete native species following fire. Consider weed control post-fire	Aus^
<i>Erica baccans</i> *	Berry Heath					Shrub	• Flowers in spring • Seedling and adults are killed by fire • Adults do not resprout after fire • Response: Seeder	• Consider weed control post-fire	Aus^

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Euphrasia collina</i> <i>ssp. osbornii</i>	Osborn's Eyebright	EN	E	VU	L S	Herb	- Habitat: Mainly in sclerophyllous woodland, sometimes in sclerophyllous forest - Flowers: June to September - Response: Seeder - Establishment: Recruits readily after fire	Fire should be considered to stimulate seedling regeneration if recruitment is poor/absent	SA
<i>Genista monspessulana</i> *	Cape Broom					Shrub	- Flowering generally occurs in spring, between October and December - Seed dispersion generally occurs late summer between January and March - Plants live up to 25 years, and viable seed may be stored in soil for many years - Individual plants reach productive maturity after three years - Cape Broom germinates from seed, and often proliferate after fire or soil disturbance	Pre- and post-fire weed control likely to be required since burning stimulates mass germination of the seed bank	SA
<i>Grevillea muricata</i>	Rough Spider-flower		V	VU	Outside block	Shrub	- Habitat: Grows in open mallee heath with limited overstorey - Flowers: August to December - Response: Resprouter - Establishment: Establishment unknown	Avoid interfire intervals <20 years or >40 years	SA
<i>Hypharrhenia hirta</i> *	<i>Coolatai</i> Grass					Grass	- Declared under the SA <i>Natural Resource Management Act 2004</i> - Fire promotes regeneration	Consider weed control post-fire	SA

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Isolepis producta</i>	Nutty Club-rush		V	VU	Outside block	Rush	- Habitat: Found in muddy swampy areas & rock pools - Flowers: October to March - Response: Regeneration unknown - Establishment: Establishment unknown	#	SA
<i>Leionema equestre</i>	Kangaroo Island Phebalium	EN	E	EN	PL	Shrub	- Habitat: Endemic to KI - Flowers: Unknown - Response: Regeneration unknown - Establishment: Recruits readily after fire	#	SA
<i>Marrubium vulgare</i> *	Horehound						- 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>Moraea flaccida</i> *	One-leaf Cape Tulip						- Flowers: early Spring - Seed regenerator, seeds are only viable for 1 year - Plant requires 2 to 3 years to set seed & flower - Plants reproduce vegetatively through root corms that go dormant over summer & stay dormant in the soil until conditions are favourable - Fire can play a role in bringing corms out of dormancy – after fire a light rain can stimulate the sprouting of corms	Consider weed control post-fire	Aus^

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Olea europaea</i> ssp. <i>Europaea</i> *	European Olive					Tree	- 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	- Fire unlikely to increase spread of olive plants. However, control may be undertaken to reduce fuel loads - Consider weed control pre- and post-fire	SA
<i>Pinus halapensis</i> *	Aleppo Pine					Shrub	High intensity fire will kill pine trees	Fire can be used in conjunction with manual methods of pine control	SA
<i>Pinus radiata</i> *	Radiata Pine					Shrub	- Female cones produce large numbers of winged seeds - High intensity fire will kill pine trees	Fire can be used in conjunction with manual methods of pine control	SA
<i>Polygala myrtifolia</i> *	Myrtle-leaf Milkwort					Shrub	- Highly invasive in coastal habitats, establishing in dune systems - Able to seed when less than 50cms high - Mass germination can follow soil or canopy disturbances - High intensity fire can kill mature plans - Flowers: mostly in spring	- Follow-up weed control will be required post-fire - Seedlings can be sprayed with herbicide - Seedlings will require control for at least 3 years	Aus
<i>Pomaderris halmaturina</i> ssp. <i>halmaturina</i>	Kangaroo Island Pomaderris	VU	V	VU	L S	Shrub	- Habitat: Unknown - Flowers: Unknown - Response: Regeneration unknown - Establishment: Establishment unknown	Fire should be considered to stimulate seedling regeneration if recruitment is poor/absent	SA

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Prasophyllum calcicola</i>	Limestone Leek-orchid		V	VU	Outside block	Orchid	- Habitat: Occurs in shallow soil pockets on travertine limestone, under mallee - Flowers: Late August to early October. Population on EP observed prolific flowering post-summer fire - Response: Regeneration unknown - Establishment: Establishment unknown	- Avoid burning from Apr-Oct - Avoid inter-fire frequencies <10 years - Protection/management of browsing should be considered post-fire especially in small populations	SA
<i>Pterostylis melagramma</i>	Tall Greenhood		E	VU	S	Orchid	- Habitat: Damp sandy soils near swamps or creeklines - Flowers: July to Oct - Response: Sprouters: mature remain mature, juveniles remain juvenile - Establishment: Tolerant, will establish in presence of adult competition (multi-aged population)	#	SA
<i>Rhamnus alaternus*</i>	Italian Buckthorn					Shrub	- Reproduces by seed - Re-shoot vigorously from the base whenever top-growth is damaged or removed - Flowers: late winter-early spring	- Weed control required post-fire - Drill and swab to kill adults - Hand pull or grub seedlings	Aus^
<i>Rubus</i> spp*	Blackberry					Shrub	- Weed of National Significance 1 year to seed set - Readily re-sprouts following fire	Consider weed control pre- and post-fire	Aus^
<i>Sollya heterophylla</i>	Bluebell Creeper						- Smothers ground-flora and smaller shrubs - Prolific seedling emergence following fire or soil disturbance among dense infestations is likely - Seed dispersed by birds and foxes - Flowers: spring-summer	- Avoid burning areas of infestation (unless follow-up control is available) - Small plants can be hand-pulled - Larger plants can be controlled by using herbicide	Aus^

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Life Form	Species Ecology & Fire Response	Fire Management Considerations	Source
<i>Ulex europaeus</i>	Gorse					Shrub	- Gorse plants germinate from seed in autumn and spring and often proliferate after fire or soil disturbance - Individual plants reach reproductive maturity after two years - Flowering generally occurs twice a year in autumn and spring - Plants live for up to 30 years and viable seed may stay stored for up to 30 years	Consider pre- and post-fire control	SA
<i>Watsonia meriana</i> <i>var. Bulbillifera</i>	Bulbil Watsonia					Herb	- Flowers: Oct – Dec - Declared under the <i>SA Natural Resource Management Act 2004</i> - Fire stimulated flowering has been recorded in <i>Watsonia</i> sp.	Consider weed control post-fire	Aus^

Appendix 3 – Fire Response of Rated, Significant and Introduced Fauna Species

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Bird	<i>Calidris ferruginea</i>	Curlew Sandpiper			EN	PL	I	Sites: This species does not breed in Australia	- Habitat: Mainly occur on intertidal mudflats in sheltered coastal areas. Forage on mudflats and nearby shallow water. Generally roost on bare dry shingle, shell or sand beaches, sandspits and islets - Response: Unlikely to be indirectly affected by fire	#	Aus
Bird	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo		V	RA	L PL S	G	- Sites: hollows high in canopy - Material: wood chips - Season: November to March	- Habitat: Inhabits woodland & often seen in pine plantations where it feeds on seeds. High mobility - Response: Nomadic or locally migratory. Higher intensity fire can increase hollow loss. Fire likely to impact the availability of food sources	- Protect known nesting sites from the impact of prescribed burns - Minimise the loss of important feeding sites & critical habitat (including Aleppo Pine stands) - Maximise the potential for <i>Hakea carinata</i> recovery from prescribed burn operations by ensuring the habitats containing this species are burned at high intensity at a time when good amounts of ripe seed are present on the plants	SA

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Bird	<i>Calyptorhynchus lathamii halmaturinus</i>	Glossy Black-cockatoo (Kangaroo Island ssp)	EN	E	EN	L P	G	- Sites: Large hollows in Sugar Gums (<i>Eucalyptus cladocalyx</i>), South Australian Blue Gums (<i>E. leucoxylon</i>), and Manna Gums (<i>E. viminalis cygnetensis</i>). >85% of known nest hollows occur in Sugar Gums - Material: chewed woodchips - Season: January to October	- Habitat: Restricted to foraging in Drooping Sheoak (<i>Allocasuarina verticillata</i>) stands - Response: High mobility within flock areas. Potential long term loss of feeding and breeding habitat from extensive high intensity fires. Fire exclusion may inhibit hollow development and feeding habitat regeneration	- Penneshaw Block contains a significant area of feeding habitat in the planning area - Do not plan fires in areas containing Drooping Sheoak stands if more than 15% of feeding habitat within that flock region has been burnt in the previous 15 years (in either bushfires or prescribed burns) - Do not conduct prescribed burns in or adjacent to nesting habitat with active GBC nests	SA Aus

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Bird	<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V	NT	L PL	I	- Sites: Arid inland Australia, when wetlands appear after rain or flooding - Material: 3-4 eggs laid in a small depression in soft ground - Season: May to December & after heavy rains	- Habitat: Occurs on inland salt and freshwater lakes - Response: Unknown	#	Aus
Bird	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		E	CR	L PL S	C	- Sites: On cliff or high in a living tree fork and large horizontal limbs - Material: Platform of sticks - Season: May-October, critical sensitivity period May-September	- Habitat: Forages in open grassland - Response: Fire may disrupt breeding and/or destroy nest sites	- Protect known nesting sites from the impact of prescribed burns - Avoid successive, extensive fires - Protect potential tall habitat trees from the impact of prescribed burns - Minimise canopy scorch within 100m of known nesting site - Identify an avoidance distance during aerial operations	SA

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Bird	<i>Lewinia pectoralis</i>	Lewin's Rail		V	VU	Out side block	I	• Site: nest within low vegetation, in or near water • Material: Saucer shaped nests created amongst the dense vegetation like tussock grasses and reeds • Season: August to December	• Habitat: Inhabits dense reedy sections of swamps & lakes. Avoids exposure by feeding in vegetation • Response: Species is likely to abandon wetlands where the fringing vegetation has been degraded by frequent burning. Highly vulnerable to habitat change	• #	SA Aus
Bird	<i>Numenius madagascariensis</i>	Far Eastern Curlew		V	CR	PL	C	• Sites: Breeds in the northern hemisphere • Season: May to June	• Habitat: Found in estuaries, tidal mudflats, sandspits, saltmarshes, mangoves, open grasslands near water and fresh or brackish lakes • Migratory • Response: Unlikely to be directly affected by fire	• #	SA Aus

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Bird	<i>Pandion haliaetus</i>	Osprey		E	CR	L PL	C	- Sites: coastal locations - high in trees, rocky headlands, artificial towers, etc. - Material: Sticks/twigs - Season: laying July to September, hatching August to October, fledging October to December	- Habitat: Mostly found in coastal areas. Highly mobile, large breeding territories. The same nesting site may be used for many years - Response: High mobility, unlikely to be adversely affected by fire events. Fire may impact on nesting locations	- Minimise impact to nest sites, such as smoke, machinery use, ground crew, aerial suppression - Avoid prescribed burning in spring, as this is more likely to disturb nesting and/or breeding. Avoid successive, extensive fires - Identify an avoidance distance during aerial operations???	SA
Bird	<i>Psophodes nigrogularis lashamri</i>	Western Whipbird (Kl ssp)		R	RA	S	I	- Sites: dense understorey - Material: Bowl-shaped nest from twigs, bark and grass - Season: Late winter/spring	- Habitat: Prefers dense scrub & undergrowth in mallee & heathland - Response: Preferred areas 10 to 25 years post-fire. Moderate mobility. High potential for significant mortality & loss of habitat as a result of extensive high intensity fires	- Avoid burning more than 50% of individual habitat patches in a single fire event - Avoid 2 or more successive fires in late winter/spring	SA
Bird	<i>Sternula nereis</i>	Fairy Tern	VU	E	CR	L PL	C	- Site: sand, rocky flats - Material: sand, pebbles, shell - Season: September to January	- Habitat: Prefers coastal areas. High mobility - Response: Fire may disturb breeding cycle	Avoid burning near nesting locations in spring-early summer	SA Aus

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Bird	<i>Stictonetta naevosa</i>	Freckled Duck		V	RA	PL	I	• Site: nests in bushes at water level • Season: Sep-Nov (can breed out of season when conditions are favourable)	• Habitat: Species inhabits wetland areas, dependent on dense vegetation in large shallow swamps for breeding, & on permanent waters for refuge during drought • Response: Unlikely to be indirectly affected by fire	• #	SA Aus
Bird	<i>Stipiturus malachurus halmaturinus</i>	Southern Emu-wren (KI ssp)				PL	I	• Habitat: Prefers low coastal mallee scrub & coastal heath on limestone and lime sand, low open mallee on laterite soils inland. Moderate mobility • Sites: near ground in a grass tussock or dense shrub • Material: grasses • Season: August to December	• Response: Moderate mobility. High potential for significant impact on populations due to extensive fires	• Avoid burning more than 50% of nesting patches in a single fire event • Avoid 2 or more successive fires in spring/early summer	SA

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Bird	<i>Thinornis rubricollis</i>	Hooded Plover (Hooded Dotterel)		V	EN	L PL S	I	- Habitat: Inhabits margins of coastal beaches, lagoons and inland salt lakes - Sites: Above high water mark on beaches and dunes - Material: shallow scrape in sand - Season: August to February	Response: Fire may disrupt breeding, flushing birds away from nests and leaving eggs/chicks exposed	Avoid burning near nesting areas in early spring and late summer. Avoid 2 or more successive fires in early spring-late summer	SA Aus
Bird	<i>Zoothera lunulata</i>	Bassian thrush		R	VU	L S	I	- Sites: tree forks or tree stumps - Material: cup shaped of bark strips, leaves, grasses, moss & rootlets - Season: July to December	- Habitat: Prefers dense vegetation & moist gullies but will utilise nearby open areas for foraging. Also frequents <i>Callitris rhomboidea</i> & <i>Exocarpos cupressiformis</i> areas. Sedentary but dispersive. Forages for insects on the ground beneath leaf litter - Response: Low mobility. Frequent fire and intensive fires that remove leaf litter and cover are likely to degrade habitat	> 50% of habitat patch should not burn in single fire event - Undertake patchy burns in riparian areas - Ensure post-fire weed control is undertaken to avoid habitat degradation - Where stands of <i>Callitris</i> and <i>Exocarpos</i> comprise significant habitat, ensure sufficient areas of this habitat remain unburnt	SA Aus

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Mammal	<i>Cercartetus lepidus</i>	Little Pygmy-possum			NT	Outside block	IN	- Sites: hollows, disused birds nests, under shrubs, etc. - Material: nest of leaves - Season: all	- Habitat: Dry forest with a dense shrub layer - Response: Threatened by frequent fires that remove the shrub layer and mallee providing food and shelter	#	SA^
Mammal	<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (SA mainland & KI ssp)	EN	V	NT	LPLS	IHG	- Sites: dense understorey vegetation - Material: soil & leaves - Season: late winter to summer	- KI Habitat: Known to occur in a range of vegetation communities. Home range 1 ha - 6 ha - Response: Highly susceptible to predation when the density of understorey vegetation is reduced. At least some individuals capable of surviving low intensity fire. Some indication that species prefers early seral stages, however this is not conclusive & habitat preference is more likely to be related to habitat structure rather than time since fire	- Mosaic of post-fire vegetation is desirable (diversity & structure) - Avoid inter-fire intervals < 7 years - Some inter-fire intervals > 15 years desirable	SA^
Mammal	<i>Tachyglossus aculeatus multiaculeatus</i>	Kangaroo Island Echidna			NT	LPLS	I	- Sites: Rudimentary pouch - Season: June to September	- Habitat: Shelters under logs, in stumps or burrows or under bushes. Home ranges of approx. 50 ha - Response: Fire likely to impact food source and shelter availability	#	SA

Type	Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Regional Rating	Block	Diet	Breeding	Species Ecology & Fire Response	Fire Management Considerations	Source
Reptile	<i>Varanus rosenbergi</i>	Heath Goanna		V	NT	PLS	C	- Sites: termite mounds - Season: eggs laid in February, young hatch in Spring	- Habitat: Wide ranging, terrestrial predator - Response: Likely to survive fire by taking refuge in burrows. May benefit in the short-term from scavenging opportunities post-fire. Extensive fires may decrease prey resources (medium to long-term). Vulnerable to fox and cat predation post-fire	- Avoid Spring burns in known habitat where possible, particularly if burns are large-scale - Patchy burns may reduce post-fire predation - Where possible, prevent termite mounds from being impacted from fire management activities	SA
Invertebrate	<i>Aenigmatinea glatzella</i>	Enigma moth				Unknown	H	Unknown	- Habitat: Known to only feed on <i>Callitris gracilis</i> - Response: Unknown	#	SA

Appendix 4 – Ecological Communities of Conservation Significance

Ecological Community	SA Status (DEH 2005)	Other Status comments	Occurrence	Components	Fire Response	Fire Management Considerations	Source
Kangaroo Island Narrow-leaved Mallee (<i>Eucalyptus cneorifolia</i>) woodland		Critically endangered ecological community (EPBC)	Known only to occur on the eastern part of Kangaroo Island	- It is identified as patches of native vegetation that have <i>Eucalyptus cneorifolia</i> as the most common tree in the canopy - The understorey is made up of a range of native shrubs and herbs. The density and species composition of the understorey can vary with site and soil characteristics.	Anecdotal observations at Eastern Plains Fire Trial sites post-burn have confirmed that burning small areas of long unburnt Kangaroo Island Narrow-leaved Mallee Woodland can promote a regeneration event that greatly increases the above ground diversity of these plant communities. However, anecdotal observations also suggest that this regeneration response (in terms of species diversity and seedling abundance) has not been uniform across all sites.	Fire should be considered to stimulate understorey seedling regeneration if recruitment is poor/absent	SA

Ecological Community	SA Status (DEH 2005)	Other Status comments	Occurrence	Components	Fire Response	Fire Management Considerations	Source
Sheoak <i>(Allocasurina verticillata)</i> grassy low woodland	V (SA)		Shallow soils over Cambrian bedrock: coastal areas of Dudley-Haines Plateau	<i>Allocasurina verticillata</i> over a sparse or scattered shrub layer including <i>Acacia brachybotrya</i>, <i>Acacia cupularis</i>, <i>Acacia triquetra</i>, <i>Acacia spinescens</i>, <i>Bursaria spinosa</i>, <i>Dodonaea viscosa</i> ssp. <i>spatulata</i>, <i>Dodonaea baueri</i>, <i>Hibbertia riparia</i>, <i>Leucopogon parviflorus</i>, <i>Olearia axillaris</i>, <i>Olearia ramulosa</i>, <i>Rhagodia candolleana</i> ssp. <i>candolleana</i>, <i>Rhagodia crassifolia</i> and <i>Xanthorrhoea semiplana</i> ssp. <i>sempi plana</i> - The ground layer is dominated by grasses such as the Speargrasses (<i>Austrostipa</i> spp), Wallaby Grasses (<i>Rytidosperma</i> spp.) and Kangaroo Grass (<i>Themeda triandra</i>), and sedges (eg. <i>Gahnia lanigera</i>, <i>Lepidosperma</i> spp.) and/or tussocky lilies (eg. <i>Lomandra</i> spp.)	- Sheoak species regenerate profoundly, taking 7-12 years to mature - High frequency, intense fires results in a decline in mature Drooping Sheoak	- Significant to the Glossy Black-cockatoo (<i>Calyptorhynchus. lathamii halmaturinus</i>) since they are restricted to only foraging in Drooping Sheoak stands - Avoid burning contiguous remnants of Drooping Sheoak Woodland in their entirety during a single fire event, instead aim to increase patchiness within the remnants - Grazing pressure by herbivores, such as kangaroos and rabbits post-fire can affect recruitment of Drooping Sheoaks	

Summary of Codes Used in Appendices

Block Codes

CODE	Block	CODE	RESERVE
L	Lashmar	PL	Pelican Lagoon
P	Penneshaw	S	Southern

Other Codes Used

NPW ACT STATUS		EPBC ACT STATUS		DIET OF RATED FAUNA SPECIES		REGIONAL STATUS	
E	Endangered	EX	Extinct	C	Carnivore or scavenger. Mainly vertebrates	RE	Regionally Extinct
V	Vulnerable	CE	Critically Endangered	H	Herbivore. Includes folivores, grazers & browsers	CR	Critically Endangered
R	Rare	EN	Endangered	N	Nectar feeder	EN	Endangered
		VU	Vulnerable	I	Insectivore/"arthropodivore"/omnivore	VU	Vulnerable
				G	Granivore. Typically peak in abundance after a fire event in fire adapted vegetation, due to the stimulation of flowering and subsequent seed set.	RE	Rare
						NT	Near Threatened
						LC	Least Concern
						DD	Data Deficient
						NE	Not Evaluated

MISCELLANEOUS CODES	
#	Fire response is unknown or ambiguous, thus the required data are 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
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 (DENR 2011f).
Biodiversity	Biological diversity. The diversity of life in all its forms (i.e. plants, animals and micro-organisms) and at all its levels of organisation (i.e. genetic, species and ecosystem levels).
Bushfire	An unplanned fire. A generic term that includes grass fires, forest fires and scrub fires.
Bushfire Management Area Plan (BMAP)	Developed by Bushfire Management Committees as a requirement under the <i>Fire and Emergency Services Act 2005</i> .
Bushfire Management Committee (BMC)	Bushfire Management Committees are responsible for the governance, planning and coordination of local fire prevention work. Responsible for the development of Bushfire Management Area Plans. A total of 9 Bushfire Management Committees exist across the state, reporting to a central State Bushfire Coordination Committee.
Bushfire Survival Plan	Also known as a Bushfire Action Plan. A pre-prepared plan developed by people who live, visit or work in a bushfire prone area encompassing the decision to either "Leave Early" or to "Stay and Defend" to ensure that they are prepared and know what to do in the event of a bushfire (CFS 2009b).
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 (DENR 2011f).
Cultural values	Aboriginal and non-aboriginal sites and objects of significance.
Continuous fuels	Significant areas of connected native vegetation and fuels, which allow a fire to have an uninterrupted run across the landscape.
Control line	A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire.
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.
Ecological burning	A form of prescribed burning. Treatment of vegetation in nominated areas to achieve specified ecological objectives.

TERM	DEFINITION
Ecological Burn Rationale	A document prepared to justify prescribed burning for ecological purposes in the absence of a plan, or where ecological guidelines don't exist or may be breached through the implementation of the burn.
Ecological Fire Management	The active use of fire in nominated areas to achieve specified ecological objectives.
Elevated Fuel	Shrubs and juvenile understorey plants up to 3 m in height (DENR 2011f).
Environmental Assessment (EA)	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</i> 1991. The EA process considers cultural sites and objects (scar trees, middens), heritage sites (state listed buildings), significant recreational and amenity values, environmental values, landscapes and the recent fire regime, as per the DEW's <i>Prescribed Burn Environmental Assessment Procedure</i> (DEWNR 2017).
Environmental values	Non-built assets and values including threatened species, ecological communities, significant habitat elements (such as tree hollows), soil, water and other values which are valued for non-monetary reasons.
EPBC Act	The Cwlth Environment Protection and Biodiversity Conservation Act 1999.
Fire Danger Index	Fire Danger Index. Calculated using a combination of temperature, relative humidity, wind speed, vegetation and drought factors (CFS 2009a).
Fine fuels	Grass, leaves, bark and twigs less than 6mm in diameter.
Fire access track	A track designed, constructed and maintained for the safe passage of fire fighting vehicles undertaking fire suppression activities (GAFMWG 2014). In summary: Major – at least 7 m wide, clear of vegetation overhead. Standard – 4 to 5 m wide, passing bays at least every 400 m. Minor – 4 to 5 m wide. All lesser tracks are Service.
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 (DEWNR 2017).
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, Severe, Extreme, or Catastrophic.
Fire frequency	The number of fires that have occurred on the same area over a time period.

TERM	DEFINITION
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 et al. 2003).
Fire interval	The interval between successive fires.
Fire management	All actions 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 et al. 2004).
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 et al. 2003).
Fire suppression	The activities connected with restricting the spread of bushfire following its detection and making it safe.
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 hazard	The overall fuel hazard is defined as the sum of the influences of bark fuel, elevated fuel and surface fine fuel (DENR 2011f).
Fuel management	Modification of fuels by prescribed burning, or other means.
GAFMWG	South Australian Government Agencies Fire Management Working Group.
Heritage Agreement (HA)	Private conservation areas established through an agreement between the SA Minister for Environment and Water and the landholder under the <i>Native Vegetation Act 1991</i> .
Incident Controller (IC)	The individual responsible for the management of all incident operations and the decisions of the Incident Management Team.

TERM	DEFINITION
Incident Management Team (IMT)	Incident Management Team. The group of incident management personnel comprising the Incident Controller and the people he/she appoints to be responsible for the functions of Operations, Planning and Logistics.
Key Fire Response Species (KFRS)	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.
Life history	The combination of attributes with respect to growth, shelter, food/nutrients and reproduction which determine species' requirements for existence (FEWG 2004).
Major Track	A track designed, constructed and maintained for the safe passage of firefighting vehicles undertaking fire management activities. Track shall be a minimum of 7 metres wide and sufficiently clear of vegetation both sides and overhead to allow ready two-way access (GAFMWG 2014).
Major Vegetation Groups (MVG)	A broad, upper level classification of native vegetation within the NVIS. MVG are based on aggregations of 'like' vegetation types, principally in terms of structure, growth form and floristic composition in the dominant stratum. Each MVG has different mixes of plant species within the canopy, shrub and ground layers, but vegetation within each is structurally similar and often dominated by a single genus. There are currently 33 Major Vegetation Groups nationally (Department of the Environment 2014).
Major Vegetation Sub-groups (MVS)	A finer scale classification of native vegetation types within the NVIS that sit within the MVG. Defined for the purposes of finer scale mapping and regional analyses. There are currently 85 Major Vegetation Sub-groups nationally (Department of the Environment 2014).
Mechanical removal	Physical modification of flammable material to reduce fuel hazard levels through selective logging, thinning, clearing, slashing, mowing and trimming of vegetation using machinery or equipment.
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 (WFLC 2003).
Minor Track	A track designed, constructed and maintained for the safe passage of firefighting vehicles undertaking fire management activities. Track shall be 4 to 5 metres wide and sufficiently clear of vegetation both sides and overhead to permit single lane access (GAFMWG 2014).

TERM	DEFINITION
Near-surface fuel	Grasses, low shrubs and heath, sometimes containing suspended components (leaves, bark and/or twigs).
NPW Act	The South Australian National Parks and Wildlife Act 1972.
Native Vegetation Council (NVC)	Native Vegetation Council. Established under the provisions of the Native Vegetation Act 1991, responsible for making decisions on a wide range of matters concerning native vegetation in SA (DEW 2017).
Native Vegetation Information System (NVIS)	The Native Vegetation Information System (NVIS) is a comprehensive data system that provides information on the extent and distribution of vegetation types in Australian landscapes. The NVIS database contains over 9000 distinct vegetation types (Department of the Environment 2014).
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: Nationally rated, that is, listed as <i>Threatened</i> (with a rating of <i>Extinct</i>, <i>Critically Endangered</i>, <i>Endangered</i>, <i>Vulnerable</i>, <i>Marine and Migratory</i> or <i>Conservation Dependent</i>) under the federal EPBC Act. South Australian rated, listed as <i>Threatened</i> (with a rating of <i>Endangered</i>, <i>Vulnerable</i> or <i>Rare</i>) under the NPW Act, Revised Schedules 7, 8 and 9. Provisionally listed as <i>Threatened</i> (with a rating of <i>Endangered</i> or <i>Vulnerable</i>) in South Australia, that is, included on the unpublished DEW Provisional List of Threatened Ecosystems of South Australia (DEH 2005) and/or Regional Species Conservation Assessment Project (Gillam & Urban 2014).
Patchiness	The uneven distribution of fire regime across an area. Patchiness can be used to describe variability within a single burn area or variability between burn areas across a landscape.
Preparedness	All activities undertaken in advance of an incident to decrease the impact, extent and severity of the incident and to ensure a more effective response.
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 burning	The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives.
Readiness	All actions undertaken in advance of an incident to decrease the impact, extent and severity of the incident and to ensure a more effective response.
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.

TERM	DEFINITION
Risk assessment	Used in DEW 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 actions for risk mitigation. Considers Likelihood and Consequence to determine an overall risk rating through a matrix (DEWNR 2017).
Service Track	All other access tracks which are not maintained to the Major, Standard or Minor Track requirements and therefore may not be trafficable or appropriate to use these for fire management purposes (GAFMWG 2014).
Spotting	The ignition of spot fires from sparks or embers.
Standard Track	A track designed, constructed and maintained for the safe passage of firefighting vehicles undertaking fire management activities. Track shall be 4 to 5 metres wide, sufficiently clear of vegetation both sides and overhead and incorporate passing bays (a minimum of 17 metres long and up to 6 metres wide) every 400 metres or less (GAFMWG 2014).
Surface Fuel	Otherwise known as 'litter'. Comprised of leaves, twigs and bark on the ground (DENR 2011f).
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 (CFS 2013a).
Threshold of Potential Concern	The Threshold of Potential Concern is defined as a point in time where Key Fire Response Species are likely to be affected by an aspect of fire regime.
Vital Attributes	Vital attributes are the key life history features which determine how a species lives and reproduces. With respect to fire, these attributes govern how a species responds to fire and/or persists within a particular fire regime (FEWG 2004).
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 have been sourced from the *AFAC Bushfire Glossary* (AFAC 2012) or the *DEW Fire Management Glossary* (DEWNR 2017).